



Children's measured exposure to food and beverage advertising on television in a regulated environment, May 2011–2019

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Abstract

Objective: To quantify food/beverage advertising on television in Montreal (Quebec), to estimate and characterise children's exposure and to examine trends over time.

Design: Television food advertising data were licensed for nineteen food categories and eighteen stations for May 2011, 2016 and 2019. The frequency of advertisements and the average number viewed per child aged 2–11 years overall, by food category and by station type (i.e. youth-appealing (n 3) and generalist (n 15) stations) were determined. The percent change in advertising frequency and exposure between May 2011 and 2019 was calculated.

Setting: Montreal, Quebec, Canada.

Participants: This study used media data and did not directly involve human participants.

Results: The total number of television advertisements increased by 11 % between May 2011 (n 41 084) and May 2019 (n 45 406); however, exposure to food/beverage advertisements decreased by 53 %, going from 226 ads/child in May 2011 to 107 ads/child in May 2019. Overall, the most advertised food categories in both May 2011 and 2019 were fast food (29.8 % and 39.2 %, respectively) followed by chocolate (14.2 %) in 2011 and savory snacks (9.7 %) in 2019. In May 2019, children were predominantly exposed to unhealthy food categories such as fast food (41.3 % of exposure), savory snacks (7.5 %), chocolate (5.0 %) and regular soft drinks (4.5 %), and most (89.3 %) of their total exposure occurred on generalist television stations.

Conclusion: Despite Quebec's restrictions on commercial advertising directed to children under 13 years, Quebecois children are still frequently exposed to unhealthy food advertising on television. Government should tighten restrictions to protect children from this exposure.

Keywords
Food advertising
Children
Policy
Prevention
Consumer Protection Act

Over the last four decades, the prevalence of childhood obesity has increased twofold in high-income countries⁽¹⁾. In Canada, almost one-third of children and adolescents is currently overweight or has obesity, with a higher estimated prevalence of obesity in Atlantic Canada (i.e. Newfoundland and Labrador, Nova-Scotia, Prince Edward Island and New Brunswick) and the Prairies (i.e. Manitoba, Saskatchewan and Alberta) and among the lowest estimated prevalence in the province of Quebec^(2,3). The nutritional quality of children's diet is also lacking^(4,5). For instance, most Canadian children do not consume enough fruit and vegetables, and, on average, over 50 % of their daily energy

intake is composed of ultra-processed foods, which typically contain excessive amounts of nutrients of public health concern such as Na, fat and/or sugar^(4,5). This is concerning as obesity and the persistence of poor dietary behaviours into adulthood pose significant health risks as they are associated with a myriad of negative health outcomes such as CVD, some cancers and type 2 diabetes^(6–8).

The unhealthy nature of the food environment, including the pervasive promotion of unhealthy processed foods, has been identified as a contributor to the increasing prevalence of these diet-related illnesses⁽⁹⁾. Among children, extensive research has identified the marketing of unhealthy

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foods and beverages as a particularly influential determinant of their dietary patterns^(10–15). Specifically, exposure to unhealthy food advertising has been shown to increase children's preferences for nutrient-poor and energy-dense foods^(14,15). One meta-analysis found that children's food intake increases by 30 kcal over an average duration of 15 min during or after their exposure to food advertising⁽¹⁵⁾. Food marketing also incites children to pester their parents for promoted products^(10,11,16). The influence of food marketing on children's eating and food requesting behaviours is partly attributable to their level of cognitive development, which makes them more susceptible to food advertising cues⁽¹⁰⁾. As such, restricting the marketing of unhealthy foods and beverages has become a global priority to protect children, and in doing so, contribute to environments supporting their healthy development⁽¹⁷⁾. Yet, despite this global consensus, little progress has been made to reduce children's exposure to unhealthy food marketing^(18–20).

Contrary to the rest of Canada, where food advertising to children is mostly self-regulated, the province of Quebec, where the language of majority is French, has banned commercial advertising directed to children under 13 years since 1980 under its Consumer Protection Act^(21,22). This law applies to a wide variety of media channels including television, Internet, radio, print media and mobile phones^(21,22). Specifically, advertisements in these media cannot promote products intended for children (e.g. toys, Happy Meal) when children under 13 constitute 15% or more of the viewing audience and advertisements can never be designed in a manner that appeals specifically to these young viewers⁽²²⁾. There are no restrictions, however, on when and where food advertising can be placed on television⁽²²⁾. As such, advertisements promoting unhealthy food products that are ostensibly directed to older audiences (such as an ad featuring a middle-aged man eating fast food in his office) can be advertised on most programming in Quebec, including on programmes or television stations intended for child audiences. It should be noted that this law was designed primarily to reduce the commercialisation of childhood rather than to protect children from unhealthy food advertising. Nevertheless, some positive effects on food purchasing behaviours and food advertising to children have been noted^(23–25). For instance, an analysis of household purchasing data collected in the 1980s and 1990s suggested that Quebec's Consumer Protection Act reduced the likelihood of fast food purchases by 13% per week among Francophone households with children living in urban areas in Quebec, compared with their Anglophone counterparts and families living in Ontario, a neighbouring province⁽²⁵⁾. As for its effect on food promotions, a comparison of food advertising viewed by children in Quebec and Ontario found that food advertisements broadcast during the preferred television programming of Francophone children in Quebec were slightly healthier compared with those airing on the preferred programming of their Anglophone counterparts

in Quebec and Ontario⁽²³⁾. Francophone children in Quebec were also less likely to be exposed to endorsement characters or celebrities, which is a particularly persuasive marketing technique among children^(24,26).

