Public Health and the Harm Reduction Approach to Illegal Psychoactive Substances☆

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Introduction—Shifting Sands

Debate over the failure and harmful consequences of psychoactive substances prohibition, and discussion about improving psychoactive substances policy is escalating at local, national, and international levels (Wood et al., 2012; Carter and MacPherson, 2013; United Nations Office of Drugs and Crime, 2015). There have been repeated calls for modernizing the current drug control system by many international leaders represented by the Global Commission on Drug Policy (2011, 2012, 2014), South American leaders (Latin American Commission on Drugs and Democracy, 2009; Organization of American States, 2013), academics (Buxton et al., 2008), health-care service providers (Centre for Addictions and Mental Health, 2000; Wodak, 2012), lawyers (King County Bar Association, 2005), and law enforcement representatives (Law Enforcement Against Prohibition, 2016).

These calls for change include recommendations to adopt a public health approach to regulation and management of currently illegal psychoactive substances. The purpose of this article is to describe the context and status of illegal psychoactive substances policy reform and current drug management models; and to summarize the concept of the "public health approach" to psychoactive substances, with particular reference to currently illegal substances.

Internationally, psychoactive substances policy reform momentum is reflected in a variety of documents that propose significant policy changes:

- A number of publications and in particular two guides by the UK organization Transform that emphasize the public health orientation to regulating drugs i.e., *After the War on Drugs: Blueprint for Regulation* (Rolles, 2009) and *How to Regulate Cannabis: A Practical Guide* (Rolles and Murkin, 2013).
- Room et al. (2010), in *Psychoactive Substances Policy: Moving Beyond Stalemate* discuss alternatives to prohibition and propose a "Framework Convention on Cannabis Control" based on the "Framework Convention on Tobacco Control."
- Haden (2008) described a public health–oriented regulatory model for stimulants.
- Haden and Emerson (2014) described a vision for a public health–oriented regulatory model for cannabis and the Center for Addictions and Mental Health published a policy framework for cannabis based on a public health approach (Crépault, 2014).
- Haden et al. (2016) described a public health–based vision for the management and regulation of psychedelics.

☆*Change History*: October 2017. Brian Emerson and Mark Haden made minor changes to the article.

The XVIII International AIDS Conference (AIDS, 2010) in Vienna produced the Vienna Declaration, an official statement seeking to improve community health and safety by calling for incorporation of scientific evidence into illegal drug policies. The declaration in part stated "The criminalisation of illicit drug users is fuelling the HIV epidemic and has resulted in overwhelmingly negative health and social consequences. A full policy reorientation is needed . . . Basing drug policies on scientific evidence will not eliminate drug use or the problems stemming from drug injecting. However, reorienting drug policies towards evidence-based approaches that respect, protect and fulfil human rights has the potential to reduce harms deriving from current policies and would allow for the redirection of the vast financial resources towards where they are needed most: implementing and evaluating evidence-based prevention, regulatory, treatment, and harm reduction interventions" (International Centre for Science in Drug Policy, 2010).

The United Nations has recognized that deliberate international discussions about pressures for changing drug policy are needed, and conducted a General Assembly Special Session in 2016 (UNGASS, 2016) to address this issue (United Nations, 2016). While the outcome document of that session did not contain the substantive changes anticipated by a number of civil society and reform-minded countries, there were substantial and frank discussions about the need to reorient the approach to one that places greater emphasis on public health and human rights (Emerson's experience from attending the UNGASS 2016 and Side Events, personal communication).

Harms of Drug Use and Harms and Failures of Drug Prohibition

This shift in views on drug policy is in part driven by the recognition of the importance of distinguishing the harms from consuming substances (e.g., acute toxic or chronic effects, substance use disorders, and negative effects resulting from unsupervised use) from the harms of the social and political "control" policies (e.g., production of adulterated or concentrated products, sharing needles that fuel the spread of HIV and hepatitis, illegal market violence, adverse health and social effects, and costs of enforcement and incarceration).

Harms of Drug Use

Drug use can be harmful at both the individual and the population level. At the individual-level psychoactive substance effects are no different than any other substances (including food) which are taken into the body, in that they may exert harmful or beneficial effects.

The harmful effects to the individual can be acute (i.e., occur within a short time of taking the substance) such as toxicity, intoxication; or chronic such as damage to lungs or heart, or result in development of a substance use disorder. These effects may include overdose, injuries, noncommunicable diseases, mental disorders, and infectious diseases (Babor et al., 2010b).

The risk of "addiction" or "dependency" to psychoactive substances is particularly concerning. A minority of people who use substances develop patterns of use that jeopardize their health or adversely affect their families, friends, and community. Anthony et al. (1994) reported that the prevalence of lifetime dependence is around 9% among persons who ever used cannabis, 32% for tobacco, 23% for heroin, 17% for cocaine, 15% for alcohol, and 11% for stimulant use.

The converse of these statistics is that most drug use is non-problematic. Based on an online survey of illegal drug users, Reneau et al. (2000) concluded that "many individuals use drugs and lead productive, successful lives." This should not be a surprise given the fact that nonproblematic use is the norm for most people who use Western societies' most popular drug, alcohol, and that opioids such as methadone and buprenorphine are used as effective components of medication- assisted treatment of people with opioid use disorder (Amato et al., 2005; Oviedo-Joekes et al., 2009).

Nonproblematic or beneficial use of illegal drugs has been described by Hart et al. (2012), who noted that the research literature on problems associated with the use stimulants are exaggerated, and that much use is probably nonproblematic. In a large study spanning 19 countries, a World Health Organization study noted that most cocaine use was nonproblematic and that "Use of coca leaves appears to have no negative health effects and has positive therapeutic, sacred and social functions for Indigenous Andean populations" (World Health Organization, 1995).

At the population level the "burden of disease" is the most common measure of harms. The Global Burden of Disease (Lim et al., 2013) study examined risk factors for deaths and disability-adjusted life years (DALYs; sum of years lived with disability and years of life lost) for 67 risk factors and risk factor clusters across 21 global regions in 2010. Drug use deaths and DALYs were derived from estimates of the proportion of the population reporting use of cannabis, opioids, and amphetamines, and proportion of the population reporting use of injecting drugs. Outcomes that were included were drug use disorders; schizophrenia; HIV/AIDS; aggregate of diseases due hepatitis B and hepatitis C; and intentional self-harm.

It should be noted that violence related to drug use and enforcement of drug laws was not included in these estimates. For example, in Mexico alone in the period from 2006 to 2012 homicides increased from around 10,000 per year to around 25,000 per year, most being attributed to drug-related violence (Csete et al., 2016).

For drug use, the authors estimated that in 2010 there were 157,805 deaths (men = 109,420, women = 48,385) and 23 810,000 DALYs (men = 16,248,000, women = 7,562,000).

When compared to 1990, the ranking of drug use as a risk factor (using DALYs) increased from 25th to 19th, indicating the growing importance of this problem.

Harms and Failures of Prohibition

The policy of prohibition has relied heavily on enforcement as a tool. However, globally and historically, enforcement actions against illegal drug markets have many adverse consequences.

