Caffeinated Energy Drinks
Technical Report on Public Health Concerns and Regulation in Canada

Prepared by Toronto Public Health | February 16, 2017

Background

The term 'energy drink' is commonly used to refer to packaged beverages containing naturally occurring and/or added caffeine, added sugar and other sweeteners, herbal stimulants such as guarana, and flavouring ingredients.[1-4] Although other types of beverages have similar features, 'energy drinks' are regulated by Health Canada as **caffeinated energy drinks** (CED) and are distinct from other products sold in Canada such as caffeinated soft-drinks, 'energy shots', and sports drinks.[2] Caffeinated energy drinks that are approved for sale are required to meet standards for product formulation and labelling and comply with conditions on marketing.[2]

This technical report presents the public health concerns with CEDs and outlines the regulatory framework for CEDs in Canada.

Public Health Concerns

The public health concerns with CEDs are related to the caffeine and sugar content, and to the practice of mixing CEDs with alcohol, particularly by youth and young adults.[1,3,4] Caffeinated energy drinks are typically marketed to youth and young adults[5,6] and contain more caffeine per serving than caffeinated colas and soft-drinks and generally less than brewed coffee[7] (see Table 1). In addition to caffeine (a stimulant), CEDs often contain additional herbal stimulants such as guarana and ginseng.[1-4] Unlike coffee, which is typically served warm or hot, CEDs can be consumed more quickly because they are typically packaged in sealed, single-use containers[8] and can be served cold or at room temperature.

Caffeine content

Caffeine naturally occurs in some foods (e.g. coffee, tea) and flavours (e.g. those derived from guarana) and may be added to colas and soft drinks.[7] Caffeine has stimulant properties, can be a diuretic, and exhibits a number of transient effects on mood, performance, and behaviour in humans.[7,9] Caffeine is not considered to be an addictive substance and its consumption is generally considered to be safe.[7,9] However, Health Canada provides caffeine consumption guidance to Canadians to avoid adverse effects such as insomnia, headaches, irritability and nervousness.[7] Some populations, such as pregnant or breastfeeding women and children, may be at greater risk from the health effects of caffeine.[7] Health Canada has developed additional guidelines for some populations as a precautionary measure.[7] For example, for children 10-12 years of age, Health Canada recommends a maximum of 85 mg/day of caffeine.[7] For adolescents (13 years old to adult), Health Canada has a precautionary recommendation of

consuming no more than 2.5 mg/kg-body-weight of caffeine per day (e.g. this is equivalent to 125 mg of caffeine for a 50 kg adolescent). Older or heavier adolescents may be able to safely consume caffeine up to the recommended limit for adults of 400 mg per day.[7] Other factors may contribute to the occurrence of adverse effects and Health Canada generally advises limiting caffeine intake as a wise precaution.[7]

The presence of caffeine in CEDs means that they are not suitable for hydration or as an electrolyte replacement during sports performance as they can mask the signs of dehydration.[10] Manufacturers and distributors of CEDs have agreed to not market CEDs for these purposes as a condition for approval by Health Canada to sell and market CEDs in Canada.[11] Health Canada has additional marketing restrictions and labelling requirements to protect populations that may be more sensitive to caffeine. For example, CEDs cannot be marketed to children 12 years old and under and CED packages must contain the message 'Not recommended for children'[11] (see Table 2 for a complete list of requirements).

The evidence from recent reviews on energy drink consumption is limited and of varying quality. However, the reviews reaffirm the findings that Health Canada used in its risk management approach, including, reported adverse health events following consumption of CEDs such as cardiovascular events, daytime sleepiness, and behavioural issues such as irritability and nervousness.[12-17] Given the noted limitations and lack of strong countervailing evidence, the current evidence on CED consumption supports Health Canada's current precautionary approach in setting conditions for the sale and marketing of CEDs or from public health's advice for youth to moderate their consumption of CEDs.

Sugar content

Caffeinated energy drinks are typically sugar-sweetened (sweetened varieties have a similar sugar content compared to soft drinks) and present the same health concerns as other sugar-sweetened beverages, such as an association with obesity and dental health issues.[18] Among Canadian children and youth, the consumption of foods with added sugar has increased over the past 30 years and it is now estimated that half of their daily sugar intake comes from beverages.[19] Between 2004 and 2015, the sales of soft drinks in Canada (per capita) has declined by 27% while the sales of energy drinks (per capita) has increased by 638%.[20] Canada's Food Guide recommends limiting foods and drinks that are high in added sugar and drinking water in hot weather and when active.[21]

Mixing caffeinated energy drinks and alcohol

The appeal and ease in which CEDs can be mixed with alcohol is a particular concern for public health. This mixture combines the stimulant properties of caffeine with the depressant properties and impairment effects of alcohol.[4] Caffeine does not affect alcohol metabolism by the liver and thus does not reduce the risk of alcohol-attributable harms.[4] Concern about this combination increased in the 2000s with the rising popularity of mixing energy drinks with alcohol and, in particular, the availability of and reported adverse events related to certain

premixed caffeinated alcoholic beverages[a] in the United States (US).[22,23] The US Food & Drug Administration eventually took action to prevent the sale of these products in 2010.[24] The concern of mixing energy drinks and alcohol is reflected in the Canadian regulatory framework for CEDs. Health Canada has prohibited the sale of packaged alcoholic beverages that include a CED as an ingredient (and regulates the use of other caffeine-containing ingredients) and requires that CED product labels contain the message "Do not mix with alcohol"[11] (see Table 2 for more information).

