Essay

Canada's THC unit: Applications for the legal cannabis market

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ABSTRACT

The legalization of cannabis in Canada has accelerated the need for a standardized approach to measuring and communicating the amount of delta-9-tetrahydrocannabinol (THC) in cannabis products. This article offers an overview of the considerations associated with establishing and implementing a standard THC unit in the Canadian context. The article begins by discussing the applications of a standard THC unit, emphasizing its potential use in product labelling, consumer education, and product reporting and surveillance. The article then examines key considerations for identifying what a Canadian THC unit should be set at, specifically within the context of a country with a regulated commercial cannabis market. This is followed by a discussion of additional considerations related to the adoption of a Canadian THC unit, including its use across various product formats and modes of administration. A significant focus of this article is on prioritizing public health and safety and informed decision-making among adult consumers as the legal cannabis market evolves. Collaboration among various stakeholders, such as government agencies, industry, and public health professionals, is highlighted as crucial for a successful transition to the use of Canada's THC unit.

Introduction

Canada legalized the production, sale, and use of recreational cannabis in October 2018 (Government of Canada 2018). Since then, the legal cannabis market has expanded significantly and the types of products available in Canada continues to diversify. Consumers can now access various forms of dried flower, extracts, concentrates, edibles, beverages, and topicals. This wide range of products not only vary substantially in their methods of administration, but also in their strength (i.e., concentration of delta-9-tetrahydrocannabinol; THC). Cannabis markets in other countries are undergoing a similar transition towards greater product diversity and higher THC levels (Freeman et al., 2021; Hammond et al., 2022).

Consumer familiarity with THC levels is low (Hammond, 2021a). Historically, consumers have relied upon word-of-mouth and unreliable references to the cannabis 'strain' to infer the strength of cannabis products. Even in markets that have legalized recreational cannabis, most consumers have little awareness of THC numbers and lack a basic knowledge of what constituents a 'low' or 'high' THC amount (Hammond & Goodman, 2022; Leos-Toro et al., 2020; Lineham et al., 2023). Not surprisingly, many consumers have trouble dosing, and

over-consumption and adverse health effects are common (Hammond, 2021a). Cannabis accounts for considerable health care usage, including hospitalizations for harmful cannabis use, cannabis dependence, and cannabis-induced psychosis (Myran et al., 2023).

The diversity of cannabis products also presents challenges for monitoring and measuring cannabis consumption, including in research studies that assess health risk and inform policy decisions. To date, most consumption estimates rely exclusively on dried flower, and fail to account for other product forms that use different measurement units, such as edibles, orally ingested oils, and vaping liquids. The over-reliance on dried flower is becoming more pronounced as the popularity of non-flower products continues to increase, particularly in legal markets (Hammond et al., 2022).

The standard THC unit

Accordingly, there has been growing interest in standardizing cannabis measurement and in developing a standard cannabis unit (Filbey, 2020; Freeman & Lorenzetti, 2020a; Hammond, 2020; Jugl et al., 2021; Volkow & Weiss, 2020). Freeman and Lorenzetti (2020a) proposed establishing a standard unit for cannabis based on two central

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tenets: the unit should (1) reflect the quantity of the primary active pharmacological constituents (THC in milligrams (mg)), and (2) be applicable across all product types and methods of administration. They recommended a 5 mg standard THC unit based on a number of factors, including experimental data demonstrating that a dose range of 2–8 mg THC can produce intoxicating effects without producing severe adverse responses among infrequent users. Freeman and Lorenzetti also relied on ecological data along with public health factors, including the potential that a unit lower than typical consumption could reduce use, as reducing serving sizes can decrease alcohol consumption (Kersbergen et al., 2018). Finally, existing policy was taken into consideration (e.g., packaging or 'serving size' limits of 5 mg or 10 mg in states/provinces in the USA/Canada).