Examples echo throughout history. Windle (2013), for example, documented the repressive actions of Chinese officials during the 1906–17 opium suppression intervention which resulted in rural population property destruction, land confiscation, poverty aggravation, public torture, humiliation, execution, and its contribution to the fragmentation of China. A meta analysis of over 900 studies Jürgens et al. (2010) reported on the link between drug prohibition, human rights abuses and the subsequent vulnerability to HIV infection, and reduced access to services. The causal relationship between the global HIV epidemic and illegal drug policies was described by Wolfe (2004). Drug prohibition has resulted in abusive law enforcement practices, mass incarceration, extrajudicial executions and denial of basic health services (Barrett et al., 2008). A number of authors have noted that execution of people convicted of drug trafficking and other drug-related offenses is a penalty that should be abolished as it is both ineffective as a policy measure and abhorrent in terms of human rights violation (Lines, 2010; Gallahue, 2011; Edwards et al., 2011).

Gomis (2014) notes that drug prohibition has led to a reduction of international security "given its scale, the number of deaths related to trafficking and consumption it creates, and the organized crime and corruption it fuels." He notes that prohibition has been "ineffective in reducing the size of the market and in preventing the emergence of new drugs and drug routes that cause and shift instability around the world." Data that reflect the harms of prohibition assembled from a number of sources by Gomis include the following:

- Mexico's government estimates that over 70,000 people have died in drug-related killings in the country since 2006. Over 26,000 people, believed to be connected to the trade, have disappeared over the same period.
- In the United States, the world's largest drug market, the number of people arrested annually for possession only almost tripled between 1982 and 2007, from approximately 530,000 to 1,520,000. Furthermore, approximately 500,000 people are now in jail for drug-related offenses (including for possession, trafficking, production etc.), a tenfold increase from 1980. For comparison, the US population has only grown by approximately 40% over the same period.
- In the United Kingdom black and Asian people are, respectively, 6.3 times and 2.5 times more likely to be stopped and searched for drugs than whites, although consumption levels among black and Asian people are in fact lower.

It is paradoxical that these consequences are overseen by a United Nations organization, the United Nations Office of Drugs and Crime (UNODC), as the UN was established as an organization to promote and defend human rights around the globe. It is an inherent contradiction that the UNODC is responsible for promoting and expanding the current international drug control system which has led to the so much denial of human rights and consequent harms. While the UNODC has not publicly changed their position of support for drug prohibition, there is some indication of change, as indicated by their draft paper on decriminalization of drug use and possession for personal consumption (United Nations Office of Drugs and Crime, 2015). In response to dissatisfaction with the UN lead prohibition-oriented drug control system, many countries are finding flexibility within the existing treaties (Bewley-Taylor, 2003), proposing revision of the treaties, or withdrawal from this system which is harmful to both individuals and public health (Room and Reuter, 2012).

A systematic review of research investigating the association between drug law enforcement and drug-related violence concluded that increased levels of enforcement activity have paradoxically been associated with increased drug market violence (Werb et al., 2011b). The authors indicate that this may be due to removal of key players creating financial opportunities for others to enter the market and subsequent competition. Another factor they noted is the increased militarization of organized crime, and resulting increased violence, in the face of increased enforcement activity. In addition it has been reported that incarceration of adults may actually promote youth drug use (Roettger et al., 2011).

There is also increasing recognition of the failure of prohibition to effectively reduce access to substances. For example, in the United States in 2014 37% of 8th graders, 67% of 10th graders, and 81% of 12th graders reported that cannabis is fairly or very easy to get (Johnston et al., 2015). This is despite an estimated US$10 to US$18+ billions per year spent since 1990 on prohibition implementation measures (Stop the Violence BC, 2011).

In fact, in spite of this vast expenditure that was designed in part to increase the price of drugs, prices have actually decreased while the purity of drugs has increased worldwide (Werb et al., 2013). This study showed that in the United States, "the average inflation-adjusted and purity-adjusted prices of heroin, cocaine and marijuana decreased by 81%, 80%, and 86%, respectively, between 1990 and 2007, whereas average purity increased by 60%, 11%, and 161%, respectively."

Given this knowledge about the harms and limitations of prohibition, it is surprising that this discussion rarely makes it into the public dialogue. The contrast between a scientific, evidence-based approach to understanding drug issues and the ideological, political approach of those who challenge harm reduction and promote a prohibitionist response has been explored by many researchers. Johnson (2010) described the collapse of scientific integrity in drug policy in the UK. Hart et al. (2012) observed a bias in the literature examining methamphetamine use where researchers exaggerated the harms. Kerr and Wood (2008) noted how the misrepresentation of science undermines HIV prevention, and Kerr et al. (2010a) also observed the arguably unethical position of not responding to the evidence for prescribing heroin. Koren et al., 1989 reported on the bias against research showing no harm of cocaine use during pregnancy. Schechter (2002) documented the misuse of his data by opponents of needle exchange. Wood et al. (2008) describes a serious breach of international scientific standards relating to the Canadian government's handling of supervised injection research, and the lack of consideration of the evidence and the manipulation of science for ideological reasons in the analysis of harm reduction programs.

In summary it is increasingly being recognized that the policy of indiscriminate psychoactive substances prohibition has failed to achieve its intended goals and results in many harmful health and human rights consequences for people who use substances, criminal justice personnel, families, communities, and society. See Table 1 for a categorization of and additional details about the harms of prohibition.

Table 1 Harms of prohibition

Harm category	*Examples of harms*
1. Effects on prohibited substances	• Concentration of product is maximized—easier to transport and conceal, greater profits, greater risk for consumers • Leads to more dangerous modes of consumption, that is, injecting, smoking • Impurities, some of which are toxic (e.g., PMMA in ecstasy)
2. Effects on substance users	• Health effects—overdose, death, fuel spread of HIV and hepatitis, TB, injuries, abscesses, vein thrombosis, endocarditis, risks of carrying drugs in body cavities • Creation of secret and dangerous rituals of drug use to avoid detection such as injecting in back alleys • Violence directed at users as part of police seizures to secure drugs before tossing • Violence from other users and dealers • Switch, other more dangerous drugs during scarcities • Working difficult, low-paying jobs, aggravation poverty • Stigmatization and discrimination, isolation from services (especially for people with mental disorders) • Involvement in the sex trade to buy substances • Recruitment of youth to reduce risk for dealers • Vicious cycle of drugs, imprisonment, poor relationships, more drugs • Involvement in other criminal activities, including forced involvement in illegal activities such as sex trade and transporting drugs • Incarceration, sometimes for long periods which solidifies criminal behavior • Criminal records which can prevent employment, school loans, travel, etc.
3. Effects on criminal justice personnel	• Violence—injuries and death • Worker stress and anxiety • Bribery and corruption • Overcrowded prisons • Lack of respect for police • Property forfeiture, where the profits go to police departments can be a corrupting influence • Police have to use more intrusive measures due to the fact that most drug crimes are between consenting individuals, increasing risk to and stress to enforcement personnel
4. Effects on families	• Inability to care for children due to incarceration, involvement in drug trade which is not conducive to child care • Much time spent on searching for drugs and money, lead to difficulties holding down steady jobs, supporting families, maintaining solid relationships • Distrust of friends and family • Destabilized users lives adversely affecting families
5. Effects on communities	• Small underground labs that are very difficult to control, produce product of hazardous quality, damage houses, and disrupt communities • Creates a community of users, making it difficult for users to leave the community • Gives rise to a distinct culture of drug use, specialized knowledge, status, excitement • By driving "controlled" users out of the community with strict enforcement and severe penalties, drug enforcement decreases the likelihood that new users would learn techniques for managing and controlling drug use from experienced users • Drug trade violence • Drug-related crime • Police surveillance and invasion of homes • Selective enforcement against racial minorities and other marginalized members of society • Prevents aboriginal spiritual practices (peyote, ayahuasca)
6. Effects on society—provincial, national, international	• Results in creation of an illegal market, fuels organized crime • Enforcement pressure increases the number of individuals involved with organized crime as the organization heads create more layers in the organization to insulate themselves from police • Federal rules and regulations contribute to fewer doctors wanting drug users as patients which limits treatment accessibility • Barrier to health and social service provision • Deprives provinces of greater role in regulation of this health issue as the federal government is responsible for criminal drug laws • Treatment for substance use disorders poorly developed and insufficiently funded • Loss of therapeutic opportunities for some substances • Difficulty in conducting research due to illegal nature of some substances and shaping research by social, economic, and political forces such that there have been restrictions on research concerning therapeutic and beneficial use (e.g., psychedelic medicine, cannabis therapeutics), as well as restricting the application of such research into mainstream therapeutic practices • Lack of respect for law and therefore lack of respect for government • Distracts from major sources of psychoactive substance harm—tobacco and alcohol • Drug trade funded military conflicts, terrorism

