



Examining the relationship between sugars contents of Canadian foods and beverages and child-appealing marketing

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Abstract

Objective In 2016, legislation to restrict child-appealing marketing (M2K) of “unhealthy” foods and beverages (“foods”) (i.e., foods that exceed roughly 5–10% of the Daily Value (DV) for total sugars, sodium, or saturated fats) was proposed in Canada. The objective of this study was to examine the relationship between foods with on-pack M2K and excessive free sugars contents ($\geq 10\%$ calories from free sugars) and the potential for a 5% total sugars DV threshold to restrict M2K on these products.

Methods Cross-sectional analysis of the University of Toronto's Food Label Information Program (FLIP) 2013 database ($n = 15,259$, after exclusions). Odds ratios were used to determine the association between excess free sugars contents and presence of M2K, stratified by major food category. The proportion of products with excessive free sugars levels, or with M2K, that would be restricted from M2K if a 5% DV threshold for total sugars was implemented was also determined.

Results 77.8% of foods with M2K had excess free sugars levels compared with 38.4% without M2K. M2K was more likely to be present on foods with excess free sugars levels in 8 of 14 food categories that contained products with M2K. A 5% DV threshold for total sugars would restrict M2K on 83% of foods with excess free sugars levels and on 75% of current foods that had M2K.

Conclusion Findings demonstrate that foods with M2K are less healthy, particularly in regard to free sugars levels. This highlights the importance of ensuring policies aimed at supporting healthy dietary habits among children carefully consider free sugars levels.

Résumé

Objectif En 2016, des mesures législatives ont été proposées au Canada pour limiter le marketing destiné aux enfants (MDE) d'aliments et de boissons (« aliments ») jugés « malsains » (c.-à-d. les aliments qui dépassent de 5 à 10 % la valeur quotidienne (VQ) totale pour les sucres, le sodium ou les graisses saturées). L'objectif de la présente étude était d'examiner la relation entre les aliments comportant de la publicité destinée aux enfants sur l'emballage et les aliments ayant une teneur excessive en sucres libres ($\geq 10\%$ des calories provenant de sucres libres) et d'envisager l'imposition d'un seuil de 5 % de la VQ totale pour les sucres afin de limiter le MDE de tels produits.

Méthode Analyse transversale des données de 2013 de la base de données du programme FLIP (Food Label Information Program) de l'Université de Toronto ($n = 15,259$ après exclusions). Des rapports de cotes ont servi à déterminer les associations entre la teneur excessive en sucres libres et la présence de MDE et de stratifier ces associations par grande catégorie alimentaire. Nous avons également déterminé la proportion de produits ayant des niveaux excessifs de sucres libres, ou comportant du MDE, qui ne pourraient plus être commercialisés auprès des enfants si un seuil de 5 % de la VQ totale pour les sucres était imposé.

Résultats 77,8 % des aliments comportant du MDE avaient des niveaux de sucres libres excessifs, contre 38,4 % des aliments sans MDE. Le MDE était plus susceptible d'être présent pour les aliments ayant des niveaux de sucres libres excessifs dans 8 des 14 catégories alimentaires contenant des produits commercialisés auprès des enfants. Un seuil de 5 % de la VQ totale pour les sucres limiterait le MDE pour 83 % des aliments ayant des niveaux de sucres libres excessifs et pour 75 % des aliments actuellement commercialisés auprès des enfants.

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Conclusion Nos résultats montrent que les aliments commercialisés auprès des enfants sont moins sains, surtout en ce qui a trait à leurs niveaux de sucres libres. Il est donc important que les politiques qui visent à favoriser de saines habitudes alimentaires chez les enfants examinent attentivement les niveaux de sucres libres.

Keywords Sugar · Marketing to children · Nutrient composition · Food marketing · Food advertising · Public health policy

Mots-clés Sucre · Marketing destiné aux enfants · Teneur en éléments nutritifs · Marketing des aliments · Publicité alimentaire · Politiques de santé publique

