



European Monitoring Centre  
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# New developments in cannabis regulation

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Health and social responses to drug problems: a European guide

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## **New developments in cannabis regulation**

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This paper was commissioned by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) to provide background information to inform and contribute to the drafting of *Health and social responses to drug problems: a European guide*.

This background paper was produced under contract CT.16.SDI.0133.1.0 and we are grateful for the valuable contribution of the author. The paper has been cited within *Health and social responses to drug problems* and is also being made available online for those who would like further information on the topic. However, the views, interpretations and conclusions set out in this publication are those of the author and are not necessarily those of the EMCDDA or its partners, any EU Member State or any agency or institution of the European Union.

## Introduction

For decades, those seeking insights into alternatives to prohibiting cannabis supply have turned to Europe. For nearly 40 years, the Netherlands has tolerated small retail sales, and in February 2017 the Dutch Parliament narrowly passed a bill to regulate the supply of cannabis to coffee shops <sup>(1)</sup>. Spain's cannabis social clubs (CSCs), which are supposed to produce cannabis for non-profit distribution to club members, have proliferated throughout the country despite some of them being forced to shut down. Similar CSCs are now appearing in other parts of Europe (Decorte, 2015; Belackova et al., 2016; EMCDDA, 2016).

For the past five years, however, many of those searching for new developments in cannabis regulation have turned their attention to the Western Hemisphere. In 2012, voters in the US states of Colorado and Washington passed ballot initiatives to remove the prohibition on cannabis and to license profit-maximising firms to produce and sell it. In late 2013, Uruguay became the first country in the world to legalise cannabis, although its approach is much more restrictive than that being adopted in the United States. Since 2016, four more US states have approved commercial models for cannabis — including California, the world's sixth largest economy — and a bill to allow for-profit companies to produce cannabis for non-medical purposes has been introduced in Canada.

Recently, politicians in at least six European countries (in addition to the Netherlands) have introduced legislation to reform cannabis supply laws, with many proposing sales through licensed outlets (Hughes et al., 2017). While most of these proposals have already been rejected (Hughes et al. 2017), conversations about cannabis regulation are expected to become more frequent and more detailed in Europe. With this in mind, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) has requested a brief report to address the following three questions:

- What new models of cannabis regulation are emerging worldwide and in Europe? <sup>(2)</sup>
- What is the evidence about the impact of these reforms?
- What are the implications for drug policy and practice in Europe?

### **What new models of cannabis regulation are emerging worldwide and in Europe?**

When thinking about cannabis reforms it is useful to make at least three distinctions: (i) use/possession versus supply, (ii) medical versus non-medical purposes and (iii) whether or not the reform was based on a *de jure* change in policy.

#### ***Use/possession versus supply***

With respect to the first distinction, a number of jurisdictions have reduced penalties for using or possessing small amounts of cannabis and, in some places, for the cultivation of a few plants at home (EMCDDA, 2001; MacCoun and Reuter, 2001a; Pacula et al., 2005; Raschzok, 2015; Eastwood et al., 2016). The EMCDDA's European Legal Database on Drugs documents significant variation in cannabis laws across the continent, but most European justice systems prefer alternatives to criminal conviction (e.g. fines, cautions, probation) for cases involving use or possession of small

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<sup>(1)</sup> It is unclear whether or not the bill will pass in the upper house (*Financial Times*, 2017).

<sup>(2)</sup> The main focus of this paper is on cannabis policies governing production and sales, not possession and use.

quantities of cannabis (Ballotta et al., 2008) <sup>(3)</sup>. While supply for medical and research purposes is permitted under international drug conventions, supply for non-medical or non-research purposes is explicitly prohibited.

### ***Medical versus non-medical purposes***

Another distinction is the purpose of consumption. Cannabis has been used for medicinal purposes for thousands of years (O'Shaughnessy, 1843; Grinspoon and Bakalar, 1993), but largely fell out of favour in Europe and North America in the 20th century as better medicines were invented and prohibition restricted access (EMCDDA, 2008). The 1961 Single Convention on Narcotic Drugs allows signatories to produce cannabis for medicinal purposes as long as cultivation is controlled by a government agency. There is a growing body of research on the therapeutic benefits of whole-plant material and extracts (Hill, 2015; Whiting et al., 2015; National Academies of Sciences, Engineering, and Medicine, 2017), and the research base is expected to expand as restrictions on cannabis are loosened. There is very little scientific research on the non-medical benefits of cannabis (e.g. pleasure or stress relief; Caulkins et al., 2016).

The top panel of Table 1 presents a list of countries in Australasia, Europe and the Western Hemisphere where laws have been passed to allow cannabis production for medical purposes. The United States is an outlier in that more than half of the country's population lives in states where cannabis is legally available to those with a physician's recommendation, but medical cannabis remains illegal under federal law. Despite prohibition and a lack of federal support, a federal budget amendment is currently in effect until December 2017 blocking federal funds from being used to prevent states 'from implementing their own state laws that authorize the use, distribution, possession, or cultivation of medical marijuana' (for more information, see Trumble, 2017).

Of the other 11 countries that have passed laws to allow the production of medical cannabis, four are in Europe. The Dutch programme allows doctors to prescribe five strains of cannabis with varying levels of tetrahydrocannabinol (THC) and cannabidiol (CBD) (Office of Medicinal Cannabis, 2016). The Dutch Office of Medicinal Cannabis has licensed one producer, who submits the products to the government before they are distributed to pharmacies. While the United Kingdom does not make plant material available to patients, it does allow a private company to produce cannabis and create extracts that are prescribed in the United Kingdom and elsewhere. In 2013, the Czech Republic passed a medical law, and domestically produced cannabis for the programme was first delivered to the State Agency for Medical Cannabis in 2016 (before then it had been imported). In 2017, Germany passed a law to expand access to medical cannabis and to allow domestic production (previously, it could only be imported) (The Local, 2017) <sup>(4)</sup>.