Research and Policy Positions from Ontario and Canada

A 2012 Health Canada health risk assessment report on energy drinks considered both the health hazard of energy drinks and how they are actually consumed by Canadians.[25] Health Canada found that there was limited data on the toxicological interaction between caffeine and alcohol.[25] However, it noted that adverse events involving co-consumption of energy drinks and alcohol were most common among young adults, a group of relatively inexperienced alcohol consumers.[25] In the 2012 health risk assessment, Health Canada's scientists argued that it is a prudent safety measure to recommend not mixing energy drinks and alcohol.[25] Health Canada communicated to TPH staff that they continue to monitor the issue and that their precautionary messages about not mixing energy drinks and alcohol reflect their current assessment of the evidence.[26]

Recent reviews of evidence on this issue, while mixed, generally support Health Canada's precautionary approach in setting conditions for the sale and marketing of CEDs, including discouraging the consumption of CEDs mixed with alcohol, particularly among youth and young adults.[14,27-32]

Lastly, a number of health agencies and associations in Canada and the US have stated public health concerns associated with the consumption of alcohol in combination with CEDs including: US Centers for Disease Control and Prevention,[4] National Institutes of Health (US),[33] Centre for Addiction and Mental Health,[34] Canadian Centre for Substance Abuse,[35] Chief Public Health Officer of Canada,[36] British Columbia Ministry of Health,[37] Institut national de santé publique du Québec,[38] Doctors Nova Scotia,[39] and Office of the Chief Medical Officer for New Brunswick.[40]

European Food Safety Authority's 2015 Review

In 2015, at the request of the European Commission, the European Food Safety Authority's (EFSA) Panel on Dietetic Products, Nutrition and Allergies reviewed the evidence and released its opinion on the safety of caffeine, including when consumed in combination with the substances found in caffeinated energy drinks.[41] The Panel's mandate did not entail providing advice on if or how EU member states should regulate caffeinated products, including caffeinated energy drinks. As such, EU member states may implement a risk management

[a] These types of premixed caffeinated alcoholic beverages were not permitted for sale in Canada. See Table 1 for more details.

approach (for caffeinated products) that is appropriate to their jurisdiction under existing regulatory processes for EU member states.[41]

The Panel's method for its review had a narrow focus on longitudinal and experimental studies using caffeine rather than energy drinks, which contain other ingredients, as an input. The Panel also focused on cardiovascular effects and impacts on the subjective perception of alcohol intoxication and did not consider the broader array of health effects reported in the current published evidence. EU member states also expressed concern with the initial draft that was circulated before the final opinion was published. For example, German representatives (from Bundesinstitut für Risikobewertung) suggested that more realistic situations of high exposure to caffeine from energy drinks be considered (e.g. discos, music or sports events) because these individuals were considered to be at higher risk for adverse effects from energy drink consumption.[42] Similarly, representatives from France (from the Agence nationale de sécurité sanitaire) expressed concern that the data related to the co-consumption of caffeine and alcohol and subjective perception of intoxication did not represent real life conditions of consumption.[42]

Despite acknowledging the limitations in the evidence that was reviewed, the EFSA Panel proposed an upper limit for the co-consumption of caffeine and alcohol where the subjective perception of alcohol intoxication would not likely be affected.[41] This opinion is in direct contrast to the conclusion of Health Canada's scientists in their 2012 health risk assessment.[25] Promoting the 'safe' consumption of CEDs mixed with alcohol up to a threshold is highly problematic and presents numerous public health and safety concerns. The effect of consuming caffeine and alcohol separately and when combined is highly individualised. Inexperienced alcohol users compared to more experienced users will likely be affected by the co-consumption of caffeine in a different way. This is a particular concern for Toronto Public Health because a significant proportion of youth in Toronto are consuming energy drinks mixed with alcohol (see next section). These youth are likely inexperienced alcohol users and the threshold (to avoid the masking of the subjective perception of alcohol intoxication) identified by the Panel will most likely not apply.

Promoting the 'safe' co-consumption of alcohol and CEDs would also contradict the required cautionary text "Do not mix with alcohol" that is required on all CED packages as a condition for the sale and marketing of CEDs in Canada.[11] This may lead to significant public confusion. It is impractical for individuals to determine what their 'safe' threshold is or adhere to it, especially among inexperienced alcohol users (of which many are under legal drinking age). It is also impractical and risky to communicate a 'safe' threshold when consuming alcohol and CEDs. In an analogous context, public health and safety officials warn people to not drink any alcohol if they are driving or pregnant, as opposed to promoting drinking up to some 'safe level'. The Panel also noted that higher doses of alcohol combined with caffeine have not been systematically investigated.[41] It is critical that public policy measures on CEDs do not inadvertently contribute negatively to the perception or knowledge of the risks of mixing alcohol with CEDS.

As part of the current TMA process for CEDs, Health Canada is working with stakeholders and researchers to assess the perceptions and knowledge of CEDs among Canadians. This information will eventually be used to help shape the final regulations on the labelling of CEDs. However, some preliminary research is available. In 2014, focus group research was carried out among 47 participants, 12 to 18 years old, in Toronto and Montreal to assess their perceptions and knowledge of CEDs.[43] Researchers found that there was some confusion about what is considered a caffeinated energy drink compared to similar products such as energy shots, or on the basis of product labelling that included terms such as 'energy' or 'revitalizing energy'.[43] Participants (of all ages) reported believing that CED advertising was targeted towards them, especially product packaging and extreme sporting events that are sponsored by CED interests.[43] Participants also expressed general awareness of the potential harm of mixing CEDs and alcohol, however most felt that it was safe to consume this combination in moderation.[43]

Consumption of caffeinated energy drinks by Canadian youth and young adults

In 2014, nearly three-quarters of Canadians age 12 to 24 years reported having consumed an energy drink in their lifetime and one-in-six (15.6%) reported consumption in the past week.[44] Energy drinks were most commonly consumed at school, home, and work. However, a small proportion report energy drink use at bars, pubs, and nightclubs, and at the gym or while playing sports.[44] While this large study did not ask specifically about consumption of alcohol mixed with CEDs, responses to questions about why respondents drink CEDs included a number of alcohol-related reasons such as: to mix with alcohol; for going out or partying; to cope with a hangover; or to sober up after drinking alcohol.[44] Importantly, of the subsample of 20-24 year olds surveyed, nearly 27% reported consuming CEDs for mixing with alcohol, a significantly higher proportion compared to other age groups.[44]

A related, national-level report (by the same research team) found that over half of the individuals in this age group who had consumed an energy drink, reported experiencing an adverse event (55.4%), compared to about one-in-three who had consumed coffee (36.0%).[45] Among energy drink users, the most common adverse events reported were jitteriness or shakiness (26.5%), difficulty sleeping (24.1%), fast heart beat (24.7%), sudden drops in energy after feelings of increased alertness and energy (22.5%), and headaches (18.3%).[33] The report authors noted the difficulty in determining the causes of these adverse events.[45]

