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Food and beverage promotions in Vancouver schools: A study of the prevalence and characteristics of in-school advertising, messaging, and signage

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ABSTRACT

The purpose of this study was to provide a descriptive profile of food-related advertising, messaging, and signage in Vancouver schools and to examine differences in the prevalence and characteristics of promotions between elementary and secondary schools.

All food-related promotions were photographed in 23 diverse Vancouver public schools between November 2012 and April 2013. Key attributes, including the location, size, and main purpose of each promotion, as well as the type of food and/or beverage advertised and compliance with provincial school nutrition guidelines, were coded. Descriptive statistics assessed the prevalence and characteristics of promotions. Cross-tabulations examined whether the promotional landscape differed between elementary and secondary schools.

All secondary and 80% of elementary schools contained food or beverage promotions (median = 17, range = 0–57 promotions per school). Of the 493 promotions documented, approximately 25% depicted "choose least" or "not recommended" items, prohibited for sale by provincial school nutrition guidelines. Nearly 1/3 of promotions advertised commercial items (e.g., brand name beverages such as Pepsi), in violation of the Board of Education's advertising policies and only 13% conveyed nutrition education messages. Close to half of all promotions were created by students for class projects, many of which marketed minimally nutritious items.

In Vancouver schools, food-related promotions are common and are more prevalent in secondary than elementary schools. Students are regularly exposed to messaging for nutritionally poor items that are not in compliance with provincial school nutrition guidelines and which violate school board advertising policies. Stronger oversight of food-related promotional materials is needed to ensure that schools provide health promoting food environments.

Introduction

The dietary quality of children in Canada is a growing concern given the prevalence of nutrition-related chronic diseases among this group (Roberts et al., 2012; Pinhas-Hamiel and Zeitler, 2005). Evidence suggests that consumption of minimally nutritious foods (that are pervasively marketed to children), such as fast foods and sugar-sweetened beverages, contributes to suboptimal dietary quality (Garriguet, 2004, 2008), and that dietary intake differs between elementary and secondary school students (Velazquez et al., 2015). While determinants of dietary intake are myriad and complex, a comprehensive review from the Institute of Medicine suggests that exposure to food advertising influences food preferences and choices (Institute of Medicine, 2006). Children are particularly vulnerable to advertising because they lack cognitive abilities needed to actively process messages (Institute of Medicine, 2006; John, 1999; Roedder, 1981). Given the ubiquity of images depicting minimally nutritious items (Bell et al., 2009; Sutherland et al., 2010; Kelly et al., 2008a), the impact of advertising on young people is not surprising. Health advocates have subsequently suggested establishing regulatory systems to prohibit the marketing of unhealthy items to youth altogether (Raine et al., 2013).

Children and adolescents spend many of their waking hours at school. Schools are therefore an attractive venue for stakeholders interested in shaping youths' dietary choices where food companies and nutrition educators alike vie for the attention of this captive audience. The extent of commercial activity within schools reflects a larger trend of intensified corporate efforts to reach youth (Federal Trade Commission, 2012), in part because of their purchasing power, but also because they represent the future adult market (McNeal, 1992). Widespread commercialization of schools in the United States (US) has been documented (Story and French, 2004; Craypo et al., 2006; Center for Science in the Public Interest, 2008; Terry-McElrath et al., 2014). Yet in Canada, less is known about young people's exposure to food advertising. While some evidence suggests that similar tactics occur, it is

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difficult to gauge how the prevalence of advertising in Canadian schools compares with that in the US. In a 2006 report, slightly more than one in four Canadian schools reported having an exclusivity contract with Coca-Cola or Pepsi; 54% used corporate sponsored educational materials (e.g., Pizza Hut's "Book It!") and 30% had incentive programs where educational resources were awarded in return for purchasing products from these companies (e.g., Campbell's Labels for Education) (Canadian Teachers' Federation, 2006).

Acknowledging its responsibility as a provider of public education and noting an obligation to safeguard students from corporate influences, the Vancouver Board of Education (VBE) established a policy prohibiting commercial products from being advertised, unless approved as having explicit educational value. Specific to food and beverage items, the policy stipulates that vending machine facades must not be used for advertising, except product names and/or logos which are allowed in small print for the purpose of identifying items for sale (Vancouver School Board, nd). While this policy aims to reduce students' exposure to corporate marketing, preliminary observations of schools made as part of the Think&EatGreen@School project suggested that for-profit food advertising professionally produced by corporate entities was present, and appeared to differ in content and quantity by school type (elementary versus secondary) (Think&EatGreen@School, nd), bringing its implementation and oversight into question.

