



Consumption of Caffeinated Energy Drinks Among Youth and Young Adults in Canada

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ABSTRACT

The growing market for caffeinated energy drinks (CEDs) has caused concern about excessive caffeine intake and potential adverse effects, particularly among young people. The current study examined patterns of CED consumption among youth and young adults in Canada, using data from a national online survey conducted in October 2014. Data from a non-probability sample of 2040 respondents aged 12–24 from a consumer panel was weighted to national proportions; measures of CED consumption were estimated, including prevalence, excessive daily consumption, and context for use (locations and reasons). Separate logistic regression models for two outcomes, past-week consumption and “ever” exceeding two energy drinks in a day (as per common guidance), were conducted to examine associations with demographic variables (sex, age, geographic region, race/ethnicity, and language). Overall, 73.6% of respondents reported “ever” consuming energy drinks; 15.6% had done so in the past week. Any consumption of energy drinks in the past week was more prevalent among males, Aboriginal respondents (vs. white only or mixed/other), and residents of British Columbia. Among “ever-consumers,” 16.0% reported ever consuming more than two energy drinks in a day. Exceeding two in a day was more prevalent among older respondents (young adults aged 18–24), aboriginal respondents (vs. white only), and British Columbia residents. While the majority of youth and young adults had consumed energy drinks, about half were “experimental” consumers (i.e., consumed ≤5 drinks in their lifetime). Approximately one in six consumers had exceeded the usual guidance for maximum daily consumption, potentially increasing their risk of experiencing adverse effects.

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1. Introduction

The energy drink market has grown rapidly in recent years (Canadian Packaging, 2012; Harris & Munsell, 2015), with global consumption nearly doubling between 2006 and 2012 (Meier, 2012) and annual Canadian sales of over \$110 million (Nielsen, 2014). Marketing of energy drinks is often youth-oriented (Harris & Munsell, 2015; Pomeranz et al., 2013), and young adults aged 18–34 are a major target demographic (Heckman et al., 2010). However, there is concern about the risks and potentially harmful effects of energy drink consumption on consumers' health, especially young people, due to the often high

content of caffeine, sugar, and other ingredients (such as taurine, guarana, vitamins, and herbal ingredients) (Harris & Munsell, 2015; Pomeranz et al., 2013; Reissig et al., 2009).

Adverse effects after consuming energy drinks have been reported to poison control centres and regulatory authorities, and commonly include cardiac (e.g., heart palpitations/tachycardia), neurological (e.g., tremors, agitation/restlessness), and/or gastrointestinal symptoms, which are serious in some cases (Ali et al., 2015; U.S. Food and Drug Administration (FDA), 2012; Gunja & Brown, 2012; Seifert et al., 2011). Some studies have found associations between energy drink use and other risk behaviours (such as alcohol and drug use, smoking, sexual risk-taking, and violence) among adolescents and young adults (Azagba et al., 2014; Larson et al., 2015; Miller, 2008a; Terry-McElrath et al., 2014); however, energy drink consumption may fit into a broader risk-taking behavioural pattern rather than causing these behaviours. Research also suggests that the risk of harm or negative side effects, including other risky behaviours, may be increased when CEDs are used with alcohol (Bigard, 2010; Brache & Stockwell, 2011; Marczyński & Fillmore, 2014).

Abbreviations: CEDs, caffeinated energy drinks.

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A primary cause of concern and increased risk associated with CED consumption is excess caffeine consumption, which can lead to adverse effects such as sleep disturbances, anxiety, jitteriness, gastro-intestinal effects, tachycardia and other cardiac symptoms, and in rare cases, seizures and death (Bigard, 2010; Harris & Munsell, 2015; Reissig et al., 2009; Seifert et al., 2011). Health Canada recommends limiting caffeine intake to 400 mg of caffeine per day for healthy adults, and no more than 2.5 mg/kg body weight for adolescents 13 and older (Health Canada, 2013a). Energy drinks on the Canadian market typically contain between 80 and 180 mg of caffeine per single-serving container (depending on size); in these products, Health Canada allows a caffeine content of 200–400 ppm (mg/L) and a maximum of 180 mg per serving/container (Health Canada, 2013b). Both a quantitative caffeine declaration and the qualitative statement “high caffeine content” are required on these beverages, as well as several cautionary statements, including: “Do not consume more than (X) container(s)/serving(s) daily” or “Usage: (X) container(s)/serving(s) maximum daily.” (Health Canada, 2013b), where X is 1 or 2, depending on the product’s vitamin and mineral content. While there are reports of adverse effects from excess caffeine consumption (Seifert et al., 2011), the prevalence of exceeding guidance for daily maximum consumption of energy drinks among youth and young adults has not previously been reported in Canada, although European findings suggest that this behaviour is not uncommon (Zucconi et al., 2013).