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<sup>(3)</sup> The EMCDDA (2016) has also documented that more than one third of countries do not allow prison sentences for minor cannabis offences, stating 'In many of the countries where the law allows imprisonment for such cannabis possession, national guidelines advise against it.'

<sup>(4)</sup> Following a 2016 decree of the Turkish Food, Agriculture and Livestock Ministry, cannabis production will be allowed in 19 provinces for medical and scientific purposes; growers need permission from the government to produce. It is unclear who will be allowed to use cannabis for medical purposes in Turkey (*Hurriyet Daily News*, 2016; Sims, 2016).

**Table 1. Jurisdictions that have passed laws to allow cannabis production for non-research purposes (excluding allowances for industrial hemp or personal cultivation)**

Country	National?	Year passed	Comments
<b>Medical</b>			
United States	No	1996 (°)	28 states and DC passed laws to allow cannabis products to be produced and distributed; at least 15 other states allow physicians to recommend CBD oils, but do not necessarily provide legal protection for in-state production. This all remains illegal under federal law.
Israel	Yes	Late 1990s	A medical programme was developed on the 1995 recommendation of a subcommittee of the Israeli Parliament Drug Committee. Privately held companies that produce cannabis operate under a licence from the Department of Health.
Netherlands	Yes	2000	The Office of Medicinal Cannabis was established in 2000 and cannabis flowers were first made available in pharmacies in 2003. Only five strains are currently allowed to be prescribed and they are all produced by one supplier.
Canada	Yes	2001	Currently, all medical cannabis is supposed to be produced by federally licensed private companies and delivered by mail. Efforts are being made to eliminate the retail medical dispensaries that operate in some jurisdictions.
Chile	Yes	Late 2000s	A licence to grow cannabis that was granted in 2009 was withdrawn before production, but the Supreme Court ruled in 2012 that the withdrawal was unconstitutional. In 2016, Chile is expected to harvest medical cannabis from a large, legal plantation.
United Kingdom	Yes	2010	Since the 1990s GW Pharmaceuticals has produced cannabis plants in the United Kingdom to create Sativex and other cannabis-based extracts. In 2010, the United Kingdom approved Sativex to be prescribed for spasticity due to multiple sclerosis (as have many countries).
Czech Republic	Yes	2013	Domestically produced cannabis for the medical programme was first delivered to the State Agency for Medical Cannabis in early 2016 (previously, medical cannabis had to be imported).
Uruguay	Yes	2013	Cannabis will be produced by state-licensed companies and available in pharmacies for those with a physician's prescription.
Jamaica	Yes	2015	The regulations have not been implemented, but there are plans to allow small- and large-scale production of medical cannabis for residents as well as tourist and export markets.

Table 1 (continued)

Country	National?	Year passed	Comments
<b>Medical</b>			
Colombia	Yes	2015	The decree signed in December 2015 permits medical cannabis under national drug law. The new decree may be modified or superseded by a bill that has been submitted to Congress, but it has paved the way for state-licensed commercial production, although it is unclear how much cannabis production will be permitted.
Australia	Yes	2016	A law was passed at the Commonwealth level to create a regulatory framework for commercial cannabis production for medical purposes. (A Tasmanian law passed in 2015 pertained only to providing cannabis for research purposes in New South Wales.)
Germany	Yes	2017	Before the law passed, there were about 1 000 individuals who had received special permission to use cannabis for medicinal purposes; the cannabis was imported. The new law expands access and allows domestic production.
<b>Non-medical</b>			
United States	No	2012 <sup>(a)</sup>	Eight states have passed laws to allow for-profit companies to produce and sell cannabis (Alaska, California, Colorado, Maine, Massachusetts, Nevada, Oregon and Washington) to anyone aged 21 or older; Washington DC allows only home production and sharing. Production, distribution, and possession remain illegal under federal law.
Uruguay	Yes	2013	Residents aged 18 or older must register with the government to either grow at home, join a collective or purchase cannabis from pharmacies.

**Sources:** Reproduced in updated form from Kilmer and Pacula (2017); The Local (2017).

<sup>(a)</sup> In countries where subnational jurisdictions have passed laws, the date represents when the first such law passed.

There are important differences between the United States and Europe when it comes to medical cannabis, and medicine in general. Indeed, while the United States is notorious for having a prescription medicine system that relies on heavy promotion to physicians and patients, direct-to-consumer advertising of these products is forbidden in Europe. Medical officials in the United States cannot legally prescribe cannabis because of the federal prohibition, but they can make ‘recommendations’ that patients can take to ‘dispensaries’ that sell only cannabis products (in some states, patients are also permitted to grow cannabis at home (Pacula et al., 2002; Pacula et al., 2015). Depending on the state, it can be very easy to obtain a recommendation and there may be advertising for medical cannabis (e.g. D’Amico et al., 2015). The situation is very different in the Netherlands and the Czech Republic, where medical cannabis is prescribed by doctors, obtained at a regular pharmacy and not promoted.

### **De jure versus de facto changes**

A final distinction in relation to cannabis reforms is whether or not they are based on official changes to cannabis laws. Until 2012, none of the reforms related to supplying non-medical cannabis were the result of national legal changes. For example, cannabis remains technically illegal in the Netherlands, but the Dutch have a formal policy against enforcing the law against small transactions and coffee shops that comply with regulations.

