


# Examining differences in children and adolescents' exposure to food and beverage marketing in Canada by sociodemographic characteristics: Findings from the International Food Policy Study Youth Survey, 2020

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## Summary

**Background:** Many countries, including Canada, are considering regulations to restrict food and beverage marketing to children. However, little evidence is available outside of the US on how marketing exposure differs across sociodemographic subgroups.

**Objective:** To investigate potential associations between child and adolescent socio-demographic characteristics and exposure to food and beverage marketing in Canada.

**Methods:** Participants ( $n = 3780$ ) aged 10–17 self-reported exposure to food and beverage marketing across food categories, locations and marketing techniques. Logistic regression models tested relationships between sociodemographics (age, sex, ethnicity and income adequacy) and marketing exposure.

**Results:** Among other differences identified, 13–17 years old were more likely than 10–12 years old to report seeing unhealthy food marketing online. Girls were more likely than boys to see such marketing online and in retail settings, while boys were more likely to see it in video games. Minority ethnicities (including Indigenous youth) and respondents with lower income adequacy generally reported more exposure than White and higher income respondents, respectively.

**Conclusions:** This study highlights important differences in marketing exposure among youth of different sociodemographic groups in Canada, including greater exposure to marketing among those most disadvantaged and emphasizes the essential need to consider food marketing across equity groups when developing restrictions on marketing to kids.

**Abbreviations:** AOR, adjusted odds ratio; IFPS, International Food Policy Study; US, United States.

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## KEYWORDS

adolescents, children, food environment, food marketing, food policy, sociodemographic subgroups

## 1 | INTRODUCTION

The consumption of unhealthy diets is a well-established risk factor for morbidity and mortality, both in Canada and globally.<sup>1</sup> Poor diet quality is characterized by a greater intake of foods high in sugar, saturated fat and salt and a lower intake of fruits and vegetables.<sup>2</sup> Unhealthy dietary habits are particularly prevalent among children and adolescents and vary by socioeconomic status and demographic characteristics.<sup>2</sup> Patterns in weight gain and obesity over the lifespan also differ according to ethnic background, sex and socioeconomic status.<sup>3–5</sup> Children living with higher levels of sociodemographic disadvantage, such as lower income adequacy, are more likely to have overweight or obesity compared to children who experience less sociodemographic disadvantage, and the prevalence of obesity among males is higher globally compared to that among females.<sup>4,5</sup> Childhood and adolescence are influential developmental stages as eating patterns established during these periods are critical determinants of adult dietary behaviours and downstream health outcomes.<sup>6</sup>

On a daily basis, children and adolescents (hereafter referred to as ‘youth’) are exposed to high levels of food and beverage marketing through a variety of media, including television and digital media and settings, such as schools and recreation centres.<sup>7–9</sup> Youth are a particularly important demographic and are highly targeted by food marketers due to their easily exploitable cognitive vulnerabilities, purchasing power, and potential to become lifelong brand consumers.<sup>10,11</sup> Food marketers use several techniques to make marketing more appealing and influential to youth, such as the use of cartoon characters, free toys/products and celebrity endorsements.<sup>10,12–14</sup> Concerningly, international literature has revealed that unhealthy food products (those identified as a cause of poor diet and excess weight in youth) dominate the child-oriented food marketing environment.<sup>8,15–18</sup>

Adding to the complexity of the issue, existing evidence also suggests that youth of different sociodemographic backgrounds and characteristics may be differentially targeted or impacted by food marketing.<sup>19</sup> Previous studies from the US estimating differences in unhealthy food advertising as a proportion of total food advertising found that the presence of unhealthy food advertising was significantly higher in lower income neighbourhoods compared to higher income neighbourhoods.<sup>20</sup> Similarly across ethnic groups, studies have found that a greater proportion of unhealthy food advertising is presented on television stations commonly viewed by Black and Hispanic children compared to those more commonly viewed by White children in the US, and exposure to unhealthy television food advertisements is significantly higher in areas with higher proportions of Black and Hispanic children.<sup>20–22</sup> Evidence also suggests that there are gender differences in marketing: male youth tend to be exposed to food advertising more frequently than females, and marketing is more likely

to be male-dominant (i.e., featuring exclusively or predominantly male characters).<sup>23</sup> The existing evidence thus far, however, is predominantly from the US, and there has been little work investigating whether exposure to food marketing differs across children of different sociodemographic groups in Canada.<sup>24</sup> Given the differences in the sociodemographic profile (e.g., ethnicity groups) of the Canadian population compared to the US, additional data are required to understand potential sociodemographic disparities in food and beverage marketing in Canada.

In response to the evident impacts of food and beverage marketing on children, including the disproportionate effects across sociodemographic groups, the World Health Organization has called for member states to implement restrictions on food and beverage marketing to children.<sup>25</sup> Several jurisdictions have responded to this request, but most policies include narrow definitions of marketing and apply to few media, providing ample opportunity for food and beverage companies to take advantage of loopholes.<sup>26,27</sup> In Canada (excluding Québec), food marketing is self-regulated through the *Broadcast Code for Advertising to Children* and the *Children's Food and Beverage Advertising Initiative*, which restrict unhealthy food marketing to children under 12 across some media.<sup>28,29</sup> In Québec, provincial legislation through the *Consumer Protection Act* prohibits all commercial marketing to children under 13.<sup>30</sup> Despite such regulations, there have been minimal improvements in the healthfulness of food products marketed to children, and their exposure to unhealthy food marketing is still high in Canada overall.<sup>16,17,27</sup> As a result, policymakers in Canada have been working to introduce national-level restrictions on marketing unhealthy foods and beverages to children. In 2016, an Act prohibiting food and beverage marketing directed at children (Bill S-228) was introduced to Parliament but failed to pass due to industry lobbying.<sup>31</sup> More recently, Bill C-252 was introduced in February 2022 with similar goals and is making its way through Parliament,<sup>32</sup> highlighting a need for evidence to inform the implementation of potential restrictions.

This study aims to provide Canadian evidence on sociodemographic disparities in food and beverage marketing to youth. The study used data from the 2020 International Food Policy Study (IFPS) Youth Survey to investigate the potential associations between child and adolescent sociodemographic characteristics (age, sex, ethnicity and perceived income adequacy) and exposure to food and beverage marketing mediums and techniques in Canada.

