

Evidence Brief: Energy drinks and the body — Reported adverse health events



Key Messages

- Caffeinated energy drinks are beverages marketed as being able to boost a person's energy.
- Energy drinks are popular among Ontarians, particularly youth and young adults.
- Two systematic reviews summarized hospital case reports of adverse health events following energy drink consumption, including cardiovascular events.
- One systematic review and six narrative reviews pointed to various other cardiovascular, neurological, nonspecific, behavioural, and psychological/psychiatric adverse health events following energy drink consumption.
- More research is needed to better understand whether adverse events reflect true associations with energy drink consumption and whether assumed relationships are causal and dose-responsive.

April 2017

Issue and Research Question

Energy drinks are a relatively new class of beverage that are popular among Ontario youth.¹ Manufacturers claim energy drinks boost the consumers' energy level and improve alertness and utilize multiple marketing

strategies to encourage consumers to purchase their product.²

Energy drinks first arrived in North America in retail stores in 1997 and since then many brands have entered the market.³ A defining component of energy drinks is the presence of caffeine, but many of these products also

Evidence Briefs are a series of evidence summaries on key public health topics informed by rapid knowledge synthesis methods. [Visit our website for more from this series.](#)

contain ginseng, vitamins and minerals, sweeteners, taurine (a non-essential amino acid), and guarana (a supplement which also contains caffeine).^{2,4}

The popularity of energy drinks has risen, as observed through sales data. While sales of soft drinks and fruit drinks declined between 2004 and 2009, sales of energy drinks increased by 240 per cent during this same period (U.S. sales data).³ In addition, from 2014 to 2015, the three top selling energy drink brands in the U.S. increased their sales by 156 per cent, 149 per cent and 127 per cent respectively.⁵ Sales data collected in Canada is considered competitive and is not publicly available.

Energy drinks are commonly consumed by youth and young adults.³ According to the 2015 Ontario Student Drug Use and Health Survey (OSDUHS), one in eight students in grades 7 to 12 (12 per cent, representing an estimated 112,400 students) reported consuming an energy drink at least once in the past week, and 34.8 per cent reported consuming an energy drink at least once in the past year.¹ Important differences in consumption were also noted by gender, with 28.6 per cent of female students reporting consumption of at least one energy drink in the past year compared to 40.6 per cent of male students.¹

The high prevalence of consumption among youth and young adults may be a reflection of the marketing strategies for these products.⁶ The Canadian Beverage Association (CBA) (which represents major energy drink companies) and Health Canada both require that energy drink manufacturers avoid marketing, advertising or sponsorship in circumstances where the primary target audience is children.^{2,7} However, the definition of children used is “persons under 12 years of

age,”^{7,8} and energy drinks are commonly marketed through extreme sports (e.g., extreme lifestyles) and e-sports (e.g., competitive video gaming) that may appeal to youth and young adults.⁶ A Canadian survey found 88 per cent of youth (12 to 17 years old) and young adults (18 to 24 years old) reported ever having seen some form of energy drink advertising/marketing, with 60 per cent having seen an advertisement on television.⁹ Other results from the same survey also revealed that only 12 per cent of respondents had never seen advertising for energy drinks.⁹ As well, in 2010, youth in the U.S. reported seeing an advertisement for energy drinks or shots significantly more frequently than adults.⁶

With their rising popularity, reports of energy drinks’ negative health events have been documented in Ontario and internationally. For example, in 2015 the Ontario Poison Centre recorded 47 reported events related to energy drink consumption.¹⁰ In the U.S., emergency department visits directly caused by consuming an energy drink, or where an energy drink was a contributing factor more than doubled from 10,068 to 20,783 between 2007 and 2011.^{3,11} As well, calls to poison centres involving energy drink exposure increased by approximately five times in Australia from 2004 to 2010.¹²

In Canada, energy drinks are regulated as a food product by Health Canada (where they are officially categorized as Caffeinated Energy Drinks (CEDs)).² However, given the novel combination of ingredients and functional benefits that these products claim to provide, Health Canada has established both labelling and compositional requirements that are specific to these products.² CEDs sold in Canada must include labels noting that they are “not recommended for children, pregnant/breastfeeding women, [or] individuals

sensitive to caffeine.”² Compositional requirements include maximum permitted levels of: vitamins, minerals, taurine and caffeine.² According to Dietitians of Canada, the levels of added vitamins and minerals in many CED products fall into the category of “Supplemented Foods,” with dosages beyond the average daily supplement and the recommended daily allowance.¹³