In 2021, the National Institute on Drug Abuse, together with the National Institute of Mental Health, the National Cancer Institute, and the National Heart, Lung, and Blood Institute, issued a notice directing all researchers funded by these institutes to adopt a 5 mg standard THC unit (National Institutes of Health, 2021). Endorsement of the 5 mg standard THC unit by the National Institutes of Health and wider adoption of this by the international research community can increase consistency of research practices, facilitate meta-analyses, and strengthen the quality of evidence (T.P. Freeman & Lorenzetti, 2021). This will ultimately help efforts to maximise the potential benefits and minimise the potential harms of THC exposure across a wide range of health outcomes (Solmi et al., 2023). The current paper examines standard THC units from the perspective of implementing this within a country with a legal cannabis market (rather than in research settings alone), which concerns a broader set of considerations, as described below.

What are the potential applications of a standardized THC unit in Canada?

Product labelling & cannabis packaging

Product labeling on packages provides critical information for a wide variety of consumer products, including prescription and non-prescription drugs, as well as 'recreational' drugs including alcohol and tobacco. Packaging is particularly important because it provides consumers with information at the point-of-sale and use (International Agency for Research on Cancer, 2008). Labelling is also commonly displayed in retail settings, including online cannabis stores, which are legal in every province and territory in Canada.

Labelling regulations in Canada currently require that information on THC content be displayed on all products. However, there are significant differences in the way THC is displayed across product types (Health Canada, 2020). Regulations currently require two sets of THC numbers for cannabis: one for "THC amount", which includes the amount of THC in the package when purchased, and the "total THC amount" which indicates the amount of THC once the product is activated by heat and used as intended. For dried cannabis, regulations require the 'total' THC to be presented as milligrams (mg) per gram (g), which is sometimes displayed as mg/g on some products and as a percentage on others. Cannabis extracts (e.g., solid concentrates, vaping liquids, and oral liquids) must also report mg/g; however, THC levels are also reported for some oral liquids in millilitres (mls) and sometimes with percentages. In contrast, edible products display the THC levels in mgs for individual units within a package and the total package (with a maximum value of 10 mg for each package of edibles). The ways in which THC numbers and product strength are communicated in retail settings also differs widely, including among public, government-run retailers in different provinces. For example, several provinces include ranges or thresholds of THC percentages for communicating the strength of products; however, the ranges and thresholds differ, while other provinces have ceased to communicate THC percentages in relation to strength at all. In short, current labelling practices are highly

inconsistent and convey THC numbers using different units for different product forms, which often require a high level of numeracy to interpret and apply. It is, therefore, not surprising that consumers in Canada demonstrate little knowledge or understanding of THC numbers as they relate to the strength of products (Hammond, 2021a; Lineham et al., 2023).

Labelling each cannabis product with a fixed number of Canadian THC units would help consumers more clearly understand the product and its potential use (Arkell et al., 2021; Freeman & Lorenzetti, 2020a; Hammond, 2021a). Experimental studies have demonstrated the efficacy of labelling standard drinks on alcohol and have also shown that displaying standard units on packaging helps to understand strength as it relates to consumption amounts (Hobin et al., 2018). In addition, consumers have indicated they want information on a standard serving or dose to guide cannabis consumption (Kosa et al., 2017; Leos-Toro et al., 2020).

Table 1 illustrates the ways in which a Canadian THC unit could be displayed across different products using metrics for various product forms. Canadian THC units could complement, rather than replace all the existing information on THC percentages and product amounts. Canadian THC units could also be expressed in the metric of each product form to help guide consumption amounts. For example, oral liquids could indicate the amount of mls that correspond to each unit. In other words, labels could indicate that 1 Canadian THC unit = 1 ml of liquid, instead of providing consumers with THC mg/g, and requiring them to convert these numbers into the corresponding number of mls.