Considering these positive findings, Quebec's Consumer Protection Act has been proposed as a model for the rest of Canada and other countries considering statutory restrictions on food and beverage marketing to children^(27,28). The existing literature on food advertising in Quebec, however, remains limited and suggests that the majority of food products advertised on select children's stations or viewed during their preferred programming based on self-reported television viewership journals are unhealthy and/or high in fat, sugar and/or Na^(23,24,29). To date, few studies have estimated children's exposure to food and beverage advertising on television in Quebec⁽²³⁾, and none have done so using measured media data, which is considered a more objective measure of exposure. More robust evidence on food advertising to children in Quebec is needed. As such, the objectives of the current study were to (1) describe the frequency of food and beverage advertising on broadcast television in this jurisdiction, overall and by food category; (2) estimate and characterise children's exposure to food and beverage advertising using measured media data and determine what proportion of this exposure occurred on youth-appealing *v.* generalist stations and (3) describe trends in advertising frequency and exposure over time, across all stations and by station type. This research will help assess the effectiveness of Quebec's Consumer Protection Act, which in turn may help inform policy in Canada and abroad. It was hypothesised that children in Quebec are frequently exposed to unhealthy food categories on broadcast television. Given that Canadian children's consumption of broadcast television is declining^(30,31), it was also hypothesised that children's exposure to food advertising in this media has decreased over time.

Methods

Television viewership data were licensed from Numeris, while food and beverage advertising data from May 2011, May 2016 and May 2019 across eighteen television stations were obtained under license from Nielsen Media Research (2011 and 2016) and from Numerator (2019) for the Francophone market in Montreal (Quebec). In Canada, Numerator (formerly known as Market Track) acquired Nielsen's Ad Intelligence Service (i.e. the part its business that tracked television advertising) in 2017. Montreal was selected as it is the largest French language media market in Quebec. The month of May was selected as there are no major holidays during this period which could potentially inflate advertising expenditures and regular exposure. Four weeks of 24-h television programming were analysed for each month (May 1 to May 28 in 2011, May 1 to May 28 in 2016 and April 28 to May 25 in

2019). These 3 years were selected as this constitutes a secondary analysis of data licensed for funded research previously or currently being conducted. Advertising data included nineteen food categories that are among the most frequently advertised to children on television^(18,24). A description of each food category has been published elsewhere⁽³²⁾.

The audience measurement data from Numeris were collected from a stratified random sample of households proportional to the population, in which each member, whose demographic characteristics are known, wears a portable device that records when and what station they are watching on television. Data are weighted based on a variety of household and demographic characteristics (e.g. age, sex, household size and type of television reception) to estimate the audience viewership of advertisements at the market level. Advertisement viewership can then be examined by age group, including children aged 2–11 years. Nielsen and Numerator use ‘rating points’ as a metric for advertising exposure. A rating point represents the approximate percentage of individuals of the selected demographic group that viewed an individual advertisement. Consistent with the methodology of previous studies^(33,34), the average number of advertisements viewed per Francophone child aged 2–11 years in Montreal per 4-week period was calculated by summing the rating points of each advertisement viewed by this age group, overall and by food category, and then dividing these sums (also known as Gross Rating Points) by 100. It should be noted that rating points from May 2011 and May 2016 were reported for each unique ad, whereas in May 2019, rating points were sometimes reported by advertised product. In other words, if an advertisement from 2019 featured two products, a viewership rating was reported for each product, and the rating for this unique advertisement would appear twice in the data set. To be consistent with the reporting from May 2011 and 2016 and to ensure the comparability of the data across time, data from May 2019 were reviewed such that unique advertisements and its rating were only reported once in our data set. When advertisements from May 2019 promoted more than one food category, these were classified into a single category in a manner that was consistent with the data from May 2011 and 2016. For example, advertisements featuring both regular and diet soft drinks (n 719 in 2016 and n 582 in 2019) were classified under regular soft drinks, while those featuring both cold cereal and a portable snack (n 229 in 2016 and n 1345 in 2019) were classified under cold cereal.

Advertising frequency and child exposure to food and beverage advertising were examined by type of station, including youth-appealing stations (i.e. those that appeal to youth aged 17 years and under; n 3) and generalist stations (i.e. those that appeal to broad audiences; n 15). Télétoon was considered a youth-appealing station because most of its programming is intended for children under 13 years of age. VRAK and MusiquePlus were also

classified as such because their programming predominantly focused on child programming (e.g. SpongeBob) and adolescent or family-targeted sitcoms (e.g. VRAK la vie, iCarly, Life with Derek), in the case of the former, and music videos and reality TV programs (e.g. Next Top Model, LypSync battle, Catfish), in the case of the latter. In late 2016, VRAK was rebranded and its programming shifted towards older audiences, including older youth, airing programming intended for or appealing to adolescents (e.g. Le Studio, One Tree Hill, Vampire Diaries, Riverdale, Friends). This station was also considered youth-appealing in May 2019. Included television stations are listed in online Supplemental Table 1.

Analysis

Television advertising data were extracted using Nielsen’s Spotwatch software for May 2011 and 2016 and Numerator’s Ad Quest software for May 2019. The frequency of food advertising and children’s exposure, overall and by food category, was summarised for May 2011, May 2016 and May 2019 across all stations and by station type using frequencies. χ^2 and post hoc z tests with Bonferroni correction were performed to identify differences in the distribution of advertisement exposure (as expressed in Gross Rating Points) by food category over time. This was performed to test differences across time on all stations and by station type (i.e. youth-appealing stations and generalist stations). Some food categories were collapsed to ensure that test assumptions were met. P -values of <0.05 were considered statistically significant. The percent and absolute changes in ad frequency and exposure between May 2011 and May 2019 were also calculated. For May 2019, the frequency and percentage of children’s exposure originating from youth-appealing and generalist stations, overall and within food categories, were also determined. Analyses were conducted using SPSS version 27 (IBM, 2020).

