



Commentary

The Lower-Risk Cannabis Use Guidelines (LRCUG): A ready-made targeted prevention tool for cannabis in New Zealand



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ABSTRACT

Cannabis use is common, especially among young people, and associated with risks for select acute and chronic adverse health and social outcomes. New Zealand features overall high cannabis use levels, yet may soon follow other jurisdictions and implement legalization of non-medical cannabis use and supply towards public health objectives. While existing cannabis-oriented interventions mainly focus on primary prevention and treatment (e.g., for dependence), key harms from use are crucially influenced by risk factors that can be modified by the user. On this basis, and similar to other health behavior-oriented interventions, 'Lower-Risk Cannabis Use Guidelines' (LRCUG), consisting of 10 recommendation clusters for lower-risk use, were systematically developed in Canada as an evidence-based, targeted prevention tool towards reducing adverse outcomes among cannabis users. We briefly summarize the concept of and experiences with implementation of the LRCUG elsewhere, and describe how their adoption as a population health intervention may serve public health goals of possible cannabis legalization in New Zealand and elsewhere.

Cannabis is the most commonly used illicit drug globally, with some 250 million estimated active (e.g., past year) users [1,2]. Policy approaches for cannabis have been shifting gradually around the world recently. While criminal prohibition has been the main control framework for decades, Canada, Uruguay, and 11 US states have recently legalized non-medical cannabis use and supply, with reference to public health and safety objectives [3,4]. New Zealand, alongside other jurisdictions, is actively considering a similar policy reform towards legalization of non-medical cannabis use and supply that will be decided in a public referendum in late 2020 [3,5]. Public opinion polls suggest an about split for and against a legalization framework as presented in the draft 'Cannabis Legalization and Control Bill'. This proposal is very similar to Canada's laws in: legal use age of 20 years; no public use;

commercial production and retail of diverse cannabis products; and home-growing of cannabis allowed [6,7].

New Zealand, along with North America and Australia, is part of a group of 'high-use' countries in which 8%–15% of the population report cannabis use, the majority of whom have tried cannabis in their teens. While survey evidence is not wholly consistent, cannabis use has increased among young adults in the general population in New Zealand but declined among adolescents [8,9]. Cannabis use remains concentrated among youth/young adults (e.g., ages 15–29 years), with about one in three reporting recent use but its prevalence of is lower than that of alcohol and tobacco.

Cannabis use is associated with increased risk of a range of adverse health and social consequences [10–12]. These include: acute cognitive,

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Box 1

The Lower-Risk Cannabis Use Guidelines' (2017) Recommendations. [Acknowledgement: The textbox's content is reproduced with permission from the original source: Fischer, B. et al. "Lower-Risk Cannabis Use Guidelines: A Comprehensive Update of Evidence and Recommendations" American Journal of Public Health (Sheridan Press) August 2017; 107 (8): e1-e12 (Table 1 – page e4).]

RECOMMENDATIONS

Recommendation 1: The most effective way to avoid any risks of cannabis use is to abstain from use. Those who decide to use need to recognize that they incur risks of a variety of—acute and long-term—adverse health and social outcomes. These risks will vary in their likelihood and severity with user characteristics, use patterns, and product qualities, and so may not be the same from user to user or use episode to another. *[Evidence Grade: None required.]*

Recommendation 2: Early initiation of cannabis use (i.e., most clearly that which begins before age 16 years) is associated with multiple subsequent adverse health and social effects in young adult life. These effects are particularly pronounced in early-onset users who also engage in intensive and frequent use. This may be in part because frequent cannabis use affects the developing brain. Prevention messages should emphasize that, the later cannabis use is initiated, the lower the risks will be for adverse effects on the user's general health and welfare throughout later life. *[Evidence Grade: Substantial.]*

Recommendation 3: High THC-content products are generally associated with higher risks of various (acute and chronic) mental and behavioral problem outcomes. Users should know the nature and composition of the cannabis products that they use, and ideally use cannabis products with low THC content. Given the evidence of CBD's attenuating effects on some THC-related outcomes, it is advisable to use cannabis containing high CBD:THC ratios. *[Evidence Grade: Substantial.]*

Recommendation 4: Recent reviews on synthetic cannabinoids indicate markedly more acute and severe adverse health effects from the use of these products (including instances of death). The use of these products should be avoided. *[Evidence Grade: Limited.]*