The 2015 Ontario Student Drug Use and Health Survey (OSDUHS) found that one-in-three students in grades 7 to 12 (34.8%) had consumed an energy drink at least once in the past year, including nearly one-in-five students in grade 7 (19.2%) and 45.9% of students in grade 12.[46] The 2015 OSDUHS also found that one-in-eight students in grades 7 to 12 (11.7%) consumed an energy drink mixed with alcohol at least once in the past year;[46] this finding is similar to the 12% reported in the 2014 Toronto Student Health Survey.[47] Consuming an energy drink mixed with alcohol (at least once in the past year) was most common among grade 12 students (23.2%), however, 5.2% of students in grade 8 also reported this practice.[46]

Regulation of Caffeinated Energy Drinks in Canada

Overview

Since 2012, Health Canada has regulated CEDs as a food product using a Temporary Market Authorization (TMA), a process enabled by the *Food and Drugs Act* and *Food and Drug Regulations*.[2,11, 48,49] The related guidance document for CEDs outlines the conditions under which manufacturers and distributors have agreed to sell and market CEDs and effectively defines what an 'energy drink' is in Canada.[11]

Before 2012, energy drinks were regulated as a natural health product.[2] This transition was part of a larger Health Canada process to begin regulating some natural health products (including energy drinks) as food products.[50] The goal of this transition was to ensure that products that look like and are consumed as foods are regulated as foods and to enable Canadians to make informed food choices (through consistent nutrition information and labelling).[50] As such, Health Canada considered the product format and composition, public perception and history of use, and marketing to consumers.[50] Health Canada took a risk-based approach to protect health and safety, but also considered operational procedural fairness and minimising disturbance to commercial activity.[50] The process itself involved impacted industries and engagement with professional and consumer groups.[50]

The TMA is a temporary, transitional regulatory phase and will eventually lead to final regulations for the sale and marketing of CEDs in Canada. During the TMA phase, manufacturers are required to collect and report (to Health Canada) on sales and annual consumption incidents.[11] A consumption incident is generally defined as an undesired harmful effect and are often reported by health professionals and consumers when they suspect or have confirmed such a link.[51] Serious consumption incidents are reported directly to the Canadian Food Inspection Agency on an expedited basis.[50] TMA holders will also collect other data deemed necessary by Health Canada to help fill data gaps.[11] Sales data collected during the TMA phase are not available to external parties, including Toronto Public Health.[51] Health Canada notes that it may revoke a TMA (i.e. not allow for sale in Canada) if Health Canada determines that the conditions of the TMA have been violated.[11] Final regulations are not expected to be in place for a number of years and will involve significant public consultation.[52]

Other caffeinated beverages and products

The term 'energy drink' is in common use and, in most cases, likely refers to the same type of caffeinated beverage that is regulated as a *caffeinated energy drink* in Canada. However, the marketplace is complex and some products may be perceived to be a CED due to the packaging and marketing. Table 1 compares the caffeine content and regulation of CEDs with examples of beverages that may be perceived to be a CED.

Table 1. Comparison of CEDs and beverages in Canada that may be perceived to be a CED

Beverage type	Caffeine content limits	Comment
Caffeinated energy drink (CED)	• 200 to 400 mg/L • Max 180 mg per reference serving (500 mL)	• See Health Canada's CED guidance document for more details on CED formulation.[11] • Caffeine content in a typical product: 80 mg for a small can (237 to 250 mL) or 150 to 160 mg for a large can (473 to 500 mL).
Caffeinated cola-type carbonated soft drink	• Up to 200 mg/L	• Complies with guidance for labelling of caffeine content in prepackaged foods.[53] • Caffeine content in a typical product: Between 36 to 50 mg per 355 mL container.[7]
Caffeinated non-cola-type carbonated soft drink	• Up to 150 mg/L	• Complies with guidance for labelling of caffeine content in prepackaged foods.[53] • Before March 2010, caffeine was only authorized for use in cola-type carbonated soft drinks.[54]
'Energy shots'	• No limit indicated	• Regulated as a natural health product.[11] • Smaller volume container (up to 90 mL). • Product is generally not consumed or perceived as a food and is meant to be consumed in a single dose.
Coffee	• No limit indicated • Up to 0.1% or 0.3% for decaffeinated varieties	• Regulated under *Food and Drug Regulations*, Part B, Division 5.[55] • Caffeine content in a typical product: Between 118 to 179 mg per 237 mL serving, depending on brewing method.[7]
Tea	• No limit indicated • Up to 0.4% for decaffeinated tea	• Regulated under *Food and Drug Regulations*, Part B, Division 20.[56] • Caffeine content in a typical product: Between 30 to 50 mg per 237 mL serving.[7]
Packaged alcoholic beverages	• See comments	• Caffeine may not be added to a prepackaged alcoholic beverage; this regulation existed before the introduction of the CED-specific regulations in 2012.[26] The caffeinated alcoholic beverages sold in the US before 2010 (and banned by the US FDA in 2010) were not permitted for sale in Canada.[26] • Packaged alcoholic beverages that contain a CED are not permitted for sale in Canada.[2,11,57] • Packaged alcoholic beverages are permitted to contain flavouring ingredients with naturally occurring caffeine (e.g. coffee, guarana).[57] Ingredients that contain caffeine as an additive (e.g. colas) are also permitted, with the exception of CEDs as noted above.[57] The caffeine content of the packaged alcoholic beverage should be consistent with the ingredient and proportional to the amount of ingredient that is added.[26] A list of these types of products is available[58] and many of these products are sold at the LCBO.
Sports drinks	• Typically do not contain caffeine	• These products contain water, sugar, and electrolytes and are formulated to aid hydration during exercise.[59] • Sports drinks are not CEDs.

Requirements for product formulation, packaging, and labelling for CEDs

Health Canada's regulations require CEDs to conform to specific product formulation and packaging standards, including minimum and maximum caffeine concentration, maximum per-serving caffeine content, and container size.[11] CEDs must adhere to all existing regulations for food, nutrition and product labelling, food additives, flavours, herbal ingredients, and novel foods.[11] Table 2 compares the product formulation and (on-container) labelling requirements in Canada, USA, European Union (EU), and Australia and Zealand (ANZ). The regulations to protect public health in Canada are relatively strong compared to the other major markets presented.