Results

Frequency of food and beverage advertisements in May 2011 and May 2019, overall and by station type

Across all eighteen television stations, a total of 41 084 food and beverage advertisements aired in May 2011 while 39 153 and 45 406 advertisements aired in May 2016 and May 2019, respectively. Overall, the frequency of food advertisements increased by 11% between May 2011 and May 2019 (Table 1). The food categories advertised the most in May 2011 overall were fast food restaurants (29.8%), chocolate (14.2%) and yoghurt (10.1%), while the most advertised categories in May 2019 were fast food restaurants (39.2%), savory snacks (9.7%) and cold cereal (9.5%). In relative terms, advertising increased the most between May 2011 and 2019 for regular soft drinks

Table 1 Number of food and beverage television advertisements broadcast on eighteen stations in Montreal (Canada) in May 2011, 2016 and 2019, overall and by food category

Food/beverage category	All stations (n 18)							
	May 2011		May 2016		May 2019		% change May 2011 to May 2019	Absolute difference May 2011 to 2019
	n	%	n	%	n	%		
Cakes	0	0	28	0.1	128	0.3	–	+128
Candy	361	0.9	1344	3.4	701	1.5	+94 %	+340
Cold cereal	3978	9.7	1493	3.8	4336	9.5	+9 %	+358
Cheese	2482	6.0	3394	8.7	2577	5.7	+4 %	+95
Chocolate	5842	14.2	3596	9.2	3694	8.1	–37 %	–2148
Compartment snacks	0	0	0	0	0	0	–	0
Cookies	1272	3.1	814	2.1	382	0.8	–70 %	–890
Energy drinks	427	1.0	533	1.4	899	2.0	+111 %	+472
Ice cream	607	1.5	1020	2.6	730	1.6	+20 %	+123
Juices	1482	3.6	2101	5.4	1435	3.2	–3 %	–47
Pizza	1263	3.1	536	1.4	614	1.4	–51 %	–649
Portable snacks	1168	2.8	804	2.1	5	<0.1	–99.6 %	–1163
Fast food restaurants	12 256	29.8	13 364	34.1	17 808	39.2	+45 %	+5552
Sit-down restaurants	2974	7.2	2547	6.5	3686	8.1	+24 %	+712
Savory snacks	1443	3.5	3358	8.6	4412	9.7	+206 %	+2969
Soft drinks – diet	744	1.8	266	0.7	124	0.3	–83 %	–620
Soft drinks – regular	433	1.1	2108	5.4	2482	5.5	+473 %	+2049
Sports drinks	204	0.5	887	2.3	37	0.1	–82 %	–167
Yoghurt	4148	10.1	960	2.5	1356	3.0	–67 %	–2792
Total	41 084	100	39 153	100	45 406	100	+11 %	+4322

Data source: Nielsen Media Research (2011, 2016) and Numerator (2019).

(+473 %) and savory snacks (+206 %), while in absolute terms, it increased the most for fast food restaurants (+5552 ads). Conversely, the largest relative decreases were noted for portable snacks (–99.6 %), diet soft drinks (–83 %) and sports drinks (–82 %), while the largest absolute decreases were noted for yoghurt (–2792 ads) and chocolate (–2148).

On youth-appealing stations, the number of food advertisements increased by 11 % between May 2011 and May 2019, going from 6830 to 7571 (Table 2). The most frequently advertised food categories in May 2011 included fast food restaurants (37.5 %), chocolate (17.4 %) and yoghurt (15.1 %), compared with May 2019, where the dominant categories were fast food restaurants (48.3 %), cold cereal (13.8 %), cheese (6.9 %) and chocolate (6.9 %). The greatest relative increases between May 2011 and 2019 were noted for ice cream (+515 %), cereal (+342 %) and energy drinks (+309 %), whereas pizza, portable snacks, diet soft drinks and sports drinks were not advertised at all in May 2019 (–100 % for each category). In absolute terms, the number of advertisements decreased the most for yoghurt (–877 ads) and chocolate (–665), while increasing the most for fast food restaurants (+1094) and cold cereal (+811) between May 2011 and May 2019.

On generalist stations, the number of food advertisements increased by 10 % between May 2011 and May 2019, going from 34 254 to 37 835 (Table 2). The most advertised food categories in May 2011 were fast food restaurants (28.3 %), chocolate (13.6 %) and cold cereal (10.9 %). In comparison, in May 2019, the most advertised categories were fast food restaurants (37.4 %), savory

snacks (10.3 %) and sit-down restaurants (9.6 %). The largest relative increases on generalist stations were noted for regular soft drinks (+754 %), savory snacks (+226 %) and candy (+190 %), while portable snacks (–99 %), diet soft drinks (–80 %), cookies (–71 %) and sports drinks (–71 %) saw the greatest relative decreases. Between May 2011 and May 2019, the greatest increases in the absolute number of advertisements were noted for fast food restaurants (+4458 ads), savory snacks (+2699) and regular soft drinks (+1946), and the greatest decreases were noted for yoghurt (–1915), chocolate (–1483) and portable snacks (–1040).

Children’s exposure to television food and beverage advertising

Overall, children were exposed to an average of 226, 123 and 107 food advertisements in May 2011, May 2016 and May 2019, respectively, with exposure decreasing 53 % between May 2011 and 2019 (Table 3). The distribution of exposure by food category across all stations differed significantly between examined periods ($X^2 = 5367.6$; $df = 32$; $P < 0.001$). In May 2011, children were exposed the most to advertisements promoting fast food restaurants (28.4 % of exposure), yoghurt (13.4 %) and sit-down restaurants (12.7 %), while in May 2019, they were exposed the most to advertisements promoting fast food restaurants (41.3 %), sit-down restaurants (11.5 %) and cold cereal (8.9 %). Between May 2011 and May 2019, the greatest relative decreases in exposure were noted for portable snacks (–100 %), cookies (–89 %) and yoghurt (–80 %), while the

