Effect of Marijuana Legalization on Risky Behavior in Adolescents and Young Adults

American College of Pediatricians – April 2018

ABSTRACT: Medical marijuana is now legal in 29 of the 50 United States. Recreational marijuana was legalized in Colorado in 2013. Various reports have revealed the short and midterm effects of this legalization process on teens and young adults. The significant detrimental effects of marijuana on teenage mental health and brain development have been documented in a previous position statement. The recent reports of the 2016 Colorado Department of Public Safety and the US 2014 National Survey on Drug Use and Health provide new information supporting the significant adverse effects of legalization on teens and young adults. Marijuana legalization in Colorado has resulted in significantly greater and more frequent usage of marijuana in adolescents and young adults. In addition, with legalization there is a perception of decreased risk of use by both teens and their parents. This process of legalization is associated with an increasing trend for many risky behaviors in youth as observed in Centers for Disease Control (CDC) reports on risky behavior in youth. Binge alcohol consumption, extramarital sexual activity, and increasing use of narcotics are among the associated behaviors. A recent surgeon general’s report suggests that how society responds to this substance use epidemic will be a “moral test” for America. This “moral test” will, of necessity, require parental education and insight for parents to provide a moral foundation that will help their children avoid harmful, risky behavior. The American College of Pediatricians agrees that efforts aimed at primary PREVENTION are essential to curbing substance abuse.

The American College of Pediatricians (The College) has previously demonstrated concerns for the current trend toward legalization of marijuana. In its marijuana position statement, the College describes in detail the medical and psychological dangers reported from the scientific literature for adolescent and young adult usage and addiction to marijuana. Colorado legalized medical marijuana use in 2001 and legalized recreational marijuana use in December of 2013. Several reports in the popular press following legalization of marijuana there highlight only the advantages of fewer arrests for marijuana possession and significant tax income for the state. Problems such as increased abuse and childhood poisonings have not received due attention from the lay press. Unfortunately, in November 2016, four states (California, Maine, Massachusetts, and Nevada) voted to legalize marijuana for recreational use despite the deleterious effects observed in Colorado. The College feels it is imperative to carefully review the early results of marijuana legalization in Colorado since it may serve as an example for other states to follow.

This statement will provide a clear and realistic report of the early findings after marijuana legalization in Colorado based on the March 2016 report from the Colorado Department of Public Safety. This report is particularly significant when combined with the 2015 data from the CDC Substance Abuse and Mental Health Services Administration (SAMHSA) reporting the incidence of risky behaviors among US adolescents and young adults.

Despite the optimistic statements from the lay press, the data from the Colorado Public Safety report
clearly shows that marijuana legalization in Colorado has resulted in significantly greater and more frequent usage of marijuana in adolescents and young adults. Figure 1 from the report clearly depicts that while the past 30-day marijuana usage in 12-17-year-olds in the US has remained relatively stable at 7%, such usage in Colorado has slowly increased from 2006 to 2014 up to 12.6%. Figure 2 similarly shows an even more alarming increase from 21 to 31% in 18-25-year-old subjects (compared to a more modest rise from 16.4% to 19.3% in the US). Even in those 26 years and older, the rate increased from 7% in 2012 to 12.4% in 2014. Overall, 14% of Colorado adults (age 18 and over) reported current use of marijuana and 49% reported use at some time in their lives. The average age among adults at first use was 18 years old, but there is a trend toward younger use, as the average age at first use among 18-24-year-olds was 16.

**Thirty-three percent of current users report daily use. Additionally, 19% of current marijuana users report driving after using.**

Race was not a significant predictor of marijuana use; however sexual orientation was related to current marijuana use. Those who reported their sexual orientation as gay, lesbian, or bisexual reported current use 30% of the time compared to 13% of those who identified as heterosexual.

Nationwide, data on actual sexual experience paralleled this, with 69% of those who had ever had a same-sex experience reporting ever using marijuana, compared to 57% of those reporting only heterosexual sexual activity and a remarkably protective association with lack of any sexual activity (only 16% had used marijuana).