Consumer education: lower-risk use guidelines and dose-specific recommendations

One of the most common messages regarding product consumption in Canada's regulated legal cannabis market is the mantra of "start low and go slow". In Canada, references to 'low' or 'high' THC levels are included in mandated health warnings on packages, recommendations in Canada's Lower-Risk Cannabis Use Guidelines (Fischer et al., 2017), and other education campaigns (Health Canada, n.d.). This descriptive guidance has little or no utility to consumers without an understanding of what THC levels constitute 'low' or 'high' amounts (Lineham et al., 2023). Canadian THC units would provide a concrete basis for helping consumers to quantify 'low' and 'high' THC levels in a metric that can be applied to all product forms (Freeman & Lorenzetti, 2020a; Le Foll, 2022). Canadian THC units could also be used to identify risk across a spectrum of use and communicate guidance around lower and higher-risk use for both acute and long-term harms. This could help people make lower-risk choices about their consumption. The use of Canadian THC units represents an important milestone in the transition from the illegal market, in which product information is conveyed

Table 1
Methods for labelling Canadian THC units across product forms.

Product form	Labelling metric # of Canadian THC units per…
'Loose' flower / dried herb	Per gram & per package
Solid concentrate (e.g., hash, rosin, wax, etc.)	Per gram & per package [1]
Vaping liquids	Per container (cartridge or disposable product)
Pre-rolled joint	Per joint & per gram
Capsule	Per capsule & per package
Edible / beverages	Per edible / beverage & per package [2]
Oral liquids	Per millilitre & per package [3]

[1] For concentrates sold in amounts < 1 gram, label Canadian THC units per 'piece'.

[2] For edibles sold with multiple individual portions (e.g. gummies), labelling should indicate the number of Canadian THC units per portion.

[3] Oral liquids could also include the number of millilitres per Canadian THC unit.

anecdotally based on unreliable information, to a well-regulated legal market in which consumers have clear information to guide their consumption patterns.

Product reporting & cannabis surveillance

In legal markets, mandatory reporting of cannabis production and sales provides important information to monitor market trends that are essential for estimating the market size, trends in legal versus illegal sales, consumption patterns, and product characteristics, including trends towards higher strength products. In Canada, as well as most other legal cannabis markets, cannabis license holders, distributers, and retailers are required to submit monthly cannabis tracking reports (Health Canada, 2022). Efforts to use this information to estimate consumption amounts often requires assumptions about the THC levels in various product forms, which are converted into 'dried flower equivalents'. In addition, the ways in which this information is collected often differs across jurisdictions, complicating efforts to compare legal markets across different countries or subnational jurisdictions, including individual provinces or states. Requiring sales data to be reported with Canadian THC units would provide a consistent, reliable means of monitoring the product market in ways that account for the increasing diversity of products.

Canadian THC units also have the potential to enhance surveillance based on population-based surveys, which are integral to monitoring patterns of use and associated public health impacts and estimating the size of the illegal market. Asking consumers about THC (and CBD) levels of their cannabis products is becoming more common in research, including epidemiological studies assessing the health effects of cannabis use, for which THC strength may be an important factor (Arterberry et al., 2019; Di Forti et al., 2019). However, to date, few consumers are able to accurately self-report the THC content of their products (Hammond & Goodman, 2022; Lineham et al., 2023). In addition, estimates of consumption remain almost exclusively based on dried flower consumption, as noted previously. However, the widespread adoption of Canadian THC units in packaging, public or consumer education, and other areas is likely to improve consumer reporting and, in turn, enhance monitoring and surveillance of cannabis consumption and related behaviours.

Overall, the use of Canadian THC units would help to harmonize the collection of cannabis data both at the market-level and at the consumer level in terms of the individual and population-level health impacts of cannabis.

Establishing a Canadian THC unit

Legalization of medical and recreational cannabis in Canada provides an opportunity to use a standard unit in applications beyond the research setting. A Canadian THC unit can enhance the way THC is conveyed to consumers and used in market surveillance. Indeed, a primary function of the legal market is to standardize product testing and reporting to ensure reliable, consistent product information is provided to consumers. Given the lack of historical experience regulating legal cannabis markets, progress in this area has been uneven. Regulatory practices differ across jurisdictions in Canada and at the state-level in the United States. The Canadian market represents an ideal setting in which to consider standard units given that cannabis has been legalized at the federal level. Canada has a diverse commercial market that is considerably less restrictive than in other countries that have legalized cannabis, including Uruguay and several European countries that are in the process of establishing retail markets.

