

**Marketing of unhealthy foods and beverages to youth: an investigation of domestic and international approaches to child-directed marketing restriction**

by

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## **AUTHOR'S DECLARATION**

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

## STATEMENT OF CONTRIBUTIONS

Liza Boyar was the sole author for Chapters 1, 2, and 6 which were written under the supervision of Dr. David Hammond and were not written for publication.

This thesis consists in part of three manuscripts written for publication. Exceptions to sole authorship of material apply to research presented in Chapters 3, 4, and 5 and are as follows:

Dr. David Hammond was the Principal Investigator on the Canadian Institutes of Health Research (CIHR) grant for the International Food Policy Study which supported this work. Dr. Sharon Kirkpatrick, Dr. Lana Vanderlee, Dr. Jean Adams, and Dr. Monique Potvin Kent were co-investigators on the grant and are co-authors of publications relating to this work. Ms. Christine White and Ms. Viki Rynard supported the International Food Policy Study as project manager and data analyst, respectively, provided guidance to Liza Boyar and are co-authors of publications.

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As lead author of the three studies, Liza Boyar was responsible for conceptualizing study design, conducting data analysis, and drafting and submitting manuscripts. Co-authors provided guidance and feedback on draft manuscripts. Dr. David Hammond provided significant direction and editorial assistance throughout.

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## ABSTRACT

### Background

Diet quality during childhood is a critical factor for healthy growth and development. Children are vulnerable to food marketing, which impacts nutrition behaviours by influencing product awareness, attitudes, and purchasing intent. Restrictions on marketing of unhealthy foods to children are a potential population-level policy implemented in several countries. In Canada, marketing practices are guided by voluntary industry self-regulation; Québec is the only province which has mandatory restrictions on child-directed advertising (the *Consumer Protection Act*). In 2023, Health Canada proposed new regulations to restrict advertising of foods that contribute to excess intakes of sodium, sugars, and saturated fat to children under 13 years of age across some media and settings. Scientific literature on the effectiveness of mandatory marketing restrictions is mixed. Few studies have examined Québec's existing provincial advertising law and there is limited evidence on nuanced components of marketing restrictions, including 'brand-only' marketing (i.e., marketing that relies solely on attributes recognizable as a representation of the brand, such as logos or mascots, without any identifiable food/beverage products). Additionally, though several countries require messages promoting healthy diet and exercise to be displayed on advertisements for unhealthy foods as an alternative policy measure, their potential to mitigate the promotional influence of advertisements is currently not well understood.

### Research Objectives

The overall objective of this thesis was to examine key characteristics of policies restricting food marketing to children that may strengthen or weaken policy impact. This was done using three sub-studies. Study 1 sought to compare self-reported exposure to child-directed unhealthy food marketing among youth in Québec (which has mandatory restrictions on child-directed advertising) to youth in the other Canadian provinces where no mandatory marketing restrictions exist. Study 2 sought to examine the impact of 'brand-only' marketing, which would be permitted under proposed federal regulations in Canada, on product appeal and selection among youth. Study 3 sought to examine the efficacy of public health messages displayed on sugar-sweetened beverage (SSB) advertisements on advertised product appeal and perceived healthiness among youth.

### Methods

The three studies were conducted as part of the International Food Policy Study (IFPS) Youth Surveys, which are annual cross-sectional surveys conducted online in Australia, Canada, Chile, Mexico, the United Kingdom, and the United States with youth aged 10-17

years. Study 1 used an observational design, consisting of cross-sectional analysis of data from 15,199 youth in Canada (n=3,757 in Québec) only. Survey waves 2019-2022 assessed self-reported exposure to unhealthy food marketing, including marketing locations, marketed products, marketing techniques, brands marketed, perceptions of marketing as targeting children under 13, and desire to consume advertised products. Logistic and linear regression models investigated differences by geographic jurisdiction, adjusting for age, sex-at-birth, race or ethnicity, perceived income adequacy, screentime, and survey year. Studies 2 and 3 both used experimental designs and were embedded within the 2023 IFPS Youth Surveys for all six countries. Study 2 consisted of a between-group experimental design conducted with 5,744 youth. Participants were randomised to view an advertisement according to one of four conditions: control (video game), 'brand-only' (McDonald's logo), 'brand and unhealthy food' (McDonald's logo and hamburger), and 'brand and healthy food' (McDonald's logo and salad). Logistic and linear regression models tested the effect of 'brand-only' marketing on product appeal (measured through desire to consume the advertised product) and self-reported menu item selection in a hypothetical product selection task, as compared with other conditions. Study 3 consisted of a between-group 2-by-2 experimental design conducted with 11,521 youth. Participants were randomised to view one of two SSB advertisements (soda or a fruit drink) either with or without a health message. Logistic and linear regression models examined the efficacy of health message presence on advertised product appeal (measured through desire to consume the advertised beverage) and perceived healthiness, including 2-way interactions between beverage type and message presence.

## **Results**

**Study 1:** Compared to youth in other provinces, Québec youth reported seeing advertisements for unhealthy foods in fewer locations ( $\beta$ : -0.46), and for fewer beverage ( $\beta$ : -0.18) and restaurant brands ( $\beta$ : -0.15;  $p < 0.001$  for all); this was true across marketing locations regardless of whether they were covered under restrictions. Québec youth also reported seeing advertisements for sugary drinks ( $\beta$ : -0.40), fast-food ( $\beta$ : -0.30), sugary cereals ( $\beta$ : -0.38), snacks ( $\beta$ : -0.27), and desserts/treats ( $\beta$ : -0.28;  $p < 0.001$  for all) less frequently than those in other provinces. Québec youth had lower odds of reporting seeing advertisements featuring child-appealing marketing techniques including cartoons/characters (adjusted odds ratio (AOR): 0.57), celebrities (AOR: 0.57), unhealthy food/drink company branding (AOR: 0.75), and restaurant toys (AOR: 0.53;  $p < 0.001$  for all). Québec youth had lower odds of identifying beverage brand advertisements as 'usually aimed at kids 12 and under' (AOR: 0.72,  $p < 0.001$ ) and reported less desire to consume branded beverages than youth in other provinces ( $\beta$ : -0.10,  $p = 0.002$ ). Overall, youth's self-reported exposure to unhealthy food and beverage advertisements was substantially lower

in Québec, the only Canadian province with mandatory restrictions on child-directed advertising.

**Study 2:** No differences by condition were observed for product appeal ( $F=2.0$ ,  $p=0.111$ ). In terms of menu item selection, youth who were randomly assigned to view the ‘brand and healthy food’ advertisement were more likely to select the Garden Salad (5.7%; product featured in ‘brand and healthy food’ condition and only menu item meeting marketing nutrient profile model thresholds) than those in the ‘brand and unhealthy food’ (3.8%, odds ratio (OR):1.53) and ‘brand-only’ (3.5%, OR:1.49) conditions ( $p<0.05$ ). Youth in the ‘brand and healthy food’ condition also selected items with less saturated fat and calories than those in the ‘brand and unhealthy food’ (saturated fat  $\beta$ : -0.66; calories  $\beta$ : -25.50) and ‘brand-only’ (saturated fat  $\beta$ : -0.62; calories  $\beta$ : -26.06) conditions ( $p<0.01$  for all). Moderate-to-weak evidence suggests that youth in the ‘brand and unhealthy food’ condition (17.5%) were more likely to select the Quarter Pounder Deluxe (product featured in ‘brand and unhealthy food’ condition) than those in the ‘brand and healthy food’ (14.2%, OR: 1.29,  $p=0.013$ ) and ‘brand-only’ (15.0%, OR: 1.20,  $p=0.068$ ) conditions. Overall, brand-only advertisements likely have similar impacts on youth’s selection of unhealthy products as advertisements featuring unhealthy foods, whereas advertisements featuring healthy products may increase selection of healthier items.

**Study 3:** No differences in advertised beverage appeal were observed by health message presence ( $F=1.13$ ,  $p=0.287$ ). Youth who saw an advertisement with a health message rated the advertised beverage as healthier (mean:1.60) than those who saw an advertisement without a health message (mean:1.54,  $\beta$ :0.06,  $p=0.001$ ). Health message presence slightly increased perceived healthiness for fruit punch ( $\beta$ : 0.09,  $p=0.002$ ) but not Sprite ( $p=0.171$ ); however, there was no evidence of an interaction between SSB beverage type and message presence for either perceived healthiness ( $F=1.68$ ,  $p=0.195$ ) or appeal ( $F=1.13$ ,  $p=0.288$ ). Overall, health messages may be ineffective in discouraging unhealthy food consumption and may even erroneously reinforce perceptions of SSBs as healthy.

### **Contribution/Significance**

The findings provide evidence in support of mandatory marketing policies having a protective effect, while highlighting the need to include brand-only marketing in marketing regulations. The results also suggest that health messages may not be an effective regulatory alternative to marketing restriction. Priorities for future research include: 1) observational research with Anglophone and Francophone youth across Canada, including robust sample sizes of non-dominant language speakers in each province, to discern language-related differences in child-directed marketing exposure; 2) experimental studies

using ‘real world’ selection tasks to assess impact of brand-only and healthy food advertisements on menu item selection across a variety of brands and food processing levels; and 3) experimental studies investigating whether framing and design of health messages according to best practice guidelines may increase message efficacy. Overall, this thesis provides timely evidence to inform efficacy of policies seeking to restrict marketing of unhealthy foods to children in Canada and abroad.

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## TABLE OF CONTENTS

Examination Committee Membership .....	ii
Author’s Declaration .....	iii
Statement of Contributions .....	iv
Abstract .....	v
Acknowledgements .....	ix
List of Figures .....	xv
List of Tables .....	xvi
List of Abbreviations.....	xix
List of Symbols .....	xx
Chapter 1: Introduction .....	1
1.1 Current Nutrition Landscape .....	1
1.2 Unhealthy Food Marketing to Children .....	2
1.2.1 Overview of Marketing.....	2
1.2.2 Impact of Marketing on Food Behaviours.....	2
1.2.3 Marketing Practices for Unhealthy Food .....	4
1.3 Marketing Policy Implementation .....	5
1.3.1 Implementation Dimensions – Policy-based Definitions of ‘Child-Directed’.....	6
1.3.2 Implementation Dimensions – Food Products .....	7
1.3.3 Implementation Dimensions – Marketing Locations .....	10
1.3.4 Implementation Dimensions – Mandatory vs. Voluntary Policies.....	11
1.3.5 Canada’s Current and Proposed Marketing Restrictions .....	14
1.4 Health Messaging as a Policy Alternative.....	16
1.5 Thesis Rationale and Aims .....	18
Chapter 2: Methods .....	20
2.1 Overview of IFPS Youth Surveys.....	20
2.2 Study 1: Differences in Youths Self-Reported Exposure to Unhealthy Food Marketing by Marketing Restriction Presence: A Comparison of Québec and Other Canadian Provinces .....	21
2.2.1 Research Objectives.....	21
2.2.2 Design and Sample.....	22

2.2.3 Measures .....	22
2.2.4 Analysis .....	25
2.2.5 Power and Sample Size Calculations for Study 1 .....	26
2.3 Study 2: Testing the Efficacy of Restrictions on Unhealthy Food Marketing to Children: an Experimental Study of ‘Brand-Only’ Food Advertisements .....	27
2.3.1 Research Objectives.....	27
2.3.2 Design and Sample.....	27
2.3.3 Measures.....	29
2.3.4 Analysis .....	33
2.3.5 Power and Sample Size Calculations for Study 2 .....	33
2.4 Study 3: Efficacy of Health Messages Displayed on Sugar-Sweetened Beverage Advertisements in Altering Products’ Appeal and Perceived Healthiness among Youth: Exploring a Potential Alternative to Marketing Restriction .....	34
2.4.1 Research Objectives.....	34
2.4.2 Design .....	34
2.4.3 Measures.....	36
2.4.4 Analysis .....	36
2.4.5 Power and Sample Size Calculations for Study 3 .....	37
Chapter 3: Exposure to Unhealthy Food Marketing in Québec Versus Canada .....	38
3.1 Study 1: Differences in Youths Self-Reported Exposure to Unhealthy Food Marketing by Marketing Restriction Presence: A Comparison of Québec and Other Canadian Provinces .....	38
3.1.1 Overview.....	39
3.1.2 Background .....	40
3.1.3 Methods .....	42
3.1.4 Results .....	46
3.1.5 Discussion.....	61
3.1.6 Conclusions.....	64
3.1.7 References .....	66
3.2 More Details on Sensitivity Analysis for Language .....	71
Chapter 4: Exemptions for ‘Brand-Only’ Advertisements.....	73

4.1 Study 2: Efficacy of restrictions on unhealthy food advertising to children: An experimental study of ‘brand-only’ advertisement impact on hypothetical menu item selection .....	73
4.1.1 Overview.....	74
4.1.2 Background .....	75
4.1.3 Methods .....	77
4.1.4 Results .....	81
4.1.5 Discussion.....	89
4.1.6 Conclusions.....	92
4.1.7 References .....	94
4.2 Brand appeal task .....	100
Chapter 5: Health Messages in Advertisements for Unhealthy Foods.....	106
5.1 Study 3: Efficacy of health messages displayed on ‘unhealthy food’ advertisements in altering product perceived healthiness and appeal among youth: exploring a potential alternative to marketing restriction .....	106
5.1.1 Overview.....	107
5.1.2 Background .....	108
5.1.3 Methods .....	111
5.1.4 Results .....	114
5.1.5 Discussion.....	119
5.1.6 Conclusions.....	122
5.1.7 References .....	124
Chapter 6: Discussion .....	130
6.1 Overview.....	130
6.2 Current Canadian Policy: a Mix of Mandatory and Voluntary Regulation .....	130
6.2.1 TV, Digital Marketing, and ‘Child-directed’ Language.....	132
6.3 Proposed Canadian Policy & the Brand Loophole .....	134
6.4 Health Messages as a Policy Alternative to Restriction.....	137
6.4.1 Health Messages & Design-related Factors .....	138
6.5 Strengths and Limitations .....	140
6.6 Future Directions .....	142
6.7 Conclusions .....	144

References .....	145
Appendices .....	168
Appendix A – Legislated Health Messages in France .....	168
Appendix B – Sample Size And Response Rate .....	169
Appendix C – Survey Document, Relevant Sections .....	170
Appendix D – Statistical Models .....	179
Appendix E – Advertisement Design .....	187
Appendix F – Chapter 3 Supplemental Tables and Figures .....	189
Appendix G – Chapter 4 Supplemental Figure .....	213
Appendix H – Chapter 5 Supplemental Table .....	214

## LIST OF FIGURES

### Chapter 3

**Figure 3-1:** Mean frequency of seeing or hearing advertisements for specific food or drink categories in the past 30 days (unadjusted, range: 1-6), 2019-2022 (weighted estimates, n=12,437)

**Figure 3-2:** Mean frequency of seeing or hearing advertisements for sugary drinks in the past 30 days (unadjusted, range: 1-6) by jurisdiction and age group, 2019-2022 (weighted estimates, n=12,437)

### Chapter 4

**Figure 4-1.** Condition images shown to survey participants.

**Figure 4-2.** Hypothetical product selection task images shown to survey participants.

**Figure 4-3.** Mean product appeal of the hamburger, by experimental condition, 2023 (n=5,748)

### Chapter 5

**Figure 5-1.** Experimental condition images shown to survey participants.

### Appendices

**Figure F-S1:** Number of locations where advertisements for ‘unhealthy’ foods or drinks were seen (unadjusted, range: 0-13) and number of brands seen advertising ‘unhealthy’ foods or drinks in the past 30 days (unadjusted, beverage brand range: 0-3, restaurant brand range: 0-4), 2019-2022 (weighted estimates: n=14,599 generally, n=14,480 for beverage brands, and n=14,467 for restaurant brands)

**Figure F-S2:** Mean desire to consume of products from advertised beverage and restaurant brands (unadjusted, range:1-7); 2019-2022 (weighted estimates, n=14,480 for beverage and n=14,467 for restaurant models)

**Figure G-S1.** Overview of Health Canada’s proposed marketing nutrient profile model thresholds and application to food items in the hypothetical product selection task.

