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**The Opinion Pages** NYT NOW *High Time: An Editorial Series on Marijuana Legalization*

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## What Science Says About Marijuana

By PHILIP M. BOFFEY JULY 30, 2014

For Michele Leonhart, the administrator of the Drug Enforcement Administration, there is no difference between the health effects of marijuana and those of any other illegal drug. “All illegal drugs are bad for people,” she told Congress in 2012, refusing to say whether crack, methamphetamines or prescription painkillers are more addictive or physically harmful than marijuana.

Her testimony neatly illustrates the vast gap between antiquated federal law enforcement policies and the clear consensus of science that marijuana is far less harmful to human health than most other banned drugs and is less dangerous than the highly addictive but perfectly legal substances known as alcohol and tobacco. Marijuana cannot lead to a fatal overdose. There is little evidence that it causes cancer. Its addictive properties, while present, are low, and the myth that it leads users to more powerful drugs has long since been disproved.

That doesn't mean marijuana is harmless; in fact, the potency of current

strains may shock those who haven't tried it for decades, particularly when ingested as food. It can produce a serious dependency, and constant use would interfere with job and school performance. It needs to be kept out of the hands of minors. But, on balance, its downsides are not reasons to impose criminal penalties on its possession, particularly not in a society that permits nicotine use and celebrates drinking.

Marijuana's negative health effects are arguments for the same strong regulation that has been effective in curbing abuse of legal substances. Science and government have learned a great deal, for example, about how to keep alcohol out of the hands of minors. Mandatory underage drinking laws and effective marketing campaigns have reduced underage alcohol use to 24.8 percent in 2011, compared with 33.4 percent in 1991. Cigarette use among high school students is at its lowest point ever, largely thanks to tobacco taxes and growing municipal smoking limits. There is already some early evidence that regulation would also help combat teen marijuana use, which fell after Colorado began broadly regulating medical marijuana in 2010.

## Comparing the Dangers

As with other recreational substances, marijuana's health effects depend on the frequency of use, the potency and amount of marijuana consumed, and the age of the consumer. Casual use by adults poses little or no risk for healthy people. Its effects are mostly euphoric and mild, whereas alcohol turns some drinkers into barroom brawlers, domestic abusers or maniacs behind the wheel.

An independent scientific committee in Britain compared 20 drugs in 2010 for the harms they caused to individual users and to society as a whole through crime, family breakdown, absenteeism, and other social ills. Adding up all the damage, the panel estimated that alcohol was the most harmful drug, followed by heroin and crack cocaine. Marijuana ranked eighth, having slightly more than one-fourth the harm of alcohol.

Federal scientists say that the damage caused by alcohol and tobacco is higher because they are legally available; if marijuana were legally and easily obtainable, they say, the number of people suffering harm would rise. However, a 1995 study for the World Health Organization concluded that even if usage of marijuana increased to the levels of alcohol and tobacco, it would be unlikely to produce public health effects approaching those of alcohol and tobacco in Western societies.

Most of the risks of marijuana use are “small to moderate in size,” the study said. “In aggregate, they are unlikely to produce public health problems comparable in scale to those currently produced by alcohol and tobacco.”

While tobacco causes cancer, and alcohol abuse can lead to cirrhosis, no clear causal connection between marijuana and a deadly disease has been made. Experts at the National Institute on Drug Abuse, the scientific arm of the federal anti-drug campaign, published a review of the adverse health effects of marijuana in June that pointed to a few disease risks but was remarkably frank in acknowledging widespread uncertainties. Though the authors believed that legalization would expose more people to health hazards, they said the link to lung cancer is “unclear,” and that it is lower than the risk of smoking tobacco.

The very heaviest users can experience symptoms of bronchitis, such as wheezing and coughing, but moderate smoking poses little risk. A 2012 study found that smoking a joint a day for seven years was not associated with adverse effects on pulmonary function. Experts say that marijuana increases the heart rate and the volume of blood pumped by the heart, but that poses a risk mostly to older users who already have cardiac or other health problems.