Spain's CSCs inhabit a grey area, since Spanish law criminalises only sale (Barriuso, 2011). Some of the Spanish clubs supply only members while others appear to be less restrictive. This has been the subject of a series of court cases, with Hughes et al. (2017) noting:

In Spain, three Supreme Court decisions of 2015 declared organized cultivation by clubs open to new members as a trafficking crime. However, a legal change in the same year defined the offence of personal cultivation, similar to that of use, to be committed only if the growing was in public view, perhaps implying that personal cultivation and use in private is now not an offence of any kind, comparable to Washington DC.

While some of these CSCs have been shut down, hundreds of them are tolerated by local law enforcement agencies (PRI, 2016). These types of clubs are operating in Belgium and other countries but are not explicitly allowed (Decorte, 2015; Belackova et al., 2016; EMCDDA, 2016).

The bottom panel of Table 1 shows the two countries where laws have been changed to allow cannabis to be produced and sold for non-medical purposes. Uruguay became the first country in the world to remove the prohibition on cannabis. It allows residents aged 18 or over to access it through one of three mechanisms: (i) grow it at home; (ii) obtain it from a CSC; or (iii) purchase it from a pharmacy. To obtain legal cannabis, residents must register with a government agency and select only one approach. The pharmacy option is still being implemented (Cerdá and Kilmer, 2017) and users will be allowed to purchase up to 40 g per month (Queirolo et al., 2016). The government will control the price and potency of what is sold in pharmacies and advertising will not be allowed (Walsh and Ramsey, 2015).

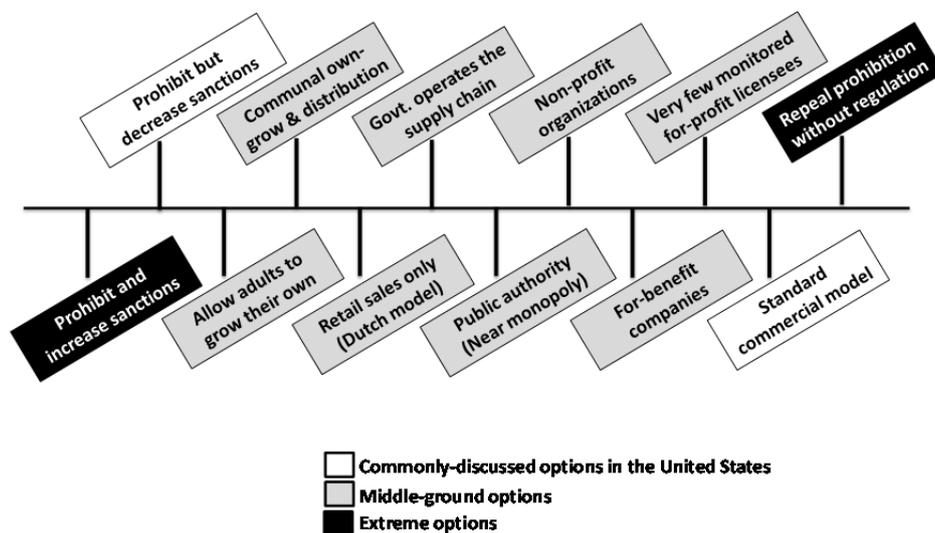
Eight states in the United States have now passed ballot initiatives to remove cannabis prohibition and allow profit-maximising firms to produce and sell cannabis products to anyone aged 21 or older<sup>(5)</sup>. Colorado and Washington State both had very lax medical programmes (i.e. it was easy to obtain a recommendation and find a dispensary) before their non-medical laws were passed in 2012. Alaska and Oregon followed in 2014, and in 2016 voters in California, Maine, Massachusetts and Nevada also passed initiatives to allow for-profit companies to supply cannabis. While all of these efforts remain illegal under federal law, the Obama administration decided to tolerate these violations as long as states had 'implemented strong and effective regulatory and enforcement systems' (Cole, 2013). It is unclear what the Trump administration will do about cannabis; it has a number of options (Kilmer, 2017a).

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<sup>(5)</sup> There are a number of reasons voters claimed to support these initiatives (e.g. to shrink the illicit market, to **generate tax revenue for the government, to reduce criminal justice expenditures and to eliminate racial/ethnic** disparities in cannabis arrest rates).

The cannabis debate in the United States has focused largely on a false dichotomy: continue to prohibit supply or create a for-profit industry. Jurisdictions considering cannabis supply reform can choose from a number of ‘middle-ground’ options such as home production, CSCs, a state monopoly and a non-profit approach (Figure 1) (Caulkins et al., 2015; Wilkins, 2016). Indeed, what is often overlooked in the United States and elsewhere is that, in 2014, the voters of Washington DC removed the prohibition on cannabis but did not permit commercial sales. Adults are allowed to grow and give away cannabis; it cannot be sold.

**Figure 1. Alternatives to status quo cannabis supply prohibition**



**Source:** Adapted from Caulkins et al., 2015.

It is likely that the next country to legalise cannabis for non-medical purposes will also be in the Western Hemisphere. In April 2017, a bill to legalise cannabis production and possession (referred to as C-45) was introduced into the House of Commons of Canada <sup>(6)</sup>. Among other actions, the bill would remove prohibition and allow the federal government to regulate for-profit producers. Decisions about retail supply would be left up to the provinces and territories, and the government of Ontario recently reported that it would choose a middle-ground option and limit cannabis sales to government-run stores (Skerritt et al., 2017 ).