Recommendation 5: Regular inhalation of combusted cannabis adversely affects respiratory health outcomes. While alternative delivery methods come with their own risks, it is generally preferable to avoid routes of administration that involve smoking combusted cannabis material (e.g., by using vaporizers or edibles). Use of edibles eliminates respiratory risks, but the delayed onset of psychoactive effect may result in the use of larger than intended doses and subsequently increased (mainly acute, e.g., from impairment) adverse effects. *[Evidence Grade: Substantial.]*

Recommendation 6: Users should avoid practices such as "deep inhalation," breath-holding, or the Valsalva maneuver to increase psychoactive ingredient absorption when smoking cannabis, as these practices disproportionately increase the intake of toxic material into the pulmonary system. *[Evidence Grade: Limited.]*

Recommendation 7: Frequent or intensive (e.g., daily or near-daily) cannabis use is strongly associated with higher risks of experiencing adverse health and social outcomes related to cannabis use. Users should be aware and vigilant to keep their own cannabis use—and that of friends, peers, or fellow users—occasional (e.g., use only on 1 day/week, weekend use only, etc.) at most. *[Evidence Grade: Substantial.]*

Recommendation 8: Driving while impaired from cannabis is associated with an increased risk of involvement in motor-vehicle accidents. It is recommended that users categorically refrain from driving (or operating other machinery or mobility devices) for at least 6 hours after using cannabis. This wait time may need to be longer, depending on the user and the properties of the specific cannabis product used. Besides these behavioral recommendations, users are bound by locally applicable legal limits concerning cannabis impairment and driving. The use of both cannabis and alcohol results in multiply increased impairment and risks for driving, and categorically should be avoided. *[Evidence Grade: Substantial.]*

Recommendation 9: There are some populations at probable higher risk for cannabis-related adverse effects who should refrain from using cannabis. These include individuals with predisposition for, or a first-degree family history of, psychosis and substance use disorders, as well as pregnant women (primarily to avoid adverse effects on the fetus or newborn). These recommendations, in part, are based on precautionary principles. *[Evidence Grade: Substantial.]*

Recommendation 10: While data are sparse, it is likely that the combination of some of the risk behaviors listed above will magnify the risk of adverse outcomes from cannabis use. For example, early-onset use involving frequent use of high-potency cannabis is likely to disproportionately increase the risks of experiencing acute or chronic problems. Preventing these combined high-risk patterns of use should be avoided by the user and a policy focus. *[Evidence Grade: Limited.]*

psychomotor control and memory impairment (including severe hallucinations or psychotic episodes); moderately increased driving impairment increasing risks of injury/death; cannabis use disorder/dependence (occurring in 10–25% of users); weak to moderate associations with chronic mental health problems, primarily schizophrenia and depression (with probable bi-directional causality); chronic bronchitis or other pulmonary problems (including possibly increased risk for lung cancer) among those who smoke cannabis (and especially with tobacco co-use); select adverse reproductive/maternal health outcomes (e.g. lower birthweight for newborns) among women using cannabis during pregnancy; and possibly cardio-vascular problems among users of high-potency cannabinoid products. With notable exceptions (e.g., cannabis-impaired driving fatalities), there are few, if any directly attributable (e.g., acute overdose) deaths from cannabis [13]. The lion's share of the cannabis-related burden of disease is attributable to cannabis-related impairment, and consequential injuries or deaths, and cannabis use disorder (CUD). The cannabis-related disease burden is substantially lower than that for alcohol, tobacco or psychostimulants [14–16].

The main adverse social consequences of cannabis use can include compromised educational attainment, and adverse consequences of arrests and convictions e.g. restrictions on travel and professional disadvantage [17–20]. Arrests commonly involve young and socio-economically marginalized males as a result of selective enforcement practices with related social injustices. Among youth and young adults, adverse health and social outcomes primarily occur among sub-groups of vulnerable users characterized by select, shared risks characteristics [10,21,22]. This fact has major implications for the foci of targeted prevention of cannabis-related harms from a public health point of view, namely the need to give priority to protecting young people from the adverse effects of their youthful cannabis use on their life chances and courses [23].

Among its essential prospective benefits, cannabis legalization allows authorities to regulate cannabis products, distribution and use. It furthermore makes it easier to directly facilitate interventions aimed at users, and specifically to systematically provide risk reduction advice ('targeted prevention') to users [20]. *Targeted or secondary prevention measures* to reduce risky or harmful cannabis use have traditionally been limited, and general prevention efforts have mostly focused on reducing availability and advising against cannabis use [24–27]. This, in part, because risk reduction advice has been seen as implicitly 'endorsing' cannabis use as an illegal activity. Recent reviews suggest some evidence for a limited impact of individual targeted risk-reduction interventions, for example, in the form of 'brief interventions', for cannabis use [28–30].