## LIST OF TABLES

### Chapter 2

**Table 2-1.** Condition images shown to survey participants.

**Table 2-2.** Ingredients of menu items included in hypothetical product selection task across study countries

**Table 2-3.** Condition images shown to survey participants.

### Chapter 3

**Table 3-1.** Sample demographic characteristics, 2019-2022 (weighted estimates, N=14,599)

**Table 3-2:** Participants reporting seeing or hearing advertisements for ‘unhealthy’ foods or drinks in the past 30 days in any locations, overall and grouped by policy coverage in Québec, 2019-2022 (weighted estimates, n=14,563)

**Table 3-3:** Frequency of seeing or hearing advertisements for specific food or drink categories in the past 30 days (range: 1-6), 2019-2022 (weighted estimates, n=12,437)

**Table 3-4:** Prevalence of seeing unhealthy foods or drinks advertised using specific marketing techniques in the past 30 days and overall prevalence of owning an item with branding or restaurant toy from a company selling unhealthy food or drinks, 2019-2022 (weighted estimates, n=14,288)

**Table 3-5:** Number of beverage and restaurant brands seen in advertisements in the past 30 days (beverage brand range: 0-3, restaurant brand range: 0-4); Prevalence of advertisements for beverage and restaurant brands perceived as usually aimed at children under 12 years of age; Desire to consume products from advertised beverage and restaurant brands) (range:1-7); 2019-2022 (weighted estimates, n=14,480 for beverage and n=14,467 for restaurant models)

**Table 3-6.** Language of survey completion by jurisdiction, 2019-2022 (weighted estimates, n=14,599)

**Table 3-7.** Participants seeing or hearing advertisements for ‘unhealthy’ foods or drinks in the past 30 days in any locations across jurisdictions, overall and by language, 2019-2022 (weighted estimates, n=14,563)

**Table 3-8.** Participants seeing or hearing advertisements for ‘unhealthy’ foods or drinks in the past 30 days in any locations for French vs English language, by jurisdiction, 2019-2022 (weighted estimates, n=14,563)

### Chapter 4

**Table 4-1.** Sample characteristics, by experimental condition, 2023 (N=5,720), % (n)

**Table 4-2.** Percent of participants who selected each menu item, by experimental condition (5,720)

**Table 4-3.** Likelihood of selecting each menu item, by experimental condition (n=5,720)

**Table 4-4.** Key nutrient level means, by experimental condition (n=5,438)

**Table 4-5.** Differences in key nutrient levels, by experimental condition (n=5,438)

**Table 4-6.** Sample characteristics of participants randomised to appeal task, by experimental condition, 2023 (N=5,748), % (n)

**Table 4-7.** Mean product appeal, overall and by experimental condition, 2023 (n=5,748)

## **Chapter 5**

**Table 5-1.** General and youth specific health messages legislated for in France under article L. 2133-1 of the Public He

**Table 5-2.** Sample characteristics, by experimental condition, 2023 (N=11,236), % (n)

**Table 5-3.** Mean perceived healthiness and appeal, by drink type and health message presence (N=11,236)

## **Appendices**

**Table A-1.** General and youth specific health messages legislated for in France under article L. 2133-1 of the Public Health Code.

**Table B-1.** Participation and cooperation rate by survey year; sample sizes by survey year.

**Table D-1.** Study 1: Exposure to Unhealthy Food Marketing in Québec versus Other Provinces, statistical models.

**Table D-2.** Study 2: Experimental Study of ‘Brand-only’ Food Advertisements, statistical models.

**Table D-3.** Study 3: Efficacy of Health Messages in Advertisements for Unhealthy Foods, statistical models.

**Table E-1.** Original advertisements and altered condition images.

**Table F-S1:** Location Exposure Index for seeing/hearing advertisements for ‘unhealthy’ foods or drinks in the past 30 days, by demographics (range: 0-13), 2019-2022 (weighted estimates, n=14,599)

**Table F-S2:** Percentage of participants reporting seeing or hearing any advertisements for ‘unhealthy’ foods or drinks in the past 30 days grouped according to policy coverage, by demographics, 2019-2022 (weighted estimates, n=14,599)

**Table F-S3:** Frequency of seeing or hearing advertisements for specific food or drink categories in the past 30 days, by demographics, 2019-2022 (weighted estimates, n=12,437)

**Table F-S4:** Prevalence of seeing unhealthy foods or drinks advertised using specific marketing techniques in the past 30 days, by demographics, 2019-2022 (weighted estimates, n=14,288)

**Table F-S5:** Prevalence of owning an item with branding or a restaurant toy for a company selling unhealthy food or drinks, by demographics, 2019-2022 (weighted estimates, n=14,288)

**Table F-S6:** Number of beverage and restaurant brands seen in advertisements in the past 30 days, by demographics (beverage brand range: 0-3, restaurant brand range: 0-4), 2019-2022 (weighted estimates, n=14,480 for beverage and n=14,467 for restaurant models)

**Table F-S7:** Prevalence of advertisements for beverage and restaurant brands perceived as ‘usually aimed at children under 12 years of age’, by demographics, 2019-2022 (weighted estimates, n=14,480 for beverage and n=14,467 for restaurant models)

**Table F-S8:** Desire to consume of products from beverage and restaurant brands, by demographics, 2019-2022 (weighted estimates, n=14,480 for beverage and n=14,467 for restaurant models)

**Table H-S1.** Pairwise contrasts of perceived healthiness and appeal by experimental condition, (N=11,236)

## LIST OF ABBREVIATIONS

AOR	Adjusted Odds Ratio
CI	Confidence Interval
HAVISA	Hábitos de Vida Saludables en la Población Española
IFPS	International Food Policy Study
OR	Odds Ratio
SE	Standard Error
SSB	Sugar-Sweetened Beverage
TV	Television
UK	United Kingdom
UNICEF	United Nations Children's Fund
US	United States
WHO	World Health Organization

## LIST OF SYMBOLS

$\beta$  Estimated regression coefficient

## CHAPTER 1: INTRODUCTION

### 1.1 Current Nutrition Landscape

Nutrition is fundamental to children's healthy growth and development [1]. In addition, early life nutrition behaviours often persist into adulthood, underscoring the importance of establishing healthy nutrition behaviours early on [1–3]. Poor nutrition is associated with increased risk of chronic diseases and is a predictor of later life morbidity and mortality, partly due to increased prevalence of overweight and obesity [2,4]. The global incidence of childhood obesity has increased over the past four decades, with children aged 5-19 years experiencing an eight-fold increase between 1975-2016, a more rapid increase than among younger children [5]. As of 2016, more than 330 million children lived with overweight or obesity, and these numbers continue to rise [5,6]. In Canada, approximately 30% of children aged 5-17 years lived with overweight or obesity in 2017 [7]. The incidence of diabetes in children has similarly been increasing, including in Canada and the United States (US) [8,9].

The food environment has a fundamental influence on dietary quality and increased rates of obesity among children [5]. Food production and consumption have undergone significant changes as a result of the industrialization and globalization of food systems, as well as worldwide urbanization [10–13]. The availability of energy-dense nutrient-poor foods has increased, with affordable ultra-processed foods contributing more than half of total energy intake among children aged 2-19 years in the US [5,10,12,14]. Ultra-processed foods can be defined as combinations of ingredients, primarily designed for exclusive industrial use, which are derived from various industrial chemical processes and combined with additives to create ready-to-eat foods [15]. Ultra-processed foods are typically high in saturated fat, salt, and sugars, and low in fibre, protein and vitamins [15,16]. Higher consumption of ultra-processed foods has been linked with heightened risk of cardiovascular disease, type II diabetes, cancer, and all-cause mortality among adults in diverse global studies [16–19]. Research with paediatric populations is more mixed [20–22]; however, there is some evidence to suggest that lower consumption of ultra-processed foods is associated with better diet quality in youth [23–26]. Accordingly, recommendations to limit intake of ultra or highly processed foods have been adopted in the national dietary guidelines of several countries, including in Canada and Brazil [27–30].

## **1.2 Unhealthy Food Marketing to Children**

Various population-level policy approaches have been implemented globally to address the public health burden of unhealthy diets and support healthy eating patterns, including taxes on products high in sugars (specifically sugar-sweetened beverages (SSBs)), health literacy and nutrition education campaigns, school food policies, as well as front-of-pack nutrition labels/warnings, amongst others [12,31,32]. A policy approach gaining traction in recent years is the implementation of restrictions on the marketing of unhealthy foods and non-alcoholic beverages (hereafter collectively referred to as ‘unhealthy food’<sup>1</sup>) to children [34].

### **1.2.1 Overview of Marketing**

Marketing refers to all processes involved in generating value for a product or service and moving it from the organization to the consumer [35,36]. These processes involve identifying and anticipating (or creating) consumer needs and aiming to satisfy them [35]. Marketing includes advertising and promotion as part of its communication processes [35]. Whereas advertising refers to paid communication messages, promotion encompasses all communication strategies including retail and price promotions, sponsorships, unpaid media, and broader promotional strategies [35]; hereafter, ‘marketing’ will be used when referring to both advertising and promotion. The overall aim of marketing efforts is to make consumers aware of the products and services offered as well as describe potential benefits [35].

Marketing communication campaigns have two core components: 1) selection of communication channels (referred to as ‘locations’ hereafter to avoid confusion with television (TV) channels), and 2) creation of communication messages [37]. These map onto the exposure and power of marketing, respectively [34,37]. Exposure is defined as the “reach and frequency of the marketing messages<sup>2</sup>”, including the location and times where marketing is seen and experienced, whereas power refers to the “creative content, design and execution of the marketing messages” [34,37]. The impact of marketing is thus a function of exposure and power [34,37].

### **1.2.2 Impact of Marketing on Food Behaviours**

According to the Hierarchy of Unhealthy Food Promotion Effects model proposed by Kelly et al., marketing impacts nutrition behaviour directly by increasing awareness and appeal of unhealthy foods, and indirectly by altering attitudes towards products and

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<sup>1</sup> For the purposes of this thesis, the term “unhealthy food” will be used to refer to foods that “contribute to excess intakes of sodium, sugars and saturated fat” as described by Health Canada in proposed federal marketing regulations [33].

<sup>2</sup> Reach refers to the “percentage of people in a target market who are exposed to the campaign over a specified period”, and frequency refers to a “measure of how many times the average person is exposed to a message” [37].

companies [38]. This impact occurs both at a brand level, including brand switching within a product category, and at the product category level, with consumers being encouraged to try new foods [38]. In turn, preferences are created for marketed products, which increase purchase intent, particularly in the presence of other persuasive cues reinforcing positive affect and recall, such as availability at point-of-sale and shelf placement [34,38]. Greater exposure to advertising has been associated with increased habitual consumption of both the advertised and related foods (indicating that the impact is not brand/product specific), as well as positive attitudes towards the advertised foods, among both adult and child populations [34,39–41]. According to the Reactivity to Embedded Food Cues in Advertising model developed by Folkvord et al., food cues in advertisements elicit physiological (e.g., salivation, increased gastric activity) and psychological (e.g., thoughts about food, cravings) responses that increase overall desire for the advertised food [42]. Consumption of the advertised food reinforces positive attitudes towards the products—particularly for foods high in sugar, sodium, and fat—creating reciprocal loops between food cue reactivity and consumption [42]. Food cues that are seamlessly embedded within marketing (e.g., via advergames or influencer content), require less cognitive elaboration occurs and are more persuasive [42]. Systematic reviews have shown increases in overall and total caloric intake following exposure, which can be hypothesised to displace nutrient-dense foods and contribute to lower diet quality [38,43–45]. Notably, intake following unhealthy food marketing exposure is not compensated for at other eating occasions [46–48]. Research has also examined the mediational or causal pathways of advertising, with exposure to food company logos and advertisement commercials increasing activation of brain areas responsible for attention, brand recognition, and reward responses, resulting in heightened recall [49–51]. This process is further reinforced by environmental cues, such as the social settings or occasions when the marketed foods are consumed [38]. Exposure to marketing accumulates over time, with each subsequent exposure reinforcing the overall impact on behaviour [38].

Children are an important demographic for marketing due to their multiple points of leverage on household spending and the potential of their future adult purchasing power [6,52]. Children can spend their own money (often on snacks or confectionary), influence household purchases through ‘pester power’ (requesting the purchase of certain products), and can develop brand and product loyalties that may persist through adulthood [6,10,53,54]. The observational evidence-base for youth aged 2 to 18 years consistently demonstrates the relationship between marketing and behaviour, with unhealthy food marketing being correlated with adiposity in youth of all ages [55–57]. There is growing evidence that both children’s and adolescents’ eating outcomes are negatively

impacted by unhealthy food marketing, including negative changes in preference, choice, and intake [43,58–60].

As per the Social Comparison theory, children and adolescents often rely on social comparisons, evaluating their beliefs and behaviours in relation to those of reference groups (e.g., family members, close friends, peers at school) [61]. Central to this socialization are social norms, which may be descriptive or injunctive. Descriptive norms refer to perceptions of how others typically behave, whereas injunctive norms refer to perceptions of how one ‘should’ behave; injunctive norms are preceded by descriptive norms in influencing behaviour [62,63]. As children grow older, familial influence on descriptive norms wanes, while peer influence on descriptive norms and subsequently behaviours, including dietary intake, increases [61]. Repeated exposure to unhealthy food advertising alters these norms, impacting children and adolescents perceptions of how commonly unhealthy foods are consumed by peers and establishing unhealthy foods as the ‘norm’ [61]. This can occur even without active processing of the marketing information, as had been initially posited by earlier models reliant on the information processing approach [64]. For example, a recent study by Kelly et al. testing the Hierarchy of Effects model found that commercial screen media use was positively associated with children’s normative brand beliefs about unhealthy food and drink brands [65]. Digital media exposure was associated with increased beliefs that ‘many children their age’ liked the brands and that ‘popular children their age’ consumed products from the brands, corresponding to descriptive and injunctive norms respectively [65]. Commercial screen media use was also associated with both increased purchase requests to parents and children’s own purchasing [65].

