The Road towards the Responsible and Safe Legalization of *Cannabis* Use in Portugal

O Caminho para a Legalização Responsável e Segura do Uso de *Cannabis* em Portugal

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ABSTRACT

Introduction: Recently, the world has seen examples of the legalization of *cannabis* for recreational purposes. Due to the diversity of experiences in progress, it is urgent to analyze the impacts of this legalization, from a public health perspective. Therefore, this article aims to review the accumulated knowledge in the states and countries where the use of *cannabis* is legal and to ponder over the relevance of starting a similar path towards legalization in Portugal, thus supporting political decisions to be properly informed and evidence-based.

Material and Methods: An extensive literature review was performed using databases and scientific journals, such as PubMed, as well as the search of institutional documentation, including the EMCDDA and SICAD.

Results: The gathered information provided insights and enabled assessment of (1) the acute and chronic effects of *cannabis* use on health, (2) the Portuguese situation related to *cannabis* and (3) the processes and lessons learned after the legalization of *cannabis* in other countries or states. Given the above, and according to the data presented, the authors argue for a safe and responsible strategy towards the legalization of *cannabis* use in Portugal. In accordance, a set of concrete proposals are presented.

Discussion: From a public health perspective, it is assumed that the interest of this proposal is to reduce the problematic use of *cannabis*, to effectively fight against illicit drug trafficking and drug-related crime, as well as health promotion and prevention of addictions and other adverse health impacts. This article reveals that the effects of legalization might, contrary to general beliefs, generate positive results with respect to these aims, given that there will be greater control on the market, price, quality, and information - to name a few - if implementation occurs with proper consideration and definition.

Conclusion: The debate on the responsible and safe legalization of *cannabis* use in Portugal should be open and promoted, based on a public health perspective.

Keywords: Cannabis; Drug Approval; Drug and Narcotic Control; Government Regulation; Health Policy; Portugal

RESUMO

Introdução: Recentemente, o mundo assistiu a múltiplos exemplos de legalização do uso de *cannabis* para fins recreativos. Numa perspetiva de saúde pública, pela diversidade das experiências em curso, torna-se premente analisar os impactos desta legalização. Por conseguinte, este artigo tem por objetivo rever os conhecimentos acumulados nos estados e países onde o uso de *cannabis* é legal e ponderar sobre a pertinência de iniciar semelhante caminho para a legalização em Portugal. O objetivo é, não apenas promover a reflexão, mas também apoiar uma eventual tomada de decisão política para que possa ser devidamente informada e assente no mais avançado conhecimento científico, económico e jurídico.

Material e Métodos: Foi realizada uma revisão extensa da literatura, tendo-se recorrido a bases de dados e revistas científicas, tais como PubMed, bem como pesquisas de documentação institucionais, nomeadamente do OEDT e SICAD.

Resultados: A revisão da literatura permitiu sistematizar informação sobre o estado da arte sobre (1) os efeitos agudos e crónicos do consumo de *cannabis* na saúde, (2) a situação portuguesa relacionada com o uso de *cannabis* e, (3) os processos e lições aprendidas após a legalização de *cannabis* em outros países ou estados. Face ao exposto, e de acordo com os dados apresentados, os autores argumentam favoravelmente por uma estratégia de legalização responsável do uso de *cannabis* em Portugal e encadeiam um conjunto de propostas concretas nesse sentido.

Discussão: Partindo de uma perspetiva de saúde pública, assume-se que o interesse da presente proposta reside na redução do consumo problemático de *cannabis*, no combate eficaz contra o tráfico de drogas ilícitas e crime relacionado, assim como a promoção da saúde, e a prevenção de dependências e outras consequências nefastas para a saúde. Este artigo revela que os efeitos de uma estratégia de legalização responsável podem, em contraste com as crenças comuns, gerar resultados positivos em relação a estes objetivos uma vez que passará a haver um maior controle sobre o mercado, preço, qualidade e informação - para citar alguns exemplos - se a implementação ocorrer de acordo com um programa devidamente desenhado e implementado com esses fins.

Conclusão: Tendo por base uma perspetiva de saúde pública, o debate sobre a legalização responsável e segura do uso de *cannabis* em Portugal deve ser aberto e promovido.

Palavras-chave: Aprovação de Medicamentos; Cannabis; Controlo de Medicamentos e Narcóticos; Política de Saúde; Portugal

INTRODUCTION

Decriminalisation of drug possession and use was approved by the Portuguese Assembly of the Republic (Parliament) in 2001, therefore acknowledging that addictive behaviours are based on a health disorder. In addition, it has been acknowledged by legislators that criminal pathways would never add to reducing drug use and these behaviours no longer led to criminal prosecution. Instead, drug use became a social offence and instruments

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of specialised help and support aimed at drug users were developed.

Drug use has not increased in Portugal (compared with the remaining EU countries) nor any increased 'drug tourism' has been found, countering the concerns that existed at the time. In fact, Portugal has become a worldwide reference due to the innovative characteristics of the legislation, the reduction in the burden to the judicial system that these cases represented, the neutral impact that decriminalisation had on drug use patterns and mainly due to the fact that the issue of drug dependence was acknowledged as an individual and public health issue.

Fifteen years upon the approval of the law under which drug use has been decriminalised – even though it has not been depenalised, legalisation of *cannabis* cultivation, sale and use has become a recurrent issue, both national and internationally, mainly due to the lack of any successful results under the existing prohibitionist pathway.

In addition, it is estimated that half of the income from drug trafficking worldwide relates to *cannabis*, corresponding to an estimated 300 thousand million US dollars per year.[1]

In addition, more and more examples of countries and states that have abandoned the prohibitionist vision of drug use can be found, even though with different market regulation models involved – from cultivation to sale. Four North-American states (Washington, Colorado, Oregon and Alaska) and Uruguay stand out, apart from those in which drug sale and use for medicinal purposes has been legalised. Legalisation has been recently announced in Canada, including drug sale and use for recreational purposes (it has been voted for by the House of Commons and is currently awaiting vote at the Senate) and will also be followed by South Africa and in Mexico. The examples of Spain and The Netherlands are also worth mentioning within the European Union.