Table 2. Comparison of energy drink regulations in Canada, USA, European Union (EU), and Australia and New Zealand (ANZ)

Product formulation regulation or labelling requirement	Canada[11]	USA[60]	EU[61]	ANZ[62]
Regulation for energy drinks	Yes	No[a]	No[b,c]	Yes
Regulation for caffeine concentration (mg/L)	200-400	No	>150	145-320
Regulation for caffeine content per serving (maximum caffeine content [mg]/reference serving [mL])	180/500	No	No	No
Label: Amount of caffeine (e.g. 80 mg)	Yes	No	No	Yes
Label: "Do not mix with alcohol" or equivalent	Yes	No	No	No
Label: "High caffeine content" or equivalent	Yes	No	Yes	No
Label: "Not recommended for children" or equivalent	Yes	No	Yes	Yes
Label: "Not recommended for pregnant and breastfeeding women" or equivalent	Yes	No	Yes	Yes
Label: "Not recommended for caffeine sensitive persons" or equivalent	Yes	No	No	Yes
Label: Statement on daily consumption recommendations	Yes	No	Yes	Yes

Notes: [a] In the US, the addition of caffeine is regulated as a substance generally recognised as safe (GRAS) under the US Code of Federal Regulations (21CFR182.1180).[60] Although the original application is listed for 'cola-type beverages' the regulation does not prevent the addition of caffeine to other foods and beverages. Regulations require that caffeine be included in the ingredient list, but, the precise amount is not required. Members of the American Beverage Association have adopted voluntary labelling requirements and marketing restrictions for energy drinks.[63] [b] The EU regulations that are presented do not identify 'energy drink' as a specific beverage category. Rather, the regulations apply to beverages that are not coffee or tea (or include those terms in the product name) and contain caffeine in excess of 150 mg/L.[61] [c] Energy Drinks Europe (EDE) notes that some EU member states have specific regulatory provisions on energy drinks in their national legislation.[64] The EDE has also developed the Code of Practice for the Marketing and Labelling of Energy Drinks, which contains provisions on marketing and labelling.[65]

Conditions on marketing of CEDs in Canada

Similar to other foods sold in Canada, claims made about CEDs must comply with the *Food and Drugs Act* and the food provisions of the *Food and Drug Regulations*.[11,48,49] Additional marketing conditions are in place for CEDs, including that they:[11]

- Shall not be marketed towards children;
- Shall not be represented for hydration and/or electrolyte replacement before, during or after physical activity;
- Shall not be represented as flavoured water or flavoured sweetened water; and
- Shall not include the word "juice", "puree" or "pulp" on the label other than as required in the list of ingredients.

In addition, marketing claims cannot create the impression that the product can be consumed as part of a daily eating pattern.[11] Health Canada also recommends that the following statements be added to all forms of advertising involving CEDs:[11]

- The advertised product may not be suitable for everyone
- Read the label and follow directions for use for the advertised product

Manufacturers and distributors that are authorised to sell and market energy drinks in Canada and are also members of the Canadian Beverage Association (CBA) have voluntarily adopted an 'Energy Drink Marketing Code'.[66] The CBA code includes a provision related to marketing and schools; this may be relevant in jurisdictions where provinces or school districts have not already adopted comparable policy measures.

Restrictions on the sale of CEDs in Canada and internationally

On a global level, restrictions on the sale of energy drinks are uncommon. Lithuania[67] and Latvia[68] enacted country-level bans for minors (under 18 years old) in 2014 and 2016, respectively. Saudi Arabia banned sales in municipal properties and required point-of-sale signage when sold at retail.[69] In 2015, India rejected the application for sale of an energy drink containing ginseng and caffeine.[70] A French ban on products containing taurine (a typical ingredient in energy drinks) was overturned in 2008.[71]

In the US, there have been mixed results in the recent attempts to ban the sale of energy drinks. For example, the push for a state-wide sales ban in Maryland in 2014 ended early in the legislative process[72] and a sales ban at the University of New Hampshire (applicable at university-operated venues) was quickly overturned by the university's president.[73] In contrast, in 2016, Middlebury College (Vermont) banned the sale of energy drinks and energy shots on campus, citing concerns with students mixing energy drinks and alcohol.[74] There are no other known state-level sales bans that have been proposed in the US. However, upcoming policy changes related to sugar-sweetened beverages (SSB) may indirectly impact energy drinks. In 2016, voters in seven jurisdictions approved ballot measures to levy taxes on SSBs, including Cook County (Illinois), Philadelphia (Pennsylvania), and five cities in California (i.e. Albany, Berkeley, Boulder, Oakland, San Francisco).[75] Lastly, at least one US municipality (City of

Thousand Oaks, California) has adopted an ordinance to require the posting of warning signage where energy drinks and alcohol are sold.[76]

In Canada, the provincial, territorial, and federal governments are responsible for enacting age restrictions on the sale of consumer products in retails stores; municipal governments do not have this authority. Presently, there are no known provincial or territorial laws that restrict the sale of CEDs in retail stores in Canada. However, the sale of CEDs may also be indirectly affected by provincial or territorial policies related to alcohol sales or to promote healthy eating. For example, the Ontario Ministry of Education has restricted the sale of energy drinks as part of a comprehensive healthy eating policy for schools,[77] alcohol retail stores in Alberta are not permitted to sell energy drinks,[78] and products that are required to contain the message "Not recommended for children" (which includes CEDs) are not permitted for sale in buildings in British Columbia that are owned, leased, or occupied by provincial public bodies.[79] In Ontario, the LCBO does not sell CEDs and has sponsored health promotion literature for parents on the potential harms of CEDs and of mixing CEDs and alcohol.[80,81]

To address the potential health concerns with CEDs, municipalities have adopted policies restricting the sale of CEDs in places where the municipality has jurisdiction, such as municipally-owned and operated buildings, parks, and other recreational facilities. For example, in 2011 Toronto City Council approved the Healthy Vending Criteria that prohibit the sale of energy drinks in vending machines at Parks, Forestry and Recreation facilities.[82] This policy also limits the sale of unhealthy beverages to 50% of the available offerings.[82] Some municipalities have banned CED sales in all municipal property; for example, many municipalities in Quebec have adopted a model policy developed by the Quebec Public Health Association.[83,84] Some municipalities in Ontario have also specifically restricted the sale of energy drinks as part of their municipal alcohol policy, which applies to events hosted on municipal property where alcohol is served. Table 3 presents the known Ontario municipalities that have adopted restrictions on energy drinks as a part of their municipal alcohol policy.