Health Canada’s compositional requirements specify that caffeine content in energy drinks is not to exceed 180 mg per single serving container or per 500 mL of a multi-serving container, which is comparable to the caffeine content of an average coffee.^{2,14,15} In addition, Health Canada classifies any drink with a caffeine concentration over 200 mg/L and under 400 mg/L as a CED, regardless of packaging and marketing of the drink.¹⁴ Therefore, sports drinks are not classified as CEDs by Health Canada given their lower or non-existent caffeine content, and likewise “energy shots” have too high a caffeine concentration to be CEDs and are regulated as natural health products.¹⁴

Organizations such as the European Food Safety Authority have examined the safety of caffeine and have concluded that single doses up to 200 mg do not produce safety concerns.¹⁶ Though energy drinks generally contain levels of caffeine that are less than or similar to an average cup of coffee, the literature states that the presence of caffeine in energy drinks has been the subject of concern, in part because coffee is a hot beverage and is typically consumed more slowly than energy drinks, as well as, energy drinks’ appeal to youth and young adults.^{3,12,17} Additionally, energy drinks contain a number of other ingredients in combination with caffeine that are not typically found in other caffeinated beverages.¹³

In order to clarify the evidence for local public health, this Evidence Brief asks: *What are the adverse health events associated with energy drink consumption?*

In this Brief, adverse health events are defined as “any occurrence that may have negative consequences for human health,”¹⁸ and include all aspects of health such as physical, mental, and social health and well-being. This Brief also explores adverse health events across all population subgroups, particularly youth (12 to 17 years) and young adults (18 to 24 years) given the targeted marketing to, and high rates of energy drink consumption by these populations.

Methods

Public Health Ontario (PHO) Library Services conducted searches in electronic databases including: Ovid MEDLINE, Embase, PsycINFO, CINAHL, SocINDEX, and the Cochrane Library. The initial search was undertaken on March 31, 2015 and updated March 14, 2016 to identify review articles published between January 2010 and March 2016. Articles retrieved by the search were assessed for eligibility by two reviewers using the following inclusion criteria: English language; narrative review, systematic review, or meta-analysis; and reported on physiological, psychological or social health events (also referred to by Health Canada as “consumption incidents”)¹⁴ related to energy drink consumption. Reviews were excluded if they focused on caffeine and caffeinated beverages other than energy drinks. Articles that focused on the adverse health effects of mixing energy drinks with alcohol were used to develop an accompanying PHO Evidence Brief, and were excluded from this review.¹⁹ All titles and abstracts were screened by two reviewers. Full text articles were retrieved, screened by two reviewers, and relevant information was

extracted from each article by one reviewer. Quality appraisal was conducted by two reviewers using the Health Evidence Quality Assessment Tool²⁰ and disagreements were resolved by consensus. The full search strategy and quality appraisal details can be obtained from PHO.

Main Findings

The search identified a total of 238 reviews, from which 13 unique reviews met inclusion criteria. Of these, two were systematic reviews of case reports of serious adverse events that occurred following consumption of CEDs and that were treated in a hospital.^{3,21} One was a systematic review of five randomized controlled trials (RCTs) and ten quasi-RCTs; none of the trials included in this systematic review were designed to detect adverse health events, all were limited by small sample sizes and low CED doses, and support from CED manufacturers was received in 6 to 10 of the 15 trials.²² The remaining ten reviews included in our Evidence Brief were narrative reviews.^{12,17,23-30} Each of the 13 included reviews had incomplete assessment of CED consumption: information was missing regarding CED quantity consumed, caffeine dose, doses of other ingredients, timing of ingestion in relation to onset of symptoms, timing between drinks, and frequency and duration of use. All reviews included were rated either ‘moderate’²² or ‘weak’^{3,12,17,21,23-30} when quality appraisal was conducted using the Health Evidence Quality Assessment Tool for review articles.²⁰ The quality appraisal scores are available in a table format upon request from PHO.