At the same time, efforts to improve the quality of items offered in schools are unfolding across many North American school districts. As in other jurisdictions (Bassler et al., 2013), several provincial governments in Canada (Ontario Ministry of Education, nd; Government of Nova Scotia, nd; Saskatchewan Ministry of Education, nd) have developed nutrition guidelines. In British Columbia (BC), the Guidelines for Food and Beverage Sales in BC Schools[a] (hereafter referred to as the Guidelines) (British Columbia Ministry of Education, 2007) specify that at least 50% of items sold must be characterized as "Choose Most" foods and up to 50% (maximum) can be from the "Choose Sometimes" category. Foods categorized as either "Choose Least" (e.g., ice cream) or "Not Recommended" (e.g., regular, full-sugar soft drinks) are prohibited from being sold in cafeterias, stores, vending machines or fundraisers. Other programs, including Action Schools! BC, Sip Smart! BC, Farm to School and the School Fruit and Vegetable Snack Program have been implemented and, are actively promoted within schools to increase awareness and consumption of healthier food items (Dietitians of Canada, 2010). Although the Guidelines provide oversight for the *sale* of certain foods, they do not regulate the content of food-related materials displayed within schools.

To our knowledge, no studies have examined whether the range of items displayed within schools support or contradict the VBE advertising policy or the spirit of the Guidelines. If, for instance, items that are shown within schools do not adhere to the aforementioned policy or align with the Guidelines, then students will be exposed to food-related messages that likely differ from what they learn in their classrooms. Such a contradiction could dilute the impact of food and beverage guidelines and other school-based initiatives aiming to foster sound food preferences and choices. As (Harris et al., 2009) note, food preferences may develop from repeated exposure to products or messages, even when individuals are unaware of such happenings such as when walking through school hallways. Thus, expanding the scope of this body of research beyond what might be considered "traditional advertising" to include food-related materials designed for other purposes (e.g., nutrition education programs, course assignments) may offer a more comprehensive understanding of the totality and types of messaging that students are regularly exposed to and in future, allow for the determination of how a variety of exposures might influence students' food-related decisions while at school.

[a] The Guidelines for Food and Beverage Sales in BC Schools have been updated since this study was undertaken. The revised 2013 Guidelines can be found at: https://www.bced.gov.bc.ca/health/2013_food_guidelines.pdf.

Methods for collecting and coding traditional food advertisement data have been described for television (Bell et al., 2009; Kelly et al., 2010) and other media (e.g., movies, billboards, internet) (Sutherland et al., 2010; Kelly et al., 2008a, 2008b; Alvy and Calvert, 2008), and several available tools have components well-suited for assessment within schools. For instance, Kelly and colleagues examined the presence of common marketing techniques such as branded characters and premium offers (Kelly et al., 2008b, 2010), which may be particularly relevant among a school-aged audience. School-based tools exist, yet remain limited because they tend to rely on reports from staff and/or lack in-depth description of promotional characteristics (Center for Science in the Public Interest, 2008; Craypo and Samuels, 2006; Molnar et al., 2006; Latimer et al., 2013). Further, these tools may not account for other potentially relevant strategies, such as signage created by students, parents, or teachers or the presence of nutrition education materials. Therefore, we reviewed and adapted available tools where relevant to develop a more comprehensive and objective approach to assessing exposure to food-related materials within schools. The primary objectives of this study were to: 1) provide a descriptive profile of food and beverage advertising, messaging, and signage including professionally- and student-made marketing promotions, nutrition education materials, and other food-related signage (hereafter referred to collectively as promotions) in a diverse sample of Vancouver schools; and 2) examine differences in the prevalence and characteristics of promotions between elementary and secondary schools. The secondary objective was to determine the inter-rater reliability of a proposed coding tool for assessing school food and beverage promotions.