## 2 | METHODS

The IFPS Youth Survey is an annual repeat cross-sectional survey conducted in Canada. Data were collected via self-completed web-based surveys conducted in November–December 2020 with youth aged

10–17 years. Respondents were recruited through parents/guardians enrolled in the Nielsen Consumer Insights Global Panel and their partners' panels. Email invitations with unique survey links were sent to adult panellists in Canada. Those who confirmed they had a child aged 10–17 living in their household were asked for permission for their child to complete the survey. Children aged 10–17 were eligible to participate. After eligibility screening, all potential respondents were provided with information about the study and asked to provide their assent. Surveys were conducted in English or French. The median survey time was 24 min.

The child's parent/guardian received remuneration in accordance with their panel's usual incentive structure (e.g., points-based or monetary rewards, chances to win prizes). The study was reviewed by and received ethics clearance through the University of Waterloo Research Ethics Committee (ORE# 41477). A full description of the study methods is available elsewhere.<sup>33</sup>

## 2.1 | Survey measures

### 2.1.1 | Outcome measures

Frequency of exposure to food and beverage marketing was assessed by asking participants, 'In the last 30 days, how often did you see or hear advertisements for these kinds of food or drinks?', with response options on a 6-point scale ranging from 'never' to 'more than once a day'. This was asked separately about ads for fast food from a restaurant, snacks, sugary drinks, desserts or treats, sugary cereals and fruit or vegetables. For the purposes of analyses, the proportion of participants reporting seeing or hearing ads 'once a week' or more was analysed for each of the six food categories.

Location of exposure to food and beverage marketing was assessed by asking participants, 'Think about the last 30 days. Have you seen or heard advertisements for "unhealthy" foods or drinks in any of these places?' Participants could select all that apply from 13 setting options, 'other', or 'I have not seen any ads for unhealthy food or drinks in the last 30 days'. A definition was provided to define 'unhealthy food or drinks'.<sup>34</sup> For the purposes of analyses, the 13 settings were collapsed into eight categories: movies and TV; online; retail settings and promotions; outdoor; radio and print; video games; school; and sport and event settings (see Table S1). The proportion of respondents selecting each location category was assessed.

Exposure to food and beverage marketing techniques was assessed using three survey measures. First, respondents were asked, 'In the last 30 days, have you seen unhealthy food or drinks advertised with any of the following?', for 'sports teams or athletes', 'cartoons or characters from movies or TV', 'cartoons or characters made by food companies', and 'famous people'. Second, respondents were asked, 'Think about the clothing, posters, stickers, or other things you have. Do any of them show a name or logo of unhealthy food or drink companies?' Third, respondents were asked, 'Do you have "Happy Meal" toys or other toys from fast-food restaurants?'. Response options included 'yes' and 'no' for each of the

three measures. The proportion of respondents who selected 'yes' was assessed.

'Don't know' and 'refuse to answer' were available as response options for all questions. For all outcome measures, participants who responded 'don't know', 'refuse to answer', or had missing responses were omitted from the corresponding analysis. Full survey measures are available on the IFPS study website.<sup>34</sup>

### 2.1.2 | Sociodemographic measures

Sociodemographic measures in the current study included age (children aged 10–12 years, adolescents aged 13–17 years), sex at birth (male, female), ethnicity (White only, East/Southeast Asian only, South Asian only, Black only, Indigenous inclusive,<sup>\*</sup> Mixed/other) and youth's self-reported perceived income adequacy (not enough money, barely enough money, enough money, more than enough money). Full sociodemographic survey measures are available on the IFPS study website.<sup>34</sup>

## 2.2 | Data analysis

Descriptive findings stratified by sociodemographic characteristics are reported for all outcomes. Statistical analyses were conducted using survey-adjusted binary logistic regression models (SURVEYLOGISTIC procedure) to test the relationships between sociodemographic characteristics and each of the outcomes of interest. All models included variables for age, sex, ethnicity and perceived income adequacy. Final sample sizes for each outcome are as indicated.

Data were weighted with post-stratification sample weights constructed using a raking algorithm with population estimates from the Canadian census based on age group, sex and region. All estimates reported are weighted unless otherwise specified. Adjusted odds ratios (AORs) and *p* values are reported for model estimates. To avoid evaluating results based on a single significance threshold (e.g.,  $p < 0.05$ ), the results are interpreted based on a spectrum of strength of evidence, as suggested by Muff et al. in 2022.<sup>35†</sup> Analyses were conducted using SAS statistical software (SAS Institute Inc., North Carolina).

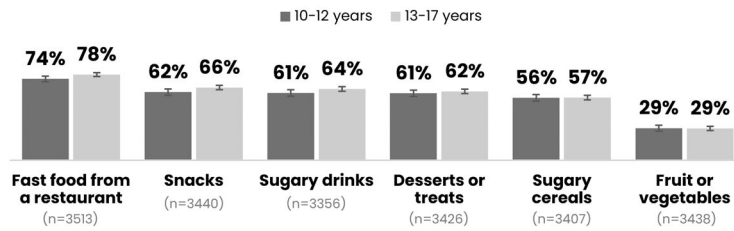
## 3 | RESULTS

A total of 4000 youth respondents completed the survey in Canada. Respondents were excluded for the following reasons: their region

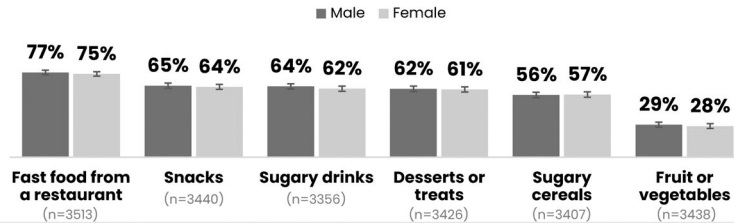
\*Indigenous inclusive includes all respondents indicating that they identify (in part or exclusively) as Indigenous, including First Nations, Metis, or Inuit descent.