Introduction

The inviting nature of foods and beverages that are marketed to children has been shown to influence taste preferences, purchasing requests, and consumption patterns of children (Cairns et al. 2009; Cairns et al. 2013). In fact, food packaging has been shown to be the predominant medium by which children are exposed to food and beverage marketing (Signal et al. 2017). However, child-appealing marketing (M2K) tends to be found more often on products that are considered “unhealthy” (Elliott 2008b, 2012, 2008a; Chapman et al. 2006; Mehta et al. 2012; Cairns et al. 2013). Given that an unhealthy diet is a major modifiable risk factor for non-communicable diseases, the marketing of unhealthy foods to children may be contributing to the high prevalence of non-communicable diseases in Canada and globally (World Health Organization 2010). In an effort to mitigate these effects, in 2010, the World Health Organization (WHO) recommended limiting the marketing of foods high in saturated fats, *trans* fats, salt, and free sugars to children (World Health Organization 2010). More recently in 2016, Health Canada’s *Healthy Eating Strategy* was introduced, which is a suite of policies aimed at improving the nutritional quality of Canadian diets, including a proposal for federally legislated restrictions on the marketing of unhealthy foods to children under the age of 13 as part of Bill S-228: *The Child Health Protection Act* (Parliament of Canada 2015).

To accompany this Bill, Health Canada has proposed a regulatory approach for defining “unhealthy” foods and beverages for use in this context—namely as products with more than “a little” total sugars, sodium, or saturated fats (exceeding roughly 5–10% of the Daily Value (DV)) (Government of Canada 2018). Although 15% DV or more is considered to be “a lot” of a nutrient (Government of Canada 2013), a lower threshold was proposed to protect children, a vulnerable population, from the negative health impacts associated with the consumption of these nutrients in excessive amounts (Government of Canada 2018). Unlike for sodium and saturated fats (Institute of Medicine 2006), there are no quantitative recommendations from authoritative health bodies to limit intakes of total sugars.

“Total sugars” is a broad term covering all mono- and disaccharides and includes sources of sugars that are recommended in dietary guidelines (e.g., fruits, vegetables, dairy, and some grains) (Government of Canada 2019). On the other hand, there are several guidelines recommending intakes of free sugars be limited to a maximum of 10% or 5% of calories to reduce the risk of adverse health outcomes and suboptimal dietary patterns associated with excessive intakes (World Health Organization 2015). Free sugars are a subcategory of total sugars and include the sugars that have been removed from their naturally occurring sources and sometimes “added” into foods and beverages. Evidently, there is a misalignment between policies focused on total sugars and dietary recommendations focused on free sugars. Furthermore, existing research has highlighted the limitations of presenting a total sugars DV on the Nutrition Facts table (NFT), namely because compared with a free sugars DV, it is not as sensitive for capturing “less healthy” foods or foods that contain excess free sugars levels (Bernstein et al. 2018). Thus, it is imperative that other policies that use the total sugars DV are not perpetuating these limitations. Moreover, children in Canada consume a considerable portion of their energy intakes from sugars, with over 25% of calories coming from total sugars in children 8 years and under as of 2015 (Langlois et al. 2019), and it is estimated that almost 17% of calories among children and adolescents 6 to 17 years of age came from added sugars (similar to free sugars) with almost 65% of them exceeding recommended intakes (Tariq 2018).

Investigations of the relationship between free sugars and the presence of on-package M2K have been stifled by the absence of data on free sugars levels (Elliott 2008b, 2008a). Additionally, the usefulness of a total sugars %DV for restricting child-appealing marketing on foods and beverages with high levels of free sugars remains unknown. It is imperative to understand the nature of the products currently being marketed to children in terms of excessive levels of free sugars—an understudied area in Canada. Examinations are also needed that assess how comprehensively a threshold based on a total sugars DV would restrict M2K on foods that contain excessive levels of free sugars ($\geq 10\%$ of calories from free sugars).

Objectives

The aims of this study were to examine the relationship between foods and beverages with M2K present on product packaging and excessive free sugars contents and to investigate the potential efficacy of a 5% total sugars DV threshold for restricting the presence of M2K on these products.

Methods

Food composition database

This study was a cross-sectional analysis of the University of Toronto Food Label Information Program (FLIP) 2013 database which contains nutrition information on 15,342 prepackaged foods and beverages collected from the top four national retailers by market share in Canada in 2013 (Bernstein et al. 2016). Details of the FLIP 2013 data collection and processing have been published by Bernstein et al. (2016) in *Nutrients*. Excluded from the present analysis were meal replacement beverages, which are intended for special dietary use ($n = 55$), and products with missing total sugar declarations ($n = 28$) for a total of 15,259 products in the present study.