Based on these experiences in the real world, increasingly stronger scientific evidences have been published by the medical and scientific community on the impact of *cannabis* use on health as well as lessons to be learnt from the experiences under which the use of *cannabis* has a legal status.

Today, we have for the first time the conditions for a serious and sustained discussion on the proposals aimed at the legalisation of *cannabis* use in Portugal.

For reasons of transparency, the authors assume having never supported legalisation of *cannabis* use in the past. In addition, having been fully acknowledged the potentially harmful impact on health of this and other drugs such as alcohol and tobacco, they acknowledge that they would wish, in an ideal world, that the degree of education and literacy was such that the use of these substances had a minor significance. However, the need for an adequate legislation within the real world is also assumed and based on a public health outlook (economic, legal and safety) and according to the most recent scientific evidence and social knowledge.

MATERIAL AND METHODS

A comprehensive literature review has been carried out and scientific databases and journals have been used, as well as research on institutional documents, namely from the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) and the Portuguese General Directorate for Intervention on Addictive Behaviours and Dependencies / *Serviço de Intervenção nos Comportamentos Aditivos e nas Dependências* (SICAD). First of all, the acute and chronic effects of *cannabis* use were systematized, aimed at obtaining a broad vision of the impact of *cannabis* on health. A comprehensive analysis of the national situation of *cannabis* use in Portugal was subsequently carried out, in order to estimate the dimension of the effect of legalisation as well as the potential impact on the market. Next, the recent examples of legalisation of *cannabis* use for recreational purposes in other countries and states worldwide have been analysed and the lessons learnt from these were listed. Finally, a literature review has underlined the arguments in favour of the implementation of a safe and responsible legalisation strategy for *cannabis* use in Portugal, as well as a range of recommendations.

RESULTS

Impact of *cannabis* use on health

All the constraints found in reaching general agreements on the impact of *cannabis* on health, such as those that have been established for alcohol and tobacco, are worth mentioning, despite the significant number of scientific studies.[2]

This is mainly due to three major reasons:

- As an illegal sale product, there is no standardised product and obviously there are differences regarding tetrahydrocannabinol (THC; major psychoactive component of *cannabis*) content in product composition, as well as regarding the route of administration (joints, water pipe, vaporizer), use intensity and frequency, i.e. what is smoked by a user cannot be assumed as comparable to the following product that will be smoked by that same user.
- *Cannabis* is frequently consumed with other products, mostly with tobacco and the separation of the impact of each substance becomes more difficult.
- *Cannabis* is mainly consumed by adolescents and young adults – usually a population with good health status – who normally give up the use of *cannabis* between the third and the fourth decade of life, making more difficult the assessment of any long-term effect.[3]

A detailed description of the known acute and chronic impact of *cannabis* use on user's health will follow.

Acute effects

- Temporary feeling of euphoria and relaxation, distorted perception, intensification of the sensitive experiences.
- Short-term memory and concentration impairment.
- Mood swings may occur after heavy use; anxiety and paranoia are the most commonly described.

Panic attacks and psychotic symptoms, usually self-limited, are frequently described by users at *cannabis* first use.[4,5]

- A 20 to 100% rise in user's heart rate may occur, with a quick return to normal levels.

A rise in blood pressure may occur when the user is seated and it may descend when standing up, producing dizziness or faint. These cardiovascular effects are usually considered as clinically irrelevant, as tolerance is usually developed by most young users. However, serious effects may affect users with heart disease, even leading to cardiac death.[4,6,7]

- Toxicity of *cannabis* is very low and the risk of overdose has not been established.[5]

Chronic effects

- Immune system: there is no evidence that the immune system may be impaired by the *cannabis* use. Studies carried out with HIV-seropositive patients showed that *cannabis* is not associated with the progression to AIDS.[4,8-10]
- Respiratory system: the effects of smoking *cannabis* are similar to those of tobacco. A regular use of high doses may lead to chronic respiratory disorders and therefore increasing the symptoms of chronic bronchitis.[11,12]
- Carcinogenicity: in vitro studies failed to show that THC may induce body cell mutations leading to cancer.[12,13] There is however an evidence of a leverage effect of *cannabis* and tobacco on lung histopathological changes, similar to those prior to lung cancer in tobacco smokers.[4,5,11,12] In addition, different factors are against the development of lung cancer in *cannabis* smokers, namely due to the fact that patterns of *cannabis* use are different from those found with tobacco. *Cannabis* use tends to be limited in time and most smokers give up between the third and the fourth decade of life (age 20 to 30). Users that keep on smoking up to more advanced ages tend to smoke one to three *cannabis* cigarettes per day, compared to 10 to 30 cigarettes in tobacco smokers. Finally, there are less *cannabis* than tobacco smokers.[13]
- Reproductive system: an inhibition of the reproductive function by THC has been found in the few studies carried out in humans, even though inconsistent evidences have been produced. Based on animal research, is has been argued that fertility in men and women is probably reduced in the short-term by *cannabis* use.[14] It has been suggested that the possible effects of *cannabis* use on spermatogenesis and testosterone may be more significant in men already presenting with fertility impairment.[5]
- Pregnancy and child development: reduced birth weight has been associated with *cannabis* use during pregnancy although it does not seem to cause any developmental malformation.
- Mental health and cognitive function: the impact of *cannabis* use on the cognitive development remains uncertain. *Cannabis* use in adolescence may negatively affect mental health as young adults, with evidences of increasing the risk of psychotic symptoms and disorders which may increase with the use frequency. However, an increased *cannabis* use rate over the past thirty years was not associated with a corresponding increase in the rate of psychosis in the population.[15] Studies have suggested that *cannabis* is a moderate statistical risk factor and have described that 6% to 8% of the cases of schizophrenia could have been avoided should the use of *cannabis* had been removed in the general population of adolescents and young adults.[16-17] There are evidences that acute psychosis may be produced by very high doses of THC, even though most young *cannabis* smokers do not develop psychosis as these usually give up smoking in case of any adverse effect. Therefore, it has been suggested that the risk of development of psychosis associated with *cannabis* use is only higher in those patients using high doses of *cannabis* (and/or with high THC content) and already presenting with some vulnerability to psychosis (genetic or other).
- Depression and anxiety: a small increase in the risk of depression among current *cannabis* users has been found in a study involving a North-American national group of 7,000 adults aged 15 to 45.[18] No direct association has been established between *cannabis* use and suicide.[19]
- *Cannabis* effect on driving: a 2-7 times increased risk of traffic accidents seems to be associated with *cannabis* use.[20,21]
- Dependence risk: it has been suggested that approximately one out of 11 users becomes a regular *cannabis* user[22,23] and increasing among those who start consuming as adolescents (up to around 17% or one out of 6)[24] and among daily users (up to 25% - 50%).[5]