### ***1.2.3 Marketing Practices for Unhealthy Food***

Marketing practices are shaped by the products, locations, and techniques involved. In general, research shows that food marketing practices promote energy-dense nutrient-poor ultra-processed foods to a far greater extent than fruits/vegetables and unprocessed foods, with the majority of food products marketed to children being high in saturated fat, salt, and/or sugars [16,34,38,66–69]. Research shows that, across media types, at minimum 50% but up to 90% of all food marketing to children promotes unhealthy foods (as classified by country specific dietary guidelines) [34,70,71]. The most commonly marketed food categories include ‘fast food’, confectionary and desserts, SSBs, snacks, breakfast cereals, and dairy products [34]. Unhealthy food marketing is common in both traditional and digital media. Traditional media includes print (e.g., magazines), broadcast (e.g., TV, cinema, radio) and packaging, while digital media refers to any online media (e.g., content embedded on webpages, social media platforms,

websites, video games, advergames) [6,34,52,58,68,72]. Other marketing locations include settings where children gather (e.g., sports clubs, community centres, recreation facilities, schools), retail environments (e.g., product placement and price promotion in food stores or restaurants), outdoor advertising (e.g., billboards, bus shelters, trains), and event sponsorship (e.g., sponsorship of youth sporting events, festivals, or public events) [6,34,52,58,68,72]. Additionally, there are a variety of techniques used to appeal to children. Food marketing directed to children often features licenced promotional characters; celebrity or sports endorsements; child appealing colours or designs/visual imagery; animation; gifts, competitions, or games [10,34]. These techniques are more likely to be employed to promote unhealthy foods, compared with healthier products [34,73]. Notably, the World Health Organization (WHO) states in its guidelines that restricting the use of promotional characters has greater impact on the promotional power of marketing, as compared with restricting a broader range of child-appealing persuasive techniques [74].

### **1.3 Marketing Policy Implementation**

Restrictions on marketing of unhealthy foods to children have been recommended by leading international health agencies, including the WHO [37]. Globally, over a dozen countries have mandatory restrictions on unhealthy food marketing to children. Six jurisdictions restrict marketing of all commercial products to children, including food, in certain types of media and settings; however, most countries with mandatory restrictions limit the scope to only foods and beverages [75,76]. For example, Mexico prohibits advertising of specific food categories on TV channels where children make up more than 35% of the audience during time frames specific to weekdays and weekends [75]. Additional updates to restrictions were rolled out in 2023, with Mexico prohibiting the use of marketing techniques appealing to children both on and off-line [77,78]. In contrast, Chile combines restrictions on advertisement contents, time of day when it is aired, and audience composition, and applies a nutrient profile model to all foods and beverages (as described below) [75]. Chilean time restrictions are some of the broadest, with audience composition restrictions also applied outside of the restricted times [75]. Additionally, the United Kingdom (UK) government recently announced new restrictions on unhealthy food marketing, to come into force in January 2026 and legislated for in the *Health and Care Act* [79]. These include a 9pm ‘watershed’ on broadcast and on-demand program advertisements of unhealthy foods, limits on promotion by volume price (e.g., multibuy offers) and in key store locations (e.g., aisle ends, checkout), as well as a prohibition on advertising by UK operating business of unhealthy foods online [79,80]. The prohibition on online advertisement would apply to advergames, social media and influencer marketing,

as well as video and in-game advertising, and is not limited to child-directed media [10,80,81]. Overall, the restrictions proposed by the UK government appear to be among the most comprehensive marketing regulations to date. With less focus on ‘child’-directed marketing, they are in greater alignment with the most recent WHO recommendations for restrictions in all settings or media where children may be exposed [74]. As demonstrated by the different approaches taken by countries, existing restrictions are fairly heterogeneous. Marketing restrictions vary on four primary criteria: definitions of ‘child-directed’ marketing, food products covered under the restrictions, marketing locations covered under the restrictions, and mandatory vs. voluntary policies. Each of these factors can influence the impact of marketing policies, as described below [59].

### ***1.3.1 Implementation Dimensions – Policy-based Definitions of ‘Child-Directed’***

The definition of what constitutes a ‘child’ remains contentious [75]. The United Nations Convention on the Rights of the Child and the United Nations Children’s Fund (UNICEF) define children as those under 18 years of age [37,82]. However, there is presently no globally agreed-upon definition of ‘child’, with regulatory interpretations ranging from anyone under 18 years of age to only those under 12 years of age [37,75]. Research has shown that children under 12 years of age cannot reliably identify persuasive intent, as described by Piaget’s theory of cognitive development [55,58,83]. The ability to critically evaluate marketing begins at 12 years and continues to develop into adolescence (13-17 years) and young adulthood, with reasoning ability not being fully developed until 16 years of age [10,41,58,84]. Beyond the cognitive stage approach, the Knowledge Persuasion model states that the ability to recognise persuasive intent of marketing is not age-specific, but rather improves as one gains experience with new types of marketing locations and techniques [64]. The ability to exhibit behavioural control and regulate purchase desire of marketed foods, similarly, continues to develop throughout adolescence [10,58,85]. The Food Marketing Defence model proposed by Harris et al. includes four conditions necessary to effectively resist food marketing stimuli: 1) conscious attention to marketing stimuli and understanding of their persuasive intent; 2) understanding of the impact of marketing stimuli and how to defend against them; 3) cognitive capacity and sufficient resources to defend against the marketing stimuli; and 4) desire to defend against the marketing stimuli [64]. Both the ability and motivation to resist marketing influence are thus important [64]. These may differ depending on age (i.e., older children possibly having greater ability and motivation as they gain more experience), as well as the marketing products (more tempting less healthy foods, which may have associated norms), locations (including locations with greater frequency of exposure such as TV), and techniques (more/less persuasive) involved [64]. Notably, the frequency of exposure to mixed-audience environments, which are not covered under most restrictions,

increases as children grow older [72]. Adolescents also experience increasing online engagement as part of their social development, with subsequently greater exposure to unhealthy food marketing and influences on descriptive and injunctive norms compared with younger children [58,86,87]. Thus, adolescents have increased exposure to unhealthy food marketing and are known to be similarly impacted, but remain largely excluded from food marketing policies [74].

Even in cases where the age at which one is deemed a ‘child’ is well defined, there is presently no consensus in marketing policy on what constitutes ‘child-directed’ marketing [75]. Most commonly, marketing is deemed child-directed if it appears on children’s TV channels and/or around the time of children’s programming [34]. Another approach is time-based restrictions, which are based on hours (e.g., after school hours) or days (e.g., weekends, holidays) when children are most likely to watch TV [75]. This approach is predicated on the fact that child-directed unhealthy food marketing was found to be more common during times when children were more likely to be watching TV [75]. An alternative to the time-based approach is viewership proportion, wherein marketing is classified as child-directed based on the proportion of viewership made up by children (e.g. more than 20% of total audience in Chilean regulations) [72,75,88]. However, when children consume the same media in the same settings as adults, they may represent a relatively small proportion of the audience, thus not triggering a ‘viewership threshold’ [72]. In this scenario, though the relative proportion may be small, the absolute number of children exposed to marketing may be large [72]. Some policies take a more general approach, restricting specific marketing techniques that are considered child-appealing, such as the use of gifts/toys, celebrities, and licenced or cartoon characters [75]. Overall, the ambiguity of the ‘child-directed’ language represents a major weakness in existing mandatory regulations, with the new WHO guidelines calling for policies to address children’s food marketing exposure regardless of marketing location, intended audience, and timing [74].

### **1.3.2 Implementation Dimensions – Food Products**

#### **1.3.2.1 Nutrition Criteria**

The scope of marketing restrictions on unhealthy foods is partly determined by the criteria used to define foods as ‘unhealthy’ [75]. This is typically determined through nutrient profiling, which refers to classifying foods according to their nutritional composition, with the explicit goal of disease prevention and health promotion [89,90]. Nutrient profile models can be applied to all foods and beverages (as in the UK and Chile) or only to specific food and beverage categories such as confectionary, sweetened-drinks, or snacks (as in Mexico) [75]. In addition to marketing policies, nutrient profile models have

also been used as a basis for a variety of other food environment-related policies, including food taxes in Mexico and front-of-pack labelling in Chile [90]. Nutrient profile models are typically based on levels of energy, total fat/saturated fat/trans-fat, total sugar/added or free sugars/non-sugar sweeteners, and sodium [75,89,90]; some models, such as the one developed by the Pan American Health Organization, make specific reference to ultra-processed foods [91]. Though less common, some nutrient profile models also account for beneficial components (e.g., fruit/vegetables, fibre, protein), including those developed in the UK, Ireland, and Mexico [75]. The models' nutrient thresholds may incentivise product reformulation, category restrictions, reduction in serving sizes, or product switching within a category, aiming to encourage consumers to shift away from processed food consumption [75,92]. Models have also been put forth by international organizations, such as the WHO regional offices [93].

The WHO Regional Office for Europe nutrient profile model was recently updated in tandem with the new WHO guidelines on food marketing policies and includes thresholds for all of the above named nutrients (sans the beneficial components) [89,90]. The WHO Regional Office for Europe model assigns nutrient thresholds to all categories except for 'fresh/frozen fruit and vegetables', and maintains a threshold for energy for only one category, 'ready-made and convenience foods', wherein energy thresholds are applied per 100g rather than per portion [89,90]. Thresholds for energy are not required in the WHO Regional Office for Europe model for categories which already have thresholds for total fat and total sugars [89,90].

### *1.3.2.2 Brand Marketing*

Branding is a common technique in child-directed marketing, with food being one of the most highly branded commercial products [94,95]. Brand marketing refers to the use of brand imagery recognizable as a representation of the brand, such as logos or mascots (e.g., McDonald's golden arches or Kellogg's Tony the Tiger), in marketing efforts [74,96]. Brand marketing works by creating positive associations with the brand, aiming to create brand loyalty [64]. This may occur subtly, and may have more long-standing impact than direct communication of product benefits or features [64]. A key factor in the impact of brand marketing is its ability to implicitly invoke positive affect [64]. This is commonly done in child-directed marketing by pairing brands with attractive stimuli (e.g., animated characters, fun games), even when the stimuli have no direct relation to the brand [64]. One study examining popular child-directed food advertisements on TV found that emotional appeals were more commonly used than rational appeals, which present information about factual attributes of the brand or product [97]. Affective reactions to advertising have been shown to be strong predictors of future purchasing [64]. Children

have been shown to have a preference for foods that are presented in branded packaging, impacting consumption and general product appeal [48,98–101]. Food company advertisements are known to promote the brand as a whole, using celebrity endorsements or other marketing techniques to increase the appeal of the brand [102].

The majority of mandatory and voluntary marketing regulations are focused on the nutrition criteria of products, restricting advertising of unhealthy foods only if products classified as ‘restricted’ by a marketing nutrient profile model appear in the advertisements [33,59,103,104]. Brand-only marketing features brand imagery but does not show or reference by name any identifiable food/beverage products which could be evaluated by a nutrient profile model (e.g. McDonald’s burgers or Kellogg’s Frosted Flakes cereal) [74,96]; brand-only marketing is thus commonly excluded from regulations [74,96]. This means that companies who may have otherwise faced restrictions due to exceeding nutrient thresholds can avoid restrictions by opting for brand rather than product marketing [59,72,75]. Further, company-owned brand equity characters (i.e., those designed specifically to promote products such as Ronald McDonald) are not typically covered by marketing restrictions [59]. The use of brand equity characters is associated with increased preference for promoted products [105]. Other examples of brand marketing include sponsorships, product placements, and lifestyle-based marketing techniques [59].

Branding is important to consider as mandatory regulations that do not address brand marketing may create a loophole for circumventing the restrictions, as illustrated in evidence from tobacco marketing [72,106]. The potential shift in advertising expenditures from restricted product marketing to unrestricted brand marketing is likely, given that marketing where no food products are featured is automatically exempt [72]. Food companies are known to advertise products that meet nutrient profile model thresholds in a way that promotes a specific brand category which may include foods not permitted for advertising [102]. For example, in 2013, Kraft Foods was found to advertise five varieties of Lunchables that met advertising standards, while offering 37 additional varieties which did not [102]. An alternative approach of brand classification has been suggested in which the top five selling items by market share are identified and brand advertising is restricted if three or more of the identified products would not be permitted under the relevant nutrient profile model [72]. The Advertising Guidance document published by the Committee of Advertising Practice in UK and offering guidance in interpreting the UK Code of Advertising stipulates that non-broadcast media brand advertising is subject to restriction if it promotes a specific high fat, sugar, or salt product by using branding that is synonymous with it (e.g., Tony the Tiger is synonymous with Kellogg’s Frosted Flakes cereal) [79,103]. These restrictions also apply to product lines (i.e., a range of products offered by

the company, such as different burgers or ice cream shakes) if the product line is made up of at least 50% high fat, sugar, or salt products [79,103]. It is not yet clear what stance the marketing restrictions currently proposed in the UK and set to be implemented in January 2026 will take [79,103]. The WHO has proposed a similar approach as part of the CLICK framework wherein a brand is categorised as ‘healthy’ or ‘unhealthy’ based on the nutrient levels of the top-selling and/or most visible product [107,108]. There is presently no scientific consensus on the best method to categorise brands as healthy or unhealthy, particularly given the legislative difficulty of the endeavour as food companies typically do not disclose item sales, complicating compliance monitoring [72,107]; [72,107]; however, a threshold model based on product-line nutrient profiling for brand classification has demonstrated some feasibility [107]. Overall, literature on child-directed brand-only marketing of foods is limited, with calls from researchers and leading global health agencies for further research [14].

### **1.3.3 Implementation Dimensions – Marketing Locations**

Marketing exposure occurs across a range of locations, as discussed in *section 1.2.3*. TV is the most commonly restricted location, in addition to schools and childcare institutions [75]. Consequentially, most research in this field has focused on restrictions on TV and in schools [59,73,75,109]. Restrictions in other settings (e.g., outdoor, cinema) and in other traditional (i.e., packaging, print) and digital media are less common [75].

Digital marketing is qualitatively different from traditional media marketing in that it often explicitly encourages children to interact with the marketing material [83]. These interactions can occur through advert gaming platforms (games featuring branded content) or through encouraging of sharing marketing content on social media (thereby making children brand ambassadors) [83]. Additionally, broadcast marketing can more readily be distinguished from programming content than marketing within the digital sphere [6]. Social media influencer marketing is an area of particular difficulty, with boundaries being easily blurred between entertainment and marketing [6]. For example, in a recent study, adolescents were not able to correctly distinguish between advertisements and Instagram posts, suggesting that social media advertisements may not be perceived as marketing [110]. Even in cases where children are able to successfully recognise digital food advertisements, they have been shown to remain engaged with the content (e.g., watching advertisements when given the option to skip) [111]. Further, marketers leverage the peer-to-peer aspect of social media to obscure the boundary between marketing and peer interaction [112]. Peer endorsed marketing has been posited to be more influential than traditional marketing, exerting greater impact on nutrition behaviours [112].