A tailor-made population-level targeted prevention tool for cannabis use, the 'Lower-Risk Cannabis Use Guidelines (LRCUG)', was developed, originally in 2011 and updated in 2017, in anticipation of cannabis legalization in 2018 in Canada [31,32]. The LRCUG embody health-focused education and 'behavioral choice' models that focus on risk factors for adverse harm outcomes from cannabis use, identified by reviews of relevant scientific evidence, that users can modify if they wish to reduce risk of harm with ongoing use. The LRCUG comprise a total of 10 recommendation clusters advising users on how to reduce cannabis use-related risks developed from the consensus of an international group of addiction and health scientists [see [Textbox](#) below for the LRCUG's original recommendations, reproduced with permission]. Important for general uptake and dissemination, the LRCUG have been endorsed by ten leading Canadian organizations [e.g., the Canadian Medical Association [CMA], the Canadian Public Health Association [CPHA], the Canadian Society of Addiction Medicine [CSAM], among others) with health, substance use and addiction focus or mandate. They were also included in education and prevention strategies devised by different levels of governments as part of the implementation of cannabis legalization in Canada. To practically facilitate wide dissemination and uptake, a suite of customized 'knowledge translation' products was developed (e.g.,

infographics, pamphlets, posters, cards, and webinars) for different target audiences and distributed jointly with key stakeholders [33]. The LRCUG, or similar frameworks, have been adapted for use in Latin America and other jurisdictions.

Based on the proposed parameters of possible legalization policy in New Zealand, and available assessments of the impact of legalization on cannabis use and harm outcomes to date in other jurisdictions, it is possible that some of these harm indicators, at least in the short-term, may increase [4,34]. Given this, the LRCUG provide a ready-made, evidence-informed population health tool with the potential to reduce the risks of adverse effects among the sizeable population of cannabis users in New Zealand. Moreover, the New Zealand government's draft legalization bill stipulates mandatory 'harm minimization messaging' to be provided to users at cannabis retail interfaces, for which the LRCUG provide a ready and fitting foundation or template [6]. While the scientific evidence informing the LRCUG is evolving and will require future updating, the LRCUG's concept and approach resemble other, established health behavior guidelines, for example targeting nutritional, cardio-vascular, sexual health promotion or related risk reduction, and – the closely topic-related – low-risk drinking guidelines in place in many English-speaking and other countries [35–38]. Initial assessments suggest that the awareness of, and compliance with the LRCUG's recommendations among cannabis users in Canada is reasonably good, but with room for improvement [39,40]. Further evaluations are required.

Because patterns and cultures of cannabis use (e.g., in modes of use and types of products used) are rather similar in New Zealand and North America, the LRCUG offer a readily available, credible and tested population health tool for reducing cannabis use related risks and the related public health burden in New Zealand [41–43]. This is, generally, the case and pertinent irrespective of whether legalization will eventually be implemented or not. We urge relevant decision-makers and respectively mandated organizations (e.g., government and health authorities, professional associations) to consider, adopting and effectively disseminating the LRCUG in the interest of advancing and improving cannabis use-related public health in New Zealand.

Beyond the specific scenario of New Zealand, the LRCUG may serve as a valuable intervention concept or tool in at least two ways – especially in jurisdictions that are considering moving away from strict prohibition towards more health-oriented cannabis policy approaches. The LRCUG respond to the concrete need and create awareness for targeted prevention among both health policy-makers and the sizable populations of (especially young) people who make the choice for cannabis use, and may concretely contribute to reduce the public health burden from cannabis through 'lower-risk' cannabis use. Depending on context, the LRCUG's recommendations may need to be adapted to local norms and cultures related to cannabis use. Overall, the LRCUG offer a useful element towards 'normalizing' policy and intervention approaches for cannabis towards public health similar to those in place for other everyday activities (e.g., driving, nutrition, alcohol use) that come with risks for health that are intended to be minimized.