Materials and methods

Data were collected as part of the Think&EatGreen@School project, a Community University Research Alliance project that initiated a variety of food system and curricular activities in VBE Schools (K–12) (Think&EatGreen@School, nd; Rojas et al., 2011). As part of this project, detailed School Food Environment Assessment Tools (SFEAT) were created and implemented over two schools years (2011/2012 and 2012/2013) to examine several broad domains related to school food systems (Black et al., 2015). During 2011/2012 data collection, the researchers recognized the need to comprehensively document food and beverage promotions. Therefore in 2012/2013, the promotion module was created and undertaken, and offered retrospectively to all schools where SFEAT assessments had already been completed. Presence of food and beverage promotions, defined as any physical materials (e.g., posters and artwork, including for-profit, not-for-profit, and student-made) that reference food or beverage items, was examined between November 2012 and April 2013 in a sample of 15 elementary (kindergarten – grade 7) and 8 secondary (grade 8 – 12) schools.

Purposive sampling was used to recruit a diverse range of Vancouver's public schools. Participating schools drew from all six geographic sectors of the city and were diverse in terms of school size and socio-demographic characteristics. This sample represents nearly half of VBE's 18 secondary schools and approximately one-sixth of Vancouver's 91 elementary schools and annexes. For elementary schools, median school size was 416 students and median family income was $57,100. Among secondary schools, median school size was 1183 students and median family income was $59,532. At the time of data collection, 10 schools (43%) had previous involvement with the Think&EatGreen@School project and 13 schools (57%) had no prior relationships with the study team. Study protocols were approved by the Behavioural Research Ethics Board at the University of British Columbia and the Vancouver Board of Education, and informed written consent was obtained from administrators at each school.

A data collection tool and coding protocol, drawing on strategies from Kelly et al. (2010) and Latimer et al. (2013), were developed to describe all food and beverage promotions located in open common areas (e.g., cafeterias, school stores, hallways) and aimed to examine

promotions posted in areas where the majority of students were likely to be exposed. Therefore, the study did not assess promotions within specific classrooms. Classroom assessment was also not pursued to minimize disruption to classroom activities and because of the logistical infeasibility of adequately documenting every classroom space in large schools.

Upon arriving at a school, trained researchers including the first author and one graduate student research assistant determined the best route to walk (when available, using a map), to move through the school efficiently and methodically. When a promotion was encountered, team members discussed the content of the promotion before documenting its location and size, and noting the name and description of product(s) shown, including any nutrition-related information (e.g., flavors, serving sizes). Materials were photographed using a digital camera for coding and verification purposes. Images were coded to evaluate each promotion's main purpose (e.g., nutrition education, fundraiser), category of food depicted using a modified version of the categories outlined in the Guidelines (e.g., fruit and vegetables, grain products) and classification based on the Guidelines (i.e., choose most, choose sometimes, choose least, not recommended). Coders also noted common marketing techniques including the use of branded logos, animated characters, and direct messaging, and whether materials were professionally- or student-made (Table 1).

Data analysis

School-level descriptive statistics assessed the prevalence and characteristics of promotions across schools (n = 23 schools). Images were also pooled to examine the relative proportion of each attribute type in the sample (n = 493 promotions). Both school- and promotion-level analyses were compared between elementary and secondary schools using cross-tabulations ($p < 0.05$). Additional cross-tabulations were also conducted, for instance to explore associations between the main purpose of promotions and their classification based on the Guidelines. When chi-square test assumptions were violated (Greenwood and Nikulin, 1996), a Fisher's exact test was used. The exact probability of the *food category* variable was estimated by means of Monte Carlo simulation because computation difficulties arose from memory limits being exceeded due to table size.

Inter-rater reliability was conducted to measure agreement between coders. A random sample of 10% of all images (n = 50) was selected, and promotional attributes were independently scored by two researchers. Individual scores for each attribute (all categorical variables) were compared using Cohen's kappa statistic (κ), which takes into account agreement credited to chance alone. Analyses were conducted in Stata version 12 (StataCorp, College Station, TX).

Results

A total of 493 food and beverage promotions were identified at 20 out of 23 schools (87%). The median number of promotions was 17 per school, but schools varied widely in the number of promotions (range = 0–57) (Table 2). For example, 25% of schools had 38 or more promotions, while the bottom quartile had 4 or fewer. The majority (60%) of all promotions were found in school hallways (median = 8 per school). Sixty-five percent of schools had promotions posted in cafeterias/lunch rooms (median = 3 per school, range = 0–35), yet these comprised only about 1/4 of all promotions identified (Table 3). Of the 6 schools with stores, 4 had promotions. Promotions in the library or gymnasium were rare and found in only one school each.