Digital marketing is also important to consider given the ubiquitous nature of digital content. For example, in 2020, 97% of UK children aged 5-15 accessed the internet and 96% watched TV programmes via on-demand services, while only 56% of children watched TV live [86]. There has been a relative decrease in recent years in per capita expenditures on traditional media, such as TV and print media advertisements (13% decrease for TV, 92% decrease for print in Canada), which is important to note given the low cost and potential high profit margin of digital marketing [52, 113]. Children are also increasingly exposed to unhealthy food marketing on food company websites, with over one million children visiting them each month [114]. Website exposure is detrimental considering that 81% of websites feature marketing of unhealthy foods and beverages, with over 85% of all food company social media (e.g., Facebook, YouTube) posts promoting food classified as restricted according to the country specific nutrient profile models [87, 115]. Digital marketing is predominant, with over two thirds of videos by popular child-influencers on YouTube ‘made-for-kids’ channels featuring food – most of which is unhealthy [116, 117]. These channels may contribute to purchasing requests and influence food choice and intake [118]. There are also additional concerns around the protection of children’s privacy and personal data, given the ‘micro-targeting’ of marketing using user data [113]. Overall, the shift from linear to digital content consumption underscores the importance of regulating digital marketing, particularly given that almost half of children aged 5 to 17 years of age report spending more than two hours per day on screens and over three quarters of children aged 10 to 17 years report using at least one social media platform [119, 120].

### **1.3.4 Implementation Dimensions – Mandatory vs. Voluntary Policies**

Though broadly described as mandatory or voluntary, marketing restrictions can take one of three forms: self-regulatory, government-approved voluntary, or mandatory [84]. Each form of restriction has nuanced differences in implementation, with subsequent implications for the effectiveness of the policies and thus consumer behaviour [121].

#### **1.3.4.1 Self-regulatory and Government-approved Voluntary Approaches**

The self-regulatory approach consists of voluntary measures, guidelines, or codes of conduct developed by the industry [84]. Examples include the *Food & Beverages Advertising Code* in Australia, the *Children’s Food and Beverage Advertising Initiative in the US*, and the *Code for the Responsible Advertising of Food and Beverage Products to Children* (‘*Food and Beverage Advertising Code*’) in Canada [122–124]. On the other hand, government-approved voluntary approaches consist of guidelines developed by regulatory authorities that are not mandated, with compliance at the discretion of industry [84]. This approach has been adopted by Ireland, Norway, Italy, Denmark, and Latvia, amongst other

countries [84]. Most countries undertaking this approach have a mix of both government-approved voluntary and mandatory approaches based on marketing technique [84].

Government-approved voluntary and industry-led self-regulation, are the dominant policy approaches globally [75,84]. Despite this, such voluntary approaches have consistently been found to have little impact on the food environment, with few meaningful changes in children's exposure to unhealthy food marketing [71,75,114,121,125–127]. International research has shown that advertisements that should theoretically not be permitted according to industry codes were more common in countries employing self-regulatory approaches than countries with no marketing restriction policies at all [66]. Systematic non-compliance with self-regulation has repeatedly been demonstrated, with negligible adherence and insufficient monitoring and evaluation [71,128].

#### *1.3.4.2 Mandatory Approaches*

Mandatory policies refer to legislation and regulations passed by governments that do not rely on voluntary adherence. Mandated restrictions on food marketing have been implemented in Mexico and Chile, with restrictions passed but implementation on pause until 2026 in the UK [84]. Other jurisdictions, such as the province of Québec, have mandated broader restrictions on marketing to children that include, but are not specific to, unhealthy foods [75].

Relatively few studies have assessed the impact of mandatory restrictions, in part due to methodological challenges such as a lack of efficient monitoring systems to support evaluating implementation [129]. The results of the existing studies suggest reductions in exposure to unhealthy food marketing and purchasing of unhealthy foods post mandatory regulation implementation [75,121]. However, the effect sizes reported in different studies are variable (potentially due to heterogeneity of study methodologies), with a recent systematic review classifying certainty of evidence as 'very low' for four of six key outcomes (exposure, power, dietary intake, and product change, e.g., portion size or reformulation) and 'low' for the remaining two outcomes (purchasing and unintended consequences favourable to public health) [75,121]. These low scores may be related to the inherent nature of GRADE criteria which ranks observational studies lower in certainty of evidence; randomised controlled trials which have a higher standard of evidence are less feasible for research examining population level marketing exposure and impact. None of the studies included in the systematic review reported on either food choice, product request or food preferences, nor physiological outcomes (i.e., dental caries, diet-related non-communicable disease outcomes, and/or body weight/BMI). Though overall exposure to unhealthy food advertisements does not appear to consistently differ following

implementation of mandatory regulations, systematic reviews do suggest that they may be better than both no policy at all and voluntary policy [75,121].

Narrow definitions of marketing content, locations, and age ranges, may result in the inability of policies to effectively restrict key sources of exposure [59,75,84]. Mandatory marketing restrictions are largely limited to broadcast restrictions and are often followed by a decrease in TV broadcast marketing of unhealthy foods [75,88,109]. For example, following the implementation of marketing restrictions on broadcast advertising in Chile, the percentage of advertisements for unhealthy foods decreased by 27.1% (from 41.9% to 14.8%) [88]. This decrease may result in a concomitant reduction in unhealthy food purchasing by and/or on behalf of children due to the reduction in exposure to marketing [121]. A recent modelling study estimating the impact of a potential time-based restriction on TV food advertising in Australia found modelled reductions in energy intake of a mean 115 kJ daily [130].

However, decreases in unhealthy food marketing covered by mandatory policies may be accompanied by increases in marketing locations not covered by the policies, thereby causing marketing exposure to not be significantly impacted overall [121]. Returning to the Chile example, the positive change in percent of unhealthy food advertisements observed can in part be attributed to the fact that the regulation applied to both children's programming and general audience programs [88]. This is often an unaddressed caveat in other regulations, which offset changes in exposure by shifting placement of unhealthy advertisements from child-directed to general marketing locations [121,131]. Any changes in children's exposure are thus limited to reductions observed during dedicated children's programming, which do not translate to an overall reduction in exposure [59]. In fact, limits on viewership thresholds have been associated with an increase in children's advertising exposure during other broadcast programming (e.g., family programming) [114], with the migration of marketing to adult airtime in turn associated with an increase in the overall volume of unhealthy food advertising throughout the day [59]. As such, there have been calls for a 9pm 'watershed' system, similar to what is in place for 'adult only' content featuring nudity or violence, with a system currently being legislated for in the UK and similar recommendations from the WHO [74,79,114]. Similarly, any short term impact due to broadcast restrictions may be followed by an increase in digital marketing to offset this [75]. The most recent WHO guidelines on marketing to children recommend the implementation of mandatory policies which employ a government-led nutrient profile model, encompass children of all ages, and minimise risk of migration of marketing from restricted to unrestricted locations (including other age groups, other media, and other spaces within the same medium) [74].

### **1.3.5 Canada's Current and Proposed Marketing Restrictions**

Despite being under discussion since 2016, Canada does not currently have mandatory federal-level restrictions on marketing of unhealthy foods to children [71,132,133]. Unhealthy food marketing is nationally regulated in Canada through voluntary industry self-regulation (the *Food and Beverage Advertising Code*) [68,122,134]. The *Code* discourages advertising in a variety of media and settings to children under 13 years of age unless the product meets nutrition thresholds for saturated fat, sodium and sugars as per Health Canada's 'low in' criteria [122,135]. Threshold details differ for: serving/reference amounts, 'foods' versus 'main dishes', breakfast cereals, and restaurant/food service meals [122]. Of note, under the *Code*, meals cannot exceed 30% daily value for saturated fat, sodium, and total sugar [122]. All on-premises communications, including packaging, are exempt from the *Code*, as is brand advertising [122].

Province and territory-specific school food policies may also regulate food marketing on school grounds, though school policies primarily restrict food provision rather than promotion [134]. The exception is Québec, which is the only province with an advertising law extending beyond schools [68,72,134]. Since 1980, Québec's *Consumer Protection Act* has restricted all advertising for commercial products, including food, using an audience-based restriction: advertising is not permitted in any media or settings where children under 13 years of age make up a substantial proportion of the audience (e.g., more than 15% of the viewership for TV), the advertisement is designed to appeal to children, and the promoted product is intended for/appeals to children [72]. Much research on the *Consumer Protection Act* to date has examined expenditure data, identifying child-directed food and beverage advertising expenditures to be 'high' despite the restrictions, at around \$9.5 million in 2019 [52,136]. A recent study by Potvin Kent et al. found that, although child-directed food advertising expenditures were 32% lower in Québec (\$9.40/capita) compared to the rest of Canada (\$13.91/capita), for some food categories advertising expenditures were actually greater in Québec than in Canada (e.g., advertising expenditures for yogurt were 2.6% higher in Québec) [52]. Research indicates that Francophone children are exposed to fewer child-appealing advertisements compared with Anglophone children in Québec, who experience exposure at levels comparable to those of Anglophone children in Ontario [52,137]. Additionally, foods advertised on French-language TV programming in Québec appear to be marginally healthier than those advertised on English-language TV programming in both Québec and Ontario, although most marketing is for unhealthy food products [138]. Advertising expenditures for unhealthy food have also been reported to be lower in French media compared with English media in Québec [52]. Older research has

previously found no differences in the number of French and English language websites featuring child-directed content, including no differences in the number of marketing techniques used [127]. Overall, literature suggests that the *Consumer Protection Act* has only been associated with minimal improvements in the power and exposure of unhealthy food marketing to children in Québec [52,68].

In 2022, a private member's bill (Bill C-252) was introduced in Canada's parliament aiming to restrict the advertisement of foods and beverages that contribute to excess sugar, saturated fat, or sodium intake in a way that is primarily directed at children under 13 years of age [52,139]. The 44<sup>th</sup> Parliament's first session concluded on January 6, 2025; as the bill was not enacted prior to the session end, it did not become law [139]. Independently of Bill C-252, Health Canada is currently looking to amend the *Food and Drug Regulations* to restrict food advertising, primarily directed at children under 13 years of age, for foods that contribute to excess intakes of sugars, saturated fat, and sodium [33,140,141]. The planned amendment is part of Health Canada's Healthy Eating Strategy [132]. Stakeholder consultations and a cost benefit analysis have been conducted [33,140,141]. Given that Bill C-252 did not receive Royal Assent, the proposed restrictions would need to be implemented under existing regulatory authorities under the *Food and Drugs Act* [33]. Per the proposed regulations, advertisements would only be restricted if they are 'primarily directed at children' under 13 years of age (based on medium of communication and child-appeal) and if the food both: 1) has added sodium, free sugars (free sugars refer to added sugars as well as sugars naturally present in syrups, honey, fruit juice, and fruit juice concentrates), or added fat, and 2) exceeds proposed nutrient thresholds of 6% of the daily value for sodium, 5% for sugars, and/or 10% for saturated fat [140,141]. Foods that do not contain added fats, added sodium, or free sugars would not be subject to restrictions [140]. The proposed nutrition thresholds are based on the 'low in' sodium, sugars and saturated fat nutrient content claims for prepackaged foods outlined in the *Food and Drug Regulations* [140,141]. These values are distinct from the percent daily value footnote included on Nutrition Facts tables specifying 5% or less daily value as 'a little' [140]; the 5% daily value footnote is exceeded by 97% of products listed on food company websites for saturated fat, sodium, and/or sugars [71]. A recent study found that almost all advertised Canadian products examined by the study would be restricted for advertising to children according to the proposed model thresholds [52].

The proposed regulations appear to have limitations in scope common to other restrictions globally. First, the proposed regulations do not cover adolescents aged 13-17 years, an age group shown to be negatively impacted by unhealthy food marketing [58–60]. Second, the proposed regulations only apply to TV and digital media, with exemptions for

packaging/labelling, sports sponsorships, physical settings (e.g., retail stores, recreation centres), and other media (e.g., radio, magazine). Last, the proposed regulations only cover advertisements where nutrient thresholds can be applied to identifiable foods shown or referenced by name (e.g., showing a McDonald's playhouse or a take-out container with the McDonald's logo on it rather than a burger); 'brand-only' marketing is excluded from the regulations [141]. The proposed regulations thus have several policy characteristics that may limit effectiveness related to 'brand-only' advertisement exemption, spill over from children's to general audience programming, and establishing advertisements as 'child-directed', as discussed above.

#### **1.4 Health Messaging as a Policy Alternative**

To reduce the influence of marketing, some countries require that health messages be displayed on advertisements for unhealthy foods, either as a complement or alternative to marketing restricting [76]. In 2007, France implemented *Article L. 2133-1* of the *French Public Health Code* which mandates that advertisers must include health messages in all marketing that features drinks with added sugars, salt or artificial sweeteners or manufactured food products, including in print, TV, digital, cinema, and radio advertising [142,143]. Four health message options are provided to advertisers to be used on rotation, with message options differing based on marketing location (e.g., radio) and target audience (e.g., general public vs children) – see Table A-1 in Appendix A [143]. For advertisements targeting children, health message options promote increased fruit/vegetable consumption, physical activity, and decreased processed food and snack intake [143]. Rather than include the messages, advertisers were previously permitted to pay a contribution to France's National Institute for Prevention and Health Education [143]. This contribution amounted to 1.5% of net funds invested in the marketing campaign, and was meant to fund nutrition education campaigns [143]. Most advertisers chose to affix the health messages [143] and the option to pay a contribution was removed in 2020 as part of a program aimed at removing low-yield taxes [144]. *Article L. 2133-1* is complemented by a self-regulatory voluntary charter on nutrition and physical activity signed in 2009 by private stakeholders and supported by government ministries and public agencies [145]. The charter aims to promote healthy eating and physical activity, rather than discourage unhealthy food promotion in advertisements [145,146].

This mandatory legislation provides an education-based alternative to marketing restrictions, aiming to counteract the power of marketing by reminding consumers of the importance of a healthy lifestyle [142,143]. National surveys conducted by Institut National de Prévention et d'Éducation pour la Santé in France show high levels of support for the

legislation, with 21% of those 15 years of age and above indicating that they have modified their nutrition behaviours and 17% stating they had changed their food purchasing behaviours as a result of the messages [147]. Other national surveys have found that while the mandated messages generally increase public awareness of the government's nutrition policy efforts (namely the Programme National Nutrition Santé), message visibility is dependent on media type [143]. Few scholarly studies have been conducted evaluating the efficacy of this legislation, including for children. Existing research suggests that while the messages were relatively well understood, noticing was limited and the messages tended to lose their effectiveness over time, with decreases in noticing and only marginal changes to dietary patterns observed [148–151]. The messages have also been posited to endorse the products presented in the advertisements, particularly when physical activity is mentioned both in the message and featured in the advertisement itself [143]. This creates the potential for 'health halo' effects, which refer to the use of health promoting messages or imagery in advertising that may increase the perceived healthiness of the advertised food/beverage products – counteracting any positive benefit the messages may have conferred [152].

Similar legislation is in place in Chile, which mandates mass communication targeted at children under 14 for all products that require a warning label (products with added saturated fats, sugars or sodium exceeding threshold limits) to include a message promoting 'healthy lifestyle habits' [153,154]. The Chilean requirement for health messages is included in addition to, rather than in place of, marketing restrictions, which currently only apply to TV programmes, radio, magazines, and websites [84,153]. No evaluations of this component of the labelling law have been identified by the author. Spain has also required health messages in TV advertising of foods and drinks since 2013 – named the HAVISA plan (Hábitos de Vida Saludables en la Población Española) [155]. This plan was a collaboration between the Spanish Food Safety Agency (Agencia Española de Seguridad Alimentaria y Nutrición) and leading food and drink manufacturers [155]. Similarly to France, Spain does not currently have any mandatory marketing restrictions [155]. However, unlike in Chile and France, the Spanish regulations apply to all foods/beverages regardless of nutrient profile, though only in the context of TV advertisements [155]. One study in Spain found no difference in desire for unhealthy products advertised or perceived healthiness, regardless of health message presence, with relatively low awareness and recall of the health messages [155]. No further evaluations of the HAVISA plan have been identified by the author. Overall, the efficacy of including health messages on advertisements for unhealthy foods is presently not well understood [152,156,157].