†Muff et al. suggest replacing binary decision-making with a more gradual notion of evidence, where the strength of the evidence is estimated based on approximate ranges of *p*-values. In this paper, *p*-value ranges are interpreted approximately as follows:  $p \geq 0.1$  = little or no evidence;  $0.1 > p > 0.05$  = weak evidence;  $0.05 > p > 0.01$  = moderate evidence;  $0.01 > p > 0.001$  = strong evidence;  $0.001 > p > 0.0001$  = very strong evidence.

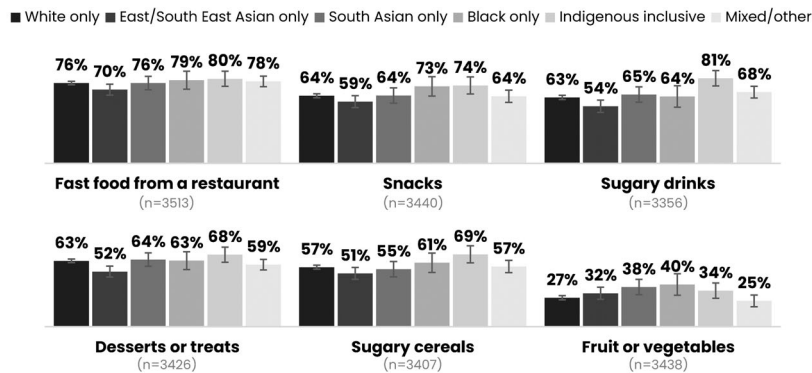
## BY AGE



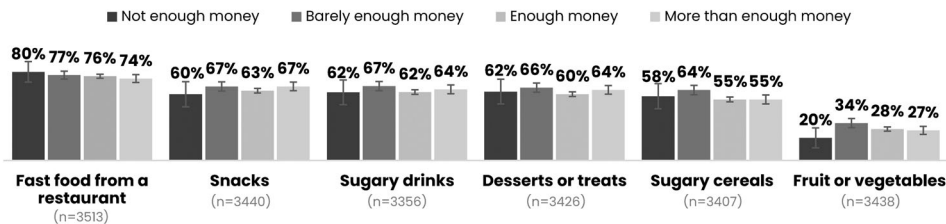
## BY SEX



## BY ETHNICITY



## BY INCOME ADEQUACY



**FIGURE 1** Unadjusted percentages of respondents in Canada who reported seeing marketing for a range of foods or drinks at least once a week in the last 30 days (weighted) in the International Food Policy Study Youth Survey, 2020. Respondents were asked, 'In the last 30 days, how often did you see or hear ads for these kinds of foods or drinks?' Graphs display percentages of the sample responding 'Once a week', 'A few times a week', 'Every day', or 'More than once a day' (versus 'Less than once a week'/'Never').

was missing, ineligible or had an inadequate sample size (i.e., Canadian territories); they had an invalid response to a data quality question; their survey completion time was under 10 min; and/or they had multiple invalid responses to open-ended measures ( $n = 105$ ). Further respondents were removed due to missing data on perceived income adequacy and ethnicity ( $n = 115$ ), adding to a total of 220 excluded. The final analytic sample included 3780 participants.

Table S2 presents the weighted and unweighted characteristics of the final analytic sample. After weights were applied, approximately two-thirds were 13–17 years old; half were female; the majority (70%) were White, followed by East/Southeast Asian only (9%) and mixed/other ethnicities (8%), and two-thirds reported their family had 'enough money'.

### 3.1 | Frequency of exposure

Figure 1 presents the weighted percentages of participants who recalled seeing marketing for various food and beverage categories at least once per week, by sociodemographic categories. Statistical tests of these differences by sociodemographic groups were tested in binary logistic regression models, as presented in Table 1.

There was moderate evidence that adolescents (13–17 years old) were more likely than children (10–12 years old) to report seeing ads for fast food, snacks and sugary drinks at least once per week in the past 30 days. There was little or no evidence for differences by age group in seeing ads for desserts/treats, sugary cereals and fruits or vegetables.

**TABLE 1** Results from binary logistic regression models modelling the frequency of exposure to food and beverage marketing (% 'once a week' or more), among 10–17 years old in the International Food Policy Study Youth Survey, 2020.

	Fast food <sup>a</sup> (n = 3513)		Snacks <sup>a</sup> (n = 3440)		Sugary drinks <sup>a</sup> (n = 3356)		Desserts/treats <sup>a</sup> (n = 3426)		Sugary cereals <sup>a</sup> (n = 3407)		Fruits or vegetables <sup>a</sup> (n = 3438)	
	AOR	p	AOR	p	AOR	p	AOR	p	AOR	p	AOR	p
Age												
10–12 years old [ref]	-		-		-		-		-		-	
13–17 years old	1.24	0.011	1.18	0.029	1.16	0.052	1.06	0.41	0.99	0.90	0.98	0.76
Sex												
Female [ref]	-		-		-		-		-		-	
Male	1.08	0.36	1.05	0.49	1.10	0.19	1.03	0.72	0.99	0.90	1.06	0.42
Ethnicity												
White only [ref]	-		-		-		-		-		-	
East/Southeast Asian only	0.72	0.016	0.78	0.052	0.70	0.006	0.66	<0.001	0.79	0.053	1.23	0.13
South Asian only	1.00	0.99	1.03	0.88	1.13	0.46	1.06	0.75	0.92	0.61	1.60	0.005
Black only	1.14	0.62	1.53	0.076	1.04	0.86	1.01	0.96	1.19	0.44	1.82	0.007
Indigenous inclusive	1.24	0.36	1.57	0.037	2.49	<0.001	1.30	0.20	1.68	0.011	1.36	0.11
Mixed/other	1.10	0.55	0.99	0.91	1.26	0.098	0.86	0.24	1.02	0.91	0.86	0.31
Perceived income adequacy <sup>b</sup>												
More than enough money [ref]	-		-		-		-		-		-	
Enough money	1.13	0.26	0.84	0.075	0.89	0.26	0.85	0.087	0.99	0.94	1.05	0.64
Barely enough money	1.18	0.25	0.98	0.88	1.12	0.40	1.09	0.51	1.42	0.006	1.36	0.021
Not enough money	1.36	0.31	0.71	0.17	0.86	0.54	0.92	0.74	1.11	0.68	0.66	0.15

Abbreviation: AOR, adjusted odds ratio.

