Perspective

Recreational Cannabis — Minimizing the Health Risks from Legalization

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The cannabis-policy landscape is undergoing dramatic change. Although many jurisdictions have removed criminal penalties for possessing small amounts of cannabis and more

than half of U.S. states allow physicians to recommend it to patients, legalizing the supply and possession of cannabis for nonmedical purposes is a very different public policy. Since the November 2016 election, 20% of the U.S. population lives in states that have passed ballot initiatives to allow companies to sell cannabis for any reason and adults 21 or older to purchase it. Although other states may move toward legalization, uncertainty abounds because of the federal prohibition on cannabis. The Obama administration tolerated these state laws; it's unclear what the Trump administration will do.
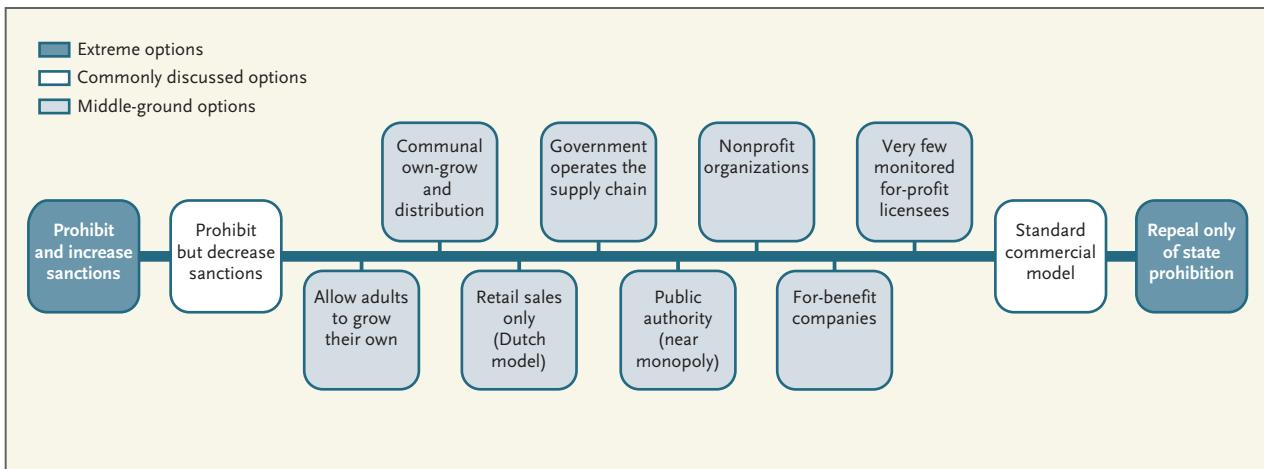
There is also tremendous un-

certainty about the net effect of cannabis legalization on public health.[1] Most adults who occasionally use cannabis find it pleasurable and don't experience substantial problems. There is a growing body of research on the medical benefits of consuming cannabis flowers or extracts,[1,2] and legalization should make it easier to study the therapeutic potential and allow access for patients who could benefit.

But cannabis use comes with important risks.[1-4] For example, cannabis intoxication impairs cognitive and psychomotor function, and there's strong evidence that delta-9-tetrahydrocannabinol (THC), the main psychoactive

chemical in cannabis, increases the risk of psychotic symptoms or panic attacks. Approximately 9% of people who try cannabis meet criteria for cannabis dependence at some point. The rate roughly doubles for those who initiate use before 17 years of age and is much higher for adolescents who use cannabis weekly or more often.[3]

Adolescents and young adults are central to many cannabis-policy discussions since there are questions about how frequent cannabis use may affect their brain development and other outcomes.[2,3] Authors from the National Institute on Drug Abuse recently wrote that regular cannabis use by adolescents is particularly worrisome because it's "associated with an increased likelihood of deleterious consequences."[2] Policy debates are often infused with heated disagree-

Continuum of Recreational Cannabis Supply Options.
Adapted from Caulkins et al.[4]

ments about the extent to which these associations are causal. Supporters of legalization are quick to note that police contact or a criminal conviction for a cannabis-related offense can be deleterious as well. Having a criminal record can make it harder to get a job or obtain an occupational license, and there can be additional consequences associated with a drug conviction (e.g., barriers to receiving federal financial aid for college or obtaining public housing).