**Figure 1. Past 30-day marijuana use, 12–17-years-old, 2006–2014: NSDUH**

![Figure 1. Past 30-day marijuana use, 12–17-years-old, 2006–2014: NSDUH](http://www.samhsa.gov/data/population-data-nsduh, retrieved 12/17/2015.)

In those seeking admission for treatment, strikingly the marijuana usage of 22 days or more per month has increased from 22% in 2007 to 36% in 2014 (Figure 3.)

Source: Colorado Department of Human Services, Office of Behavioral Health, Drug/Alcohol Coordinated Data System.
Also, the Colorado data shows that the rate of marijuana usage in Colorado increases exponentially through the middle and high school years as seen in Figure 4.

Figure 4. Past 30-day marijuana use, by grade level, 2013: Health Kids Colorado Survey (HKCS).\(^3\)


The report in 2012 and 2013 from SAMHSA on drug usage and health also pointed out that even legalization of medical marijuana was associated with an increase in 30-day use in 12-17-year-old subjects compared to states in which medical marijuana has not been legalized. (Figure 5)

Figure 5. National Average Past Month Use by 12–17-year-olds, 2013.

National Average Past Month Use by 12 to 17 Years Old, 2013

Source: See reference #3, page 12.
The increase in marijuana usage by Colorado adolescents and young adults is consistent with the perceived danger by them for marijuana usage as illustrated in Table 1. There was a significant decline in perceived danger among middle school students compared to high school students, and there was a striking percentage of high school students who either drove a car after using marijuana or rode in a vehicle whose driver had been using marijuana.

**Table 1. Student opinions regarding marijuana, by school level, 2013: HKCS**

<table>
<thead>
<tr>
<th>Question</th>
<th>Middle school</th>
<th>High school</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of students who think people who use marijuana regularly have moderate/great risk of harming themselves</td>
<td>76.4%</td>
<td>54.0%</td>
</tr>
<tr>
<td>Percentage of students who feel it would be sort of easy or very easy to get marijuana if they wanted</td>
<td>16.2</td>
<td>54.9</td>
</tr>
<tr>
<td>Percentage of students who think it is wrong/very wrong for someone their age to use marijuana</td>
<td>89.3</td>
<td>60.2</td>
</tr>
<tr>
<td>Percentage of students who think their parents would feel it is wrong/very wrong if they used marijuana</td>
<td>96.3</td>
<td>86.4</td>
</tr>
<tr>
<td>Percentage of students who rode one or more times during the past 30 days in a car or other vehicle driven by someone who had been using marijuana</td>
<td>NA</td>
<td>19.7</td>
</tr>
<tr>
<td>Among students who drove a car or other vehicle during the past 30 days, the percentage who drove one or more times when they had been using marijuana</td>
<td>NA</td>
<td>10.9</td>
</tr>
</tbody>
</table>

Source: Colorado Department of Public Health and Environment, Healthy Kids Colorado

Similarly, there was a significant reduction in perceived risk for marijuana usage among Colorado young adults that has been consistently less than the US data as seen in Figure 6.

**Figure 6. Perception of great risk for using marijuana once a month, 18–25-years-old, 2006–2014: NSDUH**
Coincident with the increased use of marijuana among Colorado youth has been an increase in the number of emergency department visits and hospitalizations associated with marijuana as reported by the Colorado Hospital Association both after approval of medical marijuana and after its final legalization as seen in Figure 7.

Figure 7. Rates of hospitalizations (HD) and emergency department (ED) visits with possible marijuana exposures, diagnoses, or billing codes per 100,000 HD and ED visits, by legalization eras in Colorado.3 [page 49]
“In sum, the impacts of marijuana legalization on public health in Colorado are still being assessed. Surveys of marijuana use show that, among young adults (18-25), past 30-day use increased from 21% in 2006 to 31% in 2014. Past 30-day use among adults ages 26 and older increased from 5% in 2006 to 12% in 2014. Since 2000, rates of hospitalizations and emergency department visits possibly related to marijuana have increased, as have the number of calls to poison control. Drug treatment admission rates for marijuana increased somewhat between 2007 and 2014 for those over the age of 21.”  