<sup>(6)</sup> <http://www.parl.ca/DocumentViewer/en/42-1/bill/C-45/first-reading>. Those seeking a summary of the bill and the task force’s report should visit <http://www.justice.gc.ca/eng/cj-jp/marijuana/c45/c45.pdf>.

## **What is the evidence about the impact of these reforms?**

Most of the evidence on cannabis supply reforms has focused on the coffee shop policy in the Netherlands and medical cannabis in the United States. This section briefly highlights the relevant literature in these areas, as well as the emerging data from non-medical legalisation in Colorado and Washington.

### ***Coffee shop policy in the Netherlands***

Cannabis remains technically illegal in the Netherlands, but the Dutch make enforcing the law against small-scale cannabis transactions the lowest priority. For nearly 40 years, the Netherlands has tolerated ‘coffee shops’ — where cannabis can be consumed on the premises and/or purchased for off-site consumption — as long as the shops are compliant with a number of specified criteria <sup>(7)</sup>. MacCoun and Reuter (2001a, 2001b) found that Dutch prevalence rates uniquely increased in the 1984-1992 period, leading them to hypothesise that ‘the dramatic mid-1980s escalation in Dutch cannabis use is the consequence of the gradual progression from a passive depenalisation regime to the broader de facto legalisation which allowed for greater access and increasing levels of promotion’, through the growth in coffee shops; however, this interpretation has been the subject of debate and additional analysis (de Zwart and van Laar, 2001; MacCoun and Reuter, 2001c; MacCoun, 2011). More recent work by Palali and van Ours (2015) finds that those growing up within 20 km of a coffee shop have a lower age of cannabis initiation.

Researchers have exploited recent changes in Dutch coffee shop policy to learn more about the consequences of restricting cannabis availability. In 2011, the city of Maastricht temporarily restricted access to its coffee shops to residents of Belgium, Germany and the Netherlands. Using administrative course grade data from students enrolled at Maastricht University before and after the policy change, Marie and Zolitz (2017) found that the academic performance of students who were no longer legally permitted to buy cannabis increased substantially, especially for courses that require more numerical/mathematical skills. To the extent that it would still be possible for excluded students to obtain cannabis from coffee shop customers or the street market, the authors suggest their findings could underestimate the true effect.

In 2012, national cannabis policy was tightened in the Netherlands to limit coffee shops to members, who had to be Dutch citizens. As noted by van Ooyen-Houben et al. (2016), there were three goals for the new policy: (i) to reduce drug tourism from other countries, (ii) to minimise nuisance associated with the coffee shops and (iii) to make the coffee shops smaller and easier to control. There was tremendous variation in the implementation of these regulations, with many jurisdictions choosing not to implement them. There were soon national changes, with the membership criterion being lifted in 2012 and the residence criterion amended in 2013, making implementation subject to local decision-makers. However, van Ooyen-Houben et al. (2016) found that in places that implemented the new criteria there was a swift decline in drug tourism and a reduction in coffee shop purchases by locals, as many Dutch users did not want to register to become members. The authors report that driving the trade outside of coffee shops led to an increase in illicit transactions

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<sup>(7)</sup> For more information on the criteria, see <https://www.government.nl/topics/drugs/toleration-policy-regarding-soft-drugs-and-coffee-shops>.

and nuisance complaints about street sales. After the membership criterion was removed, many local consumers returned to the coffee shops, but others still made purchases on the street. The authors concluded, 'The quick and robust shifts in the users' market in reaction to the policy changes illustrate the power of policy, but also the limitations caused by the dynamic and resilient nature of the Dutch cannabis supply market.'

### ***Medical cannabis in the United States***

There has been some debate in the United States about whether or not state-level medical laws were a 'Trojan horse' intended to open the door for non-medical reforms (see Kilmer and MacCoun, 2017, for a discussion), but that does not negate the fact that hundreds of thousands of patients in the United States have benefited from having access to medical cannabis.

Given that a number of US states have lax medical cannabis systems, there are concerns that these laws will increase the use of cannabis for non-medical purposes. Based on a framework developed by MacCoun (1993), Kilmer and MacCoun (2017) describe five mechanisms by which medical laws may increase cannabis consumption: decreasing legal risk, decreasing stigma, increasing availability, increasing promotion and decreasing price. They also note that there could be a 'forbidden fruit' effect whereby those who use cannabis because it is illegal and perceived as dangerous may find it less attractive once it is considered a medicine.

There is a large and growing literature examining state-level variation in these laws in the United States. Many of the early studies used a binary measure to classify states as having a medical law or not, thus ignoring the tremendous heterogeneity in these policies (Pacula et al., 2015). The more advanced studies try to account for this variation by examining the specifics of these laws (e.g., are dispensaries allowed? Home cultivation?) and the size of the programmes. A recent review of this literature by Pacula and Smart (2017) concludes:

While findings tend to be mixed when the literature is looked at as a whole, some consistent themes seem to emerge when the literature is instead considered with an eye toward differences between policies and populations. For example, studies that examine medical marijuana markets in a manner that is attentive to the development of these markets, either through measures of the presence of active dispensaries or the size of the market, seem to consistently show a positive correlation of these policies with use among high-risk users (arrestees, those in need of treatment, and polysubstance users). Similarly, many studies have shown a positive association with adult use of marijuana while most have found no association with youth prevalence or frequency of use in general school populations.