Most (88%) promotions were either small ($\leq 8.5 \times 11$ inch sheet of paper) or medium sized ($>8.5 \times 11$ inches and $<24 \times 33$ inch poster). Large promotions were found in more than 1/3 of schools, yet most schools (74%) had 3 or fewer, if any. Most large promotions were found on vending machine facades that advertised either water (e.g., Aquafina) or soft drinks (e.g., Pepsi).

Sixty-five percent of schools had nutrition education promotions (median = 2, range = 0–14). However, only 27% of these schools (17% of schools overall) had 5 or more instances of signage promoting healthy eating. Only 13% of all promotions were explicitly aimed at delivering nutrition education messages. Still, some promotions that were not primarily designed for this purpose did depict nutritious choices.

Fruit and vegetables were the most common items promoted (33%), followed by mixed entrees (18%), other beverages (mainly soft drinks or sweetened iced tea) (13%) and water (10%). Three quarters of schools had promotions for fruit and vegetables (median = 3, range = 0–31). Close to half the schools promoted water, mainly through branded bottled water (e.g., Dasani). Nearly 45% of schools had promotions for: grain products, milk and alternatives, and meat and alternatives, yet together these categories comprised less than 20% of all promotions.

Most promotions depicted products allowed under the Guidelines, of which 45% were “choose most” and 32% were “choose sometimes” items. Student-made marketing and art materials comprised around 45% of promotions for products allowed under the Guidelines. Materials designed to promote single-items or nutrition education comprised 18% and 16%, respectively, of these promotions. Yet, nearly 1/4 of all promotions advertised “choose least” (13%) or “not recommended” (11%) items. Promotions for prohibited items were found in over half of sampled schools (55%). Nearly 25% of promotions classified as student-made marketing (e.g., advertisements for school store items) and art projects (e.g., shaded drawings of soft drinks) depicted options that contradict the spirit of the Guidelines. Together, these two types of materials comprised nearly 50% of all “choose least” and “not recommended” promotions. Further, materials designed for fundraising purposes or single-item promotions comprised 25% and 21%, respectively, of all “choose least” and “not recommended” promotions.

Approximately 32% of promotions were for commercial products (e.g., Coco-Cola) of which 18% were professionally made. Promotions for commercial products were identified in roughly 45% of schools (median = 0, range = 0–28). Branded logos (e.g., Gatorade) were found in 26% of promotions and 40% of schools, whereas animated characters/celebrities and premium offers (e.g., prize giveaways) were used in only 3% and 4% of promotions, respectively, and found in four or fewer schools each. Most (70%) promotions included direct communication strategies such as an explicit message (e.g., “I GO, the new way to say yogurt”) or a branded logo.

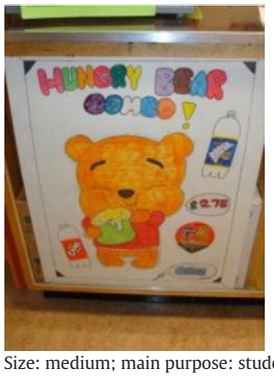
A substantial proportion (68%) of promotions was created by students. Student-made promotions with a marketing purpose were found in 39% of schools (comprising 25% of all promotions), and frequently encouraged food sold in school cafeterias and stores. Moreover, student-made art and fundraising materials were each found in more than 25% of schools, and made up 22% and 8% of all promotions, respectively.

Differences in promotional attributes by school type

Secondary schools had significantly more promotions than elementary schools, (median = 42; range = 12–57 compared to median = 8; range = 0–36, respectively), $z = -3.234$, $p < 0.01$. Secondary schools had a smaller proportion of promotions in hallways, but a larger percentage in cafeterias and stores (X^2 (4, N = 493) = 60.85, $p < 0.001$), likely because many Vancouver elementary schools do not have designated cafeterias and none in this sample housed school stores. The percentage of large promotions, particularly those on vending machine facades, was smaller in elementary schools (X^2 (2, N = 493) = 50.85, $p < 0.001$), where vending machines are uncommon.