Competing interests/funding declarations

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References

- [1] L. Degenhardt, A.J. Ferrari, W.D. Hall, Chapter 10 - the global epidemiology and disease burden of cannabis use and dependence, in: V.R. Preedy (Ed.), *Handbook of Cannabis and Related Pathologies*, Academic Press, San Diego (CA), 2017, pp. 89–100.
- [2] L. Degenhardt, A.J. Ferrari, B. Calabria, et al., The global epidemiology and contribution of cannabis use and dependence to the global burden of disease: results from the GBD 2010 study, *PLoS One* 8 (10) (2013), e76635.
- [3] T. Decorte, S. Lenton, C. Wilkins, *Legalizing Cannabis: Experiences, Lessons and Scenarios*, Routledge, New York (NY), 2020.
- [4] W. Hall, D. Stjepanovic, J. Caulkins, et al., Public health implications of legalising the production and sale of cannabis for medicinal and recreational use, *Lancet* 394 (10208) (2019) 1580–1590.
- [5] B. Fischer, C. Bullen, Emerging prospects for non-medical cannabis legalisation in New Zealand: an initial view and contextualization, *Int. J. Drug Pol.* 76 (2020) 102632.
- [6] D. Venuto, *The Rules of Cannabis: Govt Releases Draft Legislation for How Cannabis Could Be Bought and Sold*, Published, 2019 [Internet]. NZ Herald, https://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=12290516. Accessed 1 April, 2020.
- [7] T. Manhire, Cheat sheet: NZ cannabis legalisation bill, and the referendum question, revealed, in: *The Spinoff*, Published, 2019 [Internet], <https://thespinoff.co.nz/politics/03-12-2019/cheat-sheet-nz-cannabis-legalisation-bill-and-the-referendum-question-revealed/>. Accessed 1 April, 2020.
- [8] J. Ball, N. Gurrum, G. Martin, Adolescent cannabis use continues its downward trend, *New Zealand 2012-2018*, *N. Z. Med. J.* 133 (1510) (2020) 91–93.
- [9] J. Boden, Cannabis in New Zealand: a conundrum, and some good news, *N. Z. Med. J.* 132 (2019) 9–11.
- [10] L. Karila, P. Roux, B. Rolland, et al., Acute and long-term effects of cannabis use: a review, *Curr. Pharmaceut. Des.* 20 (25) (2014) 4112–4118.
- [11] N.D. Volkow, R.D. Baler, W.M. Compton, S.R.B. Weiss, Adverse health effects of marijuana use, *N. Engl. J. Med.* 370 (23) (2014) 2219–2227.
- [12] W. Hall, What has research over the past two decades revealed about the adverse health effects of recreational cannabis use? *Addiction* 110 (1) (2015) 19–35.
- [13] O.H. Drummer, D. Gerostamoulos, N.W. Woodford, Cannabis as a cause of death: a review, *Forensic Sci. Int.* 298 (2019) 298–306.
- [14] L. Degenhardt, W. Hall, Extent of illicit drug use and dependence, and their contribution to the global burden of disease, *Lancet* 379 (9810) (2012) 55–70.
- [15] W. Hall, Alcohol and cannabis: comparing their adverse health effects and regulatory regimes, *Int. J. Drug Pol.* 42 (2017) 57–62.
- [16] S. Imtiaz, K.D. Shield, M. Roerecke, et al., The burden of disease attributable to cannabis use in Canada in 2012, *Addiction* 111 (4) (2016) 653–662.
- [17] J. Macleod, R. Oakes, A. Copello, 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* 363 (9421) (2004) 1579–1588.
- [18] T.M. Moore, G.L. Stuart, A review of the literature on marijuana and interpersonal violence, *Aggress. Violent Behav.* 10 (2) (2005) 171–192.
- [19] R. Smart, M.A.R. Kleiman, Association of cannabis legalization and decriminalization with arrest rates of youths, *JAMA Pediatrics* 173 (8) (2019) 725–727.
- [20] R. Room, B. Fischer, W. Hall, S. Lenton, P. Reuter, *Cannabis Policy: Moving beyond Stalemate*, The Beckley Foundation Press in collaboration with Oxford University Press Inc., New York (NY), 2010.
- [21] W. Hall, L. Degenhardt, The adverse health effects of chronic cannabis use, *Drug Test. Anal.* 6 (1–2) (2014) 39–45.
- [22] N.D. Volkow, J.M. Swanson, A.E. Evins, et al., Effects of cannabis use on human behavior, including cognition, motivation, and psychosis: a review, *JAMA Psychiatry* 73 (3) (2016) 292–297.
- [23] B. Fischer, J. Rehm, W. Hall, Cannabis use in Canada: the need for a ‘public health’ approach, *Can. J. Public Health* 100 (2) (2009) 101–103.