Variable derivation

Distribution of total sugars %DV

For each product in FLIP 2013, a total sugars %DV was calculated. The proposal for restricting the marketing of unhealthy foods to children states that either the reference amount or manufacturer stated serving size, whichever is greater, should be used (Government of Canada 2018). Thus, total sugars levels per reference amount (from the Table of Reference Amounts for Foods (Government of Canada 2016b)) or per manufacturer stated serving size (obtained from the Nutrition Facts table (NFt)) was divided by the DV for total sugars of 100 g per day (Government of Canada 2016a). The proportion of products with (1) excessive free sugars levels and (2) M2K on product packaging that would be restricted from M2K if a threshold was set at 5% DV for total sugars was determined.

Outcome—presence of child-appealing marketing

The presence of child-appealing marketing (M2K) on product packaging was the outcome of interest. Previous research identified product packages with M2K in FLIP 2013 (Labonté et al. 2017). Product packages were scanned for aspects of M2K and subsequently coded into a binary (i.e., yes/no) variable. As detailed previously by Labonté et al.

(2017), for marketing on a product to be classified as “child-appealing”, it had to possess one or more of the following aspects of product packaging, adapted from a previously established set of conditional criteria (Colby et al. 2010; Elliott et al. 2013): (1) allusions to fun/play; (2) children’s product lines (e.g., “mini” or “junior” product lines); (3) lettering or graphics that may appeal to children; (4) unconventional flavours, colours, or shapes; (5) toys, coupons, prizes, or contests; (6) games; or (7) characters appealing to children. Products that had a character or image appealing to children that was part of the product’s brand or company logo, with none of the other conditional criteria, were not considered to be a product with M2K. The number of products with M2K in FLIP 2013 ($n = 747$) and by product category has been published by Labonté et al. (2017) in the *American Journal of Clinical Nutrition*.

Primary predictor—excessive free sugars levels

The primary predictor of interest for this study was excessive free sugars levels ($\geq 10\%$ of calories from free sugars). Free sugars contents in FLIP 2013 had been previously calculated using the University of Toronto’s *Free Sugar Algorithm* for all products in the unprepared or “as sold” form (Bernstein et al. 2016). Products were categorized into a binary variable based on whether the product contained excess free sugars levels ($\geq 10\%$ of calories from free sugars) or did not ($< 10\%$ of calories from free sugars). This threshold is in line with WHO’s recommendations for free sugars intake (World Health Organization 2015) and the threshold for foods with “excess free sugars” according to WHO’s regional office of the Pan American Health Organization’s nutrient profiling model (Pan American Health Organization 2016).

Additional covariate—major food category

Previous research conducted on the FLIP 2013 database has shown that free sugars contents vary substantially by food category (Bernstein et al. 2016). Likewise, analysis of FLIP 2013 has also indicated that M2K is more prevalent in some food categories than others (Labonté et al. 2017). Thus, the potential confounding effect of food category on the relationship between free sugars content and the presence of M2K was assessed as described below using an interaction term. Specific for this study, all products in FLIP 2013 were categorized into sugar-focused major food categories to ensure comparisons of similar foods. Sugar-focused categories were created based on Schedule M food categories as outlined in the Canadian *Food and Drug Regulations* (Government of Canada 2012), as well as Health Canada’s sodium-focused categories (Health Canada 2012). These categories were further divided or combined on the basis of sugar and sweetener ingredients, intended use, and food type to ensure categories

contained like products. All products in FLIP 2013 were categorized into sugar-focused categories regardless of sugars or free sugars content. Details on the categorization and types of foods included in each sugar-focused major food category have been published by Bernstein et al. (2016) in *Nutrients*.

Statistical analysis

Categorical variables (e.g., presence of excess free sugars, presence of M2K, food category) were presented as frequencies (%). A multivariable logistic regression model was used to assess the relationship between products with excess free sugars contents and the presence of child-appealing marketing, adjusted for major food category. Effect modification of food category on the relationship between excessive free sugars content and child-appealing marketing was also assessed using an interaction term (i.e., food category \times excessive free sugars). Analyses were stratified by major food category upon observing a significant interaction ($p = 0.0002$). Firth's penalized maximum likelihood estimation method was used where quasi-separation was identified. Firth's bias reduction minimizes the bias attributable to small sample sizes in the presence of a relatively rare outcome with highly predictive independent variables (Firth 1993). Results were considered statistically significant at $p < 0.05$. All statistical analyses were conducted using SAS version 9.4 (SAS Institute Inc., Cary NC).