Elementary schools had a greater proportion of promotions for “choose most” items (X^2 (3, N = 493) = 24.23, $p < 0.001$). Still, 33% of elementary schools had at least one promotion for “choose least” or “not recommended” items (median = 0, range = 0–26); however, all secondary schools had at least one “choose least” or “not recommended”

Table 1
Description and/or example of promotion attributes.

Promotion attribute	Description and/or example	Illustrative examples
Location	Cafeteria, gym, hallway, library, school store	
Size		
Small	≤8.5 × 11 sheet of paper	
Medium	>8.5 × 11 to 24 × 33 poster	
Large	>24 × 33 poster or vending machine façade	 Size: large (vending machine façade); main purpose: single item promotion; food group: water; classification: choose most; component: commercial, logo; communication type: direct; quality: professionally made
Main purpose		
Breakfast promotion	Item promoted as part of breakfast program	
Fundraising	Parent or student group food fundraiser	
Nutrition education	ActionSchools!BC, Ag in the Class	
Passive food/beverage item	Item (e.g., apple) shown without message	
Single item promotion	Only one item or type of product depicted	
Student art	Food-related poster, collage	
Student marketing	Food-related poster, collage with intent to sell	
Other	Menu, recipe	
Food group[a]		
Candies and chocolates	Mints, cough drops, chocolate bars	
Condiments	Ketchup, mustard, mayonnaise	
Energy bars	Meal replacement bars, sports bars	
Fruit and vegetables	Apple, carrot, fruit juice	
Grain products	Rice, pasta, bagels	
Meat and alternatives	Beef, poultry, eggs	
Milk and alternatives	Milk, cheese, yogurt	
Mixed entrees	Sandwiches, burgers, pizza	
Other beverages	Soft drinks, tea	
Water	Bottled or tap water	
Classification		
Choose most	Whole grain products, fresh vegetables	
Choose sometimes	Flavored yogurts	
Choose least	French fries	
Not recommended	Regular, full sugar soft drinks	
Component		
Animated character/celebrity	Characters and/or celebrities are present	 Size: medium; main purpose: nutrition education; food group: fruit and vegetables; classification: choose most; component: none; communication type: direct; quality: professionally made
Branded logo	Brand name logo (e.g., Gatorade logo) shown	
Commercial product	Pepsi, Coca-Cola	
Premium offer	Special offer, giveaway, contest	
Communication type		
Direct	Explicit message, brand name/logo shown	
Passive	Promotion with no words (e.g., apple)	
Quality		
Professionally made	Professionally printed or vending machine	
Student created	Hand-made or personally printed	 Size: medium; main purpose: student marketing; food group: other beverage; classification: not recommended; component: commercial, logo, animated; communication: direct; quality: student created
		 Size: small; main purpose: student art; food group: fruit & vegetables; classification: choose most; component: none; communication: passive; quality: student created

[a] Food groups were modified based on the Guidelines for Food and Beverage Sales in BC Schools.

promotion (median = 9.5, range = 2–14) ($z = -3.104$, $p < 0.01$). The proportion of materials designed to promote nutrition education and student-made art projects were each higher in elementary schools, whereas promotions for both student-made marketing projects and single items were more prevalent in secondary schools (X^2 (7, N = 493) = 194.62, $p < 0.001$).

Table 2
School-level promotion characteristics, compared between elementary and secondary schools (n = 23 schools) in Vancouver, Canada.