Establishment of a Canadian THC unit can be informed by the same principles as the standard THC unit (Freeman & Lorenzetti, 2020a) that has been endorsed for use in research (National Institute on Drug Abuse, 2021). It should (1) reflect THC in mg, and (2) be applicable across all product types and methods of administration. It should also be informed by experimental data, ecological data, public health considerations and existing policy. Taking these factors into account with a focus on identifying a Canadian THC unit that is supported by evidence, considers contextual public health considerations, and aligns with existing recommendations and practices, the authors propose that a 2.5 mg Canadian THC unit would be most appropriate.

Public health considerations in Canada

In Canada, the primary purpose of the *Cannabis Act* is "to protect public health and public safety" (Government of Canada 2018), and the context of a federally regulated legal market must also be considered. There are people accessing cannabis on the legal market across the full spectrum of cannabis use, from those who use cannabis infrequently to those who use frequently (daily or almost daily). While it is important that a Canadian THC unit has relevance for consumers across this spectrum, it is critical to prioritize the public health and safety of inexperienced and infrequent consumers.

A 2.5 mg Canadian THC unit is within the lower end of the 2–8 mg THC dose range proposed by Freeman and Lorenzetti (2020a) for producing intoxicating effects without severe adverse responses among infrequent users. Establishing a Canadian THC unit that is low may reduce the likelihood of unpleasant experiences or over intoxication in novice consumers accessing the legal market who consume a single unit (Freeman & Lorenzetti, 2020a; Hammond, 2021a). A 2.5 mg Canadian THC unit would also be consistent with the idea that the threshold should be set at or below the typical level required to induce intoxication among most consumers, as others have also suggested (Chester et al., 2020). In a review of 10 different studies, Kleinloog et al. (2014) reported that 2 mg of THC significantly differed from placebo, with 58 % of participants reporting feeling "high" after a 2 mg dose. The percentage of participants who reported feeling high increased to 80 % at a 4 mg dose. Thus, setting the Canadian THC unit at 2.5 mg is important within the Canadian context due to novice or infrequent consumers accessing products on the legal market, who have a greater need for guidance. These individuals are more likely to experience negative effects due to a lack of tolerance and experience with cannabis (Chester et al., 2020; Curran et al., 2019; D'Souza et al., 2008). Also, people who are less experienced with using cannabis and selecting products may interpret the THC unit as a "recommended dose" or "serving" (Hudak et al., 2015; Leos-Toro et al., 2020). Thus, a lower standard unit of 2.5 mg provides less potential risk of over-consumption for novel consumers who take guidance from the standard unit. There is no single 'usual' or typical intake either across product forms or across individuals that use the same product. Indeed, consumption amount and THC intake vary widely (Kitdumrongthum & Trachootham, 2023). There is also no uniform level at which consumers experience intoxication due to innate differences in THC metabolism and subjective experience, as well as varying levels of tolerance among frequent consumers. The Canadian THC unit would not constitute a starting point nor an upper limit to guide consumption, however a 2.5 mg unit may reduce adverse effects for people who construe a Canadian THC unit as a recommended dose.

Many regular cannabis consumers may consider a 2.5 mg Canadian THC unit to be too low given their usual intake, which can be considerably higher. For example, ecological data collected from people who use cannabis found that cannabis joints contained 7 mg THC in Spain, (Kögel et al., 2017), 32 mg in the Netherlands (van der Pol et al., 2014) and 35 mg in the UK (Freeman et al., 2014). However, setting a Canadian THC unit at 2.5 mg does not limit the ability of more experienced consumers to ingest larger quantities, if desired, and it is easier for consumers to add THC units or servings than it is to divide products into smaller units (Hammond, 2021a). Using non-cannabis comparisons, identifying a standard serving of food or alcohol does not limit how much can be consumed. Indeed, many alcohol consumers consume many 'standard drinks' in a single session, but still count their consumption in terms of individual drinks, just as typical cigarette smokers

consume between 10 and 15 cigarettes a day in countries such as Canada (Hammond, 2021a; Reid et al., 2022). In other words, the size of a Canadian unit need not reflect usual intake levels to provide useful information on consumption amounts, even for heavier consumers.