Results

Overall, 77.8% ($n = 581/747$) of products with M2K had excess levels of free sugars compared with 38.4% of products without M2K (Table 1). Of the 17 major food categories examined, 14 contained products with M2K (Table 1). M2K was more likely to be present on products that had excessive levels of free sugars for 8 of the 14 major food categories that contained products with M2K, ranging from 2.57 (1.48, 4.49) times to 43.00 (15.31, 120.80) times more likely for mixed dishes and cereal and grain products, respectively (Table 1). There was no significant relationship between the presence of M2K and free sugars content in the remaining 6 out of 14 food categories.

Distribution of total sugars %DV for products with excessive free sugars levels

Setting a %DV threshold of 5% would restrict the presence of M2K on 83% of foods and beverages with excess free sugars levels ranging from 10% in fats, oils, and vinegars to 98% in beverages (Table 2). Conversely, setting a 15%DV threshold would restrict the presence of M2K on only 41% of these products ranging from 0% in several categories to 82% in beverages (Table 2). A total sugars %DV threshold of 0%

would be required to restrict M2K on 100% of foods with excess free sugars levels, while an 8%DV would restrict 75%, a 13%DV would restrict 50%, and a 20%DV would restrict 25% of these foods.

Distribution of total sugars %DV for products with child-appealing marketing

Setting a DV threshold of 5% would restrict the presence of M2K on 75% of foods and beverages that had M2K on product packaging in 2013 ranging from 0% in several categories to 96% in sugars and sweets (Table 2). Conversely, setting a 15%DV threshold would restrict the presence of M2K on only 29% of foods and beverages that had M2K on product packaging, ranging from 0% in several categories to 80% in beverages (Table 2). A total sugars %DV threshold of 0% would be required to restrict M2K on 100% of products that had M2K, a 6%DV would restrict 75%, an 11%DV would restrict 50%, and a 17%DV would restrict 25%.

Discussion

The study presented here examines the relationship between the presence of M2K on Canadian prepackaged foods and beverages and excessive levels of free sugars. Furthermore, it investigates the potential efficacy of a 5% total sugars DV threshold for restricting the presence of M2K, particularly on products containing an excessive amount of free sugars and carrying M2K on product packaging. The results of this research are well timed given the recent emergence of a proposal to restrict the marketing of unhealthy foods and beverages to children using a threshold for sodium, saturated fats, and total sugars (Government of Canada 2018).

To our knowledge, this is the first study to investigate the relationship between free sugars and presence of on-package M2K. Previous analyses have been limited in their capacity to quantify free sugars levels in prepackaged foods (Elliott 2008a, b; Potvin Kent et al. 2017). For instance, prior research from Alberta, Canada, by Elliot and colleagues (Elliott 2012) has described the relationship of products with M2K and sugars levels using a threshold of more than 20% of calories coming from total sugars as one way to describe foods of poor nutritional quality (Elliott 2012). Similar to the present study, Elliot and colleagues (Elliott 2012) found that 73% of products with M2K derived over 20% of calories from total sugars. Considering that around 65% of the total sugars in Canadian prepackaged foods were derived from free sugars in a representative 2013 investigation (Bernstein et al. 2016), a threshold of 20% of calories from total sugars is equivalent to a threshold of 13% of calories from free sugars and, thus, higher than the threshold of 10% of calories from free sugars applied here. Another Canadian study investigated the predominance of added sugars and M2K on breakfast

Table 1 Frequency and number of products with child-appealing marketing (M2K) that have excess free sugars levels ($\geq 10\%$ of kcal), by major food category and odds of child-appealing marketing on productswith excess free sugars contents ($\geq 10\%$ of kcal) compared with products without excess free sugars contents ($< 10\%$ of kcal), by major food category ($n = 15,259$)