Table 1 (Continued)

Harm category	*Examples of harms*
	• Destabilizes economic markets • International tension regarding ideological based approaches • Environmental damage from illegal drug labs and herbicide spraying • Political instability for some governments • Loss of government and local revenue opportunities • Opportunity cost—better spending of public funds • Use of detention centers in which people who may have used illegal substances are arbitrarily incarcerated, physically abused, and forced to labor • Ineffective school-based education for young people which results in missed prevention opportunities and leads youth to distrust adults

From International Centre for Science in Drug Policy (2010). The Vienna Declaration. http://www.viennadeclaration.com/index.html; Anon (2015). Count the Costs. http://www.countthecosts.org/; Barrett, D., Lines, R., Schliefer, R., Elliot, R. and Bewley-Taylor, D. (2008). Recalibrating the regime: the need for a human rights based approach to drug policy. UK: The Beckley Foundation and the International Harm Reduction Association; Beauchesne, L. (2005). Les Drogues: les coûts chachés de la prohibition, Lanctôt Éditeur, 175–181; Carstairs, C. (2006). Jailed for possession: Illegal drug use, regulation, and power in Canada, 1920–1961. Toronto: University of Toronto Press; Carter, C. and MacPherson, D. (2013). Getting to tomorrow: A report on Canadian drug policy. Vancouver: Canadian Drug Policy Coalition; DeBeck, K., Wood, E., Montaner, J. and Kerr, T. (2006). Canada's 2003 renewed drug strategy—An evidence-based review. HIV/AIDS Policy Law 11 (2/3), pp. 1–11; Kerr, T., Small, W. and Wood, E. (2005). The public health and social impacts of drug law enforcement: A review of the evidence. *The International Journal on Drug Policy* **16**, 210–220; Nutt, D., King, L. and Nichols, D. (2013). Effects of Schedule I drug laws on neuroscience research and treatment innovation. *Nature Reviews. Neuroscience* **14**(*8*), 577–585; Room, R., Fischer, B., Hall, W., Lenton, S. and Reuter, P. (2010). Cannabis policy: Moving beyond stalemate. Oxford, New York: Oxford University Press; Saucier, R., Wolfe, D., Kingsbury, K. and Silva, P. (2011). Treated with cruelty: abuses in the name of rehabilitation & treatment or torture? Applying international human rights standard to drug detention centers. New York: Open Society Foundations.

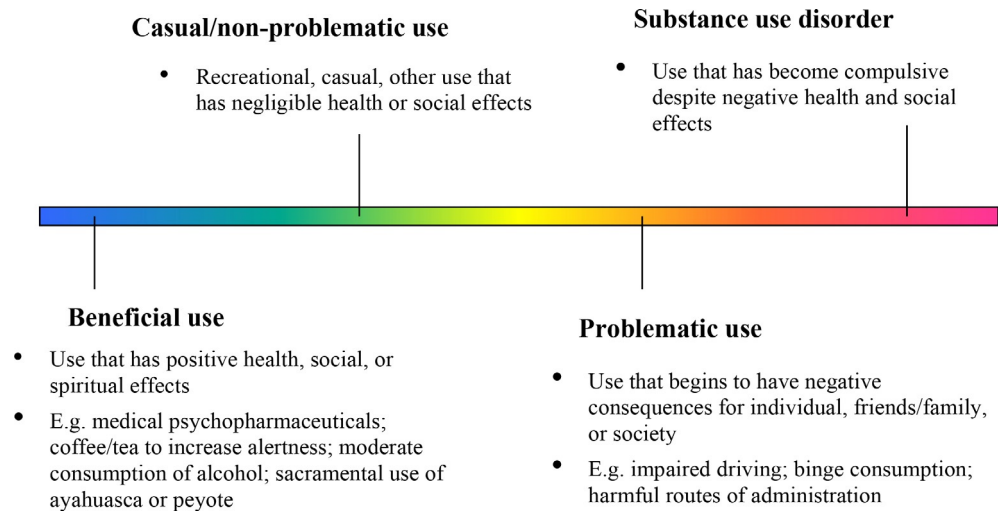

Fig. 1 Spectrum of psychoactive substance use. Every door is the right door: a British Columbia planning framework to address problematic substance use and addiction. Adapted with permission from BC Ministry of Health Services, 2004.

Determinants of Benefits and Harms of Psychoactive Substances

The public health approach to management of psychoactive substances is founded on addressing the determinants of benefits and harms, which operate at the individual and population levels.

Individual-Level Determinants

At the individual level, a spectrum of beneficial and harmful outcomes has been conceptualized (see Fig. 1). It is determined by complex interactions (Babor et al., 2010a) between the particular substance(s) taken (recognizing that poly-substance use is common); mechanism of action; age; dose; quality/contamination; pattern of consumption, for example, binge consumption or long-term regular use; mode of administration, that is, by mouth, injection, inhalation; idiosyncratic factors; context of use and mind-set of the person using the substance (i.e., "set and setting" (Zinberg, 1984)) and drug-using rituals (Grund, 1993). Outcomes can be real or perceived beneficial effects, acute and chronic toxic effects, impairment, and substance use disorders.

Individuals use substances for a variety of reasons, which usually revolve around anticipation of experiencing real or perceived benefits (University of Victoria and Canadian Mental Health Association, 2013). Muller and Schumann (2011) have identified a number of reasons why people consume substances, including pursuit of health and well-being, improved social interaction/connection, facilitated sexual behavior, improved cognitive performance, counteracting fatigue, facilitating recovery from and coping with psychological distress, self-medication for mental disorders, sensory curiosity, expanded perception horizon, euphoria, improved physical appearance, and attractiveness. Other reasons for using substances include as a cognitive tool to assist with education and understanding (Tupper, 2003), pleasure (Duff, 2008), self-exploration (Field, 1992), religious use (Halpern et al., 2008), spiritual or mystical exploration (Griffiths et al., 2008, 2011), treatment for addiction (Hendricks, 2014; Krebs and Pø, 2012) seeking relief from symptoms of medical conditions, for example, cluster headache (Sewell and Halpern, 2007) or to avoid uncomfortable withdrawal symptoms.