	All schools, n = 23		Elementary, n = 15	Secondary, n = 8	
	Median (range)	% of schools with attribute	% of schools with attribute (median promotions per elementary school)	% of schools with attribute (median promotions per secondary school)	p-Value*
Total promotions	17 (0–57)	87	80 (8)	100 (42)	0.001
Location					
Cafeteria	3 (0–35)	65	53 (1)	88 (12)	0.013
Gymnasium	0 (0–1)	4	7 (0)	0 (0)	0.465
Hallway	8 (0–46)	78	73 (4)	88 (18)	0.135
Library	0 (0–2)	4	7 (0)	0 (0)	0.465
School store[a]	0 (0–39)	17	0 (0)	50 (3)	0.003
Size					
Small	9 (0–54)	83	73 (4)	100 (15)	0.075
Medium	4 (0–34)	83	73 (4)	100 (9)	0.009
Large	0 (0–13)	39	13 (0)	88 (7)	<0.001
Purpose					
Breakfast promotion	0 (0–5)	4	7 (0)	0 (0)	0.465
Fundraising	0 (0–21)	30	20 (0)	50 (1)	0.143
Nutrition education	0 (0–13)	65	67 (2)	63 (2)	0.506
Passive food/beverage item	2 (0–14)	39	27 (0)	63 (2)	0.025
Single item promotion	0 (0–7)	35	0 (0)	100 (12)	<0.001
Student art	0 (0–31)	26	27 (0)	25 (0)	0.900
Student marketing	0 (0–36)	39	13 (0)	88 (8)	<0.001
Other	0 (0–6)	48	47 (0)	50 (1)	0.725
Food group					
Candies and chocolates	0 (0–13)	30	20 (0)	50 (1)	0.122
Condiments	0 (0–1)	9	0 (0)	25 (0)	0.048
Fruit and vegetables	3 (0–31)	78	67 (4)	100 (3)	0.454
Grain products	0 (0–10)	43	33 (0)	63 (1)	0.171
Meat and alternatives	0 (0–5)	43	20 (0)	88 (2)	0.001
Milk and alternatives	0 (0–13)	43	27 (0)	75 (2)	0.018
Mixed entrees	0 (0–38)	39	20 (0)	75 (4)	0.011
Other beverages	0 (0–27)	43	20 (0)	88 (4)	<0.001
Water	0 (0–13)	48	27 (0)	88 (4)	0.002
Classification					
Choose most	6 (0–31)	83	73 (4)	100 (13)	0.048
Choose sometimes	4 (0–42)	74	60 (1)	100 (13)	0.001
Choose least	1 (0–13)	52	33 (0)	88 (6)	0.006
Not recommended	0 (0–24)	43	20 (0)	88 (4)	0.002
Component					
Animated character/celebrity	0 (0–9)	13	0 (0)	38 (0)	0.013
Branded logo	0 (0–28)	39	7 (0)	100 (12)	<0.001
Commercial product	0 (0–28)	43	13 (4)	100 (16)	0.013
Premium offer	0 (0–12)	17	0 (0)	50 (1)	0.003
Communication type					
Direct	7 (0–51)	83	73 (2)	100 (33)	0.001
Passive	5 (0–35)	83	73 (2)	100 (6)	0.032
Quality					
Professionally made	4 (0–30)	83	73 (2)	100 (13)	<0.001
Student created	11 (0–52)	87	80 (5)	100 (21)	0.013

* Median differences in frequency of promotional attributes were compared between elementary and secondary schools using the Mann–Whitney *U* test (using $p < 0.05$ to determine statistical significance).
[a] Only 6 schools (all secondary) in this sample had school stores.

Inter-rater reliability

The coding tool exhibited excellent inter-rater reliability. Kappa coefficients for all coded promotional attributes yielded estimates ranging from $\kappa = 0.78$ (main purpose) to $\kappa = 0.95$ (food category). Two out of nine variables exhibited "substantial" agreement (defined as $\kappa = 0.61$–0.80), while the remainder demonstrated "almost perfect" agreement (defined as $\kappa = 0.81$–1.00), according to the guidelines proposed by Landis and Koch (1977).

Discussion

This study provides new insight about the nature and degree of food and beverage promotions in Vancouver schools. While studies have documented the pervasiveness of corporate advertising in US schools (Story and French, 2004; Craypo et al., 2006; Center for Science in the Public Interest, 2008; Terry-McElrath et al., 2014), findings from this study suggest that nearly half of schools had promotions for commercial items. Overall, approximately 1/3 of promotions depicted commercial products, many of which were made by students. Although corporate presence appears lower in Vancouver schools than estimates from the US, it was higher than expected given the VBE advertising policy. On the whole, students in Vancouver schools are exposed to signage directly conflicting with messaging promoted by programs including Action Schools! BC, Sip Smart! BC, Farm to School and the School Fruit and Vegetable Snack Program designed to promote healthy eating (Dietitians of Canada, 2010). While little comparable data is available from other school districts, we suspect promotions encouraging the purchase and consumption of minimally nutritious foods and branded products is even more pervasive in regions lacking policies or support for improving school food environments.