Table 2 Number of food and beverage television advertisements broadcast on youth-appealing and generalist stations in Montreal (Canada) in May 2011, 2016 and 2019, overall and by food category

Food/beverage category	Youth-appealing stations (n 3)								Generalist stations (n 15)							
	May 2011		May 2016		May 2019		% change May 2011 to May 2019	Absolute difference May 2011 to 2019	May 2011		May 2016		May 2019		% change May 2011 to May 2019	Absolute difference May 2011 to 2019
	n	%	n	%	n	%			n	%	n	%	n	%		
Cakes	0	0	0	0	0	0	–	–	0	0	28	0.1	128	0.3	–	+128
Candy	131	1.9	593	7.8	33	0.4	–75%	–98	230	0.7	751	2.4	668	1.8	+190%	+438
Cold cereal	237	3.5	483	6.3	1048	13.8	+342%	+811	3741	10.9	1010	3.2	3288	8.7	–12%	–453
Cheese	334	4.9	724	9.5	526	6.9	+57%	+192	2148	6.3	2670	8.5	2051	5.4	–5%	–97
Chocolate	1191	17.4	1084	14.2	526	6.9	–56%	–665	4651	13.6	2512	8.0	3168	8.4	–32%	–1483
Compartment snacks	0	0	0	0	0	0	–	–	0	0	0	0	0	0	–	0
Cookies	54	0.8	149	2.0	33	0.4	–39%	–21	1218	3.6	665	2.1	349	0.9	–71%	–869
Energy drinks	90	1.3	66	0.9	368	4.9	+309%	+278	337	1.0	467	1.5	531	1.4	+58%	+194
Ice cream	39	0.6	20	0.3	240	3.2	+515%	+201	568	1.7	1000	3.2	490	1.3	–14%	–78
Juices	204	3.0	72	0.9	124	1.6	–39%	–80	1278	3.7	2029	6.4	1311	3.5	+3%	+33
Pizza	58	0.8	157	2.1	0	0	–100%	–58	1205	3.5	379	1.2	614	1.6	–49%	–591
Portable snacks	123	1.8	138	1.8	0	0	–100%	–123	1045	3.1	666	2.1	5	<0.1	–99.5%	–1040
Fast food restaurants	2564	37.5	2865	37.5	3658	48.3	+43%	+1094	9692	28.3	10 499	33.3	14 150	37.4	+46%	+4458
Sit-down restaurants	149	2.2	174	2.3	65	0.9	–56%	–84	2825	8.2	2373	7.5	3621	9.6	+28%	+796
Savory snacks	247	3.6	461	6.0	517	6.8	+109%	+270	1196	3.5	2897	9.2	3895	10.3	+226%	+2699
Soft drinks – diet	126	1.8	0	0	0	0	–100%	–126	618	1.8	266	0.8	124	0.3	–80%	–494
Soft drinks – regular	175	2.6	527	6.9	278	3.7	+59%	+103	258	0.8	1581	5.0	2204	5.8	+754%	+1946
Sports drinks	76	1.1	112	1.5	0	0	–100%	–76	128	0.4	775	2.5	37	0.1	–71%	–91
Yoghurt	1032	15.1	12	0.2	155	2.0	–85%	–877	3116	9.1	948	3.0	1201	3.2	–61%	–1915
Total	6830	100	7637	100	7571	100	+11%	+741	34 254	100	31 516	100	37 835	100	+10%	+3581

Data source: Nielsen Media Research (2011, 2016) and Numerator (2019).



Table 3 Francophone children’s exposure to food and beverage television advertisements in Montreal (Canada) in May 2011, 2016 and 2019, overall and by food category

Food/beverage category	May 2011			May 2016			May 2019			% change May 2011 to 2019	Absolute difference May 2011 to 2019 (ad/child)
	GRP	Avg. number of ads viewed per child	%	GRP	Avg. number of ads viewed per child	%	GRP	Avg. number of ads viewed per child	%		
Cakes & Cookies	561	5.61	2.5 ^a	186	1.86	1.5 ^a	64	0.64	0.6 ^a	-89 %	-4.97
Cakes	0	0	0	1	0.01	<0.1	3	0.03	<0.1	-	+0.03
Cookies	561	5.61	2.5	185	1.85	1.5	61	0.61	0.6	-89 %	-5.00
Candy	211	2.11	0.9 ^a	340	3.40	2.8 ^a	142	1.42	1.3 ^a	-33 %	-0.69
Cold cereal	2069	20.69	9.1 ^a	594	5.94	4.8 ^{ab}	953	9.53	8.9 ^b	-54 %	-11.16
Cheese	1317	13.17	5.8 ^a	1029	10.29	8.4 ^{ab}	645	6.45	6.0 ^b	-51 %	-6.72
Chocolate	2658	26.58	11.8 ^a	843	8.43	6.8 ^a	538	5.38	5.0 ^a	-80 %	-21.20
Compartment snacks	-	-	0	-	-	0	-	-	0	-	-
Energy drinks	171	1.71	0.8 ^a	76	0.76	0.6 ^b	117	1.17	1.1 ^{ab}	-32 %	-0.54
Ice cream	382	3.82	1.7	186	1.86	1.5	145	1.45	1.4	-62 %	-2.37
Juices	791	7.91	3.5 ^a	544	5.44	4.4 ^a	304	3.04	2.8 ^a	-62 %	-4.87
Pizza	679	6.79	3.0 ^{ab}	163	1.63	1.3 ^a	172	1.72	1.6 ^b	-75 %	-5.07
Portable snacks	536	5.36	2.4 ^a	173	1.73	1.4 ^a	0	0	0 ^a	-100 %	-5.36
Fast food restaurants	6412	64.12	28.4 ^a	4762	47.62	38.7 ^a	4401	44.01	41.3 ^a	-31 %	-20.11
Sit-down restaurants	2868	28.68	12.7 ^a	1166	11.66	9.5 ^a	1232	12.32	11.5 ^a	-57 %	-16.36
Savory snacks	418	4.18	1.8 ^{ab}	827	8.27	6.7 ^a	796	7.96	7.5 ^b	+90 %	+3.78
Soft drinks – diet	315	3.15	1.4 ^{ab}	74	0.74	0.6 ^a	66	0.66	0.6 ^b	-79 %	-2.49
Soft drinks – regular	160	1.60	0.7 ^{ab}	602	6.02	4.9 ^a	477	4.77	4.5 ^b	+198 %	+3.17
Sports drinks	47	0.47	0.2 ^a	375	3.75	3.0 ^{ab}	19	0.19	0.2 ^b	-60 %	-0.28
Yoghurt	3021	30.21	13.4 ^a	371	3.71	3.0 ^a	598	5.98	5.6 ^a	-80 %	-24.23
Total	22 616	226.2	100	12 311	123.1	100	10 669	106.7	100	-53 %	-119.5