The literature about medical cannabis laws and alcohol consumption is inconclusive (Kilmer and MacCoun, 2017), but, given the public health importance of this issue, it will continue to be the subject of research. There is also a growing literature about how these medical cannabis laws may affect the use of opioids<sup>(8)</sup>. One hypothesis is that some patients prefer to use cannabis rather than opioids for treatment and will reduce opioid consumption if cannabis is available. Another hypothesis is that diversion of medical cannabis to the non-medical market may increase availability,

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<sup>(8)</sup> There is also an emerging literature about the effects of medical cannabis laws on traffic safety (e.g. Anderson et al., 2013; Kim et al., 2016; Santaella-Tenorio et al., 2016).

which could make cannabis more attractive than opioids to those seeking intoxication. Both could be true at the same time, and there may be other explanations. Kilmer and MacCoun (2017) summarise the quasi-experimental literature on the association between medical cannabis laws and opioid outcomes, finding:

[M]ost peer-reviewed studies suggest increased availability of medical marijuana is negatively associated with opioid-related outcomes <sup>(9)</sup> such as opioid overdose deaths at the state level (Bachhuber et al. 2014), prescriptions for painkillers among Medicare Part D enrollees (Bradford & Bradford 2016), prescriptions for pain killers among Medicaid enrollees (Bradford & Bradford 2017), and opioid positivity among 21- to 40-year-old fatally injured drivers (Kim et al. 2016). That said, the peer-reviewed studies have been criticized for overplaying the causal mechanisms at play, which is very difficult to determine when working with aggregate-level data (Finney et al. 2015; Caputi & Humphreys 2016).

There are also papers undergoing peer review that use stronger methodologies and yield consistent findings about the association between medical marijuana availability and opioid overdoses (Powell et al., 2015; Smart, 2015). Considering that the United States is in the middle of an opioid crisis, it is unclear whether or not these associations would hold elsewhere.

### ***Non-medical cannabis in the United States***

The causal mechanisms by which increasing the availability of medical cannabis could influence overall cannabis use also apply to laws that legalise cannabis for non-medical purposes (Caulkins et al., 2015). Of course, much will depend on the type of regulation that is implemented. The effects of simply allowing small-scale home cultivation are likely to be much smaller than those of licensing profit-maximising firms to advertise and produce/sell as much as they want.

It is too early to conduct most of the rigorous analyses needed to evaluate the overall effects of commercial legalisation in the United States (Caulkins et al., 2016; Hall and Lynskey, 2016; Subritzky et al., 2016; Kilmer and MacCoun, 2017) <sup>(10)</sup>. While Colorado and Washington legalised cannabis in 2012, retail stores did not open in these states until January 2014 and July 2014 respectively (and Washington furthermore had a slow roll-out, since unlike Colorado it did not allow medical dispensaries to use their existing inventories). That said, we do know that overall possession arrests have decreased (although an *increase* in the cannabis arrest rate for Hispanic and African-American youth in Colorado is troubling) (Colorado Department of Public Safety, 2016<sup>11</sup>), tax revenues are coming in and concentrates have created challenges for regulators. Cannabis-related pediatric emergency room visits have increased by a large percentage in Colorado, but this is based on a very

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<sup>(9)</sup> They noted, 'Wen et al.'s (2015) paper is the exception; they did not find a statistically significant association between medical marijuana laws and prescription pain killer misuse.'

<sup>(10)</sup> There is a substantial amount of sub-state variation in the implementation of legalisation in states that have passed these initiatives (e.g. Dilley et al. (2017) report that 'As of June 30, 2016, 30 % of the state population lived in places that had temporarily or permanently banned retail sale'). In the short term it is expected that more will be learned from studies examining within-state variation than from those examining across-state variation.

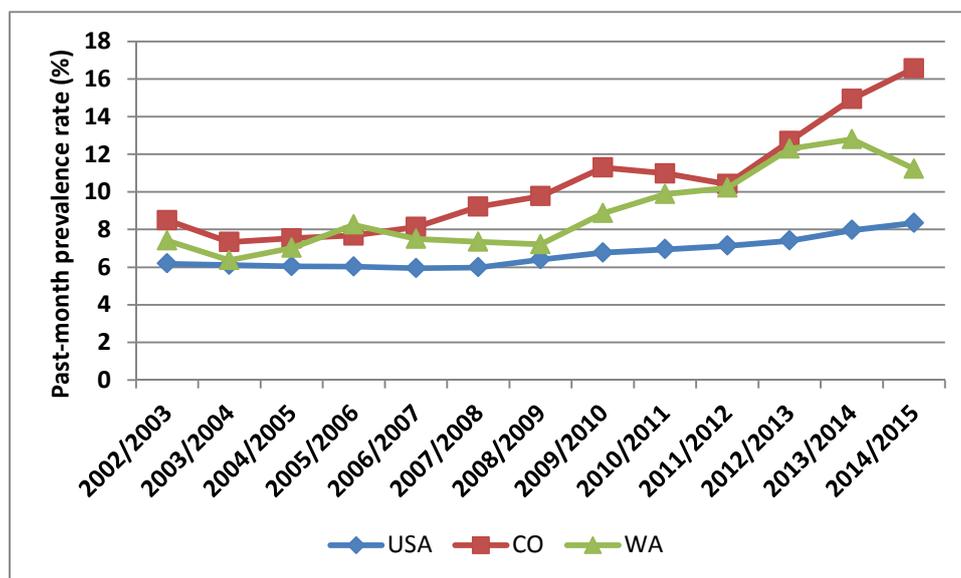
<sup>(11)</sup> This finding about Hispanic and African-American youth in Colorado is based on an analysis using data through 2014. I am not aware of more recent analyses examining the cannabis arrest rates for these groups.

low base rate (Wang et al., 2016), and it is hard to determine how much of the increase is attributable to parents feeling less stigma about reporting cannabis as the reason for the visit <sup>(12)</sup>.