<sup>a</sup>Respondents were asked, 'In the last 30 days, how often did you see or hear ads for these kinds of foods or drinks?' Regression models are estimating the odds of responding 'Once a week', 'A few times a week', 'Every day', or 'More than once a day' (versus 'Less than once a week'/'Never').

<sup>b</sup>Respondents were asked, 'Does your family have enough money to pay for things your family needs?', with response options 'Not enough money', 'Barely enough money', 'Enough money' and 'More than enough money'.

There was no evidence of differences by sex in the frequency of seeing ads for any of the food categories in the past 30 days.

There was moderate to very strong evidence that White respondents were more likely than East/Southeast Asian respondents to report seeing ads for fast food, snacks, sugary drinks, desserts/treats and sugary cereals. There was strong evidence that both South Asian and Black respondents were more likely than White respondents to report seeing ads for fruits or vegetables at least once per week, and weak evidence that Black respondents were more likely to report seeing ads for snacks than White respondents. There was moderate to very strong evidence that Indigenous respondents were more likely than White respondents to report seeing ads for snacks, sugary drinks and sugary cereals at least once per week in the last 30 days.

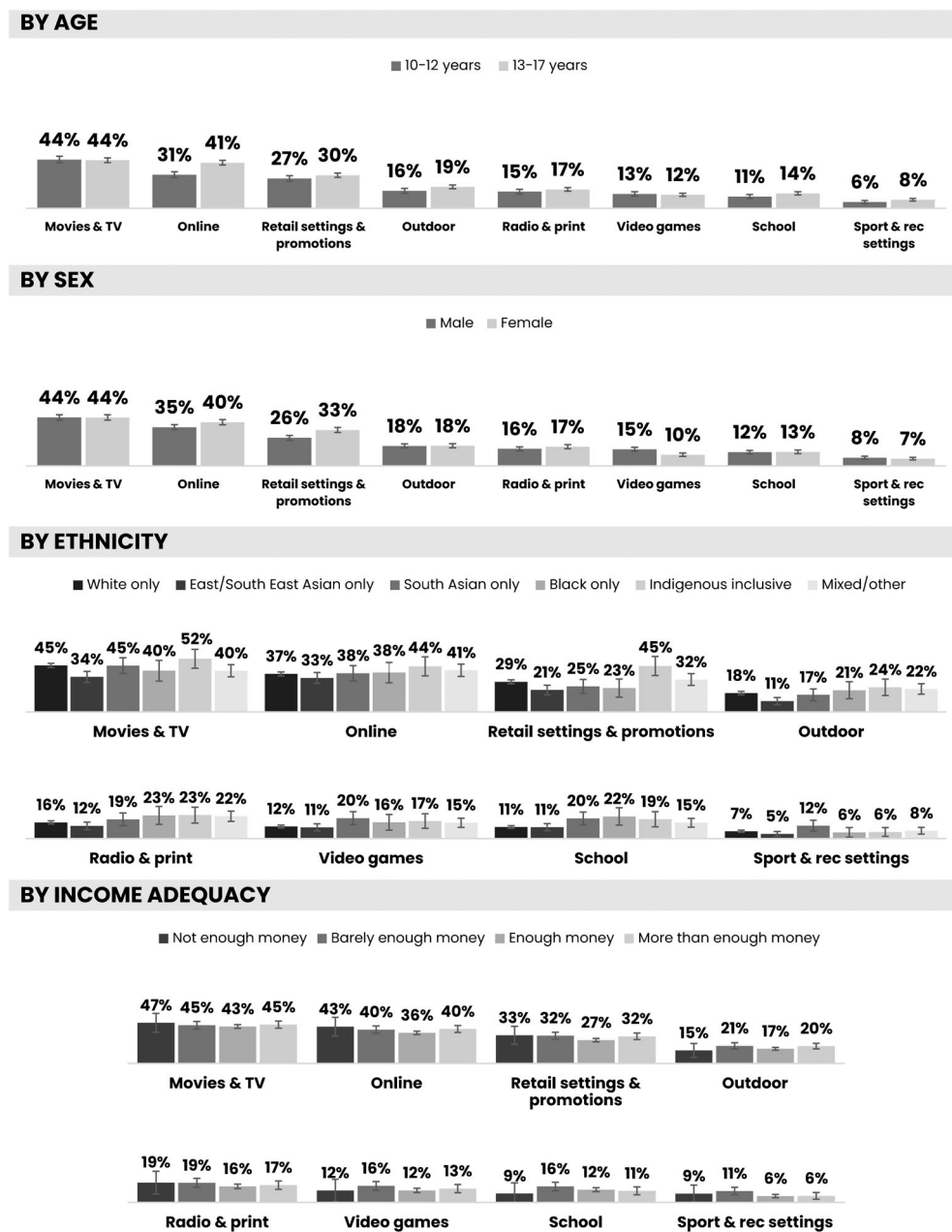
There was moderate to strong evidence that respondents reporting 'barely enough money' were more likely than those with 'more than enough money' to report seeing ads for sugary cereals and fruits or vegetables at least once per week in the past 30 days. There was weak evidence that those reporting 'more than enough money' were more likely than those with 'enough money' to report seeing ads for snacks and desserts/treats.

### 3.2 | Location of exposure

Figure 2 presents the weighted percentages of participants who recalled seeing marketing for unhealthy foods or drinks in various locations in the last 30 days, by sociodemographic categories. Statistical tests of these differences were tested in binary logistic regression models, as presented in Table 2.

There was moderate to very strong evidence that adolescents were more likely than children to recall seeing ads for unhealthy foods online, outdoors, in school and in sport and event settings in the past 30 days. There was little or no evidence for differences by age groups in recalling seeing unhealthy food ads in movies and TV, in retail settings, on radio/print, or in video games.

There was strong to very strong evidence that male participants were less likely than female participants to recall seeing unhealthy food ads online and in retail settings but more likely to recall seeing them in video games. There was little or no evidence of differences by sex in seeing unhealthy food ads in movies and TV, outdoors, on radio/print, in school, or in sport and event settings.