Data source: Nielsen Media Research (2011, 2016) and Numerator (2019).

The distribution of exposure (as measured in GRP) by food category differed significantly across time periods on all examined stations ($X^2 = 5367.6$; $df = 32$; $P < 0.001$). The cakes and cookies categories were collapsed to ensure that test assumptions were met. Within rows, matching letters in superscript denote proportions that differ significantly ($P < 0.05$) according to post hoc z-tests with Bonferroni correction.



greatest and only relative increases were observed for regular soft drinks (+198%) and savory snacks (+90%). In absolute terms, the greatest and only increases in children's exposure were seen for savory snacks (+3.8 ads/child) and soft drinks (+3.2), while yoghurt (−24.2), chocolate (−21.2) and fast food restaurants (−20.1) declined the most.

Temporal changes in children's exposure to food advertising by television station type and food category are shown in Table 4 and Table 5. Children's exposure to food advertising decreased on youth-appealing and generalist stations by 77% (38 ads/child) and 46% (81 ads/child), respectively. The distribution of exposure by food category differed significantly on both youth-appealing and generalist stations between examined periods ($X^2 = 2739.3$; $df = 26$; $P < 0.001$ and $X^2 = 4674.8$; $df = 32$; $P < 0.001$, respectively). On youth-appealing stations, exposure increased the most in relative and absolute terms for cold cereal (+453%, +1.5 ads/child) and savory snacks (+352%, +0.7) while decreasing the most, in relative terms, for pizza, portable snacks, sports drinks and diet soft drinks (−100%) and in absolute terms for yoghurt (−14 ads/child), fast food restaurants (−13.9) and chocolate (−5.3). On generalist stations, the largest relative and absolute increases in children's exposure were noted for regular soft drinks (+228%, +3.2 ads/child) and savory snacks (+77%, +3.0) while decreasing the most, in relative terms, for portable snacks (−100%) and cookies (−89%) and in absolute terms for chocolate (−15.9 ads/child), sit-down restaurants (−14.0) and cold cereal (−12.7).

Most (89%) of children's total exposure to food and beverage advertising in May 2019 occurred on generalist television stations. As shown in Table 6, the share of children's exposure to specific food categories varied by stations type. For all food categories, generalist stations accounted for more than half of children's exposure including fast food restaurants (89% of exposure), chocolate (90%), regular soft drinks (97%) and savory snacks (88%).

Discussion

In Montreal (Quebec), the total number of food and beverage ads airing on the eighteen examined television stations increased by 11% between May 2011 and May 2019; however, exposure to food and beverage advertisements decreased by 53%, going from 226 food ads per child (equivalent to 8.1 ads/d), on average, to 107 (3.8 ads/d). Consistent with our hypothesis, Francophone children in Montreal are frequently exposed to unhealthy food advertising despite Quebec's law restricting commercial advertising to children. In May 2019, unhealthy food categories, such as fast food restaurants, regular soft drinks, and savory snack foods, among others, accounted for more than half of children's exposure and only one out of ten exposures to food advertising were viewed on youth-appealing stations. Although Quebec's Consumer Protection Act has been

proposed as a policy approach that could be modelled by other jurisdictions seeking to restrict unhealthy food advertising to children⁽²⁸⁾, our findings demonstrate that this law does not protect children from exposure to unhealthy food advertising on broadcast television.

Notably, children's exposure to food advertising overall decreased by more than half between May 2011 and May 2019, even though the frequency of food advertising increased by 10–11% overall and on both youth-appealing and generalist stations. A steady and greater relative decrease in exposure from youth-appealing stations was noted between May 2011 and May 2019 (−77%) compared with generalist stations where exposure decreased by 46%, with most of the decrease occurring between May 2011 and 2016. Since exposure is a function of television viewing habits and the frequency and placement of advertisements, this decline in exposure, despite a concurrent increase in ad frequency, is likely attributable to changes in media consumption. For instance, children's viewership may have shifted to stations that were not monitored by Nielsen/Numerator at the time of the study or may have shifted to other television streaming platforms. According to measured media data, viewership of broadcast television among children aged 2 to 11 years in Canada did in fact decrease by 22%, going from 22.2 h per week in 2011–2012 to 17.3 h per week in 2017–2018^(30,31). The noted decline in exposure among children in Montreal, however, is also larger than that noted among children of the same age in Toronto (Ontario). In this city, exposure to food advertising across thirty stations decreased by 20%, going from 170 food ads viewed per child, on average, in May 2011 to 136 food ads viewed per child in May 2019⁽³⁵⁾. Although children's exposure in Montreal was considerably lower in May 2019, one could estimate that children viewed upwards of 1300 food advertisements in 2019 on broadcast television exclusively. Our findings therefore highlight that broadcast television remains an important source of exposure to food advertising among Francophone children in Quebec.