As for cannabis use, the US federal government is able to produce state-level estimates of past-year and past-month cannabis prevalence by combining two years of annual general population survey data from the National Survey on Drug Use and Health (SAMHSA, 2016). Figure 2 displays the self-reported past-month cannabis prevalence rates for the entire US as well as Colorado and Washington from 2002/2003 to 2014/2015. Nationally, past-month cannabis prevalence for those aged 12 or older increased by 4.8 %, from 7.96 % in 2013/2014 to 8.34 % in 2014/2015 ( $p = 0.001$ ). Interestingly, Colorado and Washington display different trends over this period. While Colorado saw an 11 % increase over this period (from 14.93 % to 16.57 %;  $p = 0.063$ ), Washington saw a 12 % decrease (from 12.79 % to 11.22 %;  $p = 0.019$ ).

**Figure 2.**

**Self-reported past-month cannabis prevalence for those aged 12 and older in Colorado, Washington, and the US, 2002/2003 – 2014/2015**



Source: SAMHSA, annual

Even if both states had seen an increase over this period, it would be incorrect to use these simple trend data alone to make strong inferences about legalisation. First, much depends on the year one uses for the base estimate. For example, while the recreational stores opened in Colorado in January 2014, all of the initial stores were pre-existing medical dispensaries. Some have argued that real commercialisation and expansion in Colorado started around 2009, not 2014 (e.g. Ghosh et al., 2015; Rocky Mountain High Intensity Drug Trafficking Area, 2016). Second, there are other factors that influence prevalence aside from cannabis policy (see, for example, Jacobson, 2004); rigorous

<sup>(12)</sup> There is also a lot of discussion about the effect of non-medical legalisation on traffic safety; however, the author is aware of only one peer-reviewed study that examines the effect of these laws on overall traffic crashes or fatalities (Aydelotte et al., 2017). Rigorous analyses will look beyond drivers in crashes who test positive for THC (Caulkins et al., 2016). For information about medical cannabis laws and traffic safety, see note 8.

analyses will attempt to control for them. Third, some of the increase in self-reported use in legalisation states may be attributable to respondents being more honest about their cannabis use (Kilmer and Pacula, 2017). Fourth, from a health perspective, we care more about quantity consumed than whether or not someone has used cannabis in the past month; however, the survey does not ask about amount consumed (and the state-level estimates do not include information about the number of days used in the past month). Fifth, if the goal is to evaluate the public health and public safety consequences of legalisation, analysts must look at how legalisation influences the use of alcohol, tobacco, opioids and other substances (Caulkins et al., 2016).

The first peer-reviewed, multi-state, individual-level analysis exploring the association between cannabis legalisation and youth prevalence was published by *JAMA Pediatrics* in February 2017 (Cerdá et al., 2017). Using the Monitoring the Future (MTF) school survey data and controlling for a number of individual-, school- and state-level factors in a differences-in-differences design, the authors found no effect of passing a law legalising cannabis for 8th, 10th, and 12th grade students in Colorado (the study examined changes from when the law became effective in January 2013, not from when stores opened). In Washington, they similarly found no significant association between passing the legalisation and marijuana use among 12th grade students, but they did find small statistically significant increases in past-month cannabis prevalence for 8th and 10th grade students in Washington (relative to students in states that had not legalised). These were the same age groups in Washington that showed a significant decline in perceived harmfulness of cannabis.

The MTF survey does not produce state-representative samples and roughly 5 500 Washington students were included in the analysis (fewer than 1 000 students per year, 2010-2015, from a total of 30 schools). The authors of the study noted, 'A greater number of schools would have been advantageous, and the sample design may lead to discrepancies between MTF results and those found in other large-scale surveillance efforts.' Washington State conducts a biennial Healthy Youth Survey (HYS), which includes the vast majority of 6th, 8th, 10th and 12th grade students (in 2016, the sample size exceeded 230 000 students, from more than 1 000 schools). From this large sample, a representative sample is created and the results do not suggest that past-month cannabis prevalence for Washington's 8th or 10th graders increased after the legalisation change; if anything, the raw data suggest the rate decreased (HYS, various years). Advanced multivariate analyses with HYS data are currently being conducted, but this highlights how inferences about legalisation may depend on the data sources being considered.

### **What are the implications for drug policy and practice in Europe?**

When considering the implications of these policy changes and of this emerging evidence, it is important to step back and consider the goals of these cannabis reforms. In the Netherlands, one of the main justifications for the coffee shop regime was to reduce youth contact with dealers who might be selling more dangerous drugs. In the United States, many arguments were offered by legalisation proponents, such as reducing the size of the illicit market, generating significant tax revenues, reducing criminal justice interactions and protecting public health with testing and labelling. There were other health claims, such as a reduction in youth consumption, because 'drug dealers don't check identification', and a reduction in alcohol use, but the evidence for these claims remains to be seen. In Uruguay, legalisation was not motivated by tax revenues; the main focus was on reducing the violent crime associated with Paraguayan drug distributors. In Canada, there seems

to be a lot of emphasis on the public health implications, with the Task Force on Cannabis Legalization and Regulation (2016) reporting, 'Our recommendations reflect a public health approach to reduce harm and promote health.'