By comparison, around one third of tobacco smokers and 15% of alcohol users become dependent.[22,23]

- Reduction in opiate-related fatalities: a correlation between *cannabis* legalisation in Colorado and the reduction in opiate-related fatalities has been described in a recent study, countering the tendency found in the remaining North-American states.[25]
- Overdose: as shown in Table 1, from all the available drugs in the market, *cannabis* has the lowest risk of causing an overdose, even when compared with tobacco and alcohol.[21,24]
- Risk of intoxication: the level of intoxication produced by any substance "increases the social and personal damage that a substance may cause". *Cannabis* has been found as more intoxicating than tobacco in studies aimed at the assessment of the propensity of different psychoactive substances to produce intoxication, but less so than alcohol, cocaine or heroin.[26]

Table 1 – Rating on dimensions of danger (Adapted from EMCDDA, 2008)

	Safety ratio[25]	Intoxicating effect[26]	Dependence (how hard to quit)[26]	Potential addictiveness[27]	Degree of psychic dependence[28]
Cannabis	> 1000 smoked	Fourth highest	Lowest	**	Weak
MDMA	16 Oral	NR	NR	**	?
Stimulants	10 Oral	NR	NR	***	Middling
Tobacco	NR	Fifth highest	Highest	***	Very strong
Alcohol	10 Oral	Highest	Fourth highest	***	Very strong
Cocaine	15 Intranasal	Third highest	Third highest	***	Strong but intermittent
Heroin	6 Intravenous	Second highest	Second highest	*****	Very strong

NR: not rated; *: very mild; **: mild; ***:middling; ****: strong; *****: very strong
Source: EMCDDA

Dangerousness of *cannabis*

Dangerousness dimensions of different drugs including *cannabis* have been assessed by the Roques Committee (1999)[27] by considering general toxicity as corresponding to long-term risks such as cancer or liver disorder, to the risks associated with the mode of use and to short-term risks taking safety ratios into account. Social dangerousness refers to the states of comportment leading to aggressive or uncontrolled conducts (fights, robberies, crime, for instance), as well as risks for the user or others (in case of driving a vehicle).[27,28]

As shown in Table 2, we may find that *cannabis* is ranked with very weak toxicity, below alcohol and tobacco and involving a weak social dangerousness, also below alcohol.

Even considering that it is not the subject of this article, it is clear why the possible legalisation of the use of other drugs such as cocaine and heroin for recreational purposes should not be considered, from a public health point of view. Dangerousness associated with the use of these drugs, both for the user and for society is unacceptable and should therefore be strongly combated in such context (Table 3).

The Portuguese reality on *cannabis*

According with data from the EMCDDA and the SICAD, Portugal remains as an important transit point of the international drug trafficking, mainly regarding cocaine, while a large percentage of other drugs seized in Portugal was aimed at the local market. In 2015, most cocaine has been trafficked onward from Brazil and from the Antilles. Instead, the heroin that has been seized in Portugal came from Spain and The Netherlands, the ecstasy came mostly from The Netherlands and from France while the *cannabis* products mostly came from Morocco. As what happened over the past 10 years, the largest number of drug seizures were from hashish (4,180 in 2015; 3,472 in 2014; 3,087 in 2013; 3,298 in 2012; 3,093 in 2011), followed by cocaine and herbal *cannabis* (1,081 and 791, respectively)[29,30] (Fig.1).

As regards the degree of purity of the seized drugs, mean potency (% THC) of *cannabis* has been increasing over the past few years and herbal *cannabis* has reached in 2015 the highest mean levels since 2005.

Mean 'street' price of hashish has systematically been reduced from 2010 and it is currently in the region of € 2.50 / gram (2015).[29]

Still according to the most recent annual SICAD report (2016), *cannabis*, ecstasy and cocaine were the most preferred drugs by Portuguese users, showing a lifetime prevalence (at least one use experience) of 9.0%, 1.3% and 1.2%, respectively.[30]

Around 0.7% of the Portuguese population aged 15-64 and 1.2% of the young adult population has described symptoms of dependence with *cannabis* use, corresponding to around one quarter of those who have used *cannabis* over the past 12 months.[30]

As regards drug-related health risk awareness, *cannabis* is considered as the less dangerous to health by the young

Table 2 – Rating on global dimensions of dangerousness – General Toxicity and Social Dangerousness ([27]; adapted from [3])

	General toxicity	Social dangerousness
Cannabis	Very weak	Weak
Benzodiazepines (Valium®)	Very weak	Weak (except when driving)
MDMA/*Ecstasy*	Possibly very strong	Weak (?)
Stimulants	Strong	Weak (possible exceptions)
Tobacco	Very strong	None
Alcohol	Strong	Strong
Cocaine	Strong	Very strong
Heroin	Strong (except therapeutic use of opiates)	Very strong