Drugs, as a "cause" of problematic substance use, is a widely held misperception. This belief partially comes from historical research which observed that rodents in cages given free access to morphine easily develop behaviors indicative of a substance use disorder. Alexander et al. (1978, 1981) challenged this by showing that rats kept in cages which provided an ideal social and physical environment developed behaviors indicative of a substance use disorder at a much lower rate than rats isolated in typical small cages. The importance of an enhanced environment as a protective factor for problematic substance use was confirmed by Bezard et al. (2003) with respect to mice and cocaine, and Xu (2007) for mice and morphine. Along similar lines Whitaker et al. (2013) observed that social isolation increases vulnerability to indicators of "addiction" in rats.

The understanding that drugs themselves do not cause substance use disorder was also noted by Robins et al. in a study of soldiers returning from Vietnam ($n = 900$), in which 20% reported they were "addicted" to heroin. In a follow-up, only 1% reported addiction to heroin during the first year back from Vietnam, and only 2% reported addiction in the second or third year after returning, with treatment playing a negligible role (Robins et al., 1973, 2010; Robins, 1993) in the decline in addiction rates. Alexander reviewed the literature on addiction theory, outlining the complexities of addiction, and concluded that the simple belief that "drugs cause addiction" is a myth (Alexander, 2002).

In summary, most people who use drugs do not develop problems; the path to problematic use is determined by many factors, the illegal/legal status of the substance complicates the understanding of the determinants of harms, and more work is needed to understand the determinants and protective factors of problematic drug use.

Population-Level Determinants

The focus of public health is on the population-level benefits and harms, which for psychoactive substances are influenced by complex interactions among a number of categories of determinants; supply, demand, availability, accessibility, social norms, context, governance and laws, and health, social and criminal justice services, in addition to the determinants of outcomes at the individual level. The connections between these determinants are shown somewhat simplistically in Fig. 2.

At the population level, harms are measured using burden of disease indicators such as mortality and morbidity, for example, numbers or rates of overdoses, hospitalizations, substance use disorder rates, burden of related chronic diseases and injuries. Population prevalence of use is an important driver of population levels of harms, that is, if substantial numbers of people use substances then substantial negative population health impacts may accrue due to the probability that a certain proportion will develop problems with their use.

The consequences of this are demonstrated by comparing the estimated health and social costs of tobacco, alcohol, and illegal drugs. For example, in the Costs of Substance Abuse in Canada report on 2002 data, Rehm et al. (2007) estimated that the legal substances tobacco and alcohol, with high use rates of which have historically been driven by substantial marketing and advertising campaigns, account for 79.3% of the total costs to society (tobacco accounts for 42.7%–$17 billion, alcohol accounts for 36.6%–$14.6 billion whereas all illegal drugs account for 20.7%–$8.2 billion).

Governance and Laws

The governance structures established to manage psychoactive substances in society, and the laws that flow, reflect a response to circumstances of the time they were developed, and drive much activity. If not updated these can become impediments to change, and entrench past practices in spite of evidence of better practices. Because of the preeminence of governance structures and universal application of law, these have potential for widespread positive or unintended negative consequences. The importance of the law as a determinant of health has been recently recognized and is the focus of newly formed Commission on Global Health and the Law (Gostin et al., 2015).

Historically societies have developed a spectrum of governance and regulatory approaches to manage psychoactive substances in an attempt to realize benefits and mitigate harms, as well as to achieve social, political, and economic objectives. Governance and regulatory approaches to managing substances span a spectrum from free-market commercialization with varying degrees of regulatory control (e.g., tobacco, caffeine, and alcohol), medical-use restrictions (e.g., pain medications, sedatives, stimulants, nicotine for smoking cessation); state control such as government monopolies or partial monopolies, for example, alcohol; and prohibition, where it is either a criminal or civil offense to possess and sell substances, except for some very limited reasons such as medical indications (e.g., cannabis, cocaine, psychedelic substances, and heroin).

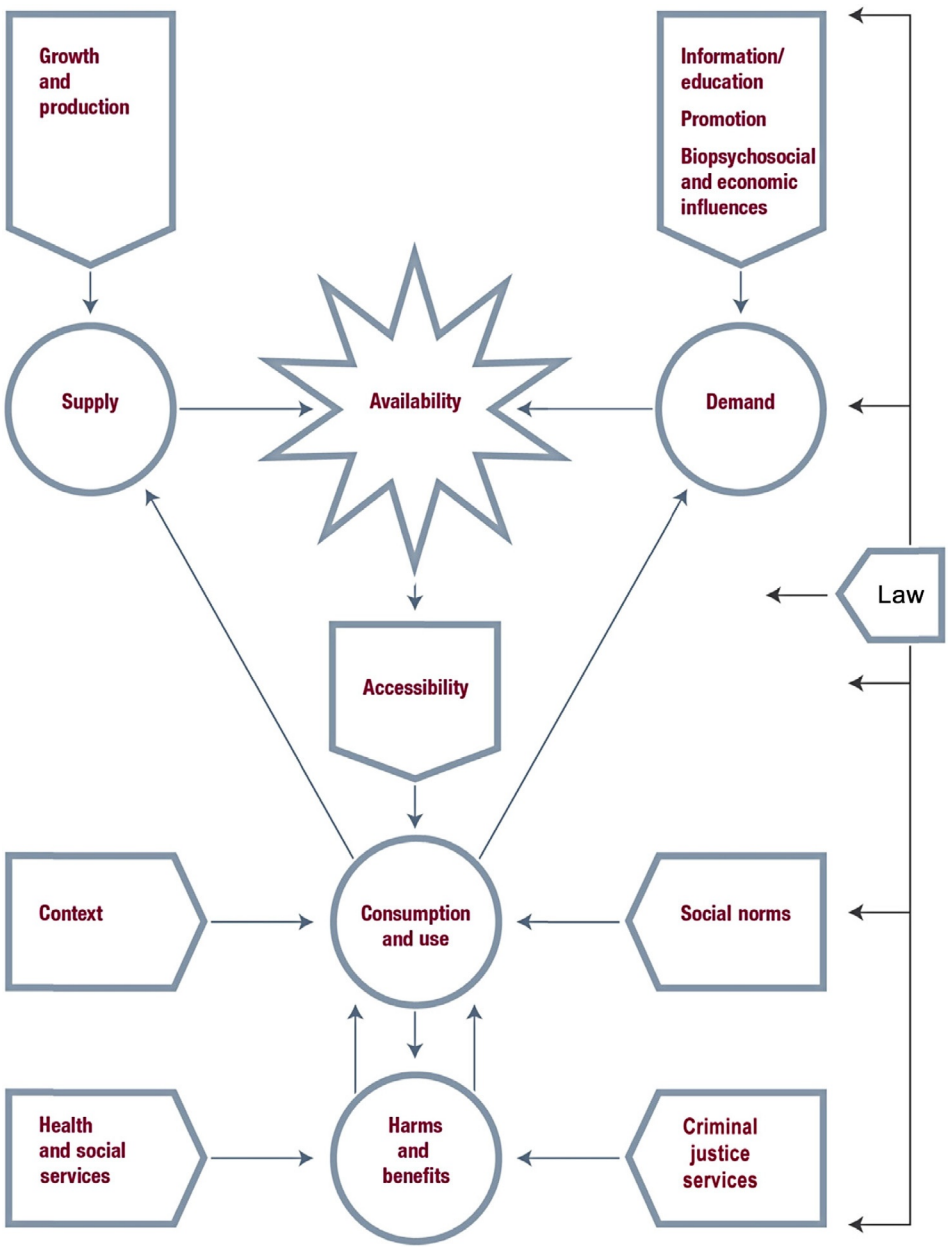

Fig. 2 Determinants of harms and benefits. Reproduced with permission from the Health Officers Council of BC. http://healthofficerscouncil.net/positions-and-advocacy/regulation-of-psychoactive-substances/.