## How Addictive Is Marijuana?

Marijuana isn't addictive in the same sense as heroin, from which withdrawal is an agonizing, physical ordeal. But it can interact with pleasure

centers in the brain and can create a strong sense of psychological dependence that addiction experts say can be very difficult to break. Heavy users may find they need to take larger and larger doses to get the effects they want. When they try to stop, some get withdrawal symptoms such as irritability, sleeping difficulties and anxiety that are usually described as relatively mild.

The American Society of Addiction Medicine, the largest association of physicians specializing in addiction, issued a white paper in 2012 opposing legalization because “marijuana is not a safe and harmless substance” and marijuana addiction “is a significant health problem.”

Nonetheless, that health problem is far less significant than for other substances, legal and illegal. The Institute of Medicine, the health arm of the National Academy of Sciences, said in a 1999 study that 32 percent of tobacco users become dependent, as do 23 percent of heroin users, 17 percent of cocaine users, and 15 percent of alcohol drinkers. But only 9 percent of marijuana users develop a dependence.

“Although few marijuana users develop dependence, some do,” according to the study. “But they appear to be less likely to do so than users of other drugs (including alcohol and nicotine), and marijuana dependence appears to be less severe than dependence on other drugs.”

There’s no need to ban a substance that has less than a third of the addictive potential of cigarettes, but state governments can discourage heavy use through taxes and education campaigns and help provide treatment for those who wish to quit.

## Impact on Young People

One of the favorite arguments of legalization opponents is that marijuana is the pathway to more dangerous drugs. But a wide variety of researchers have found no causal factor pushing users up the ladder of harm. While 111 million Americans have tried marijuana, only a third of that number have tried cocaine, and only 4 percent heroin. People who try

marijuana are more likely than the general population to try other drugs, but that doesn't mean marijuana prompted them to do so.

Marijuana "does not appear to be a gateway drug to the extent that it is the cause or even that it is the most significant predictor of serious drug abuse," the Institute of Medicine study said. The real gateway drugs are tobacco and alcohol, which young people turn to first before trying marijuana.

It's clear, though, that marijuana is now far too easy for minors to obtain, which remains a significant problem. The brain undergoes active development until about age 21, and there is evidence that young people are more vulnerable to the adverse effects of marijuana.

A long-term study based in New Zealand, published in 2012, found that people who began smoking heavily in their teens and continued into adulthood lost an average of eight I.Q. points by age 38 that could not be fully restored. A Canadian study published in 2002 also found an I.Q. loss among heavy school-age users who smoked at least five joints a week.

The case is not completely settled. The New Zealand study was challenged by a Norwegian researcher who said socio-economic factors may have played a role in the I.Q. loss. But the recent review by experts at the National Institute on Drug Abuse concluded that adults who smoked heavily in adolescence had impaired neural connections that interfered with the functioning of their brains. Early and frequent marijuana use has also been associated with poor grades, apathy and dropping out of school, but it is unclear whether consumption triggered the poor grades.

Restricting marijuana to adults is more important now that Colorado merchants are selling THC, the drug's active ingredient, in candy bars, cookies and other edible forms likely to appeal to minors. Experience in Colorado has shown that people can quickly ingest large amounts of THC that way, which can produce frightening hallucinations.

Although marijuana use had been declining among high school students for more than a decade, in recent years it has started to climb, in contrast to continuing declines in cigarette smoking and alcohol use. Marijuana was

found -- alone or in combination with other drugs -- in more than 455,000 patients visiting emergency rooms in 2011. Nearly 70 percent of the teenagers in residential substance-abuse programs run by Phoenix House, which operates drug and alcohol treatment centers in 10 states, listed marijuana as their primary problem.

Those are challenges for regulators in any state that chooses to legalize marijuana. But they are familiar challenges, and they will become easier for governments to deal with once more of them bring legal marijuana under tight regulation.

***Correction: August 2, 2014***

*An editorial on Thursday about the science on marijuana incorrectly stated that marijuana was the principal cause of more than 455,000 emergency room visits in 2011. It was found in combination with other drugs in roughly 327,000 cases and alone in 129,000 cases. It did not necessarily cause the emergency room visit.*

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