Source: EMCDDA

Table 3 – A summary of adverse effects on health for heavy users of the most harmful common form of each of the four major drugs within the European market[3]

	Cannabis	Tobacco	Heroin	Alcohol
Traffic and other accidents	*		*	**
Violence and suicide				**
Overdose death			**	*
HIV and liver infections			**	*
Liver cirrhosis				**
Heart disease		**		*
Respiratory diseases	*	**		
Cancer	*	**		*
Mental illness	*			**
Dependence / addiction	**	**	**	**
Lasting effects on the foetus	*	*	*	**

* less common or less well-established effect; ** important effect
Source: EMCDDA

Portuguese people, according with the results of the Flash Eurobarometer – Young People and Drugs study carried out in 2014 among the European people aged 15-24 (34% in occasional and 74% in regular *cannabis* users). It is worth mentioning that the evolution of this awareness between 2011 and 2014 showed a higher awareness of health risk related to *cannabis* when compared with the responses of the young people from the remaining EU countries, in contrast to the European tendency.[30]

Legalisation of *cannabis* use for recreational purposes in other countries

Until now, *cannabis* use for recreational purposes has not been legalised in any of the countries in the European Union. The better known European models of control of *cannabis* regards the Dutch coffee-shops and the Spanish *cannabis* social clubs. However, these policies have been limited as regards their conception, leading to atypical solutions for complex issues, something that Uruguay and four North-American states have tried to avoid by assuming the way of legalisation and regulation.[31]

Uruguay was the first country in the world where *cannabis* production, supply and use by adults has been legalised for non-medical purposes in December 2013. Citizens are allowed to cultivate no more than six plants at home and to develop private clubs where significantly more plants may be produced (´*cannabis* clubs´). However, the federal government has the control over the whole value chain through a network of licensed points of sale, as well as by establishing the retail selling price. The application of the law has taken around two years and by August 2015 there were 2,743 registered domestic cultivators.[32,33]

Each client with a minimum age of 18 is required to be registered into a database at the Ministry of Health. In addition, purchase is limited to 40 grams per month. The price has been established at around $1 USD per gram, in order to efficiently combat the parallel market, close to the price of *cannabis* at the illegal market, imported from

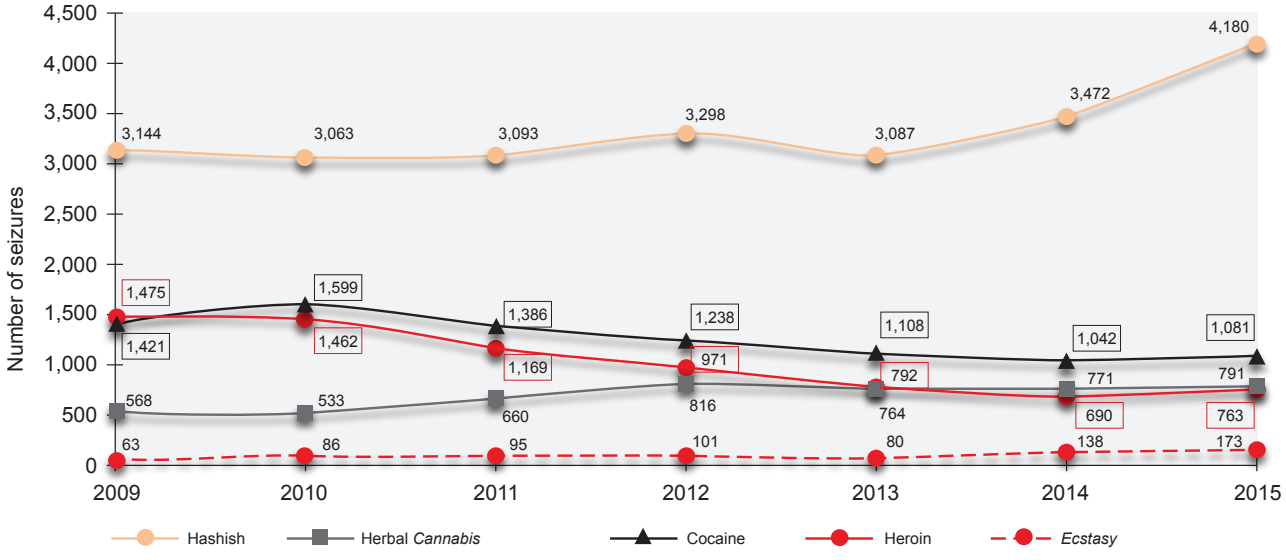

Figure 1 – Number of seizures, per year and type of drug (2009 - 2015)

Source: *Polícia judiciária: UNCTE / Serviço de intervenção nos comportamentos aditivis e nas dependências: DMI - DEI*

Table 4 – A summary of the characteristics of the legislation in countries/states that have followed legalisation