Overall, there is a trade-off in terms of the threshold for setting a standard unit: a lower threshold is preferable for new or infrequent consumers to minimize the risk of over-consumption and to avoid the need calculate 'fractions' of a unit; in contrast, a higher threshold may be more suitable for individuals that consume very high amounts of THC. To the extent that this trade-off is inevitable, 'new' consumers and less frequent consumers with lower consumption levels have a greater need for guidance, such that there may be greater overall benefit from a lower threshold.

Consistency of a 2.5 mg Canadian THC unit with existing recommendations and practices in Canada

A 2.5 mg Canadian THC unit would also be consistent with current lower risk guidance in Canada (Health Canada, 2019c) and established recommendations from medical cannabis authorities. The available medical cannabis literature suggests that a dose of 3 mg of THC or lower can have therapeutic effects with minimal adverse events (Health Canada, 2018). Health Canada (2016) recommends that those without previous experience of cannabis use who are initiating it for medical purposes should begin "at a very low dose (e.g., 1 mg THC)" (para. 6), while guidance from federal licensed cannabis companies typically recommends a starting dose of 2 mg for oral liquids and other product forms. In addition, a modified Delphi process producing consensus recommendations on dosing and administration of medical cannabis to treat chronic pain identified 2.5 mg/day as the starting THC dose (Bhaskar et al., 2021). A systematic review involved in composing the Clinical Practice Guidelines for the Use of Cannabis and Cannabis-Based Medicines in the Management of Chronic Pain and Cooccurring Conditions (Bell et al., 2024) also found that literature consistently recommended starting at a low dose. While this paper primarily addresses the use of a Canadian THC unit in the context of the recreational legal market, these are important considerations if there is an eventual application within the medical framework. Finally, a 2.5 mg Canadian THC unit would be consistent with industry practices for manufacturing cannabis edibles in Canada. Under federal regulations, edibles can contain a maximum of 10 mg in each package; however, in most cases, cannabis manufacturers sub-divide edibles into units smaller than 5 mg (usually 2.0 or 2.5 mg pieces), which demonstrates that there is demand for units less than 5 mg. While it differs from the 5 mg standard THC unit endorsed by the National Institutes of Health, a 2.5 mg Canadian THC unit can be easily converted as a fraction of the 5 mg standard THC unit (Freeman & Lorenzetti, 2020a) to facilitate harmonisation of reporting practices and data synthesis.

Ultimately, the threshold for a THC unit that is chosen by governmental organizations and policy makers may vary across jurisdictions, as has been the case for alcohol units. As indicated above, such decisions depend on a range of factors including ecological data, experimental studies, public health considerations and compatibility with existing policy (Freeman & Lorenzetti, 2020a). In Canada, protecting public health and public safety is the central objective of the *Cannabis Act,* and therefore it would be reasonable for Canada to prioritize public health when setting and implementing a Canadian THC unit in its regulated cannabis market. Setting the Canadian THC unit at 2.5 mg for all products and methods of administration would be consistent with existing policy in Canada's regulated legal cannabis market (Health Canada, 2019c) and the principles of the standard THC unit (Freeman & Lorenzetti, 2020a) endorsed by the National Institutes of Health (National Institute on Drug Abuse, 2021).