**FIGURE 2** Unadjusted percentages of respondents in Canada who reported seeing marketing for unhealthy foods or drinks in a range of settings in the last 30 days ( $n = 3395$ ; weighted) in the International Food Policy Study Youth Survey, 2020. Respondents were asked, ‘Think about the last 30 days. Have you seen or heard advertisements for ‘unhealthy’ foods or drinks in any of these places?’ Respondents could select all that apply. Graphs display percentages of the sample selecting each location.

The results across ethnicity groups suggested that White respondents tended to be more likely than East/Southeast Asian respondents to recall seeing ads for unhealthy foods across some settings (movies and TV, retail settings, outdoors and sport and event settings). There was strong evidence that South Asian respondents were more likely than White respondents to recall seeing unhealthy food ads in video games, at school and in sport and event settings. There was also strong evidence that Black respondents were more likely than White respondents to recall seeing ads for unhealthy foods at school. There was very strong evidence that Indigenous respondents were more likely than White respondents to recall seeing unhealthy food ads in retail settings, and weak to moderate evidence that they were more likely to recall seeing or hearing unhealthy food ads on radio/print, in

video games, or in school. There was weak to moderate evidence that respondents reporting a mixed or other ethnicity were more likely than White respondents to recall seeing or hearing ads for unhealthy foods on radio or in print, in video games and at school in the last 30 days.

Across income adequacy groups, there was strong evidence that respondents with ‘barely enough money’ were more likely than those with ‘more than enough money’ to recall seeing ads for unhealthy foods in sport and event settings, and weak evidence that they were more likely to recall seeing them at school. There was weak to moderate evidence that those with ‘more than enough money’ were more likely than those with ‘enough money’ to recall seeing unhealthy food ads online, in retail settings and outdoors.

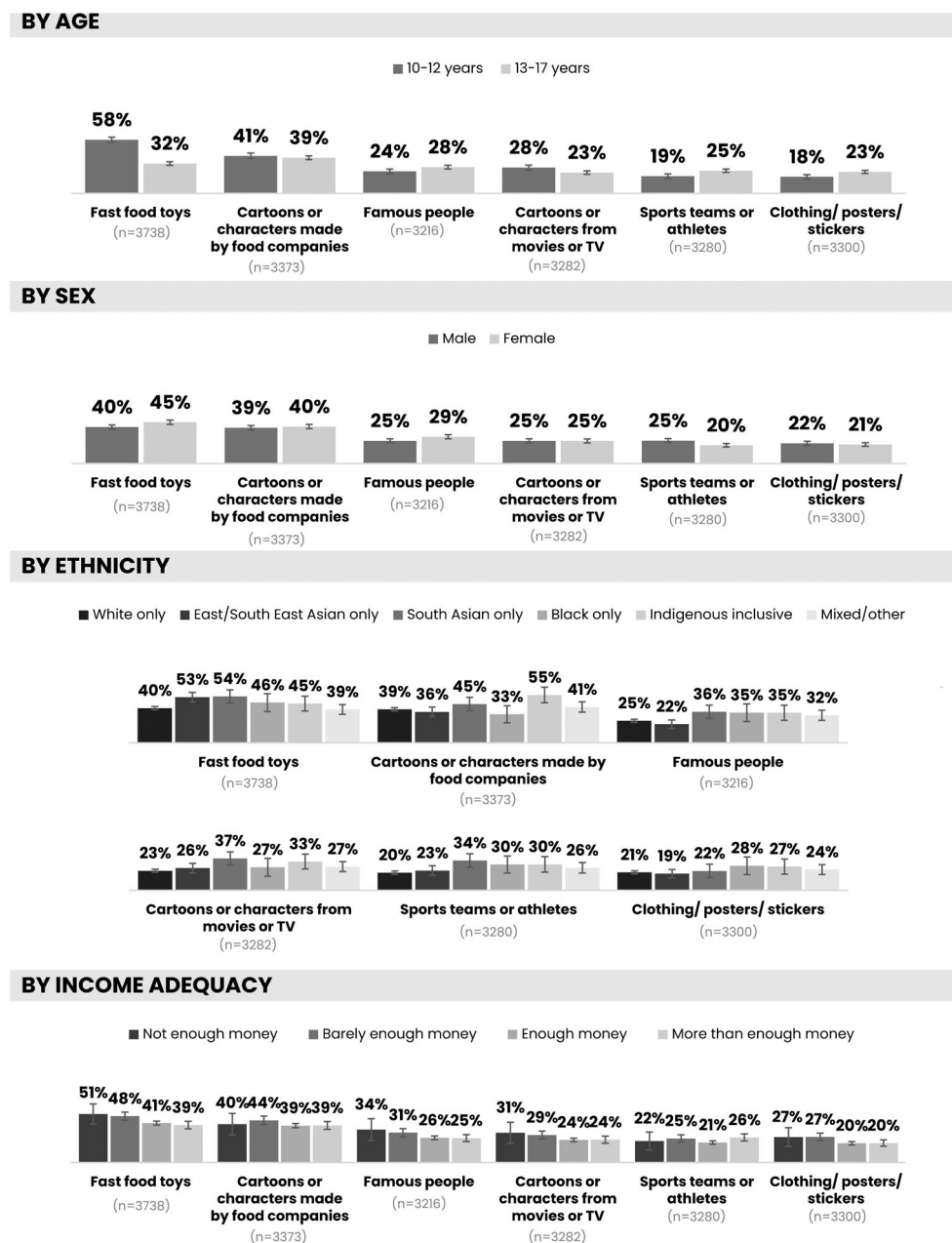
**TABLE 2** Results from binary logistic regression models modelling exposure to unhealthy food and beverage marketing in various settings (% selected), among 10–17 years old in the International Food Policy Study Youth Survey, 2020 (n = 3395).