	Uruguay	Colorado	Washington	Oregon	Alasca
Regulated by	Instituto de Regulación y Control del Cannabis (IRCCA)	Department of Revenue (CDR)	Washington State Liquor and Cannabis Board (LCB)	Oregon Liquor Control Commission	Alaska Liquor Control Board
Quantity for individual possession	40 g	~28 g (one ounce)	~28 g (one ounce)	~224 g (eight ounces)	~28 g (one ounce)
Domestic cultivation for personal use and immediate share	6 plants (from which 3 mature)	6 plants (from which 3 mature)	Not allowed	4 (per household)	6 plants (from which 3 mature)
Minimum age (possession and use)	18	21	21	21	21
Potency limits	IRCCA may determine the percentage of THC in the authorised products (Government authorities have already mentioned a maximum limit of 15% THC)	Unspecified	Unspecified	Unspecified	Unspecified
Compulsory registration of users	Yes. It will be used to control all the modes of production and purchase.	No	No	No	No
Public use	According with anti-tobacco law	Banned (fine: $100 USD and 24-hour community work)	Banned (fine: $50 USD)	Banned (fine: up to $1,000 USD)	Banned (fine: $100 USD)
Driving	Driving not allowed under the presence of any amount of detectable THC in the body	Up to 5 ng THC / mL of blood	Up to 5 ng THC / mL of blood	Driving not allowed under the presence of any amount of detectable THC in the body	Driving not allowed under the presence of any amount of detectable THC in the body
Regulation of packaging and labelling	Yes: product must be preserved over a minimum six-month period and cannot exceed 10 g. Restrictions regarding labelling and packaging will be determined by the IRCCA.	Yes: amount, use frequency, ingredients and potency are regulated.	Yes: amount, use frequency, ingredients and potency are regulated.		
Advices on harmful effects on health	Unspecified, although these may be established by the IRCCA	Yes	Yes	Yes	Yes
Taxes	A value-added tax (VAT) has been established and applicable to the sale of *cannabis*	Around 30% total tax (15% consumption tax + 10% on sale + municipal taxes)	Before 1 Jul 2015, around 50% of the total price. From then onwards: 37%		
Publicity	All forms of direct or indirect forms of publicity are banned. All forms of publicity at public events, tournaments or competitions are also banned.	Allowed, although restricted, in order to avoid affecting those aged less than 21. A sign is allowed at the point of sale according to the local legislation.	Restricted to no more than one sign at the point of sale.	Doubtful	Doubtful

Paraguay. Smoking *cannabis* at the workplace is still illegal, as well as driving any sort of vehicle under its effect and offenders are fined, apart from facing other sanctions, including the destruction of the stored *cannabis* and the inhibition of appearing in the database and consequently the inhibition of legally buying any *cannabis*.[32,33]

The main objective of the law was openly to combat the illegal market and not to increase *cannabis* use. In contrast, there is some fear that access may be given to the personal and confidential information within the database and used for different purposes from those that stood for its creation.[33]

Whereas the reform in Uruguay was based on a central government initiative, regulation changes in the USA were based on public referendums at a state level. Legalisation has been approved by the voters in Colorado and in Washington during the 2012 elections and at the 2014 elections at the remaining states. In all these states, *cannabis* use is illegal at public spaces and sale has been limited to people aged 21 or above. California, Maine, Massachusetts and Nevada have more recently joined the list of those that opted for the legalisation. For this article, the authors opted to analyse those countries or states with a longer experience of the implementation of legalisation policies.

The major characteristics of the political changes in each of these countries and states that have been submitted to a legalisation procedure over 12 months ago are shown in Table 4.[31,33-35]

Even though legalisation is a very recent issue, there are already some data showing a significant impact on the law system. For instance, an 80% decrease in law and criminal investigation expenses related to *cannabis* has been found between 2010 and 2014, as shown in the recently published report of the Colorado Judicial Branch. The clear reduction in the number of charges related to *cannabis* possession is the main reason for this decline. In addition, a 78.4% reduction in the number of charges related to cultivation has been found from 2010 to 2014 (Table 5),[35] while a 23% reduction in all the expenses related to drug combat has been found since 2010 in Colorado, showing the key role that *cannabis* represented to the illicit drug market, as well as the implications of legalisation of *cannabis* into the reform of the criminal justice in general.

This report also showed a reduction in the number of arrests associated with synthetic *cannabis* since the opening of *cannabis* stores in 2014. According with the records of the district courts, a 50% decrease in arrests related to synthetic *cannabis* has been found in 2014, when compared to the previous year. Considering that the impact of *cannabis* on health is better known than those related to the synthetic forms, the potential reduction in the supply of these is often described as one of the benefits of legalisation.[35]

From the point of view of publicity associated with the *cannabis* marketing, a study carried out in Oregon has suggested that publicity restrictions are needed to protect citizens and particularly young adults against pro-*cannabis* messages. As the definition of such restrictions is a challenging issue, one may argue that such measures should be defined within the process of legalisation.[36]

In addition, another study on the *cannabis* market held in Washington has shown an increasing potency of *cannabis* products. This tendency is consistent with the investments made regarding innovation, development and marketing of characteristic products of the *cannabis* industry with profit purposes, established by the legal framework in Washington, under which the market and the price of *cannabis* is allowed to be shaped by the own market. It is worth mentioning that this was the spirit of the lawmaker within the legalisation of *cannabis* use for recreational purposes.[37]

DISCUSSION

Learnt lessons

Even though recent, there are important lessons to learn from the known processes of legalisation of *cannabis* use and that should be taken into account by those involved in following this pathway in other regions of the world.

- Identification of a clear objective: uncertainty on the subject that was intended to be solved as well as on the targets that were intended to be achieved has produced important delays in the implementation of the law in the states analysed.[31-38]
- Importance of planning before legislating: the lack of preparation of the North-American states of Colorado and Washington ended up in successive delays in the implementation of changes in legislation.[34-38]
- Definition of an adequate taxation framework: legalisation involves the challenge of establishing a well-balanced relationship between too high taxes (corresponding to a tendency of leading users back to the black market) and too low (leading to an increasing use). A 44% tax on the sale of *cannabis* has been established in the state

Table 5 – *Cannabis*-related expenses in the Courts of Colorado, 2010 - 2014[35]

Year	Possession	Supply	Cultivation	Total
2010	8.736	1.077	423	10.236
2011	8.501	987	415	9.903
2012	8.978	930	419	10.327
2013	2.739	553	144	3.436
2014*	1.922	23	91	2.036
Diferença 2010 - 2014	**-78.0%**	**-97.8%**	**-78.4%**	**-80.1%**

* based on data regarding only 49 weeks in 2014

of Washington and 28% in Colorado. The states have assumed that users would agree to pay more for the benefit of being able to legally and safely purchase the products. However, it has been found that the higher the tax the lower the impact of legalisation on combating the illegal sale. That being said, it is consensual that lower prices in Colorado have had a positive impact on the combat against the organised crime.[31,39-42]