The goals of the cannabis reform will shape decisions not only about how cannabis is supplied (Figure 1), but also about how it is regulated; however, no one knows the best way to legalise and regulate cannabis supply. While some insights can be drawn from the extensive research on alcohol and tobacco regulation (Pacula et al., 2014; Barry and Glantz, 2016), cannabis is a unique substance that can be consumed in an increasing number of forms. Table 2 highlights a number of regulations that could be applied to cannabis, focusing on four major areas: product, seller/server and sales, marketing, and possession or use (Caulkins et al., 2015).

**Table 2. Examples of regulations that could be applied to cannabis**  
(examples are not necessarily endorsements)

Area of regulation	Precedent pertaining to currently legal products	Example of application to marijuana
<b>Product</b>		
Types of products that are permitted	At various times, jurisdictions have banned absinthe and Everclear, even when allowing most types of alcohol.	Restrict legalization to just usable marijuana plant materials (herbal cannabis).
Additives or products attractive to children	Flavourings (except menthol) are banned from cigarettes.	Ban fruit flavours and marijuana-infused candies.
Potency or strength	Many states restrict sale of products with more than 10% ethanol from being sold in grocery stores.	Create a THC ceiling or a CBD floor.
Product labelling	Australia adopted plain packaging for all tobacco products in 2012; similar efforts are being pursued in other countries.	Require unbranded packaging, devoid of logos or any form of commercial design.
Packaging	Child-resistant packaging is standard on a variety of household items, including prescription and over-the-counter medications, vitamins, pesticides, and household chemicals.	Require marijuana products to be sold in resealable, opaque, child-resistant containers.
<b>Seller or server and sales</b>		
Inventory-control system	Both Washington and Colorado are implementing inventory-control systems for recreational marijuana.	Require all licensees throughout the supply chain to participate in inventory-control system.
Age of sellers and servers	Many states impose a minimum age restriction of 21 for serving alcohol.	Require that anyone selling or handling marijuana in stores be at least 21 years old.
Vendor and server training and responsibilities	Many states require training for those who serve alcohol to (1) ensure they check the patron's age, (2) identify people at risk of excess, and (3) understand their legal responsibilities and risks as servers.	Require specific training course that includes how to advise consumers on potency and related risks.
Sold in certain types of outlets only	Many liquor-control states limit sale for off-premises consumption to specialized alcohol-only stores.	Require that marijuana be sold only in marijuana-only stores.
Outlet density and location	Washington restricts the total number of legal marijuana outlets and requires that licenses be distributed across the state according to consumption data.	Limit outlet density to ensure that there is no over-availability in any area.
Vending machines	The United States restricts tobacco-vending machines to establishments with over-18 age restrictions.	Prohibit sales of marijuana products in vending machines.
Days of sale and hours of operation	Most states limit the times when alcohol can be sold. Several states ban sale of alcohol for off-premises consumption on Sundays.	Restrict sales of marijuana to the same outlet hours as alcohol sales.
Happy hours and bulk discounts	Many U.S. states ban happy-hour pricing for alcohol sales.	Prohibit happy-hour pricing and discounts with bulk purchases.

Table 2 (continued)

Area of regulation	Precedent pertaining to currently legal products	Example of application to marijuana
Quantity and promotional discounting, free samples	In response to grocery stores using alcohol as a loss leader to get people into the stores, the UK banned promotions that sold alcohol below cost.	Prohibit coupons, discounts, and giveaways (e.g., free marijuana with purchases of other goods).
Sales quotas and limits	Dutch coffee shops limit marijuana sales to no more than 5 g per purchase, and Uruguay limits pharmacy purchases to 40 g per month (no more than 10 g per week).	limit the amount of marijuana that can be purchased with in a day or month (e.g., tied to driver's license).
Non-resident access	In Colorado, a non-resident can purchase only up to 0.25 oz. of herbal marijuana at a time; a resident can purchase up to 1 oz.	Restrict sales to residents only.
On-premise consumption	Various jurisdictions ban consumption in marijuana dispensaries; Washington State bans marijuana use in any establishment with a liquor license.	Allow the marijuana equivalent of liquor stores but not bars; ban consumption of marijuana at establishments that serve alcohol.
Product placement	As of 2010, FDA has restricted the sale of tobacco products in vending machines and self-service displays; they can be sold only behind the counter.	Ban self-service displays and so require a store assistant to access.
Minimum pricing	Many states have minimum pricing laws for cigarettes.	Require that 1 mg of THC be sold for no less than a certain price.
<b>Marketing</b>		
Physical location and size of advertising	Washington bans advertising within 1 000 ft. of schools and playgrounds; in the Netherlands, only establishments that refrain from advertising are exempted from marijuana law enforcement.	Prohibit off-premise advertising.
Electronic advertising	Finland bans alcohol-branded social media communication.	Make refraining from sponsoring games and other online contests a condition for licensure.
Product placement and sponsorship	FDA bans the tobacco industry from sponsoring sporting and entertainment events.	Prohibit marijuana firms from sponsoring sporting and entertainment events and any event at a school.
Ads targeting youth	Both the tobacco companies and the beer industry have been challenged for the use of youth-oriented marketing materials. Joe Camel was effectively removed because of court challenges.	Prohibit use of cartoon figures, animals, and other marketing images geared toward youth.

