



## Commentary

# Medical marijuana programs – Why might they matter for public health and why should we better understand their impacts?

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## ABSTRACT

**Objective.** Although cannabis is an illegal drug, ‘medical marijuana programs’ (MMPs) have proliferated (e.g., in Canada and several US states), allowing for legal cannabis use for therapeutic purposes. While both health risks and potential therapeutic benefits for cannabis use have been documented, potential public health impacts of MMPs – also vis-à-vis other psychoactive substance use – remain under-explored.

**Methods.** We briefly reviewed the emerging evidence on MMP participants’ health status, and specifically other psychoactive substance use behaviors and outcomes.

**Results.** While data are limited in amount and quality, MMP participants report improvements in overall health status, and specifically reductions in levels of risky alcohol, prescription drug and – to some extent – tobacco or other illicit drug use; at the same time, increases in cannabis use and risk/problem patterns may occur.

**Conclusion.** MMP participation may positively impact – for example, by way of possible ‘substitution effects’ from cannabis use – other psychoactive substance use and risk patterns at a scale relevant for public health, also influenced by the increasing population coverage of MMPs. Yet, net overall MMP-related population health effects need to be more rigorously and comprehensively assessed, including potential increases in cannabis use related risks and harms.

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Cannabis is the most widely used illegal drug globally, and its current legal status is being controversially debated (United Nations Drug Control Programme (UNDCP), 2014; Room, 2014). Despite cannabis’ illegal status in most places, including Canada, medical marijuana programs (MMPs) have proliferated in several US states and Canada, as well as other countries (e.g., UK, Israel, Netherlands) in recent years (Room, 2014; Hoffmann and Weber, 2010; Procon.org, 2014). MMPs are publicly regulated programs where individuals, usually following a medical confirmation of a health condition, are permitted to use marijuana for ‘medical’ purposes and thus are exempted from punitive cannabis law enforcement that otherwise may apply (Hoffmann and Weber, 2010; Hall and Degenhardt, 2003). Terminology has evolved using the term ‘medical marijuana use’ (MMU) for those who are participants of MMPs, whereas ‘therapeutic’ cannabis use is applied more generally for use that is assumed to be beneficial for health; this paper

will adhere to this use of terminology. We first describe the example of Canada for the emergence and regulatory framing of its MMP, then briefly review the available evidence on possible population health relevant effects – specifically vis-à-vis other psychoactive substance use – related to MMPs, and conclude with comments on potential implications for public health, policy and future research.

Canada’s original MMP was established in 2001, following several higher court decisions involving constitutional challenges which essentially forced the federal government to facilitate and regulate cannabis use and access for therapeutic purposes for chronically/severely ill patients (Belle-Isle et al., 2014; Lucas, 2009; Fischer et al., 2003). The original authorization process for MMU involved a rather onerous process. Consequently, initial utilization of the MMP was quite limited, and only a few hundred individuals were formally approved in the MMP’s initial years, despite survey data suggesting that as many as 500,000–1,000,000 Canadians self-characterized their cannabis use as being for therapeutic purposes (Lucas, 2009; Ogborne and Smart, 2000). As the number of authorizations under the MMP began to rise, ongoing concerns about process, access and supply issues entailed several program revisions, finally leading to the implementation of – completely overhauled – new MMP regulations in 2014 (Health Canada, 2014b;

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Belle-Isle et al., 2014). With these, physicians — and no longer the government — authorize an individual for MMU; authorization can be granted for a list of defined severe/chronic conditions, or for any “debilitating symptom that is associated with a medical condition or [its] medical treatment” (Health Canada, 2014b; Fischer et al., 2014). In essence, MMU can now be sanctioned in Canada for any health condition for which a physician confirms therapeutic benefits from cannabis use (Health Canada, 2014b). There were 37,000 authorized medical marijuana users in Canada by the end of 2013; this population, based on above-mentioned estimates of self-identified therapeutic cannabis users, is expected to grow to as many as 500,000 or more, or >2%, of the adult Canadian population in the coming years (Health Canada, 2014a). These recent rapid increases in the number of MMP participants mirror developments in other jurisdictions. For example, obtaining endorsement for MMP participation in California has been rather easy and flexible, and resulted in a MMP user population of >1,000,000 (California NORML, 2011; Reinerman et al., 2011; Harris et al., 2000).