Additional considerations in the adoption of a Canadian THC unit

The are several considerations for adopting a Canadian THC unit in a regulatory setting with diverse product formats. First, the pharmacokinetics of THC and other cannabinoids vary by mode of administration. Inhalation leads to more rapid absorption of THC relative to ingesting a cannabis product. Bioavailability of THC is also greater following inhalation (25 % to 30 %) than ingestion (4 % to 25 %), although considerable interindividual variability has been observed (Ashton, 2001; Grotenhermen, 2003; Huestis, 2007). While bioavailability is lower following ingestion, a greater amount of THC is converted to 11-hydroxy-THC, a metabolite believed to have equal or greater psychoactive effects than THC (Newmeyer et al., 2016). Together, differences in absorption and metabolism of THC, in turn, influence time course of psychoactive effects (Grotenhermen, 2003; Huestis, 2007). Freeman and Lorenzetti (2020a) pointed out that despite differences in the onset and duration psychoactive effects, preliminary research suggests that peak subjective effects (i.e., the high) may be similar between inhaled and ingested products with equal THC levels (infrequent users in Newmeyer et al., 2017; Ohlsson et al., 1980). This suggests that, while consumers should be educated on the distinct time course and effect profile of different routes of administration, there may be some degree of similarity in the peak effects of consuming a Canadian THC unit via oral and inhaled administration.

The pharmacokinetics and associated psychoactive effects of THC may be further influenced by the presence of other cannabinoids in cannabis or in a cannabis product. CBD in particular has received attention for its potential to modulate some adverse effects of THC. Administering a relatively high (600 mg) oral dose of CBD 3.5 h prior to a 1.5 mg intravenous THC injection attenuated THC-induced psychotic symptoms and mitigated impairment in episodic memory performance (Englund et al., 2013). Similarly, vaporizing a 400 mg dose of CBD reduced the intoxicating effects of 8 mg of THC, whereas a lower dose of CBD (4 mg) enhanced these effects, particularly among infrequent cannabis consumers (Solowij et al., 2019). More recently, oral co-administration of 20 mg THC with 640 mg CBD was reported to heighten self-reported anxiety, sedation, memory impairments, and elicited more pronounced deficits in cognitive and psychomotor performance relative to THC administration alone (Zamarripa et al., 2023). In addition to these findings, several studies reported no protective effects of varying doses of CBD against the adverse effects THC administration. For instance, vaporizing 16 mg of CBD did not mitigate acute psychotic and memory impairing effects 8 mg THC (Morgan et al., 2018). Similarly, vaporizing 10 mg, 20 mg or 30 mg had no protective effects against the adverse effects of 10 mg on delayed verbal recall and induced psychotic symptoms (Englund et al., 2023). Finally, vaporized cannabis flower preparations consisting of 24 mg of CBD per 75 kg individual did not significantly alter the effects of 8 mg THC per 75 kg person on subjective drug effects, verbal episodic memory, or measures of psychotic symptoms (Lawn et al., 2023). Overall, studies investigating how CBD influences the effects of THC have produced mixed results (Freeman et al., 2019) and while potentially relevant to consumers, its health impact appears unclear, and considerably less important than the dose of the primary intoxicating cannabinoid, THC.

Certainly, more research is needed to better understand the pharmacokinetics and pharmacodynamics of various cannabis products, including the role of other cannabinoids. For example, some cannabinoids like cannabinol and delta-8-tetrahydrocannabinol are psychoactive, whereas it is unclear whether others such as delta-9-tetrahydrocannabivarin are psychoactive (Advisory Council on the Misuse of Drugs, 2016). In fact, the complexities surrounding cannabinoids and diverse cannabis products supports, rather than opposes, the value of having a standardized unit of THC (Volkow & Weiss, 2020). Standardized measurement of THC can facilitate research that aims to more reliably predict psychoactive effects, or establish equivalencies, across different product formats. More generally, it is highly unlikely

that additional research will yield a simple, superior metric than dose of THC for predicting the health effects of cannabis use.

Dosing cannabis products based on standard THC units may be easier with certain product formats than others. Ingestible products (e.g., chocolates, gummies, capsules, beverages) are commonly available in distinct THC unit sizes, such as 2.5 mg, 5 mg, or 10 mg, making them relatively easy for consumers to dose. Some cannabis oils come with dispensing devices (syringes) labelled with millilitres, which can be converted to THC units if Canada implements a standard THC unit. However, dosing, in THC units or other metrics may be more complex with certain inhaled products like dried cannabis where the amount of product used in a joint or bong can vary considerably across consumers (Dawson et al., 2023). Labeling loose dried cannabis with the number of THC units per gram and per package, as shown in Table 1, could help consumers in preparing joints of appropriate size to achieve their desired effects.