Table 3. Ontario municipalities with energy drink restrictions in their municipal alcohol policy

Year Adopted	Municipality	Text Related to Energy Drinks
2016	City of Brampton[85]	No energy drinks (with or without alcohol in them) shall be sold, served or consumed.
2015	City of Waterloo[86]	No energy drinks (with or without alcohol in them) shall be sold.
2015	City of Guelph[87]	Energy drinks are prohibited.
2015	Municipality of Callander[88]	Alcohol sales and service – including the choice of beverages so as to avoid the supply of fortified or extra strength drinks or no energy drinks are permitted.
2015	Township of Seguin[89]	No energy drinks (with or without alcohol in them) shall be sold.

Year Adopted	Municipality	Text Related to Energy Drinks
2014	City of Cambridge[90]	No energy drinks (with or without alcohol in them) shall be sold.
2014	City of Kitchener[91]	No energy drinks (with or without alcohol in them) shall be sold.
2014	Township of North Dumfries[92]	No energy drinks (with or without alcohol in them) shall be sold.
2014	Township of Armour[93]	No energy drinks (with or without alcohol in them) shall be sold.
2013	Township of Brock[94]	No energy drinks will be permitted to be sold.
2013	City of Oshawa[95]	No energy drink of any kind will be permitted at events.

Note: The contents of this table was derived from an internet search. Some municipal alcohol policies may not be publicly posted.

Conclusion

The health evidence provides no compelling reason to deviate from the current precautionary public health approach to advise limiting the consumption of CEDs by children and youth and to discourage the mixing of CEDs with alcohol. The existing Canadian regulations and conditions (for the sale and marketing of CEDs) serve these two objectives by providing information to the public. For example, requiring product labelling (e.g. "Not recommended for children", "Do not mix with alcohol") and placing conditions on how CEDs can be marketed (e.g. no marketing to children, not suitable for the purpose of hydration or use during physical activity). Some municipalities have enacted further precautionary public health measures that apply to municipal-owned properties and venues. Public health should continue to monitor the evidence on CEDs and pursue policy measures and health promotion, as appropriate.

References

1. Food and Drug Administration. *The Buzz on Energy Drinks*. Available from: https://www.cdc.gov/healthyschools/nutrition/energy.htm.
2. Health Canada. *Caffeinated energy drinks.* Available from: http://www.hc-sc.gc.ca/fn-an/prodnatur/caf-drink-boissons-eng.php.
3. Dietitians of Canada. *Energy drinks.* Available from: http://www.dietitians.ca/Your-Health/Nutrition-A-Z/Energy-drinks.aspx.
4. Centers for Disease Control and Prevention. *Fact Sheets – Caffeine and Alcohol*. Available from: http://www.cdc.gov/alcohol/fact-sheets/caffeine-and-alcohol.htm.
5. Emond JA, Sargent JD, Gilbert-Diamond D. 2014. Patterns of energy drink advertising over US television networks. *J Nutr Educ Behav* 47(2):120–126.e1. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4356017/.
6. Kumar G, Onufrak S, Zytnick D, Kingsley B. 2015. Self-reported advertising exposure to sugar-sweetened beverages among US youth. *Public Health Nutr*. 18(7): 1173-1179. Available from: https://www.cambridge.org/core/services/aop-cambridge-