Surprisingly, nearly 50% of all promotions were made by students as part of marketing assignments or art projects. Many of these student-made materials were for nutritious items like fruit, however nearly 1/4 depicted options that contradict the spirit of the Guidelines.

Table 3
Characteristics of school promotions, compared between elementary and secondary schools in Vancouver, Canada for all promotions (n = 493 promotions).

	Total promotions, n = 493	Elementary school promotions, n = 183	Secondary school promotions, n = 310	p-Value*
	Number of total promotions (%)[a]	Number of elementary promotions (%)[a]	Number of secondary promotions (%)[a]	
Location				<0.001
Cafeteria	133 (27)	36 (20)	97 (31)	
Gymnasium	3 (0.6)	1 (0.6)	2 (0.7)	
Hallway	296 (60)	144 (79)	152 (49)	
Library	2 (0.4)	2 (1)	0 (0)	
School store	59 (12)	0 (0)	59 (19)	
Size				<0.001
Small	283 (57)	139 (76)	144 (47)	
Medium	154 (31)	42 (23)	112 (36)	
Large	56 (11)	2 (1)	54 (17)	
Purpose				<0.001
Breakfast promotion	5 (1)	5 (3)	0 (0)	
Fundraising	41 (8)	17 (9)	24 (8)	
Nutrition education	62 (13)	45 (25)	17 (6)	
Passive food/beverage sign	35 (7)	14 (8)	21 (7)	
Single item promotion	91 (19)	0 (0)	91 (29)	
Student art	110 (22)	78 (43)	32 (10)	
Student marketing	124 (25)	11 (6)	113 (37)	
Other	25 (5)	13 (7)	12 (4)	
Food category				<0.001
Candies and chocolates	40 (8)	15 (8)	25 (8)	
Condiments	2 (0.4)	0 (0)	2 (0.7)	
Fruit and vegetables	163 (33)	93 (51)	70 (23)	
Grain products	28 (6)	10 (6)	18 (6)	
Meat and alternatives	20 (4)	4 (2)	16 (5)	
Milk and alternatives	35 (7)	7 (4)	28 (9)	
Mixed entrees	86 (18)	18 (10)	68 (22)	
Other beverages	65 (13)	29 (16)	36 (12)	
Water	50 (10)	5 (3)	45 (15)	
Classification				<0.001
Choose most	218 (45)	100 (55)	118 (39)	
Choose sometimes	155 (32)	37 (20)	118 (39)	
Choose least	62 (13)	18 (10)	44 (14)	
Not recommended	52 (11)	26 (14)	26 (9)	
Animated character/celebrity				0.003
Yes	13 (3)	0 (0)	13 (4)	
No	479 (97)	182 (100)	297 (96)	
Branded logo				<0.001
Yes	129 (26)	27 (15)	102 (33)	
No	363 (74)	155 (85)	208 (67)	
Commercial product				<0.001
Yes	155 (32)	39 (21)	116 (37)	
No	337 (69)	143 (79)	194 (63)	
Premium offer				<0.001
Yes	21 (4)	0 (0)	21 (7)	
No	472 (96)	183 (100)	289 (93)	
Communication type				<0.001
Direct	343 (70)	98 (54)	245 (79)	
Passive	149 (30)	84 (46)	65 (21)	
Quality				<0.001
Professionally made	158 (32)	41 (22)	117 (38)	
Student created	335 (68)	142 (78)	193 (62)	

* Differences in promotional attributes were compared between elementary and secondary schools using the chi-square test (using $p < 0.05$ to determine statistical significance).
[a] Number of promotions (%) within each attribute. Percentages within each attribute may not add to 100% due to rounding.

This finding suggests that the students, teachers, administrators and/or parent advisory councils who oversee the creation of these materials are either unaware of or actively disregarding policies. Since the majority (68%) of all promotions, regardless of purpose, were created by students, further examination of these types of materials is warranted. Food preferences may result from repeated exposure to products and/or messages (Harris et al., 2009), thus the presence of student-created materials in schools may be an important aspect of the overall food-related messaging that students are exposed to while at school. Efforts to align signage created by students, including materials approved as having an educational purpose (e.g., posters created for marketing courses), with other school-based health-promotion initiatives may be one way to improve school food environments. However, the extent to which exposure to student-made materials shapes food preferences and choices remains unknown; therefore, future research is needed to explore these associations.