	Movies and TV <sup>a</sup>		Online <sup>a</sup>		Retail settings and promotions <sup>a</sup>		Outdoor <sup>a</sup>		Radio and print		Video games <sup>a</sup>		School <sup>a</sup>		Sport and event settings	
	AOR	p	AOR	p	AOR	p	AOR	p	AOR	p	AOR	p	AOR	p	AOR	p
Age																
10–12 years old [ref]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13–17 years old	0.97	0.72	1.61	<0.001	1.14	0.11	1.27	0.016	1.15	0.18	0.92	0.44	1.30	0.025	1.37	0.042
Sex																
Female [ref]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Male	1.00	0.98	0.83	0.009	0.71	<0.001	1.00	0.96	0.88	0.18	1.59	<0.001	0.98	0.87	1.16	0.28
Ethnicity																
White only [ref]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East/Southeast Asian only	0.63	<0.001	0.83	0.14	0.65	0.004	0.52	<0.001	0.76	0.12	0.93	0.71	0.96	0.84	0.63	0.096
South Asian only	0.99	0.94	1.06	0.72	0.82	0.28	0.91	0.66	1.26	0.29	1.84	0.004	1.96	0.002	1.91	0.012
Black only	0.81	0.33	1.03	0.88	0.73	0.20	1.20	0.47	1.56	0.086	1.44	0.22	2.16	0.004	0.82	0.65
Indigenous inclusive	1.30	0.17	1.32	0.17	1.93	<0.001	1.38	0.16	1.57	0.053	1.59	0.076	1.76	0.027	0.87	0.71
Mixed/other	0.80	0.10	1.15	0.29	1.09	0.56	1.28	0.12	1.48	0.017	1.40	0.069	1.44	0.042	1.07	0.80
Perceived income adequacy <sup>b</sup>																
More than enough money [ref]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Enough money	0.91	0.33	0.83	0.062	0.81	0.036	0.81	0.083	0.90	0.41	0.84	0.21	1.10	0.51	0.98	0.93
Barely enough money	0.97	0.80	0.94	0.64	1.01	0.97	1.00	0.98	1.12	0.49	1.23	0.23	1.41	0.058	1.84	0.008
Not enough money	1.08	0.75	1.09	0.73	1.04	0.89	0.67	0.24	1.09	0.78	0.80	0.56	0.68	0.34	1.34	0.51

Abbreviation: AOR, adjusted odds ratio.

<sup>a</sup>Respondents were asked, ‘Think about the last 30 days. Have you seen or heard advertisements for ‘unhealthy’ foods or drinks in any of these places?’ Respondents could select all that apply. Regression models are estimating the odds of respondents selecting each location (versus not selecting).

<sup>b</sup>Respondents were asked, ‘Does your family have enough money to pay for things your family needs?’, with response options ‘Not enough money’, ‘Barely enough money’, ‘Enough money’ and ‘More than enough money’.



**FIGURE 3** Unadjusted percentages of respondents in Canada who reported being exposed to various food marketing techniques (weighted) in the International Food Policy Study Youth Survey, 2020. Respondents were asked, ‘Do you have ‘Happy Meal’ toys or other toys from fast-food restaurants?’ ‘In the last 30 days, have you seen unhealthy food or drinks advertised with any of the following?’ (for ‘Cartoons or characters made by food companies’, ‘Famous people’, ‘Cartoons or characters from movies or TV’ and ‘Sports teams or athletes’); and ‘Think about the clothing, posters, stickers, or other things you have. Do any of them show a name or logo of unhealthy food or drink companies?’ Graphs display percentages of the sample responding ‘Yes’.

### 3.3 | Marketing techniques

Figure 3 presents the weighted percentages of participants who reported being exposed to a range of food marketing techniques, by sociodemographic categories. Statistical tests of these differences were tested in binary logistic regression models, as presented in Table 3.

There was very strong evidence that adolescents were less likely than children to report having fast food toys and seeing unhealthy foods marketed with characters from movies/TV. There was strong to very strong evidence that adolescents were more likely to report seeing unhealthy foods marketed with famous people and sports teams or athletes and to have clothing/posters/stickers with the name or logo of unhealthy food or drink companies.

There was strong evidence that male respondents were less likely than female respondents to report having fast food toys and seeing unhealthy foods marketed with famous people, and more likely to recall seeing unhealthy foods marketed with sports teams or athletes.

Across ethnicity groups, there was very strong evidence that East/Southeast Asian and South Asian respondents were more likely than White respondents to report having a fast food toy. There was strong to very strong evidence that South Asian respondents were more likely than White respondents to see unhealthy foods marketed with famous people, characters from movies/TV and sports teams or athletes. There was weak to moderate evidence that Black respondents were more likely than White respondents to see unhealthy foods marketed with famous people and

**TABLE 3** Results from binary logistic regression models modelling exposure to unhealthy food and beverage marketing techniques (% yes), among 10–17 years old in the International Food Policy Study Youth Survey, 2020 ( $n = 3718$ ).

	Fast food toys <sup>a</sup> ( $n = 3738$ )		Characters from food companies <sup>b</sup> ( $n = 3373$ )		Famous people <sup>b</sup> ( $n = 3216$ )		Characters from movies/ TV <sup>b</sup> ( $n = 3282$ )		Sports teams or athletes <sup>b</sup> ( $n = 3280$ )		Clothing/posters/ stickers <sup>c</sup> ( $n = 3300$ )	
	AOR	<i>p</i>	AOR	<i>p</i>	AOR	<i>p</i>	AOR	<i>p</i>	AOR	<i>p</i>	AOR	<i>p</i>
Age												
10–12 years old [ref]	-		-		-		-		-		-	
13–17 years old	0.33	<0.001	0.91	0.20	1.27	0.008	0.73	<0.001	1.40	<0.001	1.36	0.002
Sex												
Female [ref]	-		-		-		-		-		-	
Male	0.80	0.002	0.95	0.48	0.80	0.006	1.01	0.88	1.34	<0.001	1.10	0.28
Ethnicity												
White only [ref]	-		-		-		-		-		-	
East/Southeast Asian only	1.81	<0.001	0.89	0.36	0.80	0.14	1.21	0.19	1.14	0.38	0.90	0.51
South Asian only	1.71	0.001	1.28	0.14	1.65	0.005	1.96	<0.001	2.05	<0.001	1.10	0.62
Black only	1.35	0.17	0.78	0.28	1.52	0.060	1.24	0.40	1.69	0.029	1.46	0.12
Indigenous inclusive	1.35	0.11	1.95	<0.001	1.51	0.040	1.74	0.007	1.67	0.014	1.41	0.13
Mixed/other	0.88	0.36	1.11	0.45	1.35	0.040	1.26	0.12	1.40	0.027	1.21	0.23
Perceived income adequacy <sup>d</sup>												
More than enough money [ref]	-		-		-		-		-		-	
Enough money	1.05	0.60	0.98	0.83	1.01	0.90	0.96	0.75	0.73	0.007	1.00	0.97
Barely enough money	1.56	<0.001	1.23	0.11	1.29	0.076	1.28	0.089	0.92	0.57	1.41	0.022
Not enough money	1.65	0.042	1.04	0.88	1.42	0.20	1.38	0.25	0.73	0.28	1.36	0.26

Abbreviation: AOR, adjusted odds ratio.