core/content/view/DD8F808E14006935B52DD487B11B737D/S1368980014001785a.pdf/self-reported-advertising-exposure-to-sugar-sweetened-beverages-among-us-youth.pdf.
7. Health Canada. *Caffeine in Food*. Available from: http://www.hc-sc.gc.ca/fn-an/securit/addit/caf/food-caf-aliments-eng.php.
8. Health Canada. *Lists of foods that have received Temporary Marketing Authorization Letters*. Available from: http://www.hc-sc.gc.ca/fn-an/legislation/acts-lois/list-tmal-rpsn-eng.php#un_6.
9. Health Canada. *Caffeine and Carbonated Soft Drinks (July 2010).* Available from: http://www.hc-sc.gc.ca/fn-an/securit/addit/caf/caf-ccsd-cbg-faq-eng.php.
10. Health Canada. *Frequently Asked Questions. Information for Parents on Caffeine in Energy Drinks*. Available from: http://www.hc-sc.gc.ca/fn-an/securit/addit/caf/faq-eng.php.
11. Health Canada. *Category Specific Guidance for Temporary Marketing Authorization - Caffeinated Energy Drinks.* Available from: http://www.hc-sc.gc.ca/fn-an/legislation/guide-ld/guidance-caf-drink-boiss-tma-amt-eng.php#s1.2.
12. Burrows T, Pursey K, Neve M, Stanwell P. What are the health implications associated with the consumption of energy drinks? A systematic review. *Nutr Rev*. 2013;71(3):135-48.
13. Ali F, Rehman H, Babayan Z, Stapleton D, Joshi DD. Energy drinks and their adverse health effects: A systematic review of the current evidence. *Postgrad Med.* 2015;127(3):308-22.
14. Breda JJ, Whiting SH, Encarnacao R, Norberg S, Jones R, Reinap M, Jewell J. Energy drink consumption in Europe: A review of the risks, adverse health effects, and policy options to respond. *Front Public Health*. 2014;2(134):1-5. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4197301/.
15. Goldfarb M, Tellier C, Thanassoulis G. Review of published cases of adverse cardiovascular events after ingestion of energy drinks. *Am J Cardiol.* 2014;113(1):168-72.
16. Grandner MA, Knutson KL, Troxel W, Hale L, Jean-Louis G, Miller KE. Implications of sleep and energy drink use for health disparities. *Nutr Rev*. 2014;72(S1):14-22. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4264529/.
17. Turagam MK, Velagapudi P, Kocheril AG, Alpert MA. Commonly consumed beverages in daily life: do they cause atrial fibrillation. *Clin Cardiol*. 2015;38(5):317-22.
18. EatRight Ontario (Dietitians of Canada). *Facts on Energy Drinks*. Available from: http://www.eatrightontario.ca/en/Articles/Caffeine/Facts-on-Energy-Drinks.aspx.
19. Healthy Kids Panel. Ministry of Health and Long-Term Care (Ontario). 2013. *No Time to Wait: The Health Kids Strategy.* Toronto, ON, Queen's Printer for Ontario. Catalogue No. 017308 ISBN: 978-1-4606-1014-5. Available from: http://www.health.gov.on.ca/en/common/ministry/publications/reports/healthy_kids/healthy_kids.pdf.
20. Canadian Cancer Society, Canadian Diabetes Association, Childhood Obesity Foundation, Chronic Disease Prevention Alliance of Canada, Heart & Stroke. *Health and Economic Impacts of Sugary Drinks in Canada: Research Summary.* Accessed 15/02/2017. URL: http://www.heartandstroke.ca/-/media/pdf-files/canada/2017-heart-month/health-and-economic-impacts-of-sugary-drinks-research.ashx?la=en.
21. Health Canada. *Eating Well with Canada's Food Guide*. Available from: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php.
22. Franklin KM, Hauser SR, Bell RL, Engleman EA. 2013. Caffeinated Alcoholic Beverages – An Emerging Trend in Alcohol Abuse. *J Addict Res Ther*. Suppl 4: S4-012. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4238293/.
23. Atwood AS. 2012. Alcohol and Caffeine: Caffeinated Alcohol Beverages: A Public Health Concern. Alcohol and Alcoholism, 47(4): 370-371. Available from: http://alcalc.oxfordjournals.org/content/alcalc/47/4/370.full.pdf.
24. US Food & Drug Administration. FDA News Release: FDA Warning Letters Issued to Four Makers of Caffeinated Alcoholic Beverages, Nov. 17, 2010. Available from: http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm234109.htm.
25. Rotstein J, Barber J, Strowbridge C, Hayward S, Huang R, Godefroy SB, et al. 2013. Energy Drinks: An Assessment of the Potential Health Risks in the Canadian Context. *International Food Risk Analysis Journal,* 3(5): 1-29. Available from: http://cdn.intechopen.com/pdfs/45380/InTech-Energy_drinks_as_assessment_of_the_potential_health_risks_in_the_canadian_context.pdf.
26. Health Canada. Personal Communication on 01/17/2017.
27. Benson S, Verster JC, Alford C, Scholey A. Effects of mixing alcohol with caffeinated beverages on subjective intoxication: a systematic review and meta-analysis. *Neurosci Biobehav Rev.* 2014;47:16-21.

28. McKetin R, Coen A, Kaye S. A comprehensive review of the effects of mixing caffeinated energy drinks with alcohol. *Drug Alcohol Depend*. 2015;151:15-30.
29. Vida K, Racz J. Prevalence and consequences of the consumption of alcohol mixed with energy drinks: A literature review. *Journal of Caffeine Research*. 2015;5(1):11-30.
30. Marczinski CA. Can energy drinks increase the desire for more alcohol? *Adv Nutr.* 2015;6(1):96-101.
31. Verster JC, Benson S, Johnson SJ, Scholey A, Alford C. Mixing alcohol with energy drink (AMED) and total alcohol consumption: A systematic review and meta-analysis. *Hum Psychopharmacol Clin Exp*. 2016;31(1):2-10. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4765368/.
32. Smoyak SA, Nowik K, Lee J. High energy drinks with and without alcohol: What do nurses know and do? J Psychosoc Nurs Ment Health Serv. 2015;53(1):39-44.
33. National Center for Complementary and Integrative Health (NCCIH). National Institutes of Health (NIH). *Energy Drinks.* Accessed 15/02/2017. URL: https://nccih.nih.gov/health/energy-drinks.
34. Centre for Addiction and Mental Health. *Partying and Getting Drunk.* Accessed 26/01/2017. URL: http://www.camh.ca/en/hospital/health_information/a_z_mental_health_and_addiction_information/alcohol/Pages/binge_drinking.aspx.
35. Canadian Centre on Substance Abuse. *Alcohol and Caffeine*. Accessed 26/01/2017. URL: http://www.ccsa.ca/Eng/topics/alcohol/Alcohol-and-caffeine/Pages/default.aspx.
36. Government of Canada. *The Chief Public Health Officer's Report on the State of Public Health in Canada, 2015: Alcohol Consumption in Canada.* Accessed 26/01/2017. URL: https://www.canada.ca/en/public-health/services/publications/chief-public-health-officer-reports-state-public-health-canada/2015-alcohol-consumption-canada.html.
37. HealthLinkBC. *Energy Drinks.* Accessed 27/01/2017. URL: https://www.healthlinkbc.ca/healthlinkbc-files/energy-drinks.
38. Institut national de santé publique du Québec. *Energy drinks: Threatening or commonplace? An update.* Accessed 27/01/2017. URL: https://www.inspq.qc.ca/pdf/publications/1669_BoissonsEnergisantes.pdf.
39. Doctors Nova Scotia. *Caffeinated Beverages*. Accessed 27/01/2017. URL: http://www.doctorsns.com/en/home/yourhealth/Caffeinated-beverages.aspx.
40. Office of the Chief Medical Officer of Health (New Brunswick). *Position Statement: Energy Drinks.* Accessed 27/01/2017. URL: http://www2.gnb.ca/content/dam/gnb/Departments/h-s/pdf/en/HealthyPeople/Dialogue/PositionStatementEnergyDrinks.pdf.
41. Panel on Dietetic Products, Nutrition and Allergies (European Food Safety Authority). 2015. Scientific Opinion on the safety of caffeine. *EFSA Journal*. 13(5):4102-120pp. Available from: https://www.efsa.europa.eu/en/efsajournal/pub/4102.
42. European Food Safety Authority. Nutrition Unit. *Minutes of the EFSA-ANSES-BfR Experts Meeting on the safety of caffeine: 13 April 2015, Brussels (Belgium).* Accessed 26/01/2017. Available from https://www.efsa.europa.eu/sites/default/files/event/150413-m.pdf.
43. McCrory C, White CM, Bowman C, Fenton N, Reid JL, Hammond D. 2017. Perceptions and knowledge of caffeinated energy drinks: results of focus groups with Canadian youth. In press.
44. Reid JL, McCrory C, White CM, Martineau C, Vanderkooy P, Fenton N, Hammond D, et al. 2016. Consumption of Caffeinated Energy Drinks Among Youth and Young Adults in Canada. *Preventive Medicine Reports,* (05):65-70. Available from: http://www.sciencedirect.com/science/article/pii/S2211335516301450.
45. Hammond D, Reid J, Zukowski. 2017. Adverse effects of caffeinated energy drinks among youth and young adults in Canada: A population-based survey. In-press: *Canadian Median Association Journal*.
46. Boak A, Hamilton HA, Adlaf EM, Mann RE. 2015. *Drug use among Ontario students, 1977-2015: Detailed OSDUHS findings (CAMH Research Document Series No. 41).* Toronto, ON: Centre for Addiction and Mental Health. Available from: http://www.camh.ca/en/research/news_and_publications/ontario-student-drug-use-and-health-survey/Documents/2015%20OSDUHS%20Documents/2015OSDUHS_Detailed_DrugUseReport.pdf.
47. Toronto Public Health. *Healthy Futures: 2014 Toronto Public Health Student Survey*. March, 2015. Available from: https://www1.toronto.ca/City%20Of%20Toronto/Toronto%20Public%20Health/Performance%20&%20Standards/Healthy%20School/Files/pdf/StudentHealthSurveyWeb%20FINAL-AODA.pdf.
48. Government of Canada. *Food and Drugs Act*. Available from: http://laws.justice.gc.ca/eng/acts/F-27/.
49. Government of Canada. *Food and Drugs Regulations*. Available from: http://laws.justice.gc.ca/eng/regulations/c.r.c.,_c._870/index.html.