Nevertheless, with the increased popularity of streaming platforms such as YouTube, Netflix and Disney+ which can be viewed on various devices, from smart televisions to tablets, exposure to food advertising on broadcast television may continue to decline. Expenditures on food advertising on television are in fact declining while increasing in digital media⁽³⁶⁾. The viewing of television content via Internet-connected platforms and devices allows for the use of meta-data and sophisticated analytics in targeting specific audience segments with tailored advertising content⁽³⁷⁾. These shifts in viewing habits and technology will make it increasingly difficult to monitor food advertising practices as well as children's exposure as measured viewership data equivalent to that used in our study is not, to the best of our knowledge, currently available for television programming streamed online, at least not to third parties.



Table 4 Francophone children's exposure to food and beverage television advertisements on youth-appealing stations in Montreal (Canada) in May 2011, 2016 and 2019, overall and by food category

Food/beverage category	May 2011			May 2016			May 2019			% change May 2011 to 2019	Absolute difference May 2011 to 2019 (ad/child)
	GRP	Avg. number of ads viewed per child	%	GRP	Avg. number of ads viewed per child	%	GRP	Avg. number of ads viewed per child	%		
Cakes	—	—	—	—	—	—	—	—	—	—	—
Candy	97	0.97	1.9 ^a	197	1.97	7.8 ^{ab}	12	0.12	1.1 ^b	-88 %	-0.85
Cold cereal	34	0.34	0.7 ^a	228	2.28	9.1 ^a	188	1.88	16.5 ^a	+453 %	+1.54
Cheese	291	2.91	5.8	165	1.65	6.6	83	0.83	7.3	-71 %	-2.08
Chocolate	580	5.80	11.6 ^a	361	3.61	14.3 ^a	55	0.55	4.8 ^a	-91 %	-5.25
Compartment snacks	—	—	—	—	—	—	—	—	—	—	—
Ice cream	34	0.34	0.7 ^a	18	0.18	0.7 ^b	70	0.70	6.1 ^{ab}	+106 %	+0.36
Juices	178	1.78	3.6 ^a	9	0.09	0.4 ^{ab}	33	0.33	2.9 ^b	-81 %	-1.45
Pizza	79	0.79	1.6 ^a	90	0.90	3.6 ^a	0	0.00	0 ^a	-100 %	-0.79
Portable snacks & cookies	42	0.42	0.8 ^a	43	0.43	1.7 ^a	2	0.02	0.2 ^a	-95 %	-0.40
Portable snacks	27	0.27	0.5	23	0.23	0.9	0	0.00	0	-100 %	-0.27
Cookies	15	0.15	0.3	20	0.20	0.8	2	0.02	0.2	-87 %	-0.13
Fast food restaurants	1884	18.84	37.8 ^a	971	9.71	38.6 ^b	497	4.97	43.6 ^{ab}	-74 %	-13.87
Sit-down restaurants	243	2.43	4.9 ^a	77	0.77	3.1 ^a	5	0.05	0.4 ^a	-98 %	-2.38
Savory snacks	21	0.21	0.4 ^{ab}	195	1.95	7.7 ^a	95	0.95	8.3 ^b	+352 %	+0.74
Soft drinks – regular	19	0.19	0.4 ^a	124	1.24	4.9 ^a	15	0.15	1.3 ^a	-21 %	-0.04
Other beverages	58	0.58	1.2 ^a	24	0.24	1.0 ^b	51	0.51	4.5 ^{ab}	-91 %	-0.07
Energy drinks	42	0.42	0.8	11	0.11	0.4	51	0.51	4.5	+21 %	+0.09
Soft drinks – diet	9	0.09	0.2	0	0.00	0	0	0.00	0	-100 %	-0.09
Sports drinks	7	0.07	0.1	13	0.13	0.5	0	0.00	0	-100 %	-0.07
Yoghurt	1428	14.28	28.6 ^a	15	0.15	0.6 ^a	33	0.33	2.9 ^a	-98 %	-13.95
Total	4988	49.9	100	2517	25.2	100	1139	11.4	100	-77 %	-38.5

Data source: Nielsen Media Research (2011, 2016) and Numerator (2019).

The distribution of exposure (as measured in GRP) by food category differed significantly across time periods on examined youth-appealing stations ($\chi^2 = 2739.3$; $df = 26$; $P < 0.001$). The portable snack and cookie categories and three beverage categories were collapsed to ensure that test assumptions were met. Within rows, matching letters in superscript denote proportions that differ significantly ($P < 0.05$) according to post hoc z-tests with Bonferroni correction.

Table 5 Francophone children's exposure to food and beverage television advertisements on generalist stations in Montreal (Canada) in May 2011, 2016 and 2019, overall and by food category