- Importance of regulation: control over product formats and contents is an urgent subject, as well as the implementation of clear rules of taxation, monitoring and publicity.[41,42]
- Prevention: avoiding *cannabis* use by young people through controlling the access, by investing in health promotion programs, prevention, awareness and education for young people and their parents.[36,38,42]
- Empowerment: empowerment of the public administration in order to act according with the new regulation framework.[38]
- Leadership: building a strong central leadership, which should involve all partners into an open and continuous collaboration process.[38,39,42]
- Scientific research: investment in prospective scientific research aimed at establishing increasingly stronger evidences.[39-41]
- Data management: accurate collection of all data related to cultivation, supply, sale and use.[38,39,42]

Arguments for the legalisation of *cannabis* use

As described above and after a comprehensive literature review, the major arguments for a possible legalisation of *cannabis* use are described as follows:

- There will be a larger control of the market and *cannabis* is the major source of income for the organised crime.[35,40-42] Therefore, legalisation of *cannabis* use will lead to a reduction in the major source of income for drug traffickers, while protecting citizens in general and users in particular, who will obtain and use products with a regulated and known composition.[1,42]
- Even though recent, changes in law that occurred at some North-American states have shown a significant impact allowing for a reduction in the number of charges and subsequent financial costs,[34-36] as well as a reduction in the number of arrests associated to *cannabis*.[35]
- A reduction in the use of *cannabis* derivatives, as well as synthetic *cannabis* forms (with less known impact, even though tendentially more harmful) has been also found until now, as regards the North-American law changes.[34,36]
- A compulsory registration of any *cannabis* purchase, such as what happens in Uruguay, allowed the Government to supervise the use patterns, as well as the implementation of a minimum age for the use, the early detection of possible deviating patterns and allowing for a timely intervention both regarding criminal investigation and healthcare.
- The regulated sale of *cannabis* will generate an important source of tax revenue,[1] which may be used for the combat against drug trafficking, for the prevention of problematic use, for dependence treatment as well as for the promotion of health education policies.
- Through regulation, the State will be able to demand for adequately identified packaging containing *cannabis*, with advice messages regarding its potentially harmful effects and to ban all forms of publicity and regulate the points of sale, as well as the model of production licensing.

From a public health perspective

- There will be a regulated control and increased quality of the products on the legal market, leading to a reduction in the number of hospital admissions or emergency episodes caused by the use of phencyclidine (PCP)-laced *cannabis*, for instance.[40]
- There will also exist a reduction in the adverse effects of *cannabis*, as a fall in the use of synthetic *cannabis* is estimated,[34-36] as well as a reduction in the current tendency of the use of products with progressively higher THC content.[40,43]
- A concomitant reduction in alcohol consumption (alcohol consumption has a significantly poorer impact on public health and on society) has been found in the regions where *cannabis* use has already been legalised.[34,38,39]
- Based on the abovementioned experience, a potential reduction in the number of traffic accidents and related fatalities is expectable; even though it is clear that THC has a harmful effect on the functions related to vehicle driving,[44-47] a reason why driving any vehicle under its effect is illegal, *cannabis* use legalisation has been associated to a 13% reduction in traffic-related fatalities involving alcohol.[48] It is worth mentioning that in the scenarios in which legalisation of *cannabis* use took place, ban of driving under the effect of these drugs has always been considered.

Finally, social and economic impacts are also expectable, regarding the national situation:

- Portugal will become more efficient regarding the combat against drug trafficking, as more resources will become available for the police as well as for criminal research.
- As the mean potency of *cannabis* has increased in Portugal over the past few years,[29-30] a reduction in the concentration of THC is expectable in most of the products that would be consumed within the regulated market.
- As *cannabis* sales currently corresponds to around half of the market of illicit drug trafficking, it is even expectable a significant reduction in drug-related criminal activity.[30]

Proposals for the responsible legalisation of *cannabis* use in Portugal

A debate involving the different representatives of the society on the recommendations that follow has been

proposed by the authors, aimed at the implementation of a responsible and safe legalisation of *cannabis* use in Portugal.

In particular, it is suggested that:

- Legalisation of *cannabis* use is aimed at reducing supply and drug use in Portugal, allowing for a more efficient combat against drug trafficking, preventing and better treating dependence, increasing the levels of health education of young people and the remaining population and, last but not least, improving safety for all.
- The legalisation of *cannabis* use exclusively for personal recreational purposes should be limited to adults aged 21 and above. The authors suggest that a future alignment with the legislation on alcohol and tobacco would be possible, as regards the definition of a limit at the age of 18. However, in the absence of strong enough scientific evidence to ensure protection under the age of 21, particularly as regards the association of *cannabis* use with schizophrenia, it is considered that the proposed age, in association with the remaining measures, will minimize these risks while there are not enough scientific evidences to ensure the safety of citizens.
- Any purchase of *cannabis* should require the registration and input of the user data into a central database, ensuring an analytical monitoring of the use patterns, particularly in order to early detect possible attempts of purchase for subsequent illegal sale.
- The entire chain of cultivation and supply of *cannabis* should be clearly regulated.
- Sale should only occur at community pharmacies, reinforcing the perception that it actually is a drug and ensuring the quality of the product to be dispensed to users.
- Pharmacies that sell the product should become responsible for the registration of the user and user's data input into the central database.
- Purchase should be limited to the amount of *cannabis* considered as enough for a personal and daily use.
- All forms of publicity, including packaging, should be banned.
- Advice messages should be included in all packages, regarding the harmful effects on user's health, including the banned use by patients with cardiovascular disease and pregnant women.
- A detailed description on the composition of the product should be included in the package.
- The THC product content should be regulated in order to ensure removal of high potency psychoactive *cannabis* (more harmful) from the market.
- The sale of all forms of synthetic *cannabis* or laced with other products that potentiate their psychoactive effects should be banned.
- Such as with tobacco, the sale of flavouring-enriched *cannabis* appealing to the use should be banned.
- *Cannabis* use at the workplace and in public places, including urban parks and in the proximity of schools should be banned.
- Vehicle driving by those having consumed *cannabis* should be banned.
- The sale of edible and drinkable products containing *cannabis*, as well as other secondary products should be totally banned, particularly due to its delayed psychoactive effects as well as the difficult control by the user on the dose intake.
- The final price per gram of *cannabis* should be equivalent to the sale price at the illegal market, in order to eradicate trafficking.
- Prospective scientific studies on the acute and chronic physical and mental effects of *cannabis* use, as well as studies on the impact of the application of the new legislation should be financed by the State.
- Taxes obtained through the sale of these products should be exclusively aimed at the following:

  Reinforcement of the budget of the police forces and criminal investigation involved in combating against drug trafficking, prevention of use, treatment of dependence (including programs for damage reduction) and also implementation of a vertical program for health education, through the development of an autonomous subject to be taught throughout all the years of compulsory education.
- Tools for population free access (telephone line and internet website, for instance) allowing for query handling and for demanding for help (where to start a treatment program) should be developed.

CONCLUSION

It follows from the above that:

- The recent examples of countries and states in which *cannabis* use has been legalised allowed for important lessons: this impulse could be used in Portugal to build up an innovative policy of safe and responsible legalisation of *cannabis* use, based on a public health approach and assuming the global leadership on following evidence-based good practices, such has what happened in Portugal with the introduction in 2011 of a policy for the decriminalisation of drug use.
- Drug supply and use may be reduced with the legalisation of *cannabis* use: even with a small initial increase in *cannabis* use, a reduction in the rate of consumption of alcohol and other more harmful drugs is expectable.
- *Cannabis* represents the largest source of income to the organised crime and Portugal remains as an important point of transit for the international drug trafficking: legalisation would remove the main source of income for traffickers, whereas an important source of tax revenue would be generated by the State and more public resources (that would therefore become available) could be oriented to the combat against illicit drug trafficking as well as to health education.
- Contradicting results and dubious quality studies on the effects of *cannabis* keep on being presented.

Legalisation of *cannabis* use would allow for an improved

knowledge on *cannabis* impact on health and therefore ensuring that the information reaching the final user as well as the preventive measures to be implemented would be more cost-effective and adequately based on stronger scientific evidence.