50. Health Canada. *Questions and Answers. Food marketed as Natural Food Products*. Available from: http://www.hc-sc.gc.ca/fn-an/prodnatur/questions-eng.php.
51. Health Canada. *Guidance Document for the Food Industry: Consumption Incident Reporting*. Available from: https://chfa.ca/images/uploads/2011/11/Guidance-Document-for-Food-Industry-Consumption-Incident-Reporting-final-en.pdf.
52. Health Canada. Personal communication on 23/12/2016.
53. Health Canada. *Preliminary Guidance for Industry on the Labelling of Caffeine Content in Prepackaged Foods (March 2010).* Available from: http://www.hc-sc.gc.ca/fn-an/legislation/guide-ld/etiquetage-caf-labelling-eng.php.
54. Health Canada. *Caffeine and Carbonated Soft Drinks (July 2010). Available* from: http://www.hc-sc.gc.ca/fn-an/securit/addit/caf/caf-ccsd-cbg-faq-eng.php.
55. Government of Canada. *Food and Drug Regulations (C.R.C., c. 870) Division 5: Coffee.* Available from: http://laws-lois.justice.gc.ca/eng/regulations/c.r.c.,_c._870/page-32.html#h-66.
56. Government of Canada. *Food and Drug Regulations (C.R.C., c. 870) Division 20: Tea.* Available from: http://laws-lois.justice.gc.ca/eng/regulations/c.r.c.,_c._870/page-72.html#h-116.
57. Health Canada. *Questions and Answers: Caffeinated Energy Drinks.* Available from: http://www.hc-sc.gc.ca/fn-an/prodnatur/questions-caf-eng.php#a17.
58. Beer, Wine and Spirits Producers. *2015 Alcohol Beverages Containing Stimulants Current Practices by Signatories to the Beer, Wine and Spirits Producers' Commitments to Reduce Harmful Drinking.* Available from: http://www.producerscommitments.org/wp-content/uploads/2016/05/SurveyofBeverages2.pdf.
59. Dietitians of Canada. *Sports Drinks.* Available from: http://www.dietitians.ca/Your-Health/Nutrition-A-Z/Sports-Drinks.aspx.
60. US Food & Drug Administration. *Code of Federal Regulations Title 21. Caffeine.* 21CFR182.1180. Available from: https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=182.1180.
61. EUR-Lex. *Regulation (EU) No. 1169/2011 of the European Parliament and of the Council of 25 October 2011on the provision of food information to consumers, amending Regulations (EC) No 1924/2006 and (EC) No 1925/2006 of the European Parliament and of the Council, and repealing Commission Directive 87/250/EEC, Council Directive 90/496/EEC, Commission Directive 1999/10/EC, Directive 2000/13/EC of the European Parliament and of the Council, Commission Directives 2002/67/EC and 2008/5/EC and Commission Regulation (EC) No 608/2004.* Available from: http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32011R1169.
62. Federal Register of Legislation (Australia). *Australia New Zealand Food Standards Code – Standard 2.6.4 – Formulated caffeinated beverages*. Available from: https://www.legislation.gov.au/Details/F2015L00467.
63. American Beverage Association. ABA Guidance for the Responsible Labeling and Marketing of Energy Drinks. Available from: http://www.ameribev.org/files/339_Energy%20Drink%20Guidelines%20(final).pdf.
64. Energy Drinks Europe. *Regulation*. Accessed 26/01/2017. URL: http://www.energydrinkseurope.org/regulation.
65. Energy Drinks Europe. *Code of Practice for the Marketing and Labelling of Energy Drinks.* Accessed 26/01/2017. URL: http://www.energydrinkseurope.org/wp-content/uploads/2015/01/FINAL_EDE-Code-of-Practice_clean_250914.pdf.
66. Canadian Beverage Association. *Energy Drinks Marketing Code*. Available from: http://www.canadianbeverage.ca/wp-content/uploads/2013/12/Energy-drinks-Code-CBA-2012-FINAL-T.pdf.
67. AusFoodNews. *Lithuania ban on energy drink sales to under 18s comes in with broader restrictions and warnings.* Available from: http://ausfoodnews.com.au/2014/11/05/lithuania-ban-on-energy-drink-sales-to-under-18s-comes-in-with-broader-restrictions-and-warnings.html.
68. LSM.lv. *Latvia bans energy drink sales to minors.* Available from: http://www.lsm.lv/en/article/societ/society/latvia-bans-energy-drink-sales-to-minors.a165212/.
69. ArabianBusiness.com. *Saudi's energy drink ban comes into force: Beverages also will now have to carry labels warning of the health side effects*. Available from: http://www.arabianbusiness.com/saudi-s-energy-drink-ban-comes-into-force-556174.html.
70. Food Safety and Standard Authority of India. *Application for approval of (I) Monster Energy Absolute Zero, and (II) Monster Energy: F.No.-P.15025/895/2012-PA/FSSAI*. Available from: http://www.fssai.gov.in/portals/0/pdf/monster_energy_product_approval.pdf.
71. Reuters. *France ends 12-year ban on energy drink Red Bull. 2010.* Available from: http://www.reuters.com/article/us-france-redbull-idUSL1576964720080715.