Demand

Demand can be measured by the population's willingness to purchase substances at a given price (Babor et al., 2010a) and is driven by a number of factors including the following:

1. Promotion of products through marketing and advertising, for example, branding/naming; attractive/convenient packaging such as cigarettes; labeling suggestive of benefits; sponsorship; price reductions, loss leaders or gifting; attractiveness association such as with pleasure, enhanced performance, sports; product placement in movies, TV; creating similar products for children (e.g., chocolate cigarettes) or youth attractive products (e.g., alcopops, flavored cigarettes); attractive, attention catching/luring signage; and Internettargeting techniques.
2. Information and education about the substance harms and benefits.
3. Biopsychosocial and economic influences (Spooner et al., 2001; Spooner and Heatherington, 2004; Stockwell, 2005; Wilkinson and Marmot, 2003) such as:

- o Inadequate housing
- o Working conditions

- Social connectedness and living in a healthy community
- Inequity
- Healthy pregnancy, nurturing early childhood development and parental support, or conversely difficult childhood experiences (e.g., childhood psychological, sexual, and physical trauma or neglect) or later life stressors such as loss of employment or partner
- Peer influences

> In short, drugs are richly functional scapegoats. They provide elites with fig leaves to place over the unsightly socially ills that are endemic to the social system over which they preside. And they provide the public with a restricted aperture of attribution in which only a chemical bogey man or the lone deviants who ingest it are seen as the cause of a cornucopia of complex problems. Reinarman (1994)

Supply and Product

Supply is created by the relationship between price and the quantity of substances that producers and distributors are willing to provide at that price (Babor et al., 2010a). Production can be by gathering or cultivation and processing plants or fungi (e.g., yeast, mushrooms); or manufacturing synthetic substances from raw materials (precursors). The final product can take many forms and concentrations which influence the benefits and harm potential.

Availability and Accessibility

Availability of substances is determined by the mechanisms that move products from producers to consumers and includes wholesaling, distribution, and retailing.

Substances are made more or less accessible to consumers through restrictions such as age of purchase requirements or prices. Availability describes the probability of encountering substances (e.g., distribution and density of retailers) whereas accessibility describes how easy it is to acquire substances from a particular source (e.g., impeded by age restrictions, higher prices, behind counter access, hours of operation). Availability and accessibility are closely related to product promotion in that high availability and accessibility is a method of promoting product use.

Social Controls

Social controls are the most ancient and commonly used practices around the world to influence what substances people use, how they use, and how they behave under the influence. There are three types of social controls; "social norms" (e.g., "no alcohol with breakfast" and "wine only with food"), social rituals (e.g., coco leaf chewing rituals, Japanese tea ceremony), and sacred or spiritual-use-related rituals (e.g., peyote and ayahuasca rituals). Social controls can have a powerful influence on patterns of use and subsequent behavior and they do not require ongoing formal enforcement processes (Knipe, 1995; Durrant, Thakker, 2003; Coomber, South, 2004).

Context

The context of substances taking can greatly influence the potential for beneficial or harmful effects (Zinberg, 1984; Grund, 1993). For example, the supervised consumption site in Vancouver, British Columbia ("Insite") in which overdoses can be rapidly attended to prevent death shows how the context of substance consumption can dramatically affect the harm potential (Wood et al., 2006).

Health, Social, and Criminal Justice Services

Comprehensive, high-quality, and adequately resourced health services and social services such as screening, diagnosis, brief intervention, withdrawal management, substance use disorder treatment, rehabilitation and recovery services; income supplementation, housing, nutrition, and child care social support services, are important for preventing and reducing harms. However, health and social services can also create or aggravate harms if the services are stigmatizing or discriminatory.

Health services can be a source of benefits and harms through the direct provision of psychoactive substances. Beneficial examples include medication-assisted treatment of opioid use disorders using methadone, buprenorphine, or pharmaceutical grade heroin. Harmful examples include over/inappropriate prescribing, such as the current iatrogenic epidemic of opioid use disorders and overdose deaths due to pharmaceutical opioids being aggressively promoted, with exaggerated benefits and minimization of risks, to treat people with chronic noncancer pain (Kolodny et al., 2015).

Adequate civil and criminal justice services ensure that regulations are adhered to and enforced, and that transgressions are dealt with fairly, promptly, and in proportion to the harms of the transgressions. However, overreliance on enforcement can result in much harm, as was described in the section on the harms of prohibition and found in Table 1.

The Public Health Approach

Public Health Approaches in Some Countries

In view of the acknowledgment of the ineffectiveness and unintended consequences of psychoactive substances prohibition, concerns about free-market commercialization, and limitations of the medical-use restriction model such as recent emergence of the epidemic of pharmaceutical opioid overdoses and deaths, there is a rapidly emerging international discussion about a public health approach which would include comprehensive regulation, with the science being fueled in part by alcohol and tobacco health policy research (Haden, Emerson, 2014; Pacula et al., 2014; Kirst et al., 2015).

Recent innovative drug policy approaches have been undertaken by a number of jurisdictions. The Portuguese realized that the problems associated with psychoactive substances were significant and that "the principal obstacles to effective government policies to manage the problems were the treatment barriers and resource drain imposed by the criminalization regime" (Greenwald, 2009). Consequently, they decriminalized possession of all drugs in 2001 and shifted their emphasis to address health and social issues. The fears expressed by opponents that this would result in increased health and social problems did not materialize. In fact, the opposite has occurred. This change led to reductions in problematic substance use, drug-related harms, criminal justice overcrowding, and drug use in youth went down in spite of the fact it was going up in surrounding countries (Greenwald, 2009; Hughes and Stevens, 2010).

Uruguay became the first country to fully legalize cannabis use for adults in 2013, and in the United States a number of states, Alaska, Colorado, Oregon, Washington, and Washington DC have legalized cannabis for adult nonmedical, nonscientific purposes (Pardo, 2014). Twenty-three states have legalized cannabis for medical purposes (Pros and Cons of Controversial Issues, 2011) and many have decriminalized its possession (Pew Research Centre, 2016).

New Zealand is the first country in the world to develop a legislative framework for regulating, rather than prohibiting synthetic psychoactive substance. This framework allows for the production or importation and sale of psychoactive substances that have been demonstrated to be of low risk of harm, as determined by the Psychoactive Substances Regulatory Authority (2015) although no products have been approved to date.