All included reviews informed the background section (above). Results are reported for the nine reviews that included a description of their

methods. Findings are organized according to the main health events reported, which include:

- non-specific symptoms
- cardiovascular events
- neurological events
- psychological/psychiatric events and
- behavioural events

Non-Specific

Seven of the included reviews reported on non-specific symptoms related to the use of energy drinks.^{3,12,22-26} Physiological events identified in relation to energy drinks included: nausea,³ headaches,²⁵ irritability,²³ gastrointestinal discomfort,²⁵ dehydration,^{23,25} and daytime sleepiness.²⁴ Consumption of high-sugar energy drinks may also contribute to an increased risk of dental caries (e.g., cavities) and obesity, especially in youth.¹² Cases of hepatic injury have also been reported.³

Cardiovascular

Seven of the included reviews examined adverse cardiovascular events related to consumption of energy drinks.^{3,12,21-23,25,27} The most recent systematic review (2015) reported adverse cardiovascular events occurred more frequently than adverse health events affecting other body systems (e.g., neurological).³ In terms of specific adverse cardiovascular events in the included reviews, the most frequently reported were arrhythmia-related (e.g., atrial fibrillation, tachycardia).^{3,21,25} Accelerated heart rate (tachycardia) was identified following excessive energy drink consumption in two reviews.^{23,25} Among other cardiac events, increased blood pressure was reported by two reviews.^{23,27}

The majority of the included literature that looked at cardiac arrhythmias suggested those

who are predisposed to arrhythmias may be at a higher risk of adverse events following energy drink consumption; however, predisposing factors may not be a prerequisite for experiencing adverse cardiovascular events. For example, in one systematic review, cardiac investigations did not reveal any predisposing cardiac abnormality in the majority of included cases of cardiovascular adverse events.²¹ The majority of cases in this review involved youth and young adults.²¹

One review that examined the potential for adverse cardiovascular events was not able to draw conclusions for energy drink consumption based on the evidence due to mixed findings, small dosages and sample sizes, and lack of longitudinal data.²²

Neurological

Four of the included reviews found evidence of a relationship between energy drink consumption and adverse neurological events.^{3,12,23,25} A recent systematic review found that adverse neurological events were the second most commonly reported type of adverse event following energy drink consumption (behind cardiovascular events).³ Among the adverse neurological events reported in this and other reviews, seizures were the most commonly reported.^{3,23,25}

Psychological and Psychiatric

Three of the included reviews examined psychological and psychiatric events related to energy drink use.²³⁻²⁵ Case reports cited in the review-level literature showed that increased consumption of energy drinks was associated with an increase in psychological events,^{23,25} including but not limited to severe anxiety,²⁵ depression,²⁴ increased psychotic symptoms in patients with schizophrenia,²⁴ and manic

episodes in patients with bipolar disorder.²⁴

One review cited evidence that energy drink consumption had also been found to interfere with the metabolism of antipsychotics and antidepressants, thereby decreasing the effectiveness of the medications.²⁴

Behavioural

Three of the included reviews looked at how energy drink consumption may be related to behaviour.^{3,12,25} Two reviews found that energy drink consumption in adolescents was positively associated with risky behaviour, including sensation seeking, sexual risk-taking, seat-belt omission, and participating in fighting/violence.^{12,25} Agitation/aggressive behaviour was also identified.³ Consumption of energy drinks was also positively associated with illicit drug and tobacco use in adolescents.¹² As well, it was reported that energy drink consumption was a risk factor for alcohol dependence even when not mixed with alcohol.¹² The reviews did not state whether subjects were known to be risk-takers, or if the consumption of energy drinks was a direct motivation for risk-taking behaviour.

Discussion and Conclusions

Based on limited review-level evidence, a variety of adverse events have been reported following energy drink consumption. These include non-specific symptoms, cardiovascular events, neurological events, psychological or psychiatric events, and behavioural events.

More research is needed to better understand whether adverse events reflect true associations with energy drink consumption and whether assumed relationships are causal and dose-responsive. Evidence is also required to understand the frequency and severity of

adverse events due to energy drink consumption in the general and specific populations (e.g., youth and young adults, persons with a mental health condition, and those with underlying cardiac pathology) who may be particularly susceptible.