## 1.5 Thesis Rationale and Aims

Marketing exerts an important influence on children's dietary intake. An increasing number of countries are seeking to regulate marketing of unhealthy foods to kids; however, evidence around several key considerations for policy development is limited. First, relatively few studies exist that explore Québec's existing provincial advertising law, including limited direct comparisons with young people in the other Canadian provinces, where no restrictions have been implemented. Much of the research to date includes relatively small sample sizes and has focused on differences in advertising expenditures, TV (and to a lesser extent digital) advertising, and comparisons with only one other province (Ontario). This does not capture the full picture of youth's experiences of exposure, including variations in exposure across other marketing locations and provinces. In evaluating the impact of the existing Québec policy, it may be possible to discern the efficacy of a 'child-directed' approach, including with respect to restrictions on digital media. This evaluation can help inform federal Canadian policy, which currently limits restriction to advertisements 'primarily directed at children' but includes digital media [140]. Additionally, the evaluation may also provide a better understanding of marketing exposure and power in the current Canadian policy context. Second, there is presently a lack of research on 'brand-only' marketing [158]. Most work has examined how branding influences product awareness and preference without accounting for the inclusion of food products (e.g., preference for cereal with and without branded packaging) – the impact of branding alone thus could not be isolated [48,98–101]. The extent to which the impact of advertisements that feature only branding is similar to the impact of advertisements for specific unhealthy food products remains unknown. The currently proposed Canadian federal marketing policy permits brand marketing, including for food companies that sell popular brands of unhealthy foods (such as McDonald's or Coca Cola). Thus, brand-only marketing is important to examine as it may influence the potential effectiveness of Canada's proposed marketing restrictions. Finally, the potential of health messages accompanying advertisements to mitigate the promotional influence of advertisements for unhealthy foods is currently not well understood. Educational approaches are preferred by the food industry as an alternative to restrictions on marketing [159]; however, there is little evidence on health messages' efficacy in addressing the promotional influence of unhealthy food marketing among children. There exists a need to examine whether requirements to display such health messages may be an effective policy approach, particularly considering the identified potential for a health halo.

Thus, the primary objective of this thesis was to examine key characteristics of food marketing policy that may strengthen or weaken policy impact, including in the context of mandatory and voluntary regulation co-existing within a country, commonly proposed

exemptions for brand-only marketing, and the alternative of public health messaging. The thesis had three specific objectives: 1) compare self-reported exposure and power of child-directed marketing among youth in Québec (where the *Consumer Protection Act* restricts advertising to children) with youth in the other Canadian provinces; 2) examine the impact of 'brand-only' marketing on product appeal and selection among youth, as compared with product marketing; and 3) examine the efficacy of public health messages displayed on advertisements for unhealthy foods on advertised product appeal and perceived healthiness among youth.

## CHAPTER 2: METHODS

This thesis is comprised of three studies, each conducted with youth aged 10-17 years. Study 1 employed an observational study design. The study used national survey data collected in Canada to examine differences in exposure and power of unhealthy food marketing among youth in Québec (which has a provincial advertising law) compared to the other Canadian provinces where there are no mandatory restrictions on marketing to children. Studies 2 and 3 both employed experimental study designs. Study 2 randomised youth to view different food advertisements to examine the impact of ‘brand-only’ advertisements (i.e., featuring brand imagery only and no identifiable foods), which would be permitted under proposed Canadian and many other global regulations, on menu item selection. Study 3 randomised youth to view different beverage advertisements to test the effect of health messages displayed on advertisements of unhealthy foods, similar to the policy approach implemented in France, on product appeal and perceived healthiness. All studies were conducted as part of the International Food Policy Study (IFPS) Youth Surveys, with Study 1 using data previously collected in the 2019-2022 survey waves and Studies 2 and 3 embedding the experiments into the 2023 IFPS survey wave.

### 2.1 Overview of IFPS Youth Surveys

The IFPS Youth Surveys are annual cross-sectional surveys conducted in Australia, Canada, Chile, Mexico, the UK, and the US with youth aged 10-17 years. Participating countries were originally selected based on broad parallels in cultures and food environments [31]. The conceptual model of IFPS was based on the principle of natural experiment designs, with comparisons between- and within- countries over time [31]. A full description of the IFPS study methodology can be found in the technical reports available online [160]. This thesis used data from 2019 to 2023 survey waves.

Data for the IFPS Youth Surveys were collected via self-completed web-based surveys conducted in November-December of each year. Participants were recruited through parents/guardians enrolled in the Nielsen Consumer Insights Global Panel and their partners’ panels. The panels were recruited using both probability and non-probability sampling methods. Email invitations with unique survey links were sent to adult panellists within each country. Those who confirmed they had a child aged 10 to 17 living in their household were asked for permission for their child to complete the survey (only one child per household was invited). Children aged 10 to 17 years were eligible to participate, with quotas for age and sex in the UK and US to facilitate recruitment of a diverse sample for males and females in two age groups: 10-13 and 14-17 years of age. These quotas were not

applied in other countries due to more limited panel sizes. Sample targets were used to recruit English- and French- speaking participants in Canada<sup>3</sup>, and English- and Spanish-speaking participants in US proportional to the population distribution. While participants for the survey were recruited from all provinces and territories in Canada, the territories (Yukon, Nunavut, and the Northwest Territories) are not included in the thesis due to small cell sizes. After eligibility screening, all potential participants were provided with information about the study and asked to provide assent. Surveys were conducted in English in Australia and the UK; Spanish in Chile and Mexico; English or French in Canada; and English or Spanish in the US. Members of the IFPS research team who are native in each language reviewed the French and Spanish translations independently. The median survey time ranged from 22 minutes in 2021 to 25 minutes in 2020 (median survey time was 24 minutes in 2019 and 23 minutes in both 2022 and 2023). 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). Participants could complete the survey on both desktop/laptop computers, as well as mobile devices such as smartphones and tablets, with measurement rendering adjusted to device type. Sample sizes and response rates are available in Table B-1 in Appendix B. The IFPS has been reviewed by and received ethics clearance through a University of Waterloo Research Ethics Board (REB# 41477). All analyses were conducted using SAS Studio v3.81 and SAS Enterprise v8.4 (SAS Institute Inc., North Carolina).

## **2.2 Study 1: Differences in Youths Self-Reported Exposure to Unhealthy Food**

### **Marketing by Marketing Restriction Presence: A Comparison of Québec and Other Canadian Provinces**

#### **2.2.1 Research Objectives**

The overall objective of Study 1 was to compare the exposure and power of food marketing experienced by youth in Québec (where the *Consumer Protection Act* restricts advertising to children in any setting where children make up a substantial proportion of the audience) with that experienced by youth in the other Canadian provinces. The study investigated four specific research questions:

1. Does youth's reported exposure to unhealthy food marketing differ between Québec and the other Canadian provinces, including overall, in marketing locations specifically covered by Québec's advertising law, as well as for beverage and restaurant brands?

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<sup>3</sup> There were no specific sampling targets within Québec for Anglophone versus Francophone respondents.

2. Does youth's reported exposure to marketing for specific food product categories and using specific child-directed marketing techniques differ between Québec and the other Canadian provinces?
3. Are there differences between Québec and the other Canadian provinces in whether youth perceive themselves to be the target audience for unhealthy food advertisements and how much they wish to consume products from advertised brands?
4. Are there differences in described outcomes by age between Québec and the other Canadian provinces?

### **2.2.2 Design and Sample**

Study 1 consisted of cross-sectional analysis of data from the IFPS Canada Youth Surveys conducted between 2019-2022. A total of 15,199 participants aged 10 to 17 years and residing in Canada completed the survey. Participants were excluded for the following reasons: ineligible region; below minimum survey completion time based on median survey time; multiple invalid responses to open-ended measures; and/or invalid response to a data quality question asking, "which of these is a fruit" (n=546). Additionally, participants with missing data on screentime ('Don't know'/'Refuse') were further excluded from the sample (n=53) for all models, as screentime can reasonably be both extremely low and extremely high. Data were aggregated for analysis across the four annual survey waves, and the analytic sample included 14,599 youth: 3,666 in 2019 (Québec=969, other provinces=2,697), 3,878 in 2020 (Québec=964, other provinces=2,914), 3,492 in 2021 (Québec=982, other provinces=2,510), and 3,563 in 2022 (Québec=826, other provinces =2,737). 'Listwise' deletion was used in which only participants with complete data for the measure analysed were included in the corresponding model; individual model sample sizes are provided in Chapter 3.

### **2.2.3 Measures**

The IFPS Youth surveys were developed based on guidance from international experts, with questions from previous studies being adapted and used where possible. All measures below were included in each of the 2019-2022 survey waves unless otherwise noted. See Appendix C for a copy of the survey document from 2022; surveys for each year are publicly available at [www.foodpolicystudy.com/methods](http://www.foodpolicystudy.com/methods).

#### *2.2.3.1 Locations of Exposure to Marketing for Unhealthy Foods – Overall and by policy coverage*

Participants were asked, "Think about the last 30 days. Have you seen or heard advertisements for 'unhealthy' foods or drinks in any of these places?", and shown a list of

locations, from which they were asked to ‘select all that apply’. Participants were also presented with the option “I haven’t seen any advertisements for unhealthy food or drinks in the last 30 days”, as well as an open ended “other” option. Responses for each location were operationalised as binary and an index variable of location exposure was created by summing the number of “Yes” responses for each participant (range: 0-13), which was analysed as continuous. Locations of exposure were additionally grouped into three categories to align with coverage of Québec’s advertising policy and exposure to each group was analysed as binary: 1) marketing locations not covered under Québec’s policy (store posters or special displays; magazines or newspapers); 2) TV and digital marketing locations covered by Québec’s policy (TV shows, series, or movies; websites or social media; video or computer games); and 3) other mostly ‘physical’ marketing locations covered by Québec’s policy (radio; billboards; public transit; movie theatres; schools; recreation or community centres; sports events, concerts, or community events; contests, free samples, or coupons).<sup>4</sup>

#### *2.2.3.2 Frequency of Exposure to Marketing for Unhealthy Foods – By food category*

Participants were asked, “In the last 30 days, how often did you see or hear advertisements for these kinds of food or drinks?” for each of six food categories: sugary drinks, fast food from a restaurant, sugary cereals, fruit or vegetables, snacks (e.g., crackers, chips, or granola bars), desserts or treats (e.g., cookies, ice cream, or candy). Six response options ranged from “never” to “more than once a day”. Continuous variables (range: 1-6) were used for each food category.

#### *2.2.3.3 Exposure to Marketing Techniques for Unhealthy Foods – By child-directed marketing technique*

Three questions assessed marketing techniques. Using a table format (Yes/No/Don’t know/Refuse to answer), participants were asked, “In the last 30 days, have you seen unhealthy food or drinks advertised with any of the following: cartoons or characters from movies or TV (e.g., Superheroes, Disney); cartoons or characters made by food companies (e.g., Tony the Tiger, Ronald McDonald); or famous people”. Participants were also 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?” and “Do you have ‘Happy Meal’ toys or other toys from fast-food restaurants?”. Response options for all items were dichotomised into affirmative or not (includes No/Don’t know) and binary variables were used for analysis.

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<sup>4</sup> These groupings are based on the exceptions stipulated in the *Consumer Protection Act*: advertising in a children’s magazine, advertising for a children’s entertainment event, and advertising in stores (windows, displays, containers, packaging and labels) [161]. The policy applies for TV programs where more than 15% of the viewership is composed of children [161].

#### *2.2.3.4 Exposure to Brand Marketing for Unhealthy Foods – By beverage and restaurant brands*

Participants were shown logos for three drink brands (Coca Cola, Red Bull, and Tropicana) and, for each brand, were asked, “Have you seen any advertisements for this drink brand in the last 30 days?”. Participants were also shown logos for four restaurant brands (McDonald’s, Subway, KFC, and Tim Hortons) and, for each restaurant, were asked, “Have you seen an advertisement for this restaurant in the last 30 days?”. Continuous brand index variables were created by summing the number of “Yes” responses for the beverage (range: 0-3) and restaurants questions (range: 0-4). Measures were consistent across all survey waves, with the exception of Tim Hortons, which was only included in the brand question set for waves 2020-2022.

#### *2.2.3.5 Perceived ‘Target Group’ for Beverage and Restaurant Advertisements and Desire to Consume*

Participants were randomised to see one of three drink brands and one of four restaurant brands<sup>5</sup> and asked, “Are advertisements for this brand (or restaurant) usually aimed at kids 12 and under?”. Responses were dichotomised into affirmative or not (includes No/I’ve never seen an advertisement for this brand/Don’t know) to create binary variables for analysis. Participants were also asked, “How much would you like to have this drink/go to this restaurant?” Continuous variables were created based on responses on a 7-point Likert scale of emojis (range: 1-7).

#### *2.2.3.6 Demographics*

Demographic variables included geographic jurisdiction (Québec vs other Canadian provinces), sex-at-birth (Male vs Female), age (10-12 vs 13-17 years), race or ethnicity (White only vs East or Southeast Asian only vs South Asian only vs Black only vs Indigenous only vs Mixed or other vs Not stated or missing), and perceived income adequacy (Not enough money vs Barely enough money vs Enough money vs More than enough money vs Not stated) [162]. These sociodemographic variables were important to include given demonstrated differences in Canadian youth’s marketing exposure based on sociodemographic groups [163]. In addition, a measure of screentime was derived from ‘normal’ weekday viewing time across five media (YouTube, social media, TV/movies, gaming, online browsing). Eight response options were presented, including “0 hours (none)”, “up to 15 minutes”, “up to 30 minutes”, “up to 1 hour”, “up to 2 hours”, “up to 3 hours”, “up to 4 hours”, “more than 4 hours”, “don’t” know” and ‘Refuse to answer’. To

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<sup>5</sup> Randomization occurred independently of whether respondents had initially said they saw an advertisement for the drink brand/restaurant. The drink brand/restaurant they were randomised to may have differed between questions.

construct a single screentime variable, the levels were recoded to a single value using the upper limit of each category (e.g. “up to 30 minutes” was recoded to 0.5 hours). “More than 4 hours” was recoded as 5 hours. These values were then be summed for all platforms and quintiles were created based on distribution. Food marketing exposure has been positively associated with self-reported screentime in a previous IFPS study [120].