<sup>a</sup>Respondents were asked, 'Do you have 'Happy Meal' toys or other toys from fast-food restaurants?' Regression models are estimating the odds of responding 'Yes' (versus 'No').

<sup>b</sup>Respondents were asked, 'In the last 30 days, have you seen unhealthy food or drinks advertised with any of the following?' (for 'Cartoons or characters made by food companies', 'Famous people', 'Cartoons or characters from movies or TV' and 'Sports teams or athletes'). Regression models are estimating the odds of responding 'Yes' (versus 'No') for each.

<sup>c</sup>Respondents were asked, 'Think about the clothing, posters, stickers, or other things you have. Do any of them show a name or logo of unhealthy food or drink companies?' Regression models are estimating the odds of responding 'Yes' (versus 'No').

<sup>d</sup>Respondents were asked, 'Does your family have enough money to pay for things your family needs?', with response options 'Not enough money', 'Barely enough money', 'Enough money' and 'More than enough money'.

sports teams or athletes, and moderate to very strong evidence that Indigenous respondents were more likely than White respondents to see unhealthy foods marketed with characters from food companies, characters from movies/TV, famous people and sports teams or athletes. There was moderate evidence that respondents reporting a mixed or other ethnicity were more likely than White respondents to see unhealthy foods marketed with famous people and sports teams or athletes.

Results across perceived income adequacy groups showed that reported exposure to the marketing techniques was generally greater among respondents reporting lower income adequacy, with the exception of seeing unhealthy foods featuring sports teams or athletes, for which there was strong evidence that those with 'more than enough money' were more likely than those with 'enough money' to be exposed.

## 4 | DISCUSSION

In one of the first studies to examine differences in youth's food and beverage marketing exposure across sociodemographic groups in Canada, we identified important differences in marketing exposure across age groups, sex, ethnicity and income adequacy. In particular, the patterns of food marketing exposure suggest that children and youth in historically disadvantaged groups (such as minority ethnicity and lower income groups) were more likely to report being exposed to food and beverage marketing across various food categories, settings and techniques.

Our results reflect existing evidence that both children and adolescents are key targets for food marketers. Overall, levels of exposure to food and beverage marketing were similarly high for children (10–12 years old) and adolescents (13–17 years old), suggesting

that regardless of whether food companies are targeting youth, both children and adolescents are regularly exposed to unhealthy food and beverage marketing in a variety of locations and via a variety of techniques. One key difference in exposure between children and adolescents was in online settings: adolescents were substantially more likely to report seeing unhealthy food marketing online in the past 30 days (41%) than their younger counterparts (31%). This notable age difference reflects existing evidence from Canada suggesting that adolescents spend much more time online than children and are more likely to be exposed to food marketing on social media apps.<sup>8</sup> Adolescents in our study were also more likely than children to see unhealthy foods marketed with famous people and sports teams or athletes and more likely to have food company-branded items like clothing, posters, or stickers. Celebrity or athlete endorsement and product branding are all well-known techniques used by companies for marketing to young consumers (as well as other age groups)<sup>36</sup>; however, to the authors' knowledge, no other studies have explored age differences in exposure to such marketing techniques. The prominence of exposure to food and beverage marketing among both children and adolescents is particularly concerning given that most marketing regulations worldwide, including those currently existing in Canada, only protect children under the age of 12 or 13 years.<sup>32,37</sup> Bill C-252, currently being examined by the House of Commons, also only focuses on children under the age of 13 and, therefore, would not protect older children from these common marketing strategies.<sup>32,37</sup>

Reported exposure to marketing was strikingly similar between the sexes across the food categories assessed, but some differences were observed across marketing settings and techniques. Female youth were more likely to recall seeing ads online and in retail settings, while males were more likely to see ads in video games. Females were also more likely to see unhealthy foods marketed with celebrities, whereas males were more likely to see them marketed with sports teams or athletes. These results may be partly explained by gender differences in media use or their presence in various settings. For example, social media advertising data for 13–17 years old in Canada suggest that girls account for a greater proportion of social media use than boys,<sup>38</sup> and while video game use is high among both genders in Canada, boys report more frequent use.<sup>39</sup> Data from the IFPS Youth survey in Canada and across multiple countries confirms similar patterns, with girls reporting more time spent on social media and boys reporting more time spent playing video games.<sup>40</sup> Despite gender differences in media use, it is known that food companies use strategic techniques to tailor marketing by gender, such as featuring actors or characters of the target gender or portraying gender-stereotypical concepts such as sports and athleticism or appealing to beauty.<sup>23,41</sup> Future research should investigate the extent to which the gender differences identified in this study are a result of intentional gender-targeted marketing.

In terms of ethnicity groups, East/Southeast Asian respondents in this study tended to be less likely than White respondents to report exposure to food and beverage marketing across most food categories and several settings. To the authors' knowledge, no previous studies have identified this difference in food marketing exposure. These

differences may be explained by advertising patterns, in that advertisers in Canada may target this group to a lesser extent than other ethnicity subgroups. Alternatively, the lower exposure to marketing among East/Southeast Asian youth in Canada could be explained in part by cultural differences in media use. Additional data from the IFPS Youth survey (not shown) corroborates this to some extent: East/Southeast Asian respondents reported spending less time watching TV shows or movies, playing games and on social media than White respondents; however, they reported spending similar or more time than White respondents watching YouTube and browsing/reading websites, suggesting that there may be other factors at play contributing to their lower exposure to marketing.