Health Canada has determined that a number of outstanding information gaps need to be addressed in order to develop and finalize regulatory requirements for these products; for example, consumption patterns of CEDs in the dietary context as food, and the effectiveness of labelling for mitigating risks. Temporary Marketing Authorization was determined to be the most appropriate regulatory tool, allowing these products to be marketed temporarily under specific conditions, while such information is gathered and reviewed. Specific marketing conditions include limits on caffeine content, vitamins and minerals, clear display of caffeine content, cautionary labelling, and restrictions on advertising CEDs to children (Health Canada, 2013b). Evidence on CED consumption among young people may be useful for informing future regulations for these products.

To date, there is limited research evidence on energy drink consumption in Canada, given the relatively recent increase in the availability and popularity of these products. While there are some Canadian estimates of consumption prevalence among youth, little is known about consumption among young adults, or patterns of consumption (amount, context, reasons for use, etc.). Some school-based studies have provided regional estimates of energy drink consumption: in the Atlantic provinces, 12.7% (of grades 7, 9, 10 and 12) consumed more than once per month (Azagba et al., 2014); in Quebec, 8.1% (of secondary levels 1–5; age 12–17) consumed at least weekly (Pica et al., 2012); and in Ontario, 19.1% (of grades 7 to 12) consumed in the past week (Paglia-Boak et al., 2013) and 18.2% (of grades 9–12) reported ‘usual’ weekly consumption (Reid et al., 2015). Little is known about how and when these products are being consumed, and few studies have extended beyond one or two basic measures of consumption.

The primary objective of the current study was to examine consumption patterns of caffeinated energy drinks (CEDs) among youth and young adults in Canada, specifically the prevalence and recency of consumption, exceeding common guidance for maximum daily consumption (>2/day), and context for use (locations and reasons for use).

2. Methods

2.1. Protocol

Data were collected via self-completed web-based surveys that took place from October 3–22, 2014. Surveys took approximately 20 minutes to complete, and were conducted in English or French.

Respondents were recruited via email through Leger’s consumer panel for web surveys (see <http://www.leger360.com/admin/>

[legerweb/PanelBook_Canada_EN_2016.pdf](#)), which consists of > 400000 active members, half of them sampled using probability-based methods (using the Canadian Census), along with other non-probability-based methods, including commercial surveys (Leger, 2014). Respondents aged 18–24 were recruited directly, while those aged 12–17 were recruited through their parents and parental consent was obtained prior to youth accessing the survey. All respondents were provided with information about the study and asked to provide consent before participating. Respondents received remuneration from Leger in accordance with their usual incentive structure, which includes both points-based and monetary rewards (which can be cashed out or donated), as well as chances to win monthly prizes; the monetary incentive for this study was \$2.

The study was reviewed by and received ethics clearance from the Office of Research Ethics at the University of Waterloo. A full description of the study methods can be found in the Technical Report (Reid & Hammond, 2014).

2.2. Measures of energy drink consumption

The following preamble was included prior to questions about energy drinks: “We would like to ask you some more questions about energy drinks. Popular brands include Red Bull, Monster, Rockstar, NOS, Amp, and Full Throttle, but there are others. DO NOT include sports drinks, such as Gatorade or Powerade.” Ever consumption was assessed by asking, “Have you ever tried an energy drink, even a few sips? Include energy drinks mixed with other drinks.” Those who had ever consumed energy drinks were asked additional questions about their consumption.

Recency of consumption was assessed by asking “When was the LAST TIME you had an energy drink? Include any energy drinks mixed with alcohol.” (in the last 24 hours; in the last 7 days; in the last 30 days; in the last 6 months; in the last 12 months; More than 12 months ago; don’t know; refuse to answer). Responses were categorized into a measure of whether CEDs had been consumed in the past week. Lifetime consumption was assessed by asking “How many energy drinks have you consumed in your life? 1 drink = 1 can, container or glass, including energy drinks mixed with alcohol. If you are not sure, please provide your best guess.” (none; 1 drink or less; 2–5 drinks; 6–10 drinks; 11–20 drinks; 21–50 drinks; 51–100 drinks; More than 100 drinks; don’t know; refuse to answer). Maximum daily consumption was assessed by asking “What is the largest number of energy drinks you have ever had IN ONE DAY? Include any energy drinks mixed with alcohol.” Open-ended numeric responses were categorized as 1, 2, 3, 4 or more, and a measure of whether more than 2 CEDs had ever been consumed in a day was also created (a conservative measure for exceeding the common guidance for consumption).

To assess locations of consumption, ever-consumers of energy drinks were asked “Have you EVER had an energy drink in the following places? Select all that apply.” with the list of locations noted in Table 3. Ever-consumers were also asked about their reasons for using energy drinks: “Have you used energy drinks for any of the following reasons? Select all that apply.” with the list of reasons noted in Table 3.

2.3. Analysis

A total of 2055 respondents completed the survey. Due to missing data on the variables used for weighting (age, sex, province), 7 respondents were deleted, as well as the 8 respondents from the territories. Thus, a total of 2040 were retained for analysis. Respondents were excluded from analyses on a case-wise basis for measures with missing data.

Weights were constructed based on population estimates from the 2011 National Household Survey (Statistics Canada, 2014). Sample probabilities were created for 40 demographic groups (age group by sex by region) based on weighted NHS proportions, and applied to the

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