Table 2 (continued)

Area of regulation	Precedent pertaining to currently legal products	Example of application to marijuana
Possession or use		
Age of possession, use, and purchase	Most states allow civil and sometimes criminal penalties for minors caught possessing, using, or purchasing cigarettes or alcohol, although tobacco PUP laws are weakly enforced.	Restrict possession, use, and purchasing by people under 21 years of age.
Method of consumption	Many states have strict rules pertaining to purchasing a keg of beer so as to reduce the chances that keg parties are possible for youth and young adults.	Prohibit forms of cannabis suitable for dabbing.
Use in public	Many states have open-container laws effectively banning alcohol use in public and implement strict clean-indoor-air laws limiting where cigarettes may be smoked.	Prohibit the use in all places where tobacco is also prohibited or in all public spaces more generally.
Use before or while driving	Most states ban open alcohol containers in a car; all limit BAC as measured by a breathalyser. Colorado and Washington limit active THC per unit of blood for drivers, but there is not a practical roadside test for that, akin to breathalyser readings being assumed proportional to BAC.	Limit active THC per unit of blood for drivers.
Possession of diverted (non-tax-paid) product	Many states ban possession of non-tax-paid alcohol.	Impose criminal penalties on possession of marijuana that does not bear a Vermont tax stamp.
Providing access to minors	Many states have social-host policies that hold property owners responsible for underage drinking occurring on their property. Both state-imposed liability and private-party civil liability apply.	Impose civil penalties on those who provide access to marijuana to minors, and extend social-host policies to marijuana.
Prevention	Many states, including California, increased the sales tax on cigarettes with a specified share going to an anti-tobacco public-health campaign.	Require that a substantial proportion of revenue generated by marijuana sales go to prevention campaigns designed or run by the state public-health agency.

NB: The fact that an example is listed is not necessarily an endorsement. FDA = U.S. Food and Drug Administration. PUP = purchase, use, and possession. BAC= blood-alcohol concentration.

**Source:** Reproduced from Caulkins et al., 2015.

Among the plethora of decisions confronting jurisdictions considering alternatives to cannabis prohibition is whether or not to limit the types and potency of products that are to be made legally available. So far, none of the US states that have legalised cannabis for non-medical purposes has limited the potency of cannabis flowers or extracts that can be purchased; there have been some limits imposed on edibles. This is leading to a proliferation of high-potency cannabis products in legalisation states. For example, the majority of flower sold in Washington is labelled as being

greater than 20 % THC, and some of the concentrates (e.g. waxes, shatter) can exceed 75 % THC (Smart et al., 2017). We know very little about the health consequences of the higher-potency products and whether or not users are titrating their THC consumption (Kilmer, 2017b) <sup>(13)</sup>. One option for risk-averse jurisdictions is to initially limit potency and product types for the non-medical market until more is learned about the health consequences.

Another area where EU Member States can learn from recent innovations is with respect to taxation. There are a variety of ways to tax cannabis and each comes with a number of potential trade-offs (Caulkins et al., 2015; Oglesby, 2017). For example, most of the legalisation states in the United States tax cannabis as a function of price, which is very easy to implement. For jurisdictions concerned about collecting revenues, however, a drawback to this approach is that, as the price of cannabis drops, so will the revenue. In addition, and if jurisdictions do not explicitly prohibit bundling, profit seekers will find a way to beat the tax (e.g. ‘I’ll sell you this pipe for 50 euros and give you the cannabis for free’). Alternatively, the state of Alaska is taxing cannabis as a function of weight, which is easy to implement but raises concerns that it creates incentives to sell more potent products. Another approach is to tax cannabis as a function of potency (MacCoun, 2010; Caulkins et al., 2013, 2015), which was recommended by Canada’s cannabis task force. Taxing as a function of THC (or the THC to CBD ratio) would give governments the power to nudge users to lower potency products, but it would be dependent on having a reliable testing and labelling system. There is much to learn about all of these tax regimes — including their unintended consequences — and the European Union (EU) can learn from the mistakes of and challenges faced by early adopters.

Finally, some EU Member States may be interested to see what these changes mean for the international drug control treaties. How do countries that legalise cannabis address — or not address — their obligations to the treaties? Will it create a precedent that others will follow? The International Narcotics Control Board argues that Uruguay’s cannabis law is a breach of ‘the universally agreed and internationally endorsed legal provisions of the treaty’. In response, it was reported that President Mujica’s government argued ‘that the new law is entirely consistent with the original spirit of the UN drug treaties to promote the “health and welfare of mankind” and is aligned with Uruguay’s fundamental human rights obligations’ (Hetzer and Walsh, 2014).

There is a heated debate about whether or not the United States is in violation, since the federal government, which signed the treaty, still prohibits cannabis (see, for example, Humphreys, 2013; TNI, 2015). This debate will continue, but federal toleration would seem to make it difficult — or at least quite hypocritical (Walsh and Ramsey, 2015) — for the United States to voice disapproval about other countries violating the conventions, at least with respect to cannabis. Indeed, the US government has not made a public statement about the Uruguayan law. If Canada does legalise cannabis, it will not only be interesting to see how it addresses its obligations to the conventions, it will also be revealing how the United States and other countries react to the Canadian approach. Since Canada is a much larger country than Uruguay and a member of the G7, its actions and the responses they receive — or do not receive — could have ripple effects outside North America.

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<sup>(13)</sup> Future potency debates are likely to focus on THC to CBD ratios. For a useful review, see Englund et al. (2017).

## Conclusion

As more jurisdictions contemplate and pass laws to legalise cannabis for medical and non-medical purposes, the discussions about cannabis policy will likely become more intense in the EU. Member States can learn from these experiences and decide if they want to maintain their current cannabis supply policies or try something else. Those considering alternatives should remember that change need not be permanent; however, if profit-maximizing firms are allowed to produce and sell cannabis, they will have strong incentives to fight against regulations and policy changes that will negatively affect their bottom lines.

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