The Public Health Approach Described

The public health approach to psychoactive substances (Canadian Public Health Association, 2014) is an organized, comprehensive, multisectoral effort directed at maintaining and improving the health of populations (Last, 2006; Frank et al., 2004; Health Canada, 2005); based on ethical principles (Wodak, 2007), social justice (Mitchell, 1986), attention to human rights (Barrett et al., 2008), equity (Chambliss, 1994), and evidence-informed policy and practice (Ritter et al., 2013). (The Canadian Charter of Rights and Freedoms (Government of Canada, 1982) Section 7 provides for ". . . the right to life, liberty and security of the person and the right not to be deprived thereof except in accordance with the principles of fundamental justice" and was used as the legal argument for the Supreme Court decision concerning "Insite," the supervised consumption facility in Vancouver, as under Canadian law addiction is considered an illness. Section 2 protects the fundamental freedoms of religion and thought (both of which are infringed upon by the categorical prohibitions against substances such as cannabis, LSD, psilocybin, and ayahuasca). (Several United Nations human rights based conventions provide the foundation on which to build a public health approach, i.e., The *International Covenant on Civil and Political Rights*, the *International Covenant on Economic, Social and Cultural Rights*, the *Convention against Torture and other Cruel, Inhuman and Degrading Treatment*, the *Declaration on the Rights of Indigenous Peoples*, and the International Convention on the Protection and Promotion of the Rights and Dignity of Persons with Disabilities (United Nations, 2016).)

The public health approach is driven by identifying and then acting on the determinants of health across the life course. This includes addressing physical, biological, psychological, social (e.g., wealth distribution, education, housing, social inclusion), and ecological determinants of health, as well as the determinants of social and health inequities (such as power imbalance, racism, classism, ageism, and sexism). It recognizes that problematic substance use is often symptomatic of underlying psychological, social, or health problems and inequities, and emphasizes evidence-based, pragmatic initiatives, efficiency, and sustainability.

It includes the perspective of people who use or are affected by problematic substance use (Canadian HIV/AIDS Legal Network, 2005).

The goal of a public health approach is to maximize benefits and minimize harms of psychoactive substances, promote the health and wellness of all members of a population, reduce inequities within the population, and ensure that the harms associated with interventions and laws are not disproportionate to the harms of the substances themselves. The public health approach ensures that a continuum of interventions, policies, and programs are implemented, and tracks beneficial and adverse consequences.

Drug "use" is an indicator, and reducing drug use is not necessarily the objective of public health–based initiatives (Roberts et al., 2006). Rates of use are important determinants of population outcomes, but are not necessarily the primary outcome of interest. For example, if rising rates of cannabis use in jurisdictions in which it is legal result in alcohol harms going down due to people substituting cannabis for alcohol, the result could be a net public health benefit due to the greater physical and social harms related to alcohol than cannabis.

In addition, an over emphasis on "use" per se (and related vague concepts such as "misuse" and "abuse") as an outcome is an ongoing problem in illegal drug policy, due to the unintended consequences of such a focus. A focus on use overemphasizes personal responsibility and choice and tends to target, blame, and stigmatize people who use drugs. It can provide the basis for

punitive, discriminatory, and draconian policies including mass incarceration (Drucker, 2011) and significant human rights violations (Barrett et al., 2008). In contrast, the public health focus on outcomes, that is, "harms," "problems," and "benefits" shines the light on the systemic issues and the web of causality of risk conditions and risk behaviors which determine those outcomes.

The public health approach uses program planning methods, that is, it is guided by overarching directional elements which include clearly articulated assumptions, explicit under-lying and process public health principles, a vision, overarching goals, and specific objectives (see Table 2 for more details), and is implemented through a number of public health strategies.

Strategies of the public health approach include the following:

1. Health Promotion: It is the process of enabling people to increase control over and improve their health as elaborated in the *Ottawa Charter for Health Promotion* (World Health Organization, 1986 Ottawa). The Charter outlines prerequisites for health as being peace, shelter, education, food, income, a stable eco system, sustainable resources, social justice, and equity. A key theme is "coordinated action by all concerned."

The Ottawa Charter defines the five components of health promotion as follows:

(a) Building healthy public policy;
(b) Creating supportive environments for health;
(c) Strengthening community action;
(d) Developing personal skills; and
(e) Reorienting health services.

Table 2 Directional elements of a public health approach to guide policy and program development and implementation[a]

Assumptions	1. Consumption for both medical and nonmedical purposes has long history and will continue in the future 2. New substances will continue to be produced, and the consequences will need to be effectively managed 3. Substantial, positive differences can be made with evidence-based, coordinated, multisectoral, public health–oriented strategies
Underlying principles	1. Ensure social justice, equity, respect for human rights, and freedoms 2. Nonstigmatization and nondiscrimination—of consumers and service providers 3. Evidence informed, not ideological based decision making, access to information and transparency 4. Empowerment and informed consent about harms and benefits through evidence-based information and education 5. Supports autonomy and self-determination 6. Regulation intensity based on harm potential 7. Respect for spiritual, traditional, and therapeutic use 8. Considers: (a) determinants of health (i.e., physical, biological, psychological, and social, e.g., poverty, income distribution, education, housing) (b) determinants of social and health inequities (i.e., power imbalance, racism, classism, ageism, and sexism) 9. Protection against false claims, unsafe products 10. Individuals are held responsible and accountable for actions that harm others 11. Criminal sanctions are limited to harm to others (i.e., crimes of force, bodily harm, fraud, and public safety) 12. Compassion for people who are directly or indirectly adversely affected and easy and readily available access to help for people who do experience problems 13. Variations of substances that pose the least risk should be most accessible. For example, incentives for low dose oral or vaporized products vs. combustion smoked products, incentives for low vs. high concentration 14. Pragmatism, efficiency, and sustainability
Process principles	1. Rational, respectful discussion 2. Consensus building 3. Inclusivity—involve, include perspectives of and gain support of people who use substances, people involved in production and distribution, and people and communities affected by substances 4. Where evidence is lacking and policies and programs are designed with limited or no evidence, make this explicit encourage pilot projects and evaluate 5. Incremental implementation, rigorous evaluation, attention to benefits, harms, and unintended effects, and be prepared and willing to change course based on evaluation
Vision	1. Aspirational description of future to guide decision making. This is developed based on firstly articulating explicit assumptions and principles 2. See Canadian Public Health Association report[b] for "A Vision for 2025" (pp. 11–13) that describes what is envisioned if a public health approach is implemented
Goals and objectives	1. An overarching goal, such as that proposed by the Health Officers Council[a] "minimization of the harms associated with psychoactive substances resulting from consumption, use, policies, laws, and programs; and a realization of the benefits; for individuals, families, communities, and society." 2. Goal and objectives for specific sectors would be established, that is, health, criminal justice, education, social welfare, agriculture, environment, business and finance (see Appendix 7 of the Health officers Council[a] report for examples)

[a]Adapted from Health Officers Council of British Columbia (2011). Public Health Perspectives for Regulating Psychoactive Substances—What We Can Do About Alcohol, Tobacco and Other Drugs.

[b]Canadian Public Health Association (2014). A new approach to managing illegal psychoactive substances in Canada. Ottawa: CPHA.

2. Health protection: It includes regulatory approaches that protect and promote health such as policies and legal tools, that is, statutes and regulations, to minimize the potential for harms from substances to individuals and those secondarily affected. It includes rules about the supply chain such as production, manufacture, wholesale, distribution, retail, product promotion, purchase, and consumption.