Implications for Practice

Ontario's public health sector has a mandate to promote population health and to prevent or reduce the burden of illness from health hazards.³¹ Given the findings of reported adverse health events following energy drink consumption, several activities may be considered. These include: research and development of data collection systems, public awareness raising, and educational interventions.

Further research and the development of data collection systems could support evidence-informed decision making regarding energy drinks. Canadian, and specifically Ontario emergency department visit and poison centre call data, have the potential to provide useful information about health events where energy drinks may be implicated. For example, the Ontario Poison Centre records exposures to energy drinks with reported symptoms and toxicity outcomes, categorized by age and combinations of exposures.¹⁰ This data could be used to help health professionals better understand specific adverse health events in their jurisdictions. Such data could also inform public health and health promotion strategies.

In addition, as energy drinks are often chosen for their physical and cognitive effects, attention could be given to increase consumer awareness of potential adverse health events following energy drink consumption, with a focus on youth and young adults given their

higher rates of energy drink consumption in Ontario.¹

Educational interventions can also be used to improve awareness about potential adverse health events following energy drink consumption. For example, the Ontario elementary curriculum for Health and Physical Education includes an expectation that, by the end of Grade 5, students will “describe how advertising and media influences food choices [...] and explain how these influences can be evaluated to make healthier choices.”³² The curriculum provides an example of a television commercial in which a professional athlete is consuming an energy drink; the student is able to recognize that the commercial is trying to influence them to purchase the product, and that the athlete's endorsement does not mean that the product is healthy.³² As the curriculum already expects an understanding about a potential outcome of energy drink consumption as well as advertising awareness, the classroom is an appropriate setting for further education about adverse health events associated with energy drink consumption.

Limitations

Energy drinks are a relatively new product and the best available review-level literature is limited. The reviews shared similar limitations, including limited methodological detail, absent or limited dose-response data (i.e., actual quantity of energy drinks consumed in relation to reported adverse health events) and limited long-term follow up.

Most of the included literature that reported adverse events reflected case studies or cross-sectional studies (the RCTs and quasi-RCTs identified by one review were not designed to detect adverse events).²² Therefore, causal

relationships between energy drinks and adverse health events could not be assessed. Another significant limitation is the likelihood of underreporting of adverse events following energy drink consumption, as less severe adverse events may be less likely reported via a poison centre and less likely to motivate an emergency room visit.

One review noted that funding of studies by industry and/or author affiliation with energy drink manufacturers were identified in six of their 15 studies, and four other studies did not reveal their funding source.²² Three of the six studies with manufacturer involvement were also reported by one other review,²³ and a further two reviews in this Evidence Brief reported one of these studies.^{25,26} These may represent potential sources of bias.³³

For future research, well-designed observational or experimental studies are needed to identify whether energy drink consumption causes adverse health events. RCTs and cohort studies with a range of conditions similar to real world conditions would help to establish causality. Best practices suggest that such studies be conducted independently from industry support.³⁴

Additional Resources

Ontario Agency for Health Protection and Promotion (Public Health Ontario), Cheung B, Keller-Olaman S. Evidence Brief: Potential adverse health events following consumption of alcohol mixed with energy drinks. Toronto, ON: Queen's Printer for Ontario; 2017.

References

1. Boak A, Hamilton HA, Adlaf EM, Mann RE. Drug use among Ontario students, 1977-2015: detailed OSDUHS findings (CAMH Research

Document Series No.41). Toronto, ON: Centre for Addiction and Mental Health; 2015.

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

2. Health Canada. Caffeinated energy drinks [Internet]. Ottawa, ON: Health Canada; 2015 [updated 2015 Dec 15; cited 2016 Jul 11].

Available from: <http://www.hc-sc.gc.ca/fn-an/prodnatur/caf-drink-boissons-eng.php>

3. 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.

4. Canadian Beverage Association. Energy drinks [Internet]. Toronto, ON: Canadian Beverage Association; c2016 [cited 2016 Jul 11]. Available from:

http://www.canadianbeverage.ca/beverages/energy-drinks/#tab_1

5. Caffeine Informer. Top selling energy drink brands [Internet]. San Diego, CA: Caffeine Informer; 2016 [cited 2016 Aug 12]. Available from: <http://www.caffeineinformer.com/the-15-top-energy-drink-brands>

6. Pomeranz JL, Munsell CR, Harris JL. Energy drinks: an emerging public health hazard for youth. *J Public Health Policy*. 2013;34(2):25471.

