# Cannabis use and public health: time for a comprehensive harm-to-others framework

Cannabis, after alcohol and tobacco, is the most widely used psychoactive substance in the world, with increasingly liberal control approaches (eg, legalisation) in many places. Although approximately 4% (>200 million) of the global adult population use cannabis, in Canada (where non-medical cannabis was legalised in 2018) a fifth or more of adults report use in the past year.[1]

Most of the focus on cannabis-related harms in policy and science debates has been on the risks (primarily to health) to the user. The principal adverse consequences that can occur in association with cannabis use include: acute cognitive and psychomotor control impairment; cannabis use disorder (ie, dependence); mental health problems (eg, psychosis, depression, or suicide); driving impairments and fatal or non-fatal injuries from motor vehicle crashes; and pulmonary and cardiovascular problems.[2] Some of these outcomes can be severe and require hospitalisation, but the overall risks are mostly moderate (eg, risk ratios of >1–3) and most often affect cannabis users who engage in high-frequency, high-volume, or high-potency (ie, tetrahydrocannabinol) forms of cannabis use.

Beyond the focus on possible health harms for users, an increasingly relevant public health perspective for reducing the harms of psychoactive substance use is the concept of harm to others. The harm-to-others perspective acknowledges that psychoactive substance use not only harms the user; it can also harm others, including non-users.[3] This fact should be taken into account when designing policies and interventions for psychoactive drugs, and monitoring the effect of consumption. This perspective originally arose from the environmental health hazards of tobacco smoke.[4] It has since been applied to alcohol, given the considerable potential for alcohol use to cause harm to others via injuries or deaths, violence, birth defects in newborns, or family or workplace problems directly affecting others.

In the case of cannabis, despite its prevalent use and increasingly liberal controls, a harm-to-others perspective is conceptually and empirically underdeveloped. In Washington, a US state that has legalised cannabis, in a representative population survey of 4290 adults (2014–2016), 8·4% of respondents reported experiencing harm to others related to cannabis use in the past year, compared with 21·3% who reported harms caused by others' alcohol use.[5]

There is empirical evidence that cannabis use can adversely affect others, including non-users. First, motor vehicle crashes attributable to acute cannabis impairment are a key concern, because approximately 10–30% of cannabis users in North America report driving in the immediate hours after use, and reviews indicate that the risk of fatal or non-fatal motor vehicle crash involvement is increased 2–3 times under these conditions of acute intoxication.[6] These crashes typically harm the user, but can also involve and harm others (eg, passengers, other drivers, or pedestrians).

Second, an area of concern is interpersonal violence. Studies have found moderate associations between cannabis use and violence or aggression, implying that the intimate partners of, or others involved with, people using cannabis find themselves at a 2–3 times elevated risk of experiencing possible aggression-related injury and other harms.[7]

Third, there are particular risks to others from the smoking of cannabis, which remains the most common method for cannabis use. Several studies have documented the emission of hazardous fine particulate matter, toxins, and carcinogens in cannabis smoke that can expose others to second-hand smoke-related harms (similar to tobacco smoking).[8] These risks are most likely increased by the substantial extent of cannabis smoking that occurs in enclosed spaces, such as homes, which could occur in response to use restrictions or regulations.

Fourth, there is some evidence (although confounding factors, like other substance use, play an important role) that cannabis use during pregnancy might be moderately associated with several adverse neonatal outcomes. These can include low birthweight, preterm birth, increased neonatal intensive care admission, and possibly select neurocognitive deficits.[9] Cannabinoids have also been identified in the breastmilk of lactating women who use cannabis, although the risks for tangible harm to the breastfed infants are as yet unclear.

This evidence suggests several different ways in which cannabis use could cause substantive harm to others, including the—still overall—majority of individuals who do not use cannabis, and who might include family members, children, or friends of users. The size of the risks of the main possible harm-to-others outcomes illustrated here are comparatively moderate, but should not be neglected in public policies, interventions, or monitoring of the overall harms of cannabis use.[10] The consequential social costs can be added to these direct harms, such as health-care expenditures and productivity losses, that can arise from cannabis use and are borne by society. Our observations emphasise that conceptual and empirical perspectives on health harms arising from cannabis use cannot solely focus on harms to the health of users. In particular, jurisdictions that make efforts to liberalise cannabis control frameworks to advance public health objectives need to also consider and address the possible cannabis-related harm to others.

BF has held research grants and contracts in the areas of substance use, health, and policy from public funding and government (ie, public-only) organisations. All other authors declare no competing interests.



*Benedikt Fischer, Sheila Rubia Lindner, Wayne Hall
**bfischer@sfu.ca**

Centre for Applied Research in Mental Health and Addiction, Faculty of Health Sciences, Simon Fraser University, Vancouver, BC V6B 5K3, Canada (BF); School of Population Health, University of Auckland, Auckland, New Zealand (BF); Department of Psychiatry, Federal University of Sao Paulo, São Paulo, Brazil (BF); Department of Public Health, Federal University of Santa Catarina, Santa Catarina, Brazil (SRL); National Centre for Youth Substance Use Research, Faculty of Health and Behavioural Sciences, University of Queensland, Brisbane, QLD, Australia (WH); National Addiction Centre, Institute of Psychiatry, Kings College London, London, UK (WH)

1 United Nations Office on Drugs and Crime. World Drug Report 2022. Vienna: United Nations Publication; 2022.
2 Fischer B, Robinson T, Bullen C, et al. Lower-Risk Cannabis Use Guidelines (LRCUG) for reducing health harms from non-medical cannabis use: a comprehensive evidence and recommendations update. *Int J Drug Policy* 2022; **99:** 103381.
3 Room R, Ferris J, Laslett A-M, Livingston M, Mugavin J, Wilkinson C. The drinker's effect on the social environment: a conceptual framework for studying alcohol's harm to others. *Int J Environ Res Public Health* 2010; **7:** 1855–71.
4 Bayer R, Colgrove J. Science, politics, and ideology in the campaign against environmental tobacco smoke. *Am J Public Health* 2002; **92:** 949–54.
5 Kerr WC, Williams E, Patterson D, Karriker-Jaffe KJ, Greenfield TK. Extending the harm to others paradigm: comparing marijuana- and alcohol-attributed harms in Washington State. *J Psychoactive Drugs* 2021; **53:** 149–57.
6 Preuss UW, Huestis MA, Schneider M, et al. Cannabis use and car crashes: a review. *Front Psychiatry* 2021; **12:** 643315.
7 Dellazizzo L, Potvin S, Athanassiou M, Dumais A. Violence and cannabis use: a focused review of a forgotten aspect in the era of liberalizing cannabis. *Front Psychiatry* 2020; **11:** 567887.
8 McKee G, McClure S, Fyfe M, Stanwick R. Protecting the public from exposure to secondhand cannabis smoke and vapour following legalization. *Can J Public Health* 2018; **109:** 223–26.
9 Marchand G, Masoud AT, Govindan M, et al. Birth outcomes of neonates exposed to marijuana in utero: a systematic review and meta-analysis. *JAMA Netw Open* 2022; **5:** e2145653.
10 Fischer B, Russell C, Rehm J, Leece P. Assessing the public health impact of cannabis legalization in Canada: core outcome indicators towards an 'index' for monitoring and evaluation. *J Public Health* 2019; **41:** 412–21.