CONFLICT OF INTEREST

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REFERENCES

1. The Economist. Legalizing cannabis: reeferegulatory challenge. London: The Economist Newspaper Limited; 2016.
2. Macleod J, Oakes R, Copello A, Crome I, Egger M, Hickman M, et al. Psychological and social sequelae of cannabis and other illicit drug use by young people: a systematic review of longitudinal, general population studies. Lancet. 2004;363:1579–88.
3. EMCDDA. A cannabis reader: global issues and local experiences. 2008. Publications Office of the European Union: Luxembourg. Monograph series 8, volume 2.
4. Lafaye G, Karila L, Blecha L, Benyamina A. Cannabis, cannabinoids and health. Dialogues Clin Neurosci. 2017;19:309-16.
5. Sidney S. Cardiovascular consequences of marijuana use. Am J Clin Pharmacol. 2002;42:64–70.
6. Desai R, Patel U, Sharma S, Amin P, Bhuva R, Patel MS, et al. Recreational marijuana use and acute myocardial infarction: insights from nationwide inpatient sample in the United States. Cureus. 2017;9:e1816.
7. Roth MD, Whittaker K, Salehi K, Tashkin DP, Baldwin GC. Mechanisms for impaired effector function in alveolar macrophages from marijuana and cocaine smokers. J Neuroimmunol. 2004;147:82–6.
8. Kraft B, Kress HG. Cannabinoids and the immune system: of men, mice and cells. Schmerz. 2004;18:203–10.
9. Suárez-Pinilla P, López-Gil J, Crespo-Facorro B. Immune system: a possible nexus between cannabinoids and psychosis. Brain Behav Immun. 2014;40:269–82.
10. Tashkin DP, Baldwin GC, Sarafian T, Dubinett S, Roth MD. Respiratory and immunologic consequences of marijuana smoking. J Clin Pharmacol. 2002;42:71–81.
11. Sherrill DI, Krzyzanowski M, Bloom JW, Lebowitz MD. Respiratory effects of non-tobacco cigarettes: a longitudinal study in general population. Int J Epidemiol. 1991;20:132–7.
12. Hall W, MacPhee D. Cannabis and cancer. Addiction. 2002;97:243–7.
13. Kalant H. Adverse effects of cannabis on health: an update of the literature since 1996. Prog Neuropsychopharmacol Biol Psychiatry. 2004;28:849–63.
14. Hall W, Degenhardt L. Adverse health effects of non-medical cannabis use. Lancet. 2009;374:1383–91.
15. Degenhardt L, Hall W, Lynskey M. Testing hypotheses about the relationship between cannabis use and psychosis. Drug Alcohol Depend. 2003;71:37–48.
16. Arseneault L, Cannon M, Witton J, Murray R. Causal association between cannabis and psychosis: examination of the evidence. Br J Psychiatry. 2004;184:110–7,
17. Henquet C, Krabbendam L, Spauwen J, Kaplan C, Lieb R, Wittchen HU, et al. Prospective cohort study of cannabis use, predisposition for psychosis, and psychotic symptoms in young people. BMJ. 2005; 330: 11–14.
18. Chen CY, Wagner FA, Anthony JC. Marijuana use and the risk of major depressive episode epidemiological evidence from the United States National Comorbidity Survey. Soc Psychiatry Psychiatr Epidemiol. 2002;37:199–206.
19. Moore TH, Zammit S, Lingford-Hughes A, Barnes TR, Jones PB, Burke M, et al. Cannabis use and risk of psychotic or affective mental health outcomes: a systematic review. Lancet. 2007;28;370:319-28.
20. EMCDDA. Drug use, impaired driving and traffic accidents, EMCDDA Insights. Luxembourg: Publications Office of the European Union; 2008.
21. Sachs J, McGlade E, Yurgelun-Todd D. Safety and toxicology of cannabinoids. Neurotherapeutics. 2015;12:735–46.
22. Lopez-Quintero C, Pérez de los Cobos J, Hasin DS. Probability and predictors of transition from first use to dependence on nicotine, alcohol, cannabis, and cocaine: results of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). Drug Alcohol Depend. 2011;115:120-30.
23. Anthony JC. The epidemiology of cannabis dependence. In: Roffman RA, Stephens RS, editors. Cannabis dependence: its nature, consequences and treatment. Cambridge: Cambridge University Press; 2006. p.58-105.
24. Gable RS. Comparison of acute lethal toxicity of commonly abused psychoactive substances. Addiction. 2004;99:686–696.
25. Anderson DM, Hansen B, Rees DI. Medical marijuana laws, traffic fatalities, and alcohol consumption. J Law Econ. 2013;56,333–69.
26. Strategy Unit. Strategy unit drugs report, May 2003. Prime Minister's Strategy Unit, London. 2005. [consultado 2017 dez 17]. Relatório completo disponível em: http://image.guardian.co.uk/sys-files/Guardian/documents/2005/07/05/Report.pdf
27. Roques B. La dangerosité de drogues: rapport au secrétariat d'État à la santé [The dangerousness of drugs: report to the state secretariat for health]. Paris: La Documentation française Odile Jacob; 1999.
28. Reilly D, Didcott P, Swift W, Hall W. Long-term cannabis use: characteristics of users in an Australian rural area. Addiction. 1998; 93:837–46.
29. EMCDDA. Portugal - Country Drug Report. 2017. [consultado 2018 jan 25]. Disponível em: http://www.emcdda.europa.eu/countries/drug-reports/2017/portugal_pt
30. SICAD. Relatório Anual 2015 - A Situação do País em Matéria de Drogas e Toxicodependências. 2016. [consultado 2017 dez 17]. Disponível em: http://www.sicad.pt.
31. Pardo B. Cannabis policy reforms in the Americas: a comparative analysis of Colorado, Washington and Uruguay. Int J Drug Policy. 2014;25;727-35.
32. Infobae. Uruguay ya tiene registrados a 2743 cultivadores de marihuana. 2015. [consultado 2017 dez 17]. Disponível em: http://www.infobae.com/2015/08/10/1747473-uruguay-ya-tiene-registrados-2743-cultivadores-marihuana.
33. McKay T. One year after Uruguay legalized marijuana, here's what it's become. 2014. [consultado 2017 dez 17]. Disponível em: http://mic.com/articles/106094/one-year-after-uruguay-legalized-marijuana-here-s-what-it-s-become#.7wbZaO6cu.
34. Canadian Centre on Substance Abuse. Cannabis regulation: lessons learned in Colorado and Washington State. 2015. [consultado 2017 dez 17]. Disponível em: http://www.ccsa.ca/Resource%20Library/CCSA-Cannabis-Regulation-Lessons-Learned-Report-2015-en.pdf.
35. Gettman J. Marijuana arrests in Colorado after the passage of amendment 64. Drug Policy Alliance release. 2015. [consultado 2017 dez 17]. Disponível em: http://www.drugpolicy.org/sites/default/files/Colorado_Marijuana_Arrests_After_Amendment_64.pdf.
36. Fiala SC, Dilley JA, Firth CL, Maher JE. Exposure to marijuana marketing after legalization of retail sales: Oregonians' experiences, 2015–2016. Am J Public Health. 2018;108:120-7.
37. Smart R, Caulkins JP, Kilmer B, Davenport S, Midgette G. Variation in cannabis potency and prices in a newly legal market: evidence from 30 million cannabis sales in Washington state. Addiction. 2017;112:2167–77.
38. Caulkins J, Hawken A, Kilmer B, Kleiman M. Marijuana legalization what everyone needs to know. Oxford: Oxford University Press; 2012. p.160-72.
39. Anderson DM, Rees DI. The Legalization of recreational marijuana: How likely is the worst-case scenario? J Policy Anal Manage. 2014;33:221-32.
40. Caulkins J. Nonprofit motive: how to avoid a likely and dangerous corporate takeover of the legal marijuana market. Washington Monthly. 2014. [consultado 2017 dez 17]. Disponível em: http://www.washingtonmonthly.com/magazine/marchaprilmay2014/features/nonprofit motive049293.php?page=all.
41. Room R. Legalizing a market for cannabis for pleasure: Colorado, Washington, Uruguay and beyond. Addiction. 2013;109:345-51.
42. The Economist. Regulating cannabis: the right way to do drugs. The

Economist Newspaper Limited: London; 2016.
43. Tashkin DP. Effects of marijuana smoking on the lung. Ann Am Thorac Soc. 2013;10:239-47.
44. Kelly E, Darke S, Ross J. A review of drug use and driving: Epidemiology, impairment, risk factors and risk perceptions. Drug Alcohol Rev. 2004;23,319–44.
45. Sewell RA, Poling J, Sofuoglu M. The effect of cannabis compared with alcohol on driving. Am J Addict. 2009;18,185–93.
46. Marczinski C, Harrison EL, Fillmore M. Effects of alcohol on simulated driving and perceived driving impairment in binge drinkers. Alcohol Clin Exp Res. 2008;32,1329–37.
47. Ronen A, Gershon P, Drobiner H, Rabinovich A, Bar-Hamburger R, Mechoulam R, et al. Effects of THC on driving performance, physiological state and subjective feelings relative to alcohol. Accid Anal Prev. 2008;40,926–34.
48. Livingston MD, Barnett TE, Delcher C, Wagenaar AC Recreational cannabis legalization and opiod-related deaths in Colorado, 2000-2015. Am J Public Health. 2017;107:1827-29.