#### **2.2.4 Analysis**

Data were aggregated across all survey years (2019-2022) for Canada only, and survey year was included as a covariate. Data were aggregated for analysis to maximise sample size as no differences in relevant policy occurred between years; sensitivity analyses stratified by year were conducted to confirm no meaningful differences across years. ‘Refuse to answer’ responses were treated as missing for all variables except perceived income adequacy for which ‘Don’t know’ and ‘Refuse to answer’ were combined into a “Not stated” category. Unless otherwise stated, ‘Don’t know’ responses were recoded to “No” for all variables. There were three exceptions to this wherein ‘Don’t know’ was recoded to: 1) a neutral rating (4, range: 1-7) for desire to consume measure, consistent with the other two studies in the thesis; 2) ‘0’ for location exposure index (range: 0-13) and brand exposure indices (ranges 0-3 and 0-4) to optimise sample retention (price discounts and ‘other’ were also recoded to ‘0’, as participants did not see any of the 13 locations but did not refuse to respond to the question); 3) ‘missing’ for frequency of exposure to specific food categories, as ‘Don’t know’ could reasonably refer to both extremely infrequent and extremely frequent exposure. Sensitivity analyses for food category models were conducted with categorical variables retaining ‘Don’t know’ in the model (‘Never’ vs ‘More than never’ vs ‘Don’t know’). No significant differences in pattern of findings were identified; given the highly consistent findings, interpretation thus focused on the continuous outcomes to retain nuances in frequency.

Descriptive findings for each outcome measure were presented for Québec and the other provinces. Differences were tested using logistic and linear regression models for outcome measures with an indicator variable corresponding to jurisdiction included in each model (Québec vs other Canadian provinces). Models were run in two steps. First, ‘unadjusted’ models including only jurisdiction were run. In the second step, ‘adjusted’ models were run by adding survey year and demographic characteristics (age, sex-at-birth, race or ethnicity, perceived income adequacy, as well as total screentime) as covariates. Two-way interactions were tested between jurisdiction and age for all outcomes. Models examining perceptions of targeting and desire to consume products from advertised brands were additionally adjusted to account for the brands each participant was randomised to view. The findings from both unadjusted and adjusted models are shown;

however, the interpretation focused on the adjusted estimates given that there was little effect of adjustment on findings. Due to the lack of sampling targets within Québec for Anglophone versus Francophone participants, language of survey completion was highly correlated with jurisdiction. As a result, language could not be included in the models and sensitivity analyses were instead conducted comparing Francophone and Anglophone youth in Québec with those in other provinces. Data were weighted using post-stratification sample weights constructed using a raking algorithm with population estimates from the Canadian census based on age group, sex, and province (see the IFPS Technical Report for more detail on construction of survey weights [164]). Weights were rescaled to the unweighted sample size. All estimates reported are weighted unless otherwise specified. Table D-1, in Appendix D, provides details on each of the regression models as well as the corresponding hypotheses examined by each model, organised by research question.

Although multiple comparisons were run as part of the analytical framework, adjustments for multiplicity were not made. The use of adjustments is most appropriate when a ‘universal null hypothesis’ of no effect on all outcomes is tested, as compared with the alternative hypothesis that there was an effect on at least one of the outcomes [165,166]. However, in the current study each of the outcomes considered represents a different component of marketing exposure for which different effects on different outcomes may be observed, consistent with the principle of complex policy interventions [165,166]. Rather than adjusting the p-level for multiple comparisons, several strategies were used as recommended in literature [165–167]. First, exact p-values and confidence intervals were reported [165–167]. Second, all tested comparisons were reported and interpreted regardless of ‘significance’, allowing for a comprehensive interpretation of effect estimates [165–167]. Third, language used provided appropriate context for p-values as ‘continuous measures of statistical evidence’ and interpreted them descriptively rather than dichotomously based on exact p-values (no/weak/moderate/strong/very strong evidence vs. significant/not significant) [167]. Finally, each of the individual study outcomes were interpreted, followed by overall pattern of findings across outcomes to understand how and why the policy may have impacted some outcomes but not others [165–167].

### **2.2.5 Power and Sample Size Calculations for Study 1**

Representative sample size calculations were run to estimate statistical power for tests using the full sample. Data used to estimate baseline values were drawn from the 2021 IFPS youth survey.

### *3.2.5.1 Tests of proportions*

With a sample size of 3,758, the study had 80% power to detect a 3.0% difference between Québec and Canada in the proportion of those who saw advertisements with child-directed marketing strategies (assuming frequency in Canada 70%), for which  $\alpha=.05$  for a 2-tailed test.

### *3.2.5.2 Tests of means*

With a sample size of 3,758, the study had 80% power to detect a 0.09 change in between Québec and Canada in the mean frequency of exposure to marketing of unhealthy foods in the last 30 days (assuming baseline mean exposure 3.0,  $SD=1.4$ ), for which  $\alpha=.05$  for a 2-tailed test.

## **2.3 Study 2: Testing the Efficacy of Restrictions on Unhealthy Food Marketing to Children: an Experimental Study of ‘Brand-Only’ Food Advertisements**

### **2.3.1 Research Objectives**

The overall objective of Study 2 was to examine the impact of ‘brand-only’ food marketing on product appeal and selection among youth, compared to marketing featuring food products. In particular, the study compared advertisements for unhealthy foods that would be restricted under Health Canada’s proposed regulations (e.g., advertisement featuring a McDonald’s hamburger), with ‘brand-only’ advertisements that featured company branding without a specific food product and would thus be permitted under the proposed regulations (e.g., advertisement featuring only a McDonald’s logo). The study investigated two specific research questions:





1. Are there differences in the impact of ‘brand-only’ compared with product advertising on product appeal among youth, including for advertisements featuring ‘healthy’ versus ‘unhealthy’ food products?
2. Are there differences in the selection of a menu item meeting nutrient profile model thresholds and the nutrient levels of selected items by i) type of advertisement (i.e., brand-only versus product advertisement), and ii) type of product featured in advertisement (i.e., healthy versus unhealthy products).

### **2.3.2 Design and Sample**

Study 2 consisted of a between-group experimental design that was embedded within the IFPS Youth Survey 2023 wave in all six countries (Canada, Australia, UK, US, Mexico, and Chile). Participants were randomised to view a static digital advertisement designed according to one of four experimental conditions (see Table 2-1 below):

- 1) Control advertisement condition: a non-food advertisement for a Nintendo video game console;
- 2) 'Brand-only' advertisement condition: an advertisement for McDonald's that displays the logo and slogan but no food products;
- 3) Brand and unhealthy food advertisement condition: an advertisement featuring both branding and an unhealthy food item (McDonald's hamburger); and
- 4) Brand and healthy food advertisement condition: an advertisement featuring both branding and a healthy food item (McDonald's salad).

**Table 2-1.** Condition images shown to survey participants.

<i>Condition 1</i> <i>Control</i>	<i>Condition 2</i> <i>'Brand-only'</i>	<i>Condition 3</i> <i>Brand +unhealthy food</i>	<i>Condition 4</i> <i>Brand + healthy food</i>
			

The Nintendo Switch video game console was selected for the control as it is a non-food item which children are known to like. McDonald's was selected as the brand of choice for this experiment given its international profile and established brand imagery [168]. All products displayed in the advertisements, as well as in the tasks described below, were real McDonald's offerings that were selected according to the nutrition thresholds developed by Health Canada for the proposed marketing restrictions; the Canadian nutrient profile model was chosen for ease as models differed across countries. The images and text in each of the experimental conditions were adapted from real advertisements for McDonald's and Nintendo identified online (see Table E-1 in Appendix E for advertisements design). The logo was relatively smaller in the two product conditions compared with the brand-only condition, and both product conditions were accompanied by descriptive text (hamburger: "big. beefy. bliss.", garden salad: "crisp, flavourful, and freshly prepared.").

Participants were randomised to view an advertisement according to their experimental condition, after which they were again randomised to complete one of two tasks. The two tasks aimed to address the same overarching question (whether the impact

of ‘brand-only’ and product advertisements differ) using two distinct approaches, and were based on the cascade of effects identified in the Hierarchy of Unhealthy Food Promotion Effects model [38]. Task 1 employed a Likert measure to assess the effect of experimental condition on product appeal focusing on the ‘unhealthy food’ item featured in experimental condition 3. Task 2 used a hypothetical product selection task in which participants were asked to select 1 of 6 McDonald’s items, which included both the ‘healthy’ and ‘unhealthy’ food items featured in experimental conditions 3 and 4, respectively. All condition images and survey measures were translated into French (Canada) and Spanish (Mexico and Chile). While survey measures were also translated into Spanish for US, the condition images shown to US participants were in English to mimic the US retail environment in which most advertisements are presented in English.

A total of 12,065 participants aged 10-17 years completed the survey in 2023 across the six countries. Participants were excluded for the following reasons: ineligible region; below minimum survey completion time based on median survey time; multiple invalid responses to open-ended measures; and/or invalid response to a data quality question asking, “which of these is a fruit” (n=544). The final sample consisted of 11,521 participants, with 5,777 completing Task 1 and 5,744 completing Task 2. There were around 2,880 participants in each of the four conditions across both tasks, with approximately 1,430 participants in each condition/task combination.

### **2.3.3 Measures**

#### **2.3.3.1 Product Appeal Task**

Participants were shown an image of a hamburger with no identifiable branding and asked: “How much would you like to eat this food?”. This question was based on a study by Uribe & Fuentes-García [169]. Response options consisted of a Likert scale of 7 emojis, ranging from upset to very happy (see Appendix C for response options in survey document) which were analysed as continuous (range: 1-7). Participants were also presented with ‘Don’t know’ and ‘Refuse to answer’ response options. The hamburger shown was the same one as in the ‘brand and unhealthy food’ advertisement condition. Thus, participants in the control condition were identifying their product appeal without any associations with McDonald’s, in contrast to participants in conditions 2 and 4 who may have associated the hamburger with the McDonald’s branding as well as those in condition 3 who saw both the branding and the hamburger in the advertisement.

#### **2.3.3.2 Hypothetical Product Selection Task**

Participants were shown an image consisting of six menu options from McDonald’s: Big Mac, Chicken Nuggets, Quarter Pounder Deluxe (named McNifica in Chile and Mexico),

Grilled Chicken Salad, Chicken & Bacon McWrap with Grilled Chicken, and Garden Salad (see Appendix C). Branding was unmasked and the two items from the experimental conditions were included in the menu (i.e., Quarter Pounder Deluxe and Garden Salad). Menu items were chosen based on both popularity and healthiness of options. Participants were asked: “If you could eat one of these foods right now, which one would you choose?” and could select one of the six images of the McDonald’s menu items or “none of the above”/ ‘Don’t know’/ ‘Refuse to answer’. This question was adapted from previous studies [48,105,170]. Dichotomous variables were created for items to indicate whether or not each item was selected by participants.

Nutrient profile model thresholds were applied to the menu items to identify foods that would be permitted for advertising according to marketing restrictions. As six countries were included in the survey (countries did not belong to the same WHO regional office), the nutrient profile model included in federal advertising regulations proposed by Health Canada was used in this study [33,135]. Foods restricted from advertising are those that 1) have added sodium, free sugars, or added fat, and 2) exceed proposed nutrient thresholds of 6% of the daily value for sodium, 5% for sugars, and/or 10% for saturated fat [33,135]. These nutrient thresholds are based on the ‘low in’ sodium, sugars, and saturated fat nutrient content claims for prepackaged foods outlined in the Food and Drug Regulations [33,135]. Similar to most other marketing regulations globally, Canada’s proposed regulations would not apply to brand-only marketing [33,135,140]. Given that prior research based on Canadian advertising expenditure data estimates that over 99% of child-targeted products would be restricted for advertising to children according to the model [52], these thresholds were used to mimic the real-world retail environment to understand how the proposed regulations would apply to current product lines. The garden salad featured in the ‘Brand and healthy food advertisement’ condition was the only item identified at the time of measure creation for which the nutrients of interest were below the thresholds (based on a review of the six survey countries’ McDonald’s menus). A dichotomous variable was created to indicate whether garden salad was selected.

Participants’ menu selections were also coded according to their content of sodium, sugar, saturated fat, and calories as these are the nutrients included in most nutrient profile models [75,89,90]. Nutrient information for each menu item was determined from McDonald’s websites for each of the six countries. Where the menu item ingredients were the same, nutrient data from the Canadian website was used; where the ingredients differed, nutrient data were pulled from the website of the country which most closely matched the menu item image (see Table 2-2 below). Data were analysed as continuous (range: 0-700).

**Table 2-2.** Ingredients of menu items included in hypothetical product selection task across study countries

Item	Canada	US	UK	Australia	Mexico	Chile	Chosen Country
Big Mac [in all country menus]	Exact match	Exact match	Exact match	Exact match	Exact match	Exact match	Canada
Chicken McNuggets [in all country menus, but quantities differ]	Lowest quantity: 4 pieces	Lowest quantity: 4 pieces	Lowest quantity: 6 pieces	Comes in 3 or 6 pieces, but not 4	Lowest quantity: 4 pieces	Lowest quantity: 5 pieces	Canada
Quarter Pounder Deluxe [all country menus have some variation] *	Called 'Quarter Pounder with Cheese' (No lettuce or tomato, 2 slices of cheese)	'Quarter Pounder with Cheese Deluxe' differs from regular 'Quarter Pounder with Cheese' by having lettuce and tomato [like in photo] (but both have 2 slices of cheese unlike photo)	Called 'Quarter Pounder with Cheese' (No lettuce or tomato, 2 slices of cheese)	Called 'Quarter Pounder' (No lettuce or tomato, 2 slices of cheese)	Called 'Quarter Pounder with Cheese' (No lettuce or tomato, 2 slices of cheese)	Have a 'Quarter Pounder' (no lettuce or tomato, 2 slices of cheese) but the ' McNifica' is closer to image (same ingredients)	Chile
Grilled Chicken Salad [in UK and Australia only]	Not available	Not available	Exact match	Closest would be 'Classic Chicken Salad' (with pepitas)	Not available	Not available	UK
Chicken & Bacon McWrap with Grilled Chicken [in Canada, UK, and Australia only]	Exact match	Not available	Closest would be 'BBQ & Bacon Grilled Chicken Wrap'	Closest would be 'Grilled Chicken Snack Wrap'	Not available	Not available	Canada
Garden Salad [in UK and Australia only]	Not available	Not available	Called a 'Side Salad' (but appears to have same ingredients)	Exact match	Not available	Not available	UK

\* An image of the McNifica was used for the 'unhealthy' food in condition 3 rather than a variation of the 'Quarter Pounder' as, out of all McDonald's offerings, it most closely resembled a home-made burger. This was important for the appeal task as we were aiming to compare product appeal between conditions while minimizing any associations of the product with a specific McDonald's item for participants who did not see a hamburger in the advertisement they were randomised to (conditions 1, 2, and 4). For comparability between the appeal and hypothetical product selection task, the same image of the McNifica was

used in the menu item selection task for all countries; however, the accompanying text differed, with participants in Chile and Mexico seeing 'McNifica' and those in other countries seeing 'Quarter Pounder Deluxe'. Differences in ingredients are noted above.

### **2.3.4 Analysis**

Preliminary analyses using Rao-Scott Chi-Square tests were conducted to check whether randomization to the four experimental conditions was successful by comparing groups on age, sex-at-birth, and country. Participants missing data on the appeal task (Refuse/System missing; n=29) and the hypothetical product selection task (Don't know/Refuse; n=24) were excluded from each corresponding analysis as no response could reasonably be interpreted. 'Don't know' was recoded to a neutral rating for the appeal task (n=53), consistent with the other two studies in the thesis. Analysis for the hypothetical product selection task further used 'listwise' deletion in which all participants with complete data were included in each model; participants who selected 'none of the above' (n=282) were excluded from the nutrient content models but were included in the menu item selection models.