While much of the change in attitude and use of marijuana among youth occurred after the commercialization of medical marijuana in 2010 in Colorado, with less change from 2013-15, there has been a rapid decrease in the perceived harm from marijuana among 8th and 10th graders (more than double the change in states where marijuana remains illegal) in the state of Washington following legalization of recreational marijuana there in 2012. At the same time, contrary to the decrease in marijuana use where it is illegal, use among 8th-10th graders in Washington has increased 2-4%.

Consistent with the perceived low risk for marijuana usage among Colorado youth and the acceptance of driving or riding in a car after marijuana use is a similarly disturbing need for increased DUI treatment ordered for subjects in whom marijuana was the primary drug use involved (Figure 8).

Figure 8. DUI treatment admission trends

The Colorado report also points out: “Fatalities with THC only or THC in combination positive drivers increased 44%, from 55 in 2013 to 79 in 2014. Note that the detection of any THC in blood is not an indicator of impairment but only indicates presence in the system. Detection of delta-9 THC, one of the psychoactive properties of marijuana, may be an indicator of impairment.” The Colorado report also points out: “It should be noted that the most fundamental challenge to interpreting data related to marijuana over time stems from unmeasured changes in human behavior concerning marijuana. Legalization may result in reports of increased use, when it may actually be a function of the decreased stigma and legal consequences regarding use rather than actual changes in use patterns.” However,
the comparison of the Colorado youth to US data observed in the CDC reports provides an ominous warning to other states for placing their youth at significant risk with marijuana legalization.5

**Figure 9. Numbers of Past Month Illicit Drug Users among People Aged 12 or Older: 2014**

Note: Estimated numbers of people refer to people aged 12 or older in the civilian, noninstitutionalized population in the United States. The numbers do not sum to the total population of the United States because the population for NSDUH does not include people aged 11 years old or younger, people with no fixed household address (e.g., homeless or transient people not in shelters), active-duty military personnel, and residents of institutional group quarters, such as correctional facilities, nursing homes, mental institutions, and long-term hospitals.

Note: The estimated numbers of current users of different illicit drugs are not mutually exclusive because people could have used more than one type of illicit drug in the past month.

Figure 9 from the SAMHSA 2014 survey5 illustrates that the estimated 27 million people aged 12 or older who were current illicit drug users in 2014 represents 10.2 percent of the US population aged 12 or older. In other words, an estimated 1 in 10 individuals aged 12 or older in the United States used illicit drugs in the past month. The rise in illicit drug use among those aged 12 or older since 2002 may reflect an increase in illicit drug use by adults aged 26 or older and, to a lesser extent, increases in illicit drug use among young adults aged 18 to 25 relative to the years before 2009.

In the backdrop of these reports from Colorado and the CDC reporting the menacing effect of increasing exposure of our youth to marijuana associated with its legalization, it seems reasonable to step back and look at the problem of risky youth behaviors. A recent CDC report discusses in detail some of these concerns6 ranging from risky sexual activity, alcohol usage, marijuana, prescription, and other illicit drug usage. The survey found that among high school students, during the past 30 days:

- 33% drank some amount of alcohol.
- 18% binge drank.
- 8% drove after drinking alcohol.
- 20% rode with a driver who had been drinking alcohol.

In 2014, the National Survey on Drug Use and Health6 reported that 11.5% of youth aged 12-17 years and 59.6% of youth 18-25 years drank alcohol in the past month. Also 6.1% of 12-17-year-olds and 37.7% of 18-25-year-olds reported binge drinking in the past 30 days. Thus, over a third of young adults
in 2014 were current binge alcohol users. Several reports have discussed the consequences of underage drinking.\textsuperscript{10,11,12} Youth who drink alcohol are more likely to experience:

- School problems, such as higher absence and poor or failing grades.
- Social problems, such as fighting and lack of participation in youth activities.
- Legal problems, such as arrest for driving or physical hurting someone while drunk.
- Physical problems, such as hangovers or illness.
- Unwanted, unplanned, and unprotected sexual activity.
- Disruption of normal growth and sexual development.
- Physical and sexual assault.
- Higher risk for suicide and homicide.
- Alcohol-related car crashes and other unintentional injuries, such as burns, falls, and drowning.
- Memory problems.
- Abuse of other drugs.
- Changes in brain development that may have life-long effects.
- Death from alcohol poisoning.