The Health Officers Council of BC (2011) described a public health–oriented regulatory framework which includes *availability control* (i.e., governance and public health–directed regulation; retailing regulation, e.g., off sales and on premise consumption rules, regulation of densities, locations, and hours of operation), *accessibility control* (age limits for sales and purchase, pricing), *demand reduction* (e.g., obligations for provision of objective information, product labeling, bans on product promotion such as advertising, branding, and sponsorship), *supply control* (e.g., allowing home production for some substances, and strictly regulating commercial production, product standards, quotas) and *purchase, consumption, and use controls* (e.g., legal age of purchase, impaired driving laws).

3. Prevention: It includes primordial (e.g., addressing social determinants such as reducing poverty and inequity), primary (such as youth decision-making programs) or secondary (e.g., early identification of problems such as through screening and brief intervention) prevention.
4. Harm reduction: This is a pragmatic strategy that aims to reduce adverse consequences without necessarily reducing drug use and include measures such as low risk use guidelines; needle, crack pipe, and other harm reduction supply distribution programs; medication-assisted treatment such as with methadone or buprenorphine; supervised consumption services; and street drug testing programs (Benschop et al., 2002).
5. Emergency preparedness and response: Individual measures such as take home naloxone programs to prevent overdose fatalities, and systematic responses to the emergence of a highly toxic product such as nonpharmaceutical fentanyl.
6. Population health assessment and population health surveillance: It provides the critical information for measuring impacts on populations, tracking trends, and feeding into research and evaluation.
7. Research and evaluation: It provides the science-based evidence to inform decision making.
8. Services for people who develop problems with substances: It recognizes that irrespective of employing best practice preventive oriented measures that some people will experience problems with substances and will need help and support.

Each of these strategies includes universal initiatives, which by definition apply to the entire population, for example, population-wide social marketing campaigns, and targeted initiatives such as supervised consumption services.

Furthermore, the public health approach applies a population lens to the strategies, recognizing that subpopulations may be at increased vulnerability to harms or for other reasons may need different approaches, for example, youth, indigenous people, people of different genders.

See Fig. 3 for a visual representation of the public health approach, and Table 3 for summary listing of the main elements of a public health approach.

Impact of a Public Health Approach

Societies around the world employ a variety of approaches to manage psychoactive substances, mostly relying on legislation and other regulatory tools, rather than employing a more comprehensive public health approach. The particular approach selected by each jurisdiction is the result of a combination of history, political ideology, culture, religion, economics, health and social considerations, and the pharmacological category of substance being managed. These approaches fall along the x-axis in Fig. 4 which shows that the health and social harms associated with substances are at their maximum when their management is dominated by the extremes of governance and regulation—either criminal prohibition or commercialization. Minimal health and social harms occur at the point where public health measures have been implemented. It should also be noted that the "U" curve never goes down to zero, indicating there are always problems with substance use. The public heath approach does not seek to prevent all drug use and therefore stop all drug problems. Instead the public health approach recognizes that some people will use substances and seeks to manage this common human experience to maximize the benefits and minimize the harms.

Transitioning From Prohibition

A unique challenge in dealing with modernizing the approach to illegal substances will be to deal with two transition issues; impacts on those who currently benefit from the existing system of prohibition and impacts on those who have been harmed by this system.

Those who benefit from the existing system range from illegal producers, distributors, and dealers to criminal justice personnel who benefit from the additional work created by prohibition such as police, specifically the RCMP in Canada (Giffen et al., 1991) and prison guards in the United States (Miron and Waldock, 2010).

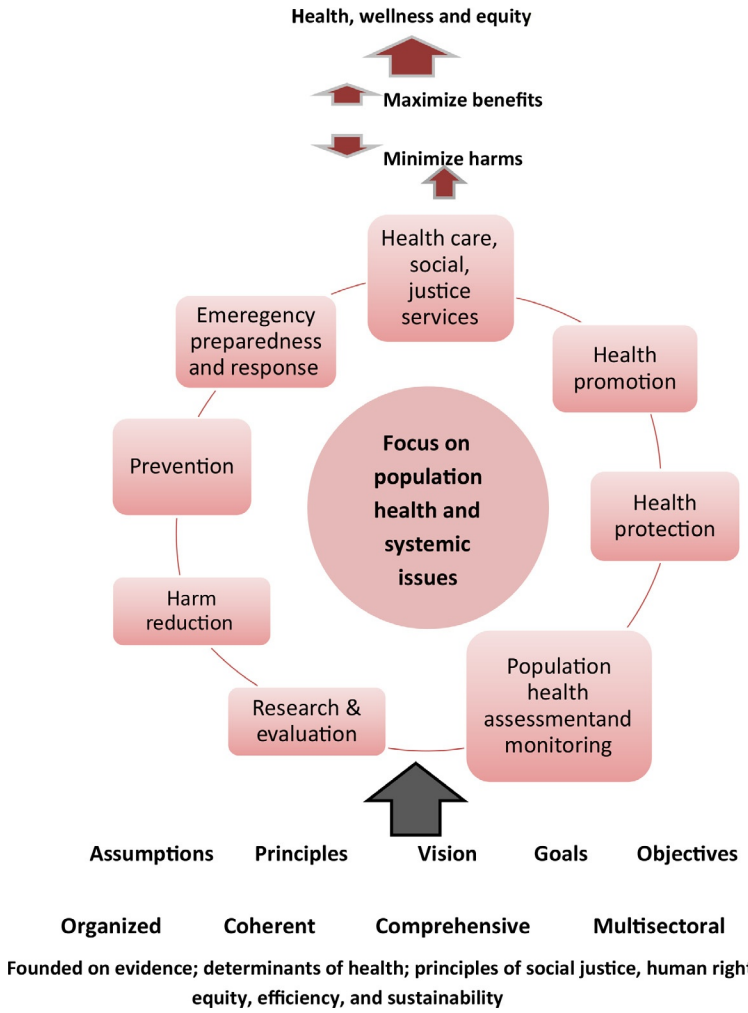

Fig. 3 Public health approach to psychoactive substances.

Table 3 Main elements of a public health approach

Directional elements	1. Assumptions—explicitly stated 2. Guiding principles/ethics 3. Vision 4. Goals and objectives
Strategies—universal and targeted	1. Health promotion 2. Health protection/regulation (see elements below) 3. Prevention—primordial, primary, and secondary 4. Harm reduction 5. Population health assessment and population health surveillance (monitoring, measuring) 6. Emergency preparedness and response 7. Research and evaluation 8. Services for people who develop problems with substances
Regulation framework (health protection)	1. Governance and Laws 2. Availability (business models, wholesale, distribution, revenue, and retailing) 3. Accessibility (age of entry/purchase, price, taxation, prescription) 4. Demand (information, education, product promotion—marketing and advertising) 5. Supply (growing, production) 6. Purchase, consumption, and use (age of purchase, locations of use rules, impaired vehicle and machinery operation rules)