72. The Press Enterprise. *INDUSTRY: Energy drink restrictions fail in Maryland legislature*. Available from: http://www.pe.com/articles/energy-693720-committee-maryland.html.
73. NPR. *University Of New Hampshire Reverses Course On Ban Of Energy Drinks*. Available from: http://www.npr.org/sections/health-shots/2011/09/30/140951147/university-of-new-hampshire-reverses-course-on-ban-of-energy-drinks.
74. The Middlebury Campus. *College to Stop Sale of Energy Drinks*. Available from: https://middleburycampus.com/article/college-to-stop-sale-of-energy-drinks/.
75. Mouthing Off (American Student Dental Association). *Sugar taxes sweep the ballot*. Available from: http://www.asdablog.com/sugar-taxes-sweep-the-ballot/.
76. America Legal Publishing Corporation. T*he City of Thousand Oaks, California Municipal Code. Chapter 27. Alcohol Energy Drink.* Sec. 5-27.03. Duty to Post Warning Signs. Available from: http://library.amlegal.com/nxt/gateway.dll/California/thousandoaks_ca/thecityofthousandoakscaliforniamunicipal?f=templates$fn=default.htm$3.0$vid=amlegal:thousandoaks_ca.
77. Ministry of Education, *Government of Ontario. Policy/Program Memorandum No. 150: School Food and Beverage Policy. 2010.* Available from: http://www.edu.gov.on.ca/extra/eng/ppm/ppm150.pdf.
78. Alberta Gaming & Liquor Commission. *Retail Liquor Store Handbook*. Available from: http://aglc.ca/pdf/handbooks/retail_liquor_stores.pdf.
79. Ministry of Health (British Columbia). 2014. *Healthier Choices in Vending Machines in BC Public Buildings*. Available from: http://www2.gov.bc.ca/assets/gov/health/managing-your-health/healthy-eating/vending-policy-2014.pdf.
80. Parent Action on Drugs. Stats, Facts and Talking Points. *About Alcohol and Other Drugs. Parent Action Pack*. Available from: http://parentactionondrugs.org/wp-content/uploads/2016/12/Parent-Action-Pack-Brochure-2016.pdf.
81. Liquor Control Board of Ontario. *Parent Action Pack: New drug and alcohol resource produced for parents.* Accessed: 15/02/2017. URL: http://www.lcbo.com/content/lcbo/en/corporate-pages/about.html#.WKSI0jg-VNQ.
82. City of Toronto (Government Management Committee). *GM2.16 Healthy Vending Criteria - Cold Drink Vending Request for Proposal (Ward: All).* Available from: http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2011.GM2.16.
83. Coalition québécoise sur la problématique du poids. *Répertoire des municipalités qui ont résolu d'interdire la vente de boissons énergisantes dans leurs installations municipals.* Unpublished report. Available from: http://www.cqpp.qc.ca/en/.
84. Quebec Public Health Association. *Banning the sale of energy drinks in public buildings: A tool to achieve it.* Available from: http://www.aspq.org/documents/file/resolution-energy-drinks_en.pdf.
85. City of Brampton. *Municipal Alcohol Policy*. Available from: http://www.brampton.ca/EN/residents/Community-Centres/Documents/Municipal%20Alcohol%20Policy/Municipal%20Alcohol%20Policy.pdf.
86. The City of Waterloo. *Municipal Alcohol Policy*. Available from: http://www.waterloo.ca/en/government/resources/a-013_municipal_alcohol_policy_march_30_2015.pdf.
87. City of Guelph. Alcohol Risk Management Policy. Available from: http://guelph.ca/wp-content/uploads/AlcoholRiskManagementPolicy.pdf.
88. Municipality of Callander. *Municipal Alcohol Policy*. Available from: http://www.mycallander.ca/wp-content/uploads/2015/01/Municipal-Alcohol-Policy-August-2014..pdf.
89. Township of Seguin. *Seguin Municipal Facilities Alcohol Policy*. Available from: http://www.seguin.ca/en/live/resources/FINAL-Municipal-Alcohol-Policy.pdf.
90. The Corporation of the City of Cambridge. *Alcohol Risk Management Policy*. Available from: http://www.cambridge.ca/relatedDocs/Cambridge%20Municipal%20Alcohol%20Policy%20pdf%20-%20Adobe%20Acrobat%20Pro.pdf.
91. City of Kitchener. *Municipal Alcohol Policy*. Available from: http://www.kitchener.ca/en/insidecityhall/resources/CSD_MAP_booklet_for_web.pdf.
92. Township of North Dumfries. *Municipal Alcohol Policy*. Available from: http://www.northdumfries.ca/en/ourservices/resources/MunicipalAlcoholPolicy2014.pdf.
93. Township of Armour. *Municipal Alcohol Policy*. Available from: http://www.armourtownship.ca/_literature_130260/Alcohol_Policy.

94. Township of Brock. *Municipal Alcohol Policy*. Available from: http://oyezoyez.townshipofbrock.ca/site/en/1707/p/9750/pdf.do.
95. City of Oshawa. *Municipal Alcohol Policy*. Available from: https://www.oshawa.ca/things-to-do/resources/municipal_alcohol_policy_approved_policy_june_24_2013.pdf.