7. Canadian Beverage Association. Energy drinks marketing code [Internet]. Toronto, ON: Canadian Beverage Association; [2013] [cited 2017 Jan 25]. Available from: <http://www.canadianbeverage.ca/wp->

<content/uploads/2013/12/CBA-Energy-drinks-Code-FINAL-English.pdf>

8. Advertising Standards Canada. The broadcast code for advertising to children - the code [Internet]. Toronto, ON: Advertising Standards Canada; c2016 [cited 2016 Aug 12]. Available from:

<http://www.adstandards.com/en/clearance/chidrens/broadcastCodeForAdvertisingToChildren-TheCode.aspx>

9. Reid J, Hammond D. Evaluating the impact of Canada's caffeinated energy drink policy among youth and young adults. Descriptive report [draft]. Online Survey - Wave 2 (2015) ed; 2016 [cited 2016 Aug 12].

10. Thompson M. Personal communication. 2016

11. Substance Abuse and Mental Health Services Administration, Centre for Behavioral Statistics and Quality. The DAWN report: update on emergency department visits involving energy drinks: a continuing public health concern [Internet]. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2013 [cited 2016 Jul 11]. Available from:

<http://archive.samhsa.gov/data/2k13/DAWN126/sr126-energy-drinks-use.pdf>

12. Breda JJ, Whiting SH, Encarnacao R, Norberg S, Jones R, Reinap M, et al. 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/>

13. Vanderkooy P. Response to updated guidance document - caffeinated energy drinks. Toronto, ON: Dietitians of Canada; 2013.

14. Health Canada, Category specific guidelines for temporary marketing authorization - caffeinated energy drinks [Internet]. Ottawa, ON: Health Canada; 2013 [updated 2015 Dec15; cited 2016 Jul 11]. Available from:

<http://www.hc-sc.gc.ca/fn-an/legislation/guide-ld/guidance-caf-drink-boiss-tma-amt-eng.php>

15. Health Canada. Information for parents on caffeine in energy drinks [Internet]. Ottawa, ON: Health Canada; 2012 [updated 2012 May 10; cited 2016 Jul 11]. Available from:

<http://www.hc-sc.gc.ca/fn-an/securit/addit/caf/faq-eng.php>

16. EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA). Scientific opinion on the safety of caffeine. *EFSA J*. 2015;13(5):4102.

Available from:

<http://onlinelibrary.wiley.com/doi/10.2903/j.efsa.2015.4102/full>

17. Kaminer Y. Problematic use of energy drinks by adolescents. *Child Adolesc Psychiatric Clin N Am*. 2010;19(3):643-50.

18. World Health Organization. Public health events of initially unknown etiology: a framework for preparedness and response in the African Region. Brazzaville, Republic of Congo: World Health Organization Regional Office for Africa; 2014. Available from:

http://www.afro.who.int/index.php?option=com_docman&task=doc_download&gid=9281&Itemid=2593

19. Ontario Agency for Health Protection and Promotion (Public Health Ontario), Keller-Olaman S. Evidence Brief: Potential adverse

health events following consumption of alcohol mixed with energy drinks. Toronto, ON: Queen's Printer for Ontario; 2017.

20. Health Evidence. Quality assessment tool for review articles [Internet]. Hamilton, ON: Health Evidence; 2008 [cited 2016 Dec 3]. Available from:

http://www.healthevidence.org/documents/our-appraisal-tools/QATool&Dictionary_01Jun16.pdf

21. 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.

22. 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.

23. Higgins JP, Tuttle TD, Higgins CL. Energy beverages: content and safety. *Mayo Clin Proc*. 2010;85(11):1033-41. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2966367/>

24. IsHak WW, Ugochukwu C, Bagot K, Khalili D, Zaky C. Energy drinks: psychological effects and impact on well-being and quality of life - a literature review. *Innov Clin Neurosci*. 2012;9(1):25-34. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3280075/>

25. Pennington N, Johnson M, Delaney E, Blankenship MB. Energy drinks: a new health hazard for adolescents. *J Sch Nurs*. 2010;26(5):352-9.