- [24] T. Babor, J. Caulkins, B. Fischer, et al., *Drug Policy and the Public Good*, second ed., Oxford University Press, Oxford (UK), 2018.
- [25] D.C. Lee, N.J. Schliez, E.N. Peters, et al., Systematic review of outcome domains and measures used in psychosocial and pharmacological treatment trials for cannabis use disorder, *Drug Alcohol Depend.* 194 (2019) 500–517.
- [26] P.J. Gates, P. Sabioni, J. Copeland, B. Le Foll, L. Gowing, Psychosocial interventions for cannabis use disorder, *Cochrane Database Syst. Rev.* (5) (2016).
- [27] D. Jutras-Aswad, B. Le Foll, J. Bruneau, T.C. Wild, E. Wood, B. Fischer, Thinking beyond legalization: the case for expanding evidence-based options for cannabis use disorder treatment in Canada, *Can. J. Psychiatr.* 64 (2) (2019) 82–87.
- [28] A. Parmar, S. Sarkar, Brief interventions for cannabis use disorders: a review, *Addict. Disord. Their Treat.* 16 (2017) 80–93.
- [29] J. Halladay, J. Scherer, J. MacKillop, et al., Brief interventions for cannabis use in emerging adults: a systematic review, meta-analysis, and evidence map, *Drug Alcohol Depend.* 204 (2019) 107565.
- [30] C. Diclemente, C. Corno, M. Graydon, A. Wiprovnick, D. Knoblach, Motivational interviewing, enhancement, and brief interventions over the last decade: a review of reviews of efficacy and effectiveness, *Psychol. Addict. Behav.* 31 (2017) 862–887.
- [31] B. Fischer, C. Russell, P. Sabioni, et al., Lower-risk cannabis use guidelines: a comprehensive update of evidence and recommendations, *Am. J. Publ. Health* 107 (8) (2017) e1–e12.
- [32] B. Fischer, V. Jeffries, W. Hall, R. Room, E. Goldner, J. Rehm, Lower risk cannabis use guidelines for Canada (LRCUG): a narrative review of evidence and recommendations, *Can. J. Public Health* 102 (5) (2011) 324–327.
- [33] Public Health Agency of Canada, *Canada’s Lower-Risk Cannabis Use Guidelines*, Published, 2019 (LRCUG) [Internet]. Government of Canada, <https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/resources/lower-risk-cannabis-use-guidelines.html>. Updated 2020 January 22. Accessed April 1, 2020.
- [34] M. Cerdá, C. Mauro, A. Hamilton, et al., Association between recreational marijuana legalization in the United States and changes in marijuana use and cannabis use disorder from 2008 to 2016, *JAMA Psychiatry* 77 (2) (2020) 165–171.
- [35] J. Rehm, J. Patra, Different guidelines for different countries? On the scientific basis of low-risk drinking guidelines and their implications, *Drug Alcohol Rev.* 31 (2) (2012) 156–161.
- [36] B.T. Johnson, M.P. Carey, K.L. Marsh, K.D. Levin, L.A.J. Scott-Sheldon, Interventions to reduce sexual risk for the human immunodeficiency virus in adolescents, 1985–2000, A Research Synthesis. *Archives of Pediatrics & Adolescent Medicine* 157 (4) (2003) 381–388.
- [37] G.L. de Melo Ghisi, F. Abdallah, S.L. Grace, S. Thomas, P. Oh, A systematic review of patient education in cardiac patients: do they increase knowledge and promote health behavior change? *Patient Educ. Counsel.* 95 (2) (2014) 160–174.
- [38] D.E.R. Warburton, S. Charlesworth, A. Ivey, L. Nettlefold, S.S.D. Bredin, A systematic review of the evidence for Canada’s Physical Activity Guidelines for Adults, *Int. J. Behav. Nutr. Phys. Activ.* 7 (1) (2010) 39.
- [39] C. Lee, A. Lee, S. Goodman, D. Hammond, B. Fischer, The lower-risk cannabis use guidelines’ (LRCUG) recommendations: how are Canadian cannabis users complying? *Prevent. Med. Rep.* 20 (100294) (2020).
- [40] Goodman S, Fischer B, Hammond D. Lower-risk cannabis use guidelines: adherence in Canada and the United States. *Am. J. Prev. Med.*. In press.
- [41] J.M. Boden, B. Dhakal, J.A. Foulds, L.J. Horwood, Life-course trajectories of cannabis use: a latent class analysis of a New Zealand birth cohort, *Addiction* 115 (2) (2020) 279–290.
- [42] S. Goodman, E. Wadsworth, C. Leos-Toro, D. Hammond, Prevalence and forms of cannabis use in legal vs. illegal recreational cannabis markets, *Int. J. Drug Pol.* 76 (2020) 102658.
- [43] C. Russell, S. Rueda, R. Room, M. Tyndall, B. Fischer, Routes of administration for cannabis use – basic prevalence and related health outcomes: a scoping review and synthesis, *Int. J. Drug Pol.* 52 (2018) 87–96.