In general, youth who binge drink have a greater risk for these problems than those who do not, and youth who start drinking before age 15 are more likely to develop alcohol abuse later in life.\textsuperscript{13,14}

The negative consequences of increasing use and dependence on marijuana are not limited to its direct effects. Among the list of risky youth behaviors has been an increasing use of prescription drugs and more recently, increasing use of heroin. The CDC reports these facts concerning heroin addiction. People who abuse or are dependent on:

- Prescription opioid painkillers are 40 times more likely to abuse or be dependent on heroin.
- Cocaine are 15 times more likely to abuse or be dependent on heroin.
- Marijuana are 3 times more likely to abuse or be dependent on heroin.
- Alcohol are 2 times more likely to abuse or be dependent on heroin.

According to the CDC report on Drug-poisoning Deaths involving Heroin in the US,\textsuperscript{15} from 2000 through 2013, the age-adjusted rate for drug-poisoning deaths involving heroin nearly quadrupled from 0.7 deaths per 100,000 in 2000 to 2.7 deaths per 100,000 in 2013. (Figure 10)

\textbf{While the age-adjusted rate for drug-poisoning deaths involving opioid analgesics has leveled in recent years, the rate for deaths involving heroin has almost tripled since 2010.}

\textbf{Figure 10. Age-adjusted rates for drug-poisoning deaths, by type of drug: United States, 2000–2013}
NOTE: The number of drug-poisoning deaths in 2013 was 43,982; the number of drug-poisoning deaths involving opioid analgesics was 16,235; and the number of drug-poisoning deaths involving heroin was 8,257. A small subset of 1,342 deaths involved both opioid analgesics and heroin. Deaths involving both opioid analgesics and heroin are included in both the rate of deaths involving opioid analgesics and the rate of deaths involving heroin. Access data table for Figure 1 at: http://www.cdc.gov/nchs/data/databriefs/db190_table.pdf#1.

The rate for heroin-related drug-poisoning deaths was highest among adults aged 25–44 from 2000 through 2013.

Compared with adults aged 18–24 and 45–64, those aged 25–44 had the highest rate for drug-poisoning deaths involving heroin (11). From 2000 through 2010, the average annual increase in the rates was 10% for adults aged 18–24, 5% for those aged 25–44, and 4% for those aged 45–64. From 2010 through 2013, the death rate for adults aged 18–24 increased 2.3-fold from 1.7 to 3.9 per 100,000; for those aged 25–44 the rate increased 2.8-fold from 1.9 to 5.4; and for those aged 45–64 the rate increased 2.7-fold from 1.1 to 3.0.

Figure 11. Rates for drug-poisoning deaths involving heroin, by selected age groups: United States, 2000–2013.
In the CDC report on teenaged marijuana usage, they reported the perceived parental disapproval of trying marijuana once or twice and using marijuana once a month or more.\textsuperscript{16}

“In 2014, the estimated national prevalence of perceived parental disapproval of trying marijuana once or twice among all persons aged 12–17 and past month marijuana users aged 12–17 years was 95.4\% and 78.5\%, respectively. From 2002 to 2014, the prevalence of perceived parental disapproval of trying marijuana once or twice decreased by 6.0\% (from 83.8\% in 2002 to 78.5\% in 2014; \( p < 0.001 \)) only among past month marijuana users aged 12–17. From 2002 to 2014, the prevalence of perceived parental disapproval of using marijuana once a month or more decreased by 1.0\% among all persons aged 12–17 years (from 96.3\% in 2002 to 95.7\% in 2014; \( p < 0.001 \)) and by 8.0\% (from 85.7\% in 2002 to 78.8\% in 2014; \( p < 0.001 \)) among past month marijuana users aged 12–17 years.”