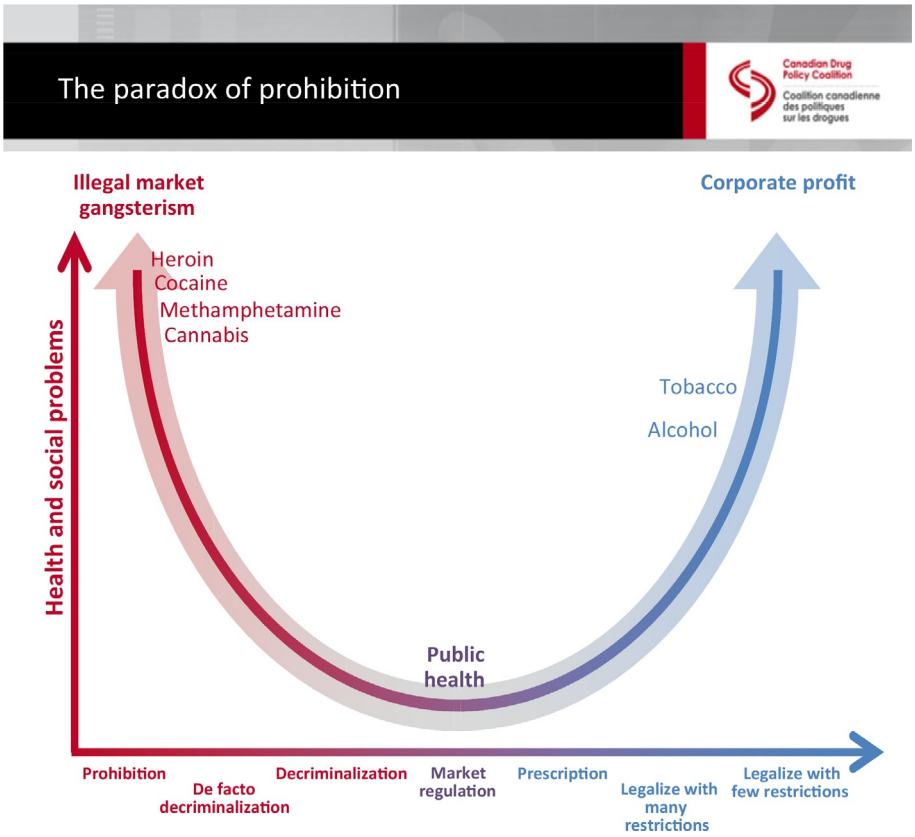

Fig. 4 The paradox of prohibition. Adapted from Marks, J. (1993). The paradox of prohibition. In: Brewer, C. (Ed.), Treatment options in addiction: Medical management of alcohol and opiate use, pp. 77–85. London: Gaskell, and reproduced with permission from the Canadian Drug Policy Coalition.

The direct harms inflicted by governments on their citizens range from incarceration, fines, travel restrictions, and criminal records (Rolles et al., 2012). The indirect harms include HIV and Hepatitis C transmissions resulting from needle sharing consequent to repressive action and lack of access to harm reduction services (Cooper et al., 2005; Kerr et al., 2005).

For individuals, families, and communities who work in the illegal industry (i.e., manufacturing, distributing, and sales) the objective is social reintegration to facilitate exiting from the illegal lifestyle.

A number of authors have explored the factors surrounding the process of cessation of drug dealing (Adler, 1993; Campbell and Hansen, 2012; Werb et al., 2011a) which need to be considered in assisting players in the illegal market to transition to the world of legal enterprise. This process of inclusion has precedent as it occurred at the end of alcohol prohibition as illegal dealers were allowed to participate in the new legal market (Barr, 1999). There are many fears that social reintegration is not possible due to the social archetype of "evil, violent drug dealer" or the "organized crime biker" but these are largely a social fiction (Coomber, 2006) as much drug market violence is a consequence of instability created by enforcement efforts (Werb et al., 2011b). This pattern of violence was also observed during alcohol prohibition (Miron, 1999).

Consideration will also have to be given to those who work in the "criminal justice industry." Some departments (e.g., police) may redeploy their officers to deal with more serious crimes, and other departments may need to be downsized (e.g., US prisons). While downsizing will have a significant benefit for government expenditures (Miron and Waldock, 2010), it could potentially have harmful effects on employees affected. Compensation packages and retraining will need to be considered.

Including existing illegal participants in the new legal system has potential public health benefits. Most current illegal dealers run small operations (Hammersvik et al., 2012) and a model with many small producers and retailers (e.g., for cannabis), rather than large, hyperefficient operations could result in a more egalitarian system that results in reasonable wages. The promotion of equity is a foundational principle of public health (World Health Organization, 1986). Such a model could also help maintain prices at a high enough rate to discourage consumption. It has been observed that many health and social problems can be traced back to the unprecedented accumulation of wealth by a small fraction of individuals (Albor et al., 2014; Kawachi et al., 1999; Pickett and Wilkinson, 2015; Wilkinson and Pickett, 2006, 2009; Wilkinson, 2004). Structuring the new system so that many smaller players receive the economic benefit (as opposed to a few large players) could benefit society as a whole.

Another issue is the need to respond to those who have been harmed by implementing the policies of prohibition. Many thousands of people have criminal records which affect their livelihood or freedom to travel. Others have been harmed by being incarcerated, or have acquired HIV or hepatitis through needle sharing. Reparations will have to be considered. A global analysis of different countries' policies revealed that this is not uncommon. Specifically, in a survey by the University of San Francisco School of

Law, of 193 countries, 129 had incorporated "retroactive ameliorative relief" if there is a change of law. They observed that "most countries in the world consider positive retroactive application of a change in law to be a basic and fundamental human right" (de la Vega et al., 2012).

Reducing barriers to social reintegration will be important and consideration will be needed for releasing those currently incarcerated for drug crimes which do not involve violence, sealing and expunging criminal records, offering pardons, preventing employers from inquiring about past drug-related criminal history, and training (and retraining) for employment (Porter, 2015).

Reintegration could also be facilitated with an apology from the government (Corntassel and Holder, 2008) for ignoring the evidence and inflicting consequent harms on citizens (Kerr and Wood, 2008; Wood et al., 2008; Kerr et al., 2010; Schechter, 2002). There are precedents for government apologies as the Canadian government has apologized to indigenous people whose children were forced into residential schools (Harper, 2008) and to the Japanese who were interned during World War II (McCulloch, 2012).

Implications and Conclusion

The public health approach to manage psychoactive substances, which is being called for as a replacement for prohibition and criminalization-based policies, provides for a comprehensive way of minimizing the harms associated with psychoactive substances while realizing the benefits.

The public health approach provides a common, organized framework for addressing these challenging issues, while implementation will require substance-specific analyses. For example, addressing cannabis will result in different policies, strategies, programs, and services to those employed to address opioids or psychedelic substances, building from the common public health foundation. In addition, implementation of the public health approach to illegal psychoactive substances will provide suggestions for better managing legal substances such as alcohol, tobacco, and pharmaceuticals to mitigate the harmful effects of those substances in society.

Unique challenges in dealing with modernizing the approach to illegal substances will be to accommodate and not further harm individuals, families, and communities that rely on the illegal market for their livelihood, deal with the prison terms and other penalties of those that are incarcerated for nonviolent offenses due to participation in the illegal market, mitigate the impact on criminal justice personnel who may lose employment due to reduced enforcement activities, and consider reparations for those that have been harmed by the prohibition policies, for example, those who have a criminal records or have been harmed by being incarcerated.

In conclusion, the complexity of managing and regulating psychoactive substances in the modern world is not simply a matter of legalizing currently illegal substances, given the risk of going to the other extreme of developing a commercially oriented market that would promote high rates of substance use. Rather an organized, coherent, comprehensive, multisectoral approach is required. These are the hallmarks of the public health approach, which if applied to its full extent, holds much promise for better protecting and improving health and well-being of individuals, families, communities, and society at large.

Disclaimer

The opinions stated in this commentary are those of the authors and not of their affiliated organizations.

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