So why might MMPs matter for public health, and why should we seek to better understand potential impacts? While not approved as a medication by key regulatory bodies, cannabis is a psychoactive substance featuring a variety of health risks next to therapeutic benefits. For example, cannabis (Gordon et al., 2013; Room et al., 2010; Volkow et al., 2014; Hall and Degenhardt, 2009) may entail various acute cognitive, memory and/or psychomotor impairments (Crean et al., 2011) specifically associated with elevated risk for (e.g., motor-vehicle) accidents or injury. Cannabis use furthermore brings risk for both dependence and psychotic and/or depression problems (Moore et al., 2007), and is associated with the incidence of different forms of (e.g., lung) cancers (Mehra et al., 2006; Zhang et al., 1999); moreover, cannabis use commonly results in other pulmonary and bronchial problems (Tetrault et al., 2007). Importantly for public health, intensive, frequent or chronic users are at highest risk for most of the above problems (see Degenhardt et al., 2013; Fischer et al., 2011; Hall and Pacula, 2003; Volkow et al., 2014).

Conversely, multiple potential therapeutic benefits are attributed to cannabis and supported by differing degrees of evidence (Baker et al., 2003a,b; Ben Amar, 2006; Borgelt et al., 2013; Hazekamp and Grotenhermen, 2010; Kalant, 2001; Leung, 2011; Robson, 2001). Various evidence points to cannabis' effects as an analgesic, especially for neuropathic pain (Campbell et al., 2001; Martín-Sánchez et al., 2009). Furthermore, there are indications of beneficial effects from cannabis as an anti-emetic (Tramèr et al., 2001) and appetite stimulant (e.g., for cancer/AIDS related problems) (Kirkham and Williams, 2001), as well as for anti-spasticity (Wade et al., 2006) and anti-convulsant (e.g., for multiple sclerosis, epilepsy) effects (Hill et al., 2012). Cannabis may further reduce intraocular pressure (e.g., for glaucoma) (Tomida et al., 2004), and exert broncho-dilating effects (e.g., for asthma) (Ziment and Tashkin, 2000). Limited evidence also points to potential anti-depressant, anxiolytic, sedative, hypnotic or neuro-protective effects (Gonzalez, 2007; Iversen, 2007; McPartland and Russo, 2001).

Beyond the effects of MMP participation for an individual, an emerging body of evidence suggests that MMPs may have discernable — both positive and negative — impacts relevant on a population health level. Most MMP participants are individuals with severe/chronic, and often multiple — physical or mental — health problems (e.g., pain, psychiatric, sleep, gastro-intestinal, MS, arthritis, HIV/AIDS, neurological problems), many of whom report improved health status/outcomes which may result in reduced health care needs or utilization. For example, among  $n = 100$  California MMP participants, 59% reported MMU for >1 chronic condition; they reported significantly higher (average global rating 81 vs. 52;  $p < .01$ ) effectiveness of MMU over other medication (Harris et al., 2000). Among  $n = 348$  Michigan MMP participants, 87% reported multiple conditions (mostly pain); improved pain scores, and physical and mental health function scores, were reported by returning ( $n = 153$ ) compared to first-time ( $n = 195$ ) MMP patients (Ilgen et al., 2013). A Hawaii sample of returning MMP patients with mainly pain

as the principal condition reported a 64% overall reduction in pain scores following MMP initiation; about half reported relief from anxiety/stress and insomnia problems (Webb and Webb, 2014). Among  $n = 130$  San Francisco MMP patients with multiple conditions, 55% reported “better symptom management” from MMU compared to other prescription drugs (Reiman, 2007); similar data from UK-based MMP patients reported superior effects from MMU on their symptoms (Coomber, 2003; Ware et al., 2005). Among  $n = 628$  Canadian MMP participants largely reporting multiple chronic conditions, 72% reported that MMU was “always helpful” and 24% reported that it was “often helpful” towards “effective symptom relief” (Walsh et al., 2013).