Whether cannabis legalization leads to notable increases in consumption by young people or in the incidence of cannabis-use disorders will probably depend on how such laws are implemented. But even if such increases occur, legalization won't necessarily have a net negative effect on public health. The overall health effect will also depend on how new laws influence the use of other substances, such as alcohol, tobacco, and prescription opioids.[4] For example, will people who use other substances switch to legalized cannabis? Or use cannabis in addition to them?

Such questions are especially important in the context of impaired driving. Most studies suggest that driving under the influence of alcohol is more dangerous than driving under the influence of cannabis, but it is important to remember that most studies indicate that the latter is more dangerous than driving sober. The bulk of the research also suggests that drivers who are under the influence of both cannabis and alcohol are more likely to crash than drivers using only one of them.

Further complicating predictions about legalization's health implications is the fact that much of our current knowledge about the consequences of cannabis use is based on studies involving people who smoked low-potency cannabis. Whereas in 2000, the average THC content of a joint was roughly 5%, today most cannabis flower sold in states permitting cannabis sales has a THC content above 15%. Consumers can also choose from a growing list of high-potency products, such as oils and waxes with a THC content sometimes above 75%.

We know very little about the health consequences of these more potent products and whether people who use them titrate their THC consumption. A Dutch study showed that users of more potent cannabis are generally exposed to more THC,[5] but it's unclear whether that finding applies to other countries as well.

Jurisdictions considering legalizing cannabis for nonmedical purposes will have to make several decisions that could have profound consequences for public health. For example, decision makers will have to determine how cannabis will be supplied (see diagram). Allowing sales by for-profit companies is only one option. Since daily and near-daily cannabis users account for the vast majority of cannabis expenditures, many businesses will target and attempt to expand the number of heavy users. Experiences with alcohol and tobacco suggest that profit-maximizing firms and their lobbyists will eventually fight to weaken regulations intended to protect health.

Even if states allow for-profit companies to produce cannabis,

local governments could limit retail sales to nonprofit organizations or sell the drug through a government monopoly. Jurisdictions less focused on generating tax revenue could simply permit home production and gifting (as Washington, D.C., does) or allow user cooperatives (an option offered in Uruguay).

Second, jurisdictions will have to decide how cannabis should be priced. The post-legalization retail price of cannabis will not only influence revenues and the size of the illicit market, it will also affect consumption. Legalizing cannabis can dramatically reduce production and distribution costs for at least three reasons: suppliers no longer have to be compensated for the risk of seizure and arrest; it allows producers to take advantage of economies of scale; and it makes it easier to incorporate new technologies into the production process.[1,4] Jurisdictions seeking to ensure that cannabis retail prices don't drop precipitously have many options. For example, they could limit production, impose costly regulations on suppliers, require a minimum price, or levy an excise tax.

Third, jurisdictions will need to decide whether to update their prevention messaging — and whether prevention campaigns will start before legal cannabis is available. They could target young people with such messages to counter commercial promotion where it's allowed and encourage adults to talk to them about the effects of cannabis, especially on driving. Prevention also includes efforts to limit access and exposure to cannabis products. Policymak-

An audio interview with Dr. Kilmer is available at NEJM.org

ers can learn important lessons about prevention from research on alcohol and tobacco.[4]

Fourth, given the dearth of information about the consequences associated with high-potency cannabis products and our inability to measure cannabis impairment, risk-averse policymakers may consider initially limiting access to

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certain types of products or imposing a cap on products' THC content. Another option, offered by Stanford social psychologist Robert MacCoun and others, is to tax cannabis according to THC content, thereby giving jurisdictions a lever to nudge users toward lower-potency products.

Finally, since each supply option has trade-offs, some jurisdictions may want to start with a middle-ground option before embracing a for-profit model (see diagram). One strategy is to implement a sunset clause allowing policymakers to decide after a predetermined period whether to maintain the status quo or switch approaches. Since no one knows the best way to tax or regulate cannabis, creating flexible rules would make it easier to make midcourse corrections and incorporate new research and other insights into policies.

Although public health outcomes are clearly important, they aren't the only considerations when setting cannabis policy. The

costs of enforcing prohibition, racial and ethnic disparities in cannabis arrests, the size of the illicit market, impact on public budgets, and nonmedical benefits of using cannabis (e.g., pleasure, stress relief) are just a few of the other issues that warrant discussion.[1] In addition, we should be skeptical of people who claim to know what the net effect of cannabis legalization on public health will be. Much will depend on implementation decisions, but jurisdictions' ability to minimize health risks will also depend on how they respond to new information and other sources of uncertainty.

Disclosure forms provided by the author are available at NEJM.org.

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