For the appeal task, a linear regression model was conducted to examine differences in the mean product appeal scores between experimental conditions. For the hypothetical product selection task, six separate binary logistic regression models were run to examine differences among experimental conditions in the proportion of participants who selected each menu item, including a model assessing selection of the Garden Salad (only item for which the nutrients of interest were below Health Canada's thresholds for advertised foods). Additionally, four separate linear regression models tested differences between conditions in the mean levels of sodium, sugar, saturated fat, and calories in the selected menu items. For all regression models, an indicator variable corresponding to experimental condition was included in the models, and all pairwise contrasts between conditions were reported. Table D-2, in Appendix D, provides details on each of the regression models as well as the corresponding hypotheses that were examined in each model.

### **2.3.5 Power and Sample Size Calculations for Study 2**

Representative sample size calculations were run to estimate statistical power for tests using the full sample. Data used to estimate baseline values were drawn from the 2021 IFPS youth survey.

#### **3.3.5.1 Tests of means**

With a sample size of 1,442 in each condition/task combination, the study had 80% power to detect a 0.12 change between any two experimental conditions in the Likert measure of product appeal for the hamburger (assuming baseline mean desire of 5.2, SD=1.5), for which  $\alpha=.05$  for a 2-tailed test.

### *3.3.5.2 Tests of proportions*

With a sample size of 1,442 in each condition/task combination, the study had 80% power to detect a 3.6% difference between any two experimental conditions in the proportion of those who select an unhealthy food item in the hypothetical product selection task (assuming frequency for the control condition is 85%), for which  $\alpha = .05$  for a 2-tailed test.

## **2.4 Study 3: Efficacy of Health Messages Displayed on Sugar-Sweetened Beverage Advertisements in Altering Products' Appeal and Perceived Healthiness among Youth: Exploring a Potential Alternative to Marketing Restriction**

### **2.4.1 Research Objectives**

The overall objective of Study 3 was to examine the potential influence of public health messages displayed on advertisements for unhealthy beverages. The study investigated the following two specific research questions:

- 1) Does the presence of a health message on a SSB advertisement alter the perceived healthiness and/or product appeal of SSBs among youth?
- 2) Does the effect of a health message on a SSB advertisement differ based on the type of SSB, including a soda versus a fruit drink?

### **2.4.2 Design**

Study 3 consisted of a between-group 2-by-2 experimental design embedded within the 2023 IFPS Youth Survey. Participants were randomised to view one of four static digital advertisements, adapted from actual advertisements identified online, for one of two SSB beverages: a soda from an established brand (Sprite) or a fruit drink from a no-name brand (titled 'fruit punch'). Fruit punch was selected because fruit drinks are typically perceived as a 'healthier' beverage than other SSBs [171,172]. Participants were further randomised to view their assigned SSB advertisement either with or without a health message displayed on the bottom of the advertisement, such that there were four experimental conditions in total: 1) soda without a health message, 2) soda with a health message, 3) fruit drink without a health message, and 4) fruit drink with a health message. The size and text in the health message were based on the warnings mandated in France, which stipulate that the message should be displayed in a horizontal banner occupying at least 7% of the advertisement surface and accompanied by a link to a country specific public health website (see Table 2-3 below) [143,150,173,174]. The colour, typeface and size of the font is not defined in the legislation [173,175]. The following health message was used: "To grow up healthy, don't eat too much fatty, sweet, or salty food" along with a link to

a fictitious non-functional country-specific public health website. Aside from the different website links and translated text, advertisement images were identical in all countries. Advertisements were based on actual advertisements identified using a Google Images search and modified for the current study, including translated text in French (Canada) and Spanish (Mexico and Chile) – see Table E-1 in Appendix E for advertisements design. While survey measures were also translated into Spanish for US, the condition images shown to US participants were in English to mimic the US retail environment, in which most advertisements are presented in English. Following randomization, participants were shown a screen featuring one of the four advertisements and asked to look at the advertisement and to click next when they were ready to proceed to the next screen. They were subsequently administered two measures, described below, with the advertisement still on screen.

A total of 12,065 participants aged 10-17 years completed the survey in 2023 across the six countries. Participants were excluded for the following reasons: ineligible region; below minimum survey completion time based on median survey time; multiple invalid responses to open-ended measures; and/or invalid response to a data quality question asking, “which of these is a fruit” (n=544). The final sample consisted of 11,521 participants, with around 2,880 participants in each of the four experimental conditions and all participants completing both measures.

**Table 2-3.** Condition images shown to survey participants.

Condition 1 Soda – No health message	Condition 2 Soda – Health message	Condition 3 Fruit drink – No health message	Condition 4 Fruit drink – Health message
			

### **2.4.3 Measures**

#### *2.4.3.1 SSB Perceived healthiness*

With the advertisement on screen, participants were asked: “Is this type of drink unhealthy or healthy?”. Response options were presented on a 5-point Likert scale ranging from “very unhealthy” to “very healthy”, and a continuous variable ranging from 1 to 5 was created based on the response options. Participants were also presented with ‘Don’t know’ and ‘Refuse to answer’ response options. This question was based on items used in other IFPS work to examine beverage perceptions [176].

#### *2.4.3.2 SSB Appeal*

With the advertisement on screen, participants were asked: “How much would you like to have this drink?”. A continuous variable ranging from 1 to 7 was created based on the response options, which included 7 emojis ranging from communicating displeasure to extreme desire as seen in Appendix C (range: 1-7). Participants were also presented with ‘Don’t know’ and ‘Refuse to answer’ response options. This question was based on items used in other IFPS papers to examine beverage brand preferences [177] and adapted from Lima et al., 2019 [178].

### **2.4.4 Analysis**

Preliminary analyses using Rao-Scott Chi-Squares test were conducted to check whether randomization to experimental conditions was successful by comparing groups on age, sex-at-birth, and country. Participants missing data on appeal (Refuse/System missing; n=56) and perceived healthiness (Don’t know/Refuse; n=232) were further excluded from the analysis as no response could reasonably be interpreted. ‘Don’t know’ was recoded to a neutral rating for appeal (n=254), consistent with the other two studies in the thesis. The final analytic sample consisted of 11,236 participants.

Separate linear regression models tested the effect of experimental condition on appeal and perceived healthiness, each in two steps. First, the main effects of two indicator variables were assessed in the same model, one for beverage type and one for health message presence. Next, 2-way interactions between the indicator variables were added. Sensitivity analyses were additionally conducted with binary versions of both outcome variables (appeal: ‘Wants to have drink’ vs Other; perceived healthiness: ‘Healthy or very healthy’ vs Other) for both main effect and 2-way interactions. No significant differences in interpretation or pattern of findings were identified; the interpretation thus focuses on the continuous outcomes given the highly consistent findings. Table D-3, in Appendix D, provides details on each of the regression models as well as the corresponding hypotheses.

### **2.4.5 Power and Sample Size Calculations for Study 3**

Representative sample size calculations were run to estimate statistical power for tests using the full sample. Data used to estimate baseline values were drawn from the 2021 IFPS youth survey.

#### **2.4.5.1 Tests of means**

With a sample size of 2,885 in each condition, the study had 80% power to detect a 0.077 change in between any two experimental conditions in the mean perceived healthiness of a beverage (assuming baseline mean perceived healthiness of 3.5, SD=1.05), for which  $\alpha=.05$  for a 2-tailed test. The study also had 80% power to detect a 0.118 change in between any two experimental conditions in the mean desire to consume a beverage (assuming baseline mean desire of 4.65, SD=1.6), for which  $\alpha=.05$  for a 2-tailed test.

## CHAPTER 3: EXPOSURE TO UNHEALTHY FOOD MARKETING IN QUÉBEC VERSUS CANADA

### 3.1 Study 1: Differences in Youths Self-Reported Exposure to Unhealthy Food Marketing by Marketing Restriction Presence: A Comparison of Québec and Other Canadian Provinces

**Status:** in preparation

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### 3.1.1 Overview

**Purpose:** To compare self-reported exposure to unhealthy food marketing among youth in Québec (a Canadian province with mandatory restrictions on child-directed advertising) to youth in other Canadian provinces where no mandatory marketing restrictions exist.

**Methods:** Cross-sectional online surveys were conducted in 2019-2022 with 15,199 youth aged 10-17 in Canada (n=3,757 in Québec). Surveys assessed self-reported exposure to unhealthy food marketing, including marketing locations, products, and techniques; brands marketed; targeting perceptions; and desire to consume advertised products. Regression models investigated differences by geographic jurisdiction, adjusting for age, sex-at-birth, race and ethnicity, perceived income adequacy, screentime, and year.

**Results:** Compared to youth in other provinces, Québec youth reported seeing advertisements for unhealthy foods in fewer locations ( $\beta$ : -0.46, confidence interval (CI): -0.54 – -0.38), and for fewer beverage ( $\beta$ : -0.15, CI: -0.19 – -0.11) and restaurant brands ( $\beta$ : -0.18, CI: -0.24 – -0.13;  $p < 0.001$  for all); this was true across marketing locations regardless of whether they were covered under restrictions. Québec youth also reported seeing advertisements for sugary drinks ( $\beta$ : -0.40, CI: -0.46 – -0.34), fast-food ( $\beta$ : -0.30, CI: -0.36 – -0.24), sugary cereals ( $\beta$ : -0.38, CI: -0.44 – -0.32), snacks ( $\beta$ : -0.27, CI: -0.33 – -0.22), and desserts/treats ( $\beta$ : -0.28, CI: -0.34 – -0.22;  $p < 0.001$  for all) less frequently than those in other provinces. Québec youth had lower odds of reporting seeing advertisements featuring child-appealing marketing techniques including movie/TV cartoons/characters (AOR: 0.57, CI: 0.51 – 0.63), celebrities (AOR: 0.57, CI: 0.52 – 0.63), unhealthy food/drink company branding (AOR: 0.75, CI: 0.67 – 0.83), and restaurant toys (AOR: 0.53, CI: 0.49 – 0.58;  $p < 0.001$  for all). Québec youth had lower odds of identifying beverage brand advertisements as ‘usually aimed at kids 12 and under’ (AOR: 0.72, CI: 0.65 – 0.79,  $p < 0.001$ ) and reported less desire to consume branded beverages than youth in other provinces ( $\beta$ : -0.10, CI: -0.17 – -0.04,  $p = 0.002$ ).

**Conclusions:** Self-reported exposure to unhealthy food marketing was substantially lower in Québec, a Canadian province with mandatory restrictions on child-directed advertising.

**Keywords:** marketing restrictions, advertising, nutrition policy, diet, Canada, Québec, adolescent, child, youth

### **3.1.2 Background**

Food and beverage marketing (hereafter ‘food marketing’) is a key component of the food environment and includes within it various forms of advertising and promotion [1]. Marketing has been shown to impact dietary intake by influencing product awareness, attitudes, and purchasing intent [2]. This impact is dependent on the power and exposure of the marketing messages, where power is defined as the “creative content, design and execution of the marketing messages” and exposure refers to the “reach and frequency of the marketing messages” [3]. Systematic reviews have found higher caloric intake following advertisement exposure among children but not adults [4,5]. This increase does not appear to be limited to advertised foods and is not compensated for at other eating occasions, contributing to greater total caloric intake [6].

Children are particularly vulnerable to food marketing. Children can influence household food purchases through ‘pester power’, spend their own money, and develop brand and product loyalties that may persist through adulthood [7,8]. In Canada, more than \$628M was spent on food advertising in 2019, with over \$57M attributed to advertising directed at children specifically [9,10]. Child-directed unhealthy food advertising is common across all marketing locations, including broadcast, digital, print, packaging, retail, event sponsorship, and settings where children gather [11,12]. A variety of techniques are used to appeal to children, including licenced promotional characters; celebrity, social media influencer, and sports-person endorsements; child appealing colours and designs; gifts, competitions, and games [12,13]. Child-directed marketing techniques are more likely to promote unhealthy foods, including ultra-processed foods with high levels of sugar, sodium, and saturated fat [12,13].

Restrictions on the marketing of unhealthy foods to children have been recommended by leading international health agencies and more than a dozen countries have implemented mandatory marketing restrictions to date, including some of the most robust restrictions in the UK and Chile [14–16]. In Canada, despite being on the policy agenda since 2015, there are presently no federal-level mandatory restrictions on marketing of unhealthy foods to children [17,18]. Canada-wide marketing practices are guided by voluntary industry-created self-regulations, which discourage advertising in a variety of media and settings to children under 13 years of age unless the product meets specific nutrition thresholds [19,20]. Such voluntary approaches have repeatedly been found to have little or no impact on industry marketing practices, including in Canada, with few meaningful changes in children’s exposure to unhealthy food marketing [14,18,21].

Although some provinces and territories in Canada regulate food marketing on school grounds (primarily restricting food provision rather than promotion) [19], Québec is the only province with a law extending beyond schools. Since 1980, Québec's *Consumer Protection Act* has restricted all commercial advertising in any media or setting where children under 13 years of age make up a substantial proportion of the audience (i.e., more than 15% of the viewership for television (TV) advertisement), and the promoted product is designed for or appeals to children [22]. Notably, the *Consumer Protection Act* applies to all consumer products including foods and beverages. Previous research suggests that the *Consumer Protection Act* has been associated with minimal reductions in children's exposure to unhealthy food advertising; although child-directed food and beverage advertising expenditures were 32% lower (\$9.40/capita) in 2019 in Québec compared to the rest of Canada (\$13.91/capita), expenditures were generally 'high' (at around \$9.5 million in 2019) despite the restrictions [10].

Relatively few studies have assessed the impact of mandatory restrictions like the *Consumer Protection Act*, in part due to methodological challenges such as a lack of efficient monitoring systems to support evaluating implementation [23]. Existing studies suggest reductions in children's exposure to unhealthy food marketing and purchasing of unhealthy foods after mandatory regulations have been implemented [14,21]. Although effect sizes are mixed (potentially due to heterogeneity of study methodologies), with certainty of evidence classified as 'low' or 'very low', systematic reviews suggest that mandatory marketing policies may be better than both no policy at all and voluntary policy [14,21]. However, narrow definitions of marketing content, locations, and age ranges may limit the scope of policies to effectively restrict key sources of exposure [14,24,25], with decreases in unhealthy food marketing in locations covered by mandatory policies potentially counteracted by increases in marketing locations not covered by the policies [21]. Further, there is presently no globally agreed-upon definition of a 'child', with regulatory interpretations ranging from anyone under 18 years of age to only those 12 years and under [3,14]. The frequency of exposure to mixed-audience environments, which are not covered under most restrictions, is higher for older children [26]. In particular, adolescents have been shown to have equivalent or greater exposure to unhealthy food marketing than younger children and are known to be similarly impacted, but remain largely excluded from food marketing policies [16]. Hereafter, 'youth' will thus be used to indicate both children 10-12 years and adolescents 13-17 years, with 'child-directed' used in reference to regulation parameters which largely apply to those 12 years and under only.