26. Seifert SM, Schaechter JL, Hershorin ER, Lipshultz SE. Health effects of energy drinks on

children, adolescents, and young adults. *Pediatrics*. 2011;127(3):511-28. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3065144/>

27. Striley CW, Khan SR. Review of the energy drink literature from 2013: findings continue to support most risk from mixing with alcohol. *Curr Opin Psychiatry*. 2014;27(4):263-8.

28. 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/>

29. Rath M. Energy drinks: what is all the hype? The dangers of energy drink consumption. *J Am Acad Nurse Pract*. 2012;24(2):70-6.

30. 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. Available from: [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1932-8737](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1932-8737)

31. Ontario. Ministry of Health and Long-term Care. Ontario public health standards 2008. Revised May 2016 [Internet]. Toronto, ON: Queen's Printer for Ontario; 2016 [cited 2016 Dec 1]. Available from: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/docs/ophs_2008.pdf

32. Ontario. Ministry of Education. The Ontario curriculum, grades 1-8: health and physical education, 2015 [Internet]. Toronto, ON: Queen's Printer for Ontario; 2015 [cited 2016 Aug 15]. Available from:

<http://www.edu.gov.on.ca/eng/curriculum/elementary/health1to8.pdf>

33. Institute of Medicine (IOM). Environmental health sciences decision making: risk management, evidence, and ethics: workshop Summary. Washington, DC: The National Academies Press; 2009.

34. Bekelman JE, Li Y, Gross CP. Scope and impact of financial conflict of interest in biomedical research: a systematic review. JAMA. 2003;289(4):454-65.

Authors

Naomi Pullen, Research Assistant, Health Promotion, Chronic Disease and Injury Prevention, PHO
Brandon Cheung, Research Assistant, Health Promotion, Chronic Disease and Injury Prevention, PHO
Sue Keller-Olaman, Manager, Knowledge Synthesis Services, Health Promotion, Chronic Disease and Injury Prevention, PHO

Reviewers

Erin Hobin, Scientist, Health Promotion, Chronic Disease and Injury Prevention, PHO
Heather Petrie, Evidence Analyst, Dietitians of Canada
Lynn Roblin, Policy Consultant, Nutrition Resource Centre/Ontario Public Health Association
Jocelyn Sacco, Research Coordinator, Health Promotion, Chronic Disease and Injury Prevention, PHO
Donna Smith, Policy and Program Coordinator, Nutrition Resource Centre/Ontario Public Health Association
Pat Vanderkooy, Public Affairs Manager, Dietitians of Canada
Genevieve Cadieux, Public Health and Preventive Medicine Resident, PHO

Special Thanks

Erin Berenbaum, Research Coordinator, Health Promotion, Chronic Disease and Injury Prevention, PHO
Tiffany Oei, Research Coordinator, Health Promotion, Chronic Disease and Injury Prevention, PHO
Julie Hui-Chih Wu, Research Coordinator, Infection, Prevention and Control, PHO

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario), Pullen N, Cheung B, Keller-Olaman S. Evidence Brief: Energy drinks and the body — Reported adverse health events. Toronto, ON: Queen's Printer for Ontario; 2017.

ISBN: 978-1-4606-9155-7

©Queen's Printer for Ontario, 2017

Disclaimer

This document was developed by Public Health Ontario (PHO). PHO provides scientific and technical advice to Ontario's government, public health organizations and health care providers. PHO's work is guided by the current best available evidence.

PHO assumes no responsibility for the results of the use of this document by anyone.

This document may be reproduced without permission for non-commercial purposes only and provided that appropriate credit is given to Public Health Ontario. No changes and/or modifications may be made to this document without explicit written permission from Public Health Ontario.

For Further Information

Knowledge Synthesis Services, Health Promotion, Chronic Disease and Injury Prevention (HPCDIP)

Email: hpcdip@oahpp.ca

Public Health Ontario

Public Health Ontario is a Crown corporation dedicated to protecting and promoting the health of all Ontarians and reducing inequities in health. Public Health Ontario links public health practitioners, front-line health workers and researchers to the best scientific intelligence and knowledge from around the world.

For more information about PHO, visit www.publichealthontario.ca.

Public Health Ontario acknowledges the financial support of the Ontario Government.