Major food category	<i>n</i>	w/ M2K ^a				w/o M2K				All	
		All w/ M2K		% w/ M2K w/ excess free sugars		All w/o M2K		% w/o M2K w/ excess free sugars		OR	95% CI
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
Bakery products	2197	176	8.0%	143	81.3%	2021	92.0%	1056	52.3%	3.96*	2.69, 5.84
Beverages	1407	95	6.8%	88	92.6%	1312	93.2%	988	75.3%	4.12*	1.89, 8.99
Cereals and grains	969	51	5.3%	47	92.2%	918	94.7%	197	21.5%	43.00*	15.31, 120.80
Dairy products and alt.	1003	35	3.5%	19	54.3%	968	96.5%	238	24.6%	3.64*	1.84, 7.20
Desserts	940	153	16.3%	146	95.4%	787	83.7%	737	93.6%	1.41	0.63, 3.18
Fats, oils, and vinegars ^b	592					592	100.0%	139	23.5%		
Fish and seafood ^c	434	2	0.5%	0	0.0%	432	99.5%	36	8.3%	2.17	0.10, 47.80
Fruits	444	13	2.9%	8	61.5%	431	97.1%	210	48.7%	1.68	0.54, 5.23
Meat, eggs, and alt. ^c	959	4	0.4%	0	0.0%	955	99.6%	89	9.3%	1.08	0.06, 20.45
Mixed dishes	1580	73	4.6%	18	24.7%	1507	95.4%	170	11.3%	2.57*	1.48, 4.49
Nuts and seeds	205	9	4.4%	3	33.3%	196	95.6%	2	1.0%	4.50*	6.80, 346.05
Other/misc. foods ^d	274	7	2.6%	5	71.4%	267	97.4%	62	23.2%	8.27*	1.57, 43.66
Sauces and dips ^b	1204					1204	100.0%	616	51.2%		
Snacks	854	31	3.6%	9	29.0%	823	96.4%	109	13.2%	2.68*	1.20, 5.97
Soups ^c	464	1	0.2%	0	0.0%	463	99.8%	129	27.9%	0.86	0.03, 21.50
Sugars and sweets	776	97	12.5%	95	97.9%	679	87.5%	656	96.6%	1.67	0.39, 7.18
Vegetables ^b	957					957	100.0%	132	13.8%		
Overall ^e	15,259	747	4.9%	581	77.8%	14,512	95.1%	5566	38.4%		

*Represents significant OR in which the 95% CI does not cross 1. OR and 95% CI were derived using multivariable logistic regressions

^a M2K was defined as products with one or more of the following criteria on the package label: (1) allusions to fun/play; (2) children's product lines (e.g., "mini" or "junior" product lines); (3) lettering or graphics that may appeal to children; (4) unconventional flavours, colours, or shapes; (5) toys, coupons, prizes, or contests; (6) games; or (7) characters appealing to children^b OR and 95% CI for *fats, oils, and vinegars*, *sauces and dips*, and *vegetables* were not calculated because there was no child-appealing marketing identified in these major food categories^c For the major food categories *fish and seafood*, *meat, eggs and alt.*, and *soups*, adjusted OR and 95% CI were determined using the Firth's penalized maximum likelihood estimation method to limit small sample size bias^d "Other foods" include baking ingredients (baking powder, baking soda, sprinkles), spices, and other miscellaneous ingredients^e OR and 95% CI for *overall* are not presented because analyses were stratified by major food category in light of a significant interaction effect*Alt.*, alternatives; *CI*, confidence interval; *kcal*, calories; *M2K*, child-appealing marketing; *Misc.*, miscellaneous; *OR*, odds ratio; *w/*, with; *w/o*, without

cereals (Potvin Kent et al. 2017). The prominence of added sugars was determined by surveying the number of added sugars ingredients and the placement of added sugars in the first three ingredients in the Ingredient List (Potvin Kent et al. 2017). Results indicated that among breakfast cereals with M2K (19.8% of the 262 unique cereals assessed), added sugars were the second most common ingredient in 75% of them (Potvin Kent et al. 2017). This study now quantifies the products with excessive levels of free sugars and in fact, 92% of cereals with child-appealing marketing contained excessive free sugars levels.

Findings from the present study demonstrate for the first time that excessive free sugars contents positively predicted the presence of M2K in many food categories. This finding

confirms the existing literature that describes products with M2K as often misaligned with dietary guidance (Elliott 2008a, b, 2012; Chapman et al. 2006; Mehta et al. 2012; Cairns et al. 2013). Significant positive relationships were seen in the food categories that collectively captured the majority (60%) of products with M2K identified in 2013 (i.e., *bakery products*, *beverages*, *cereals and grains*, *dairy products and alternatives*, *mixed dishes*, *nuts and seeds*, *other foods*, and *snacks*). Conversely, limited heterogeneity of free sugars contents in some food categories may explain the non-significant findings, namely in the categories in which free sugars are consistently found at excessive levels (e.g., *desserts*, *sugars and sweets*) or consistently found at low levels

Table 2 Percent (%) of products that would be restricted from carrying child-appealing marketing (M2K) that have excess free sugars levels ($\geq 10\%$ of kcal) or that carried M2K in 2013 using a

5% Daily Value (DV) threshold for total sugars or a 15% DV threshold for total sugars, overall, and by major food category