It is likely that higher potency products (e.g., concentrates and many vape cartridges) would deliver more than one Canadian THC unit (2.5 mg) per administration. However, most people who consume these products are experienced, frequent consumers who likely do not require that level of precision when dosing. This said, there is a need in Canada to clearly identify and communicate high potency products to consumers, especially those who are new or inexperienced with cannabis. Indeed, the Expert Panel involved in the legislative review of the *Cannabis Act* recommended establishing a definition of higher-potency products and applying additional health warnings that inform consumers about the elevated risks of these products (Government of Canada, 2024). Standard THC units could be one method of defining high potency across product formats. Public education to consumers around defining and dosing high potency products will be an important next step. In the future, a Canadian THC unit can be used to communicate acute (e.g., cannabis-induced psychosis) and long-term (e.g., cannabis use disorder) risks or harms associated with higher-potency products in lower-risk guidelines.

Feasibility of establishing a Canadian THC unit

Legal cannabis markets are in their infancy and regulatory frameworks are rapidly evolving. In jurisdictions such as Canada, the primary focus has begun to shift from establishing a legal retail market to identifying how to best regulate cannabis markets. This type of regulatory change is to be expected in jurisdictions that have legalized cannabis due to the lack of regulatory experience and precedent. As part of this process, there is a need to minimize avoidable risks associated with over-consumption and harmful consumption patterns. Product standards and enhancing the way that strength is communicated to consumers represents an important area in need of improvement that is in the shared interests of consumers, regulators, and industry. Indeed, Canada has already implemented several modifications to cannabis regulations in the first five years since legalization in 2018, including revisions to the mandated health warnings (Health Canada, n.d.). In addition, Health Canada recently sought public guidance on opportunities for simplifying THC labelling on products as part of consultations on cannabis regulations (Government of Canada, n.d.), and the legislative review of the *Cannabis Act* resulted in 54 recommendations, many of which target changes to policy and regulations, including the develoment of a 'standard dose' (Government of Canada, 2024). There is also broad support among consumers for standardized THC labelling on products (Hammond, 2021b), as well as among non-governmental and public health stakeholders (CCSA, 2023a). Industry support for Canadian THC units is less clear; however, as noted above, standard servings/doses are routinely conveyed by companies to medical cannabis users. Importantly, mandating Canadian THC units on product labels would result in minimal regulatory burden in Canada, as it does not require any new testing and could replace the unnecessary inclusion of both the THC and 'total' THC numbers that are currently required for many products.

The adoption of Canadian THC units would also provide an important precedent for other jurisdictions that are in the process of developing legal retail markets. Harmonizing labelling standards across different jurisdictions is advantageous for industry and will enhance consumer familiarity and awareness of THC content. Finally, while a Canadian THC unit is expected to increase the clarity of packaging and labels, labelling should not take the place of public education (Hammond, 2021a). Public education should help consumers understand what a THC unit is and what it is not; that this is a unit of measurement and does not constitute a recommended dose. A clear understanding of the Canadian THC unit is central to consumers being able to make more informed choices about their cannabis use and report their consumption more accurately on data collection instruments. Additional efforts should continue alongside the establishment of a Canadian THC unit to educate consumers on cannabis potency and differences across modes of administration. Targeted and specific resources can be developed to help people understand various product formats, for example, how to determine how much of their dried flower equals one THC unit. This may be similar to public education materials that provide guidance on how to determine what a standard drink is across different alcohol products (CCSA, 2023b). Overall, once a Canadian THC unit is identified and implemented, resources should be allocated for helping consumers understand the unit and product labelling to make informed choices based on their desired effects.

Ethics approval

The authors declare that the work reported herein did not require ethics approval because it did not involve animal or human participation.

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Shea Wood: Writing – review & editing, Writing – original draft, Conceptualization. **Robert Gabrys:** Writing – review & editing, Writing – original draft, Conceptualization. **Tom Freeman:** Writing – review & editing, Conceptualization. **David Hammond:** Writing – review & editing, Writing – original draft, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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