Food/beverage category	May 2011			May 2016			May 2019			% change May 2011 to 2019	Absolute difference May 2011 to 2019 (ad/child)
	GRP	Avg. number of ads viewed per child	%	GRP	Avg. number of ads viewed per child	%	GRP	Avg. number of ads viewed per child	%		
Cakes & Cookies	546	5.46	3.1	165	1.65	1.7	62	0.62	0.7	-89 %	-4.84
Cakes	0	0.00	0.0	1	0.01	0.0	3	0.03	<0.1	-	+0.03
Cookies	546	5.46	3.1	164	1.64	1.7	59	0.59	0.6	-89 %	-4.87
Candy	113	1.13	0.6 ^{ab}	143	1.43	1.5 ^a	130	1.30	1.4 ^b	+15 %	+0.17
Cold cereal	2034	20.34	11.5 ^a	365	3.65	3.7 ^a	765	7.65	8.0 ^a	-62 %	-12.69
Cheese	1026	10.26	5.8 ^a	864	8.64	8.8 ^{ab}	562	5.62	5.9 ^b	-45 %	-4.64
Chocolate	2077	20.77	11.8 ^{ab}	482	4.82	4.9 ^a	483	4.83	5.1 ^b	-77 %	-15.94
Compartment snacks	-	-	-	-	-	-	-	-	-	-	-
Energy drinks	129	1.29	0.7	65	0.65	0.7	65	0.65	0.7	-50 %	-0.64
Ice cream	348	3.48	2.0 ^a	168	1.68	1.7 ^b	75	0.75	0.8 ^{ab}	-78 %	-2.73
Juices	613	6.13	3.5 ^a	536	5.36	5.5 ^a	271	2.71	2.8 ^a	-56 %	-3.42
Pizza	600	6.00	3.4 ^a	73	0.73 ^a	0.7	172	1.72	1.8 ^a	-71 %	-4.28
Portable snacks	509	5.09	2.9 ^a	150	1.50	1.5 ^a	0	0.00	0.0 ^a	-100 %	-5.09
Fast food restaurants	4528	45.28	25.7 ^a	3792	37.92	38.7 ^a	3904	39.04	41.0 ^a	-14 %	-6.24
Sit-down restaurants	2625	26.25	14.9 ^a	1089	10.89	11.1 ^a	1227	12.27	12.9 ^a	-53 %	-13.98
Savory snacks	397	3.97	2.3 ^a	632	6.32	6.5 ^a	701	7.01	7.4 ^a	+77 %	+3.04
Soft drinks – diet	306	3.06	1.7 ^{ab}	74	0.74	0.8 ^a	66	0.66	0.7 ^b	-78 %	-2.40
Soft drinks – regular	141	1.41	0.8 ^{ab}	479	4.79	4.9 ^a	462	4.62	4.8 ^b	+228 %	+3.21
Sports drinks	41	0.41	0.2 ^a	362	3.62	3.7 ^{ab}	19	0.19	0.2 ^b	-54 %	-0.22
Yoghurt	1593	15.93	9.0 ^a	356	3.56	3.6 ^a	565	5.65	5.9 ^a	-65 %	-10.28
Total	17 626	176.3	100	9795	97.9	100	9529	95.3	100	-46 %	-80.97

Data source: Nielsen Media Research (2011, 2016) and Numerator (2019).

The distribution of exposure (as measured in GRP) by food category differed significantly across time periods on examined generalist stations ($X^2 = 4674.8$; $df = 32$; $P < 0.001$). The cake and cookie categories were collapsed to ensure that test assumptions were met. Within rows, matching letters in superscript denote proportions that differ significantly ($P < 0.05$) according to post hoc z-tests with Bonferroni correction.

**Table 6** Share of Francophone children's food and beverage advertising exposure occurring on youth-appealing stations v. generalist stations, overall and within food categories, in Montreal (Canada) in May 2019

	Youth-appealing stations (n 3)		Generalist stations (n 15)	
	Avg. number of ads viewed/child aged 2–11	% of total exposure within the food category	Avg. number of ads viewed/child aged 2–11	% of total exposure within the food category
Cakes	0.00	0.0	0.03	100
Candy	0.12	8.5	1.30	91.5
Cold cereal	1.88	19.7	7.65	80.3
Cheese	0.83	12.9	5.62	87.1
Chocolate	0.55	10.2	4.83	89.8
Compartment snacks	0.00	–	0.0	–
Cookies	0.02	3.3	0.59	96.7
Energy drinks	0.51	44.0	0.65	56.0
Ice cream	0.70	48.3	0.75	51.7
Juices	0.33	10.9	2.71	89.1
Pizza	0.00	0.0	1.72	100
Portable snacks	0.00	–	0.0	–
Fast food restaurants	4.97	11.3	39.04	88.7
Sit-down restaurants	0.05	0.4	12.27	99.6
Savory snacks	0.95	11.9	7.01	88.1
Soft drinks – diet	0.00	0.0	0.66	100
Soft drinks – regular	0.15	3.1	4.62	96.9
Sports drinks	0.00	0.0	0.19	100
Yoghurt	0.33	5.5	5.65	94.5
Total	11.4	10.7	95.3	89.3

Data source: Numerator.

Youth-appealing stations included Télétoon, VRAK and Musique Plus. All other stations were classified as generalist stations.

Although the current study did not assess the nutritional quality of products advertised, food categories that are largely or unambiguously unhealthy such as fast food, chocolate, sugar-sweetened beverages (i.e. regular soft drinks, sports drinks and energy drinks), candy, cookies, ice cream and savory snack foods (e.g. chips) accounted for more than two-thirds of food ads across all stations including youth-appealing stations and 63 % of children's total food advertising exposure in May 2019. These findings are consistent with previous research which have noted that most food and beverage products promoted on children's speciality stations and those broadcast during children's preferred television programmes in Quebec and outside Quebec are unhealthy^(18,23,29,35). Notably, the food categories that predominated children's exposure in Quebec in May 2019, such as fast food and sit-down restaurants, cold cereal and savory snack foods, parallel those that predominated children's exposure in Toronto (Ontario) during the same period⁽³⁵⁾. Despite these similarities, some differences can be noted. Candy advertising, for instance, accounted for a smaller share of children's exposure in Montreal (1.3 %) compared with Toronto (5.7 %) in May 2019, while yoghurt and cheese accounted for a larger share of children's exposure in Montreal (5.6 and 6.0 %, respectively) v. Toronto (2.3 and 2.9 %, respectively)⁽³⁵⁾. That said, direct comparison between these two studies should be interpreted with caution given that the sample of stations included in each study is considerably different in size and make-up. Future studies looking to assess the potential impact of Quebec's Consumer Protection Act should compare children's exposure to food

advertising as well as advertising content across a similar sample of stations broadcast in Quebec and outside Quebec.