Despite the Guidelines prohibiting the sale of nutritionally poor foods, such items were depicted in approximately half of all schools and comprised nearly 1/4 of promotions. Alternatively, many promotions were for "choose most" items. This finding is in contrast to work that has documented the content of in-school advertisements among US schools as predominantly for nutritionally poor items (Craypo et al., 2006; Center for Science in the Public Interest, 2008). Despite this promising finding, other recommended food categories, such as grain products, milk and alternatives, and meat and alternatives were shown in nearly 45% of schools, but together, comprised less than 20% of all promotions. Only a small fraction of promotions were designed as nutrition education materials (the majority of which were found in

elementary schools) and many schools had no visible signage advocating healthy eating.

This study also points to the need for further reflection about the promotional environment, particularly in secondary schools where exposure to food-related materials, including those depicting unhealthy items, was higher. Not only were promotions present in all secondary schools, but their attributes differed significantly from those in elementary schools. For example, techniques that are commonplace among youth-oriented advertisements (e.g., branded logos, animated characters/celebrities) (Kelly et al., 2008c) were not prevalent overall among study promotions in the schools examined here, yet were each found in secondary schools. Secondary schools reflected a more commercial landscape, which we suspect relates to the fact that older students have more access to spending money and opportunities to make independent food purchases (Velazquez et al., 2015), with promotions in these schools depicting items of lower nutritional quality compared to elementary schools. The rationale for the presence of certain types of materials over others for each school type was not examined here, however, achieving fundraising goals and/or providing hands on learning experiences for secondary students in marketing classes are likely explanations.

To our knowledge, this is the first study to objectively examine exposure to food promotions within Canadian schools, bringing attention to a tactic that could undermine efforts to improve students' dietary choices. School food environment assessments are increasing, yet exposure to food-related messaging is often overlooked, narrowly focuses on corporate advertising alone, comprises only a small part of a larger tool, or serves as part of tools aimed at gathering information about policy implementation (Kubik, 2005; Neumark-Sztainer, 2001; Masse et al., 2014; Larson et al., 2014). As such, the level of detail that these assessments provide, including the extent to which a range of food-related materials are present within schools, is limited. This study demonstrates the feasibility of monitoring promotions in a more comprehensive way, using a tool that exhibited excellent inter-rater reliability. Future work could provide more in-depth examination of exposure to food-related sponsorships, incentive programs, and/or corporate educational materials already present in Canadian schools (Canadian Teachers' Federation, 2006). Given recent interest in food availability surrounding schools, a relevant next step would be to examine the connections between marketing in and around schools and students' dietary choices.

Limitations related to assessing school-based promotions should be considered. For example, information about promotions within classrooms was not collected and it is possible promotions are also pervasive and integrated into other educational materials (e.g. school planners, worksheets). Consequently, our findings likely underestimate total school-level exposures. Also, the classification system used here differentiates items based on specific criteria such as serving size. Occasionally, when this information was not explicit, classification could not be determined with certainty. In these instances, items were placed in a healthier category. Therefore, this study may overestimate the nutritional quality of items promoted, except when they were clearly “choose most” (e.g., fruit, vegetables) or “not recommended” (e.g., sugar sweetened beverages). Additionally, this sample included only public elementary and secondary schools from one urban area and may not reflect trends outside of Vancouver's public schools. Despite these limitations, conducting direct observations was a strength of this study, providing reliable and objective measures. Moreover, this sample represented 1/6 of Vancouver's public elementary schools and nearly half of all public secondary schools, providing sufficient generalizability to infer that promotion of minimally nutritious items is likely present in schools city-wide.

This study provides new insight regarding the types of items actively promoted within Vancouver schools. Exposure to visual messaging about food is commonplace; and while some promotions depicted items advocated to be consumed more frequently, many did not. Exposure to contradictory messages could hamper the ability of youth to make sound nutrition choices, thus, interventions are needed to increase the proportion of nutritious food messages seen. Moreover, policies aimed at restricting corporate presence in schools should be strengthened with improved monitoring systems, particularly in secondary schools where students have increased autonomy over food choice and where the presence of promotions, including those depicting unhealthy items, was substantially higher.

Conflict of interest

The authors declare that there are no conflicts of interests.

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