Major food category	% with excess free sugars in 2013 that would be restricted from carrying M2K		% with M2K in 2013 that would be restricted from carrying M2K	
	5% DV threshold	15% DV threshold	5% DV threshold	15% DV threshold
Bakery products	92%	38%	69%	18%
Beverages	98%	83%	92%	80%
Cereals and grains	97%	8%	81%	7%
Dairy products and alt.	78%	33%	29%	0%
Desserts	98%	51%	93%	31%
Fats, oils, and vinegars	10%	0%		
Fish and seafood	43%	5%	0%	0%
Fruits	94%	61%	90%	19%
Meat, eggs, and alt.	74%	26%	0%	0%
Mixed dishes	88%	27%	43%	7%
Nuts and seeds	53%	0%	22%	0%
Other/misc. foods	15%	0%	0%	0%
Sauces and dips	53%	10%		
Snacks	86%	44%	57%	6%
Soups	37%	0%	0%	0%
Sugars and sweets	94%	49%	96%	65%
Vegetables	39%	0%		
Overall	83%	41%	75%	29%

Alt., alternatives; DV, Daily Value; M2K, child-appealing marketing; Misc., miscellaneous

(e.g., *fish and seafood, meats and alternatives, soups*), regardless of the presence of M2K. Insofar as M2K can influence consumption patterns (Boyland et al. 2016; Sadeghirad et al. 2016) and given the negative health effects associated with excessive free sugars intakes (World Health Organization 2015; United States Department of Agriculture and United States Department of Health and Human Services 2015), the findings from this study raise considerable concern and further emphasize the need for robust policies aimed at restricting M2K on foods and beverages high in free sugars. Future efforts can further this research by examining how the relationship between free sugars and child-appealing marketing translates into food purchases and intakes among children.

The results presented here support the use of a threshold set at 5% DV for total sugars to restrict most foods and beverages with excessive free sugars levels from being marketed to children, particularly those with existing M2K on product packaging. These findings also add considerable empirical support to the recently released Draft Guide to the Application of Bill-S228: the Child Health Protection Act, in which Health Canada has proposed using a 5% total sugars DV as opposed to the previously considered 15% DV threshold (Government of Canada 2018). While the 5% total sugars DV threshold would still permit around 20% of products with excess free sugars to carry M2K, it

is possible that these products would exceed the %DV thresholds for another nutrient of concern (e.g., sodium or saturated fat) and would therefore still exceed the thresholds for restricted M2K. These results also demonstrate that excessive free sugars levels are an important public health concern in foods and beverages currently heavily marketed to children.

Limitations of this study include those that are related to the use of the FLIP database, the University of Toronto's *Free Sugars Algorithm* (Bernstein et al. 2016), and the identification of M2K on product packaging. Only the major banners for the retailers surveyed for the FLIP 2013 collection were sampled. It is possible the major banner stores differ from discount banners regarding the foods sold and the presence of M2K. However, data provided by one of the largest Canadian grocery retailers by market share showed that FLIP 2013 contained 93.8% of foods and beverages sold throughout all their banner stores (both the major conventional banner and discount banner) (data not published). Thus, it is unlikely that the collection of products from both conventional and discount banners would have significantly altered the results of this study. The focus of this study is free sugars; however, this represents only one aspect of a product's overall nutritional quality. Future investigations should examine the relationship between child-directed marketing and other nutrients. Some strengths of this work include the use of the *Free*

Sugars Algorithm which has been shown to have high levels of inter-researcher repeatability of results (19). Last, in order to reduce the potential subjectivity related to identifying products with M2K, clear coding instructions were prepared and a second reviewer completed a random verification of 20% of foods and a 97% agreement was achieved (Labonté et al. 2017). Categories with a higher level of disagreement (i.e., bakery products, desserts, and sugars and sweets) underwent additional verification, and any discrepancies in classification were identified and resolved through consensus between two researchers.

Conclusion

The findings from this study support previous work demonstrating that foods and beverages marketed to children may be less healthy than those that are not; in this case, particularly regarding excess free sugars levels. Given the evidence showing high levels of childhood obesity and sugars intakes that contribute to over one quarter of caloric intakes among Canadian children (Langlois 2019), it is critical to ensure policies aimed at supporting healthy dietary habits among children carefully consider free sugars levels. In the context of evolving discussions on how best to limit the display of child-appealing marketing on unhealthy food and beverage products in Canada, this study suggests the need first to include product packaging in the regulations on M2K and second to ensure that a strict threshold for total sugars is set so that most products with excess free sugars will no longer be permitted to be marketed to children.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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