Our findings have policy implications, both for Canada and abroad. Although Quebec's Consumer Protection Act has been cited as a comprehensive policy approach that could be modelled by other countries, and is in fact, currently being considered in the design of national food marketing restrictions in Canada^(27,28,38), our findings show that this law does not protect children from exposure to unhealthy food advertising on television. This is not altogether surprising as Quebec's ban on commercial advertising to children was designed to reduce the commercialisation of childhood and was not specifically intended to protect them from unhealthy food advertising. While food advertisements in Quebec cannot be designed in a manner that appeals specifically to children, this does not preclude advertisers from placing ads supposedly intended for adolescents or adults on child speciality stations or during programmes with high child viewership⁽²²⁾. Research has in fact shown that ads broadcast during the preferred programming of Francophone children in Quebec are less likely to feature media characters and celebrities or promote products using fun⁽²⁴⁾.

In its definition of child-directed advertising, the Consumer Protection Act also considers the time and place advertisements are shown⁽²²⁾. For instance, food products intended for children (e.g. some candy, sugary breakfast cereals) cannot be advertised on television when children make up 15 % or more of the viewing audience but can be advertised when this child audience composition falls



below this threshold if the ad is not designed to appeal to children⁽²²⁾. Even though the Consumer Protection Act was not conceived to restrict exposure to unhealthy food advertising, the Canadian federal government recently proposed food marketing restrictions modelled on this law⁽³⁸⁾. Health Canada has in fact suggested that unhealthy food advertising be restricted on programmes intended for children as well as those where children constitute 15 % or more of the viewing audience⁽³⁸⁾. Evidence from the United States, Canada and the United Kingdom, however, suggests that such restrictions based on child audience composition rather than the absolute number of child viewers will not adequately limit children's exposure from unhealthy food advertising^(19,39) (Pauzé & Potvin Kent, unpublished). For instance, a Canadian pilot study modelling the potential impact of various restrictions found that less than half (42 %) of children's exposure to food advertising on 32 generalist stations in Toronto in May 2016 occurred on programmes where children constituted 15 % or more of the audience (Pauzé & Potvin Kent, unpublished). While our study did not examine children's exposure according to child audience viewership measurements, our findings reveal that most of children's exposure to food advertising in Montreal, overall and for all food categories, originated from generalists stations whose programming is predominately intended for general audiences. These results therefore reinforce the need to restrict unhealthy food advertising beyond child programming to adequately protect children. Based on the available evidence, these restrictions would be most effective if they applied on programmes that are viewed by large absolute numbers of children^(19,39).

Although the intent of Quebec's Consumer Protection Act is laudable, in practice, its impact is not sufficient. International guidance on designing food advertising restrictions highlights the need to limit both the persuasive power of unhealthy food advertising in addition to children's exposure⁽²⁸⁾. While the Consumer Protection Act imposes restrictions on the creative content of television advertising and limits its persuasive appeal among children, it does not limit any advertising based on the healthfulness of promoted products or brands nor does it limit where unhealthy food advertisements can be placed⁽²²⁾. Countries looking to model their advertising restrictions on the Consumer Protection Act should therefore consider adopting additional restrictions, including stringent nutrition criteria defining which products can be advertised to children as well as restrictions limiting when and/or where unhealthy food advertisements can be broadcast on television.

Strengths and limitations

Limitations of the current study are important to highlight. First, it should be noted that the audience viewership data used to estimate advertising exposure should be considered a proxy of exposure rather than a direct measure. While this data capture when a household's television set is tuned to a specific station and captures which household

members are in proximity to the television, it is not known whether these individuals actually watched the advertisements that were broadcast. Second, the current study only included advertising data for nineteen food product categories airing on eighteen stations broadcast in Montreal during a 4-week period. Notably, the sample of examined television stations only included three youth-appealing stations, excluding others who have been reported as popular among some children in Quebec⁽⁴⁰⁾. Furthermore, the analysed data do not include exposure to food promotions embedded within television programming such as product placements and branding that can be viewed during sponsored sporting events^(41,42). Our findings also do not account for seasonal variations in food advertising on television which have been noted by a recent Canadian study⁽⁴³⁾. As such, our findings, including our estimate of annual exposure, underestimate children's exposure to food advertising on broadcast television among Francophone children in Montreal. Given that advertisements featuring multiple food categories were exclusively classified under a single category, the frequency of advertisements promoting portable snacks and diet soft drinks and children's exposure to these specific food categories were also underestimated. Third, it is also important to note that we do not know how much of children's viewership is captured by the eighteen stations that were included in the study. Consequently, reported percentages of exposure attributable to youth-appealing stations *v.* those that appeal to general audiences are likely not representative. The aggregated nature of the exposure data also did not allow for the statistical testing of differences over time. Finally, the current study did not assess the nutritional quality of the food and beverages that were specifically promoted, nor did it assess the marketing techniques to which children were exposed. Despite these limitations, this is the first study to estimate children's exposure to food advertising in Quebec using an objective measure of exposure that is widely used by advertisers to inform their advertising campaigns. Estimates of exposure by food category also provide some evidence that children in Quebec are still exposed to the advertising of unhealthy foods.

Conclusion

Although commercial advertising targeting children under 13 years has been prohibited in Quebec since the 1980s^(21,22), our findings show that children in this jurisdiction are still exposed to the promotion of unhealthy foods. These findings highlight that laws designed to limit all commercial advertising directed to children by regulating the creative content of advertisements are not particularly effective at protecting children from exposure to unhealthy food advertising. The province of Quebec and jurisdictions intending to model their food advertising restrictions on the Consumer Protection Act should consider adopting additional restrictions, including stringent nutrition criteria



defining which products are healthy enough to be advertised to children as well as limits on when or/and where unhealthy food advertising can be broadcast on television.

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Supplementary material

For supplementary material accompanying this paper visit <https://doi.org/10.1017/S1368980021001373>

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