As was noted previously, teenagers also had declining perception of the risk for marijuana usage generally in the US and more so in Colorado where it had been legalized. With the increasing trend toward initially legalizing medical use of marijuana, then often followed by full legalization, there is a concomitant perception of less risk both by teenagers and parents. The legalization of marijuana is then recognized as just the tip of the iceberg for the many risky behaviors of youth. Is there also a societal trend toward increasing acceptance of all the risky behaviors reported by the CDC for teenagers and young adults? While a secularized society may be more tolerant for alcohol use, marijuana use, extramarital sexual activity, and abortion, is the end result drug dependency, a less productive and more dependent society, and drug-related fatalities? Colorado also experienced a statewide increase in crime by 4.4\% including a 14.3\% spike in homicides and 8.9\% increase in rape in 2015.\textsuperscript{17} The recent US Surgeon General’s report\textsuperscript{18} emphasized early intervention, treatment, and management of substance use...
disorders. He pointed out that because of the overwhelming tendency for substance use to begin in adolescence (ages 12-17) and peak during young adulthood, most prevention interventions are focused on teens and young adults. He states that how society responds to this substance use epidemic is a “moral test” for America. “Are we able to live up to the most fundamental obligation we have as human beings: to care for one another?”

In its statement on marijuana legalization, the American College of Pediatricians concluded with hope that parents can help to prevent increasing usage in adolescents and young adults. While treatment for existing substance abuse is necessary, the College emphasizes more importantly the concept of primary PREVENTION of the development of substance abuse. The College urges parents to do all they can to oppose the legalization of marijuana, such as working with elected officials against the drug’s legalization and scrutinizing a candidate’s positions on this important children’s issue when making voting decisions. Children look to their parents for help and guidance in working out problems and in making decisions, including the decisions to not use drugs or to engage in sexual activity. Therefore, parents should be role models, and not use marijuana or other illicit drugs. Finally, these reports strikingly emphasize the need for parents to recognize and discuss these serious health consequences of marijuana, alcohol, and drug use with their children and adolescents. Remarkably, teens who have frequent family dinners (five to seven per week) were less likely to have used marijuana, and youth aged 12 to 17 who reported that their parents always or sometimes engaged in monitoring behaviors compared to youths whose parents seldom or never engaged in monitoring behaviors had lower use of illicit drugs and binge alcohol. It is clear that the efforts of parents to prevent drug use in our youth are a heavy “moral test.” It will take great effort, care, education, and support from parents to guide their children away from the secular temptations of society. Some of this “moral test” will, of necessity, require that parents demonstrate and pass on a strong moral compass to provide their children with a foundation to avoid harmful, risky behavior.

Primary author: Donald Hagler, MD, FCP
February 2017
Revised with addendum April 2018

The American College of Pediatricians is a national medical association of licensed physicians and healthcare professionals who specialize in the care of infants, children, and adolescents. The mission of the College is to enable all children to reach their optimal, physical, and emotional health and well-being.

ADDENDUM added April 2018:

“Impact of Marijuana Legalization in Colorado on Adolescent Emergency and Urgent Care Visits”20 is a retrospective review of marijuana-related emergency and urgent care visits, from 2005 through 2015, for patients ≥ 13 and < 21 years old. Between 2005 to 2015, four thousand two hundred and two marijuana-related visits were identified. Behavioral health evaluation was obtained for 2,813 (67%); a psychiatric diagnosis was made for the majority (71%) of these visits. Coingestants were common; the most common was ethanol (12%). Marijuana related visits increased from 1.8 per 1,000 visits in 2009 to 4.9 in 2015. Despite national survey data suggesting no appreciable difference in adolescent marijuana use, this data demonstrates a significant increase in adolescent marijuana-associated emergency department and urgent cares visits in Colorado.

As more states begin to legalize marijuana, it is critical that multiple modalities of surveillance are used to fully evaluate the health impact on the adolescent population.
REFERENCES