Second, MMP participants indicate extensive histories and/or concurrent alcohol, tobacco, illicit and/or prescription drug use. Each of these drug use categories is among the major risk factors for acute and/or chronic morbidity/mortality outcomes, accounting for almost 20% of overall population-level disease burden in North America (Lim et al., 2012). Importantly, evidence suggests that MMP participation may be associated especially with reductions of risky patterns of psychoactive substance use. For example, among Michigan MMP participants, the majority (68%) reported non-medical prescription opioid (PO) use; 45% of the sample ‘intended’ to reduce their non-medical PO use (Ilgen et al., 2013); there were significant reductions in prescription sedative use among continuous versus new MMP patients. Among  $n = 404$  Canadian MMP participants, 20% were current illicit drug (other than cannabis) users, while 27% had a history of substance abuse and 20% past alcohol dependence treatment (Lucas et al., 2013); 76% reported MMU as a substitute for other substance use; specifically, 41% reported substituting cannabis for alcohol, 36% for illicit substances, and 68% for prescription drugs. Similarly, among San Francisco MMP users, 19% had an alcohol treatment history; while 50% and 47% reported substituting cannabis for alcohol and illicit drugs, respectively, and 74% reported substituting cannabis for prescription drugs (Reiman, 2007). Among California MMP users ( $n = 4117$ ), about two-thirds (64%) reported a history of hazardous drinking; when comparing current and pre-MMP alcohol use, 11% reported abstinence, 28% reported drinking less than 5% of previous peak levels, and 87% reported drinking less than half (O’Connell and Bou-Matar, 2007); similarly, a majority had reduced their tobacco use. A California MMP sample reported alleviated anxiety and sleep problems, and hence potentially reduced need for related medications (Reinerman et al., 2011). Other studies reported evidence or potential for reductions in alcohol and/or PO-related problem outcomes related to cannabis substitution effects (e.g., Clements and Daryal, 2005; Collen, 2012; Peters and Hughes, 2010; Subbaraman, 2014). A recent population-based study found that the 13 US states with MMPs had a 24.8% lower mean annual PO-related overdose mortality rate ( $p < .003$ ) compared with non-MMP states (Bachhuber et al., 2014), suggesting that MMP implementation may be “protective” of hazardous PO use, and fatal overdose, on a population level (Hayes and Brown, 2014).

Third, while MMPs may bring benefits in health status and/or risk behaviors, these may — at least in part — be offset by increases in cannabis-related problems or risks co-occurring with MMP participation. For example, among California MMP users, 59% and 18% had a lifetime or current diagnosis, respectively, for cannabis abuse or dependence; 90% used cannabis daily or near-daily (Fischer et al., 2011) — a use pattern that is a primary predictor of subsequent problems — over multiple years, and 86% smoked on average 2 or more cannabis cigarettes per day (Harris et al., 2000). Among Michigan MMP participants, intensive (i.e., daily) cannabis use was significantly more common ( $p < 0.0001$ ) among continuous (76%) compared to new (51%) MMP participants (Ilgen et al., 2013). Majorities (88% and 90% respectively) among California MMP samples reported daily cannabis use (Janichek and Reiman, 2012; O’Connell and Bou-Matar, 2007). While most Canadian MMP participants had a pre-MMP cannabis use history, the majority reported (33% “large”, 32% “small”) increases in cannabis use post-MMP initiation; 40% reported >2 g/day of use, and 42%

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