In contrast to East/Southeast Asian respondents, the other minority ethnicity groups examined in this study (South Asian, Black, Indigenous and mixed/other) tended to report equal or greater exposure to food marketing than White respondents. These results reflect existing evidence, largely from the US, that children and adolescents from minority ethnicity groups (e.g., Black and Hispanic) experience disproportionately greater exposure to food and beverage marketing.<sup>19–22</sup> Indigenous respondents, in particular, reported some of the highest rates of marketing exposure in this study across food categories, marketing settings and techniques. Although this is the first study to the authors' knowledge to estimate food and beverage marketing exposure among Indigenous youth in Canada, a growing body of evidence has demonstrated the dire state of the food environment, food security and dietary quality of First Nations and Inuit populations in Canada.<sup>42,43</sup> The higher rates of food marketing exposure among Indigenous and other racialized youth in this study may in part be a reflection of their food environment and are an additional signal that Indigenous groups should be a focus when developing and evaluating food policy, including restricting marketing to children. Further research is warranted to investigate the potential cultural, geographical, or other systemic factors that may explain differences in food marketing identified across ethnicity groups.

Results from this study demonstrated some differences in food marketing exposure by income adequacy: youth with the lowest income adequacy reported greater food marketing exposure than those with the highest income adequacy in many cases. These results reflect previous observational research, predominantly from the US, that suggests youth in lower income households are disproportionately exposed to food and beverage marketing.<sup>19,20</sup> Further, an analysis of longitudinal data in the US estimated that the impacts of television advertising on sugar-sweetened beverage purchases are stronger for low-income households than for higher income households, suggesting that food advertisers may intentionally target these subpopulations and, as a result, exacerbate existing income disparities in nutrition-related health outcomes.<sup>44</sup> Interestingly, rather than a gradient of decreasing marketing exposure with increasing income adequacy that may have been expected, youth reporting that their family had 'more than enough money' reported *more* frequent exposure to food marketing than those with 'enough money'—for example, in retail settings and advertisements with sports teams or athletes. The mechanisms for this are unclear.

As alluded to throughout, the exposure to food and beverage marketing observed in this study should be considered in the context of sociodemographic differences in media use. In fact, previous evidence from the IFPS Youth Survey across six countries (Australia, Canada, Chile, Mexico, the United Kingdom and the US) suggests that adolescents, males, minority ethnicity groups and youth with lower income adequacy report greater use of screen-based media than their counterparts.<sup>40</sup> These media consumption patterns often reflect those observed for marketing exposure in this study, suggesting that the differences in exposure may be explained in part by differences in media consumption across sociodemographic groups. With the rapid shifts towards marketing in online platforms (where companies can easily tailor their online advertising to target individuals by very specific behavioural or sociodemographic features), it is increasingly important to understand how the differences in marketing exposure across diversity characteristics are a result of differences in media consumption and how much are a result of intentional targeted marketing.

#### 4.1 | Strengths and limitations

This study is one of the first to estimate differences in food and beverage marketing exposure among children and adolescents in Canada, providing important data to inform the development and strategic implementation of food and beverage marketing restrictions in Canada and internationally. In particular, this study provided some of the first estimates of marketing exposure among Indigenous youth in Canada.

Limitations of the study include those common to survey research. Respondents were recruited using non-probability sampling; therefore, although the data were weighted by age group, sex and region, the findings do not provide nationally representative estimates. Given the self-report nature of the survey measures, the food marketing occasions that respondents recalled and reported in the survey are likely to be only a portion of the marketing that they are actually exposed to, and may not capture unconscious, implicit, or emotional effects of advertising.<sup>45</sup> Further, there are increasingly diverse forms of media available to children and adolescents that fall outside of traditional media categories (e.g., streaming television or movies online or browsing the internet on a television); therefore, respondents' reported marketing exposure locations may in some cases be different than the researchers' expectations. However, empirical evidence from tobacco marketing research has demonstrated that self-reported exposure is highly associated with objective exposure data. For example, high correlations have been observed between self-reported recall of media campaigns and both audience viewership estimates<sup>46</sup> and objective measurement of marketing in stores.<sup>47</sup> Additionally, self-report measures are more feasible to collect than objective measures of marketing exposure, allowing for more frequent monitoring—a key requirement for successful policy implementation.<sup>48</sup> Food and beverage advertisers reach youth across many different settings and through a wide variety of formats and

techniques. The measures used in this study aimed to capture a large proportion of those settings and techniques but did not capture the entirety of food and beverage marketing to kids. In particular, more subtle or less overt marketing strategies, such as product placements in television or food company-sponsored school programming, may not have been recognized as 'advertising' by respondents. This study did not examine interactions between different diversity characteristics. Future studies should assess the potential interplay between sociodemographic characteristics, such as ethnicity and income adequacy, in the context of food marketing to children.

#### 4.2 | Conclusions

The findings emphasize the essential need to consider food marketing across equity groups when developing restrictions on marketing to kids in Canada and globally. The results highlight meaningful differences in marketing exposure among youth of different age, sex, ethnicity and income adequacy groups in Canada, including greater exposure to marketing among those with higher sociodemographic disadvantage, as well as differentials in exposure that reflect sociocultural age and gender norms. Although some of these disparities may be explained by sociodemographic differences in media use and attendance in various settings, they may also be the result of targeted marketing strategies by food companies. Additional investigation will be imperative to explore the extent to which sociodemographic differences in marketing exposure in Canada are a result of intentional targeted marketing versus differences in media consumption and to identify how policy may be best designed to reduce existing inequities in children's marketing exposure and, ultimately, dietary intake and health.

#### AUTHOR CONTRIBUTIONS

David Hammond, Christine M. White and Lana Vanderlee contributed to the original study design. Rachel B. Acton analysed data. Rachel B. Acton, Mariangela Bagnato and Lauren Remedios wrote the manuscript. Monique Potvin Kent, Lana Vanderlee, David Hammond and Christine M. White contributed content knowledge and aided in interpretation of the results. All authors were involved in revising the paper and had final approval of the submitted and published versions.

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#### CONFLICT OF INTEREST STATEMENT

David Hammond has provided paid expert testimony on behalf of public health authorities in response to challenges from the food and beverage industry. All remaining authors declare no conflicts of interest.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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