Overall, while existing studies on the impact of Québec's provincial advertising law have focused on differences in advertising expenditures, TV advertising, and comparisons

with only one other province (Ontario), there are limited direct comparisons with the other provinces where no mandatory restrictions have been implemented. The extant research does not capture youth's experience of exposure nor variations in exposure across other marketing locations and provinces. The current study sought to compare the exposure and power of food marketing experienced by youth in Québec with that experienced by youth in the other Canadian provinces. The study examined four research questions: 1) Does youth's reported exposure to unhealthy food advertising differ between Québec and other provinces?; 2) Does youth's reported exposure to advertising for specific food product categories and using specific child-directed marketing techniques differ between Québec and other provinces?; 3) Are there differences between Québec and the other provinces in whether youth perceive themselves to be the target audience for unhealthy food advertisements and how much they wish to consume products from advertised brands?; and 4) Are there differences in described outcomes by age between Québec and the other provinces? The following was hypothesised as compared to youth in other Canadian provinces: H<sub>1</sub> – youth in Québec will report lower exposure, including seeing/hearing advertisements in fewer locations overall and specifically in locations covered by Québec's advertising law, as well as across fewer beverage/restaurant brands; H<sub>2</sub> – youth in Québec will report lower exposure to advertisements for all unhealthy food/drink product categories and using all child-directed marketing techniques; H<sub>3</sub> – youth in Québec will have lower odds of identifying beverage/restaurant brand advertisements as aimed at 'kids 12 and under', though no differences in desire to consume advertised foods/drinks will be observed; and H<sub>4</sub> – for all above-described hypotheses, despite the fact that the *Consumer Protection Act* only covers those 12 and under and the effects are likely to be more pronounced for children 10-12 than adolescents 13-17, adolescents in Québec will report lower exposure and power than youth of any age in the other provinces.

### **3.1.3 Methods**

This study used data from the IFPS Youth Surveys conducted in Canada between 2019 and 2022. The IFPS Youth Surveys are cross-sectional, self-complete, web-based surveys conducted annually with youth aged 10-17 years. Participants were recruited through parents or guardians enrolled in the Nielsen Consumer Insights Global Panel and their partners' panels using probability and non-probability sampling methods. Adult panellists were asked for consent for youth to complete the survey (only one child per household was invited). After eligibility screening, all potential child participants were provided with information about the study and asked to provide assent. Sample targets were used to recruit English- and French- speaking participants in Canada proportional to the population distribution, though there were no specific sampling targets within Québec

for Anglophone versus Francophone participants. Surveys were conducted in English or French according to participants' preferences, with French translations reviewed by members of the research team who are fluent. While participants for the survey were recruited from all provinces and territories in Canada, the territories (Yukon, Nunavut, and the Northwest Territories) were not included in the present study due to small cell sizes. The child's parent or guardian received remuneration in accordance with their panel's usual incentive structure. The IFPS has been reviewed by and received ethics clearance through a University of Waterloo Research Ethics Board (REB# 41477). A full description of the IFPS surveys and methodology are available at [www.foodpolicystudy.com/methods](http://www.foodpolicystudy.com/methods) [27].

### *3.1.3.1 Measures*

#### *3.1.3.1.1 Locations of Exposure to Marketing for Unhealthy Foods – Overall and by policy coverage*

Participants were asked, “Think about the last 30 days. Have you seen or heard advertisements for ‘unhealthy’ foods or drinks in any of these places?”, and shown a list of locations, from which they were asked to ‘select all that apply’. An index variable of location exposure was created by summing the number of “Yes” responses for each participant (range: 0-13) and was analysed as continuous. Locations of exposure were additionally grouped into three categories to align with coverage of Québec’s advertising policy and exposure to each group was analysed as binary: 1) marketing locations not covered under Québec’s policy (store posters or special displays; magazines or newspapers); 2) TV and digital marketing locations covered by Québec’s policy (TV shows, series, or movies; websites or social media; video or computer games); and 3) other mostly ‘physical’ marketing locations covered by Québec’s policy (radio; billboards; public transit; movie theatres; schools; recreation or community centres; sports events, concerts, or community events; contests, free samples, or coupons).

#### *3.1.3.1.2 Frequency of Exposure to Marketing for Unhealthy Foods – By food category*

Participants were asked, “In the last 30 days, how often did you see or hear advertisements for these kinds of food or drinks?” for each of six food categories: sugary drinks, fast food from a restaurant, sugary cereals, fruit or vegetables, snacks (e.g., crackers, chips, or granola bars), and desserts or treats (e.g., cookies, ice cream, or candy). Six response options ranged from “never” to “more than once a day”. Continuous variables (range: 1-6) were used for each food category.

#### *3.1.3.1.3 Exposure to Marketing Techniques for Unhealthy Foods – By child-directed marketing technique*

Participants were asked, “In the last 30 days, have you seen unhealthy food or drinks advertised with any of the following: cartoons or characters from movies or TV (e.g., Superheroes, Disney); cartoons or characters made by food companies (e.g., Tony the Tiger, Ronald McDonald); or famous people”. Participants were also 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?” and “Do you have ‘Happy Meal’ toys or other toys from fast-food restaurants?”. Response options for all items were dichotomised into affirmative or not (includes No/Don’t know) and binary variables were used for analysis.

#### *3.1.3.1.4 Exposure to Brand Marketing for Unhealthy Foods – By beverage and restaurant brands*

Participants were shown logos for three drink brands (Coca Cola, Red Bull, and Tropicana) and, for each brand, were asked, “Have you seen any advertisements for this drink brand in the last 30 days?” Participants were also shown logos for four restaurant brands (McDonald’s, Subway, KFC, and Tim Hortons) and, for each restaurant, were asked, “Have you seen an advertisement for this restaurant in the last 30 days?” Continuous brand index variables were created by summing the number of “Yes” responses for the beverage (range: 0-3) and restaurants questions (range: 0-4).

#### *3.1.3.1.5 Perceived ‘Target Group’ for Beverage and Restaurant Advertisements and Desire to Consume*

Participants were randomised to be presented with one of the three drink brands and one of the four restaurant brands and asked, “Are advertisements for this brand (or restaurant) usually aimed at kids 12 and under?” Responses were dichotomised into affirmative or not (includes No/I’ve never seen an advertisement for this brand/Don’t know) to create binary variables for analysis. Participants were also asked, “How much would you like to have this drink/go to this restaurant?” Continuous variables were created based on responses on a 7-point Likert scale of emojis (range: 1-7).

#### *3.1.3.1.6 Demographics*

Demographic variables included geographic jurisdiction (Québec vs other provinces), sex-at-birth (Male vs Female), age (10-12 vs 13-17 years), race or ethnicity (White only vs East or Southeast Asian only vs South Asian only vs Black only vs Indigenous only vs Mixed or other vs Not stated or missing), and perceived income adequacy (Not enough money vs Barely enough money vs Enough money vs More than enough money vs

Not stated) [28]. In addition, a measure of screentime was derived from ‘normal’ weekday viewing time across five media (YouTube, other social media, TV/movies, gaming, online browsing). There were 8 response options for each category that included “0 hours (none)”, “Up to 15 minutes”, “Up to 30 minutes”, “Up to 1 hour” and then hourly to “More than 4 hours”. An overall continuous screentime variable was created based on the sum of all categories, using the upper limit for each category. Quintiles were created based on the distribution.

### 3.1.3.2 Data Analysis

A total of 15,199 youth in Canada completed the surveys across 2019-2022. Participants were excluded for the following reasons: ineligible region; invalid response to a data quality question; below minimum survey completion time based on median survey time; and/or multiple invalid responses to open-ended measures (n=546). Participants with missing data on screentime were further excluded from the sample (n=53) for all models. The analytic sample included 14,599 youth, including 3,666 in 2019 (Québec=969, other provinces=2,697), 3,878 in 2020 (Québec=964, other provinces=2,914), 3,492 in 2021 (Québec=982, other provinces=2,510), and 3,563 in 2022 (Québec=826, other provinces =2,737). ‘Listwise’ deletion was used in which only participants with complete data for the measure analysed were included in the corresponding model; individual model sample sizes are reported in the results tables. Data were weighted using post-stratification sample weights constructed using a raking algorithm with population estimates from the Canadian census based on age group, sex, and province (see the IFPS Technical Report for more detail on construction of survey weights [29]). Weights were rescaled to the unweighted sample size. All estimates reported are weighted unless otherwise specified.

Data were aggregated across all survey years (2019-2022) to maximise sample size, as no differences in relevant policy occurred between years. Sensitivity analyses stratified by year were conducted to confirm no meaningful differences across years. Descriptive findings for each outcome measure are presented for Québec and the other provinces. Differences were assessed using logistic and linear regression models for each outcome measure with an indicator variable corresponding to jurisdiction included in each model (Québec/other provinces). Models were run in two steps. First, ‘unadjusted’ models including only jurisdiction were run. In the second step, ‘adjusted’ models were run by adding demographic characteristics (including screentime) as covariates. All models were adjusted for age, sex-at-birth, race or ethnicity, perceived income adequacy, total screentime, and survey year to account for potential sociodemographic and screentime-related differences in exposure as identified in prior research using data from the IFPS Youth Surveys [30,31] as well as to account for aggregation of survey years. Models

examining perceptions of targeting and desire to consume products from advertised brands were additionally adjusted to account for the brands each participant was randomised to view. The findings from both unadjusted and adjusted models are shown; however, the interpretation focuses on the adjusted estimates given there was little impact of adjustment on findings. Two-way interactions were also tested between jurisdiction and age for all outcomes to assess differences by age. Given that there were no sampling targets within Québec for Anglophone versus Francophone participants, language of survey completion was highly correlated with jurisdiction. As such, language could not be included in the models and sensitivity analyses were instead conducted to briefly compare Francophone and Anglophone youth in Québec with those in other provinces. Interpretations were made based on certainty of evidence thresholds [32]. All analyses were conducted using SAS Enterprise v8.4 (SAS Institute Inc., North Carolina).

### **3.1.4 Results**

#### *3.1.4.1 Demographic Characteristics*

The demographic characteristics of the sample are shown in Table 3-1. Distributions of age, sex-at-birth, and screentime were similar across Québec and the other provinces, with some differences in income adequacy. Larger differences were observed in race or ethnicity but are comparable to census data [33,34]. Language of survey completion differed by jurisdiction: Québec accounted for majority of participants completing the survey in French, consistent with the language distribution in Canada [35]. See Supplemental Tables F-S1-8 in Appendix F for regression model results, by demographics.

**Table 3-1.** Sample demographic characteristics, 2019-2022 (weighted estimates, N=14,599)

	<b>Overall</b> (N=14,599) % (N)	<b>Québec</b> (n=3,741) % (n)	<b>Other Canadian Provinces</b> (n=10,858) % (n)
<b>Age (years)</b>			
10-12	38.0% (5,554)	40.0% (1,494)	37.4% (4,059)
13-17	62.0% (9,045)	60.0% (2,247)	62.6% (6,799)
<b>Sex-at-birth</b>			
Male	51.0% (7,438)	50.9% (1,906)	51.0% (5,532)
Female	49.0% (7,161)	49.1% (1,835)	49.0% (5,326)
<b>Race/Ethnicity</b>			
White only	70.2% (10,253)	87.3% (3,266)	64.4% (6,987)
East/Southeast Asian only	8.6% (1,249)	1.6% (59)	11.0% (1,189)
South Asian only	4.6% (667)	0.6% (22)	5.9% (645)
Black only	3.0% (434)	2.3% (86)	3.2% (348)
Indigenous inclusive	4.4% (646)	1.4% (54)	5.4% (592)
Mixed/Other	7.7% (1,127)	5.9% (219)	8.4% (908)
Not stated	1.5% (223)	0.9% (35)	1.7% (189)
<b>Income adequacy</b>			
Not enough money	2.9% (421)	2.3% (87)	3.1% (334)
Barely enough money	16.0% (2,336)	12.2% (458)	17.3% (1,877)
Enough money	62.1% (9,067)	68.1% (2,547)	60.0% (6,520)
More than enough money	17.6% (2,569)	16.1% (602)	18.1% (1,967)
Not stated	1.4% (206)	1.3% (47)	1.5% (160)
<b>Screentime*</b>			
Quintile 1	20.5% (2,986)	22.5% (844)	19.7% (2,142)
Quintile 2	21.0% (3,077)	20.2% (755)	21.4% (2,321)
Quintile 3	18.1% (2,646)	15.9% (594)	18.9% (2,052)

Quintile 4	20.7% (3,021)	19.7% (737)	21.0% (2,284)
Quintile 5	19.7% (2,870)	21.7% (811)	19.0% (2,059)
<b>Language of survey completion</b>			
French	21.1% (3,087)	76.2% (2,851)	2.2% (236)
English	78.9% (11,512)	23.8% (890)	97.8% (10,622)

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\* Screentime was derived from 'normal' weekday viewing time across five media (YouTube, social media, TV/movies, gaming, online browsing).

#### 3.1.4.2 Overall Location Exposure to Unhealthy Food or Drink Advertisements

Table 3-2a shows the mean location exposure index for seeing or hearing advertisements for ‘unhealthy’ foods or drinks in the past 30 days across the 13 locations. Participants in Québec reported seeing/hearing advertisements for unhealthy foods or drinks in around 0.5 fewer locations compared with participants in the other provinces (adjusted  $\beta$ : -0.46, 95% CI: -0.54 – -0.38,  $p < 0.001$ ). There was no evidence of an interaction between jurisdiction and age ( $p = 0.720$ ).

**Table 3-2:** Participants reporting seeing or hearing advertisements for ‘unhealthy’ foods or drinks in the past 30 days in any locations, overall and grouped by policy coverage in Québec, 2019-2022 (weighted estimates, n=14,563)

<b>A) Overall</b>	<b>Québec</b> Unadjusted mean (SE)	<b>Other Canadian Provinces</b> Unadjusted mean (SE)	<b>β</b> (SE)	<b>Unadjusted 95% CI†</b>	<b>P value</b>	<b>β*</b> (SE)	<b>Adjusted 95% CI†</b>	<b>P value</b>
Location Exposure Index	1.56 (0.03)	2.04 (0.02)	-0.47 (0.04)	-0.55 - -0.40	<0.001	-0.46 (0.04)	-0.54 – - 0.38	<0.001
<b>B) By policy coverage</b>	<b>Québec % (n)</b>	<b>Other Canadian Provinces % (n)</b>	<b>OR</b>	<b>95% CI†</b>	<b>P value</b>	<b>AOR**</b>	<b>95% CI†</b>	<b>P value</b>
Marketing locations not covered under policy	22.7% (850)	32.8% (3,556)	0.60	0.55 – 0.66	<0.001	0.58	0.53 – 0.63	<0.001
TV and ‘digital’ marketing covered under policy	48.8% (1,824)	56.7% (6,158)	0.73	0.67 – 0.78	<0.001	0.72	0.66 – 0.78	<0.001
Other mostly ‘physical’ marketing locations covered under policy	33.5% (1,253)	37.9% (4,114)	0.83	0.76 – 0.89	<0.001	0.83	0.77 – 0.91	<0.001

† 95% confidence interval

\* Estimated regression coefficient for Québec compared to other Canadian provinces in a multiple linear regression model adjusted for age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

\*\* Adjusted odds ratio from a logistic regression model for Québec compared to other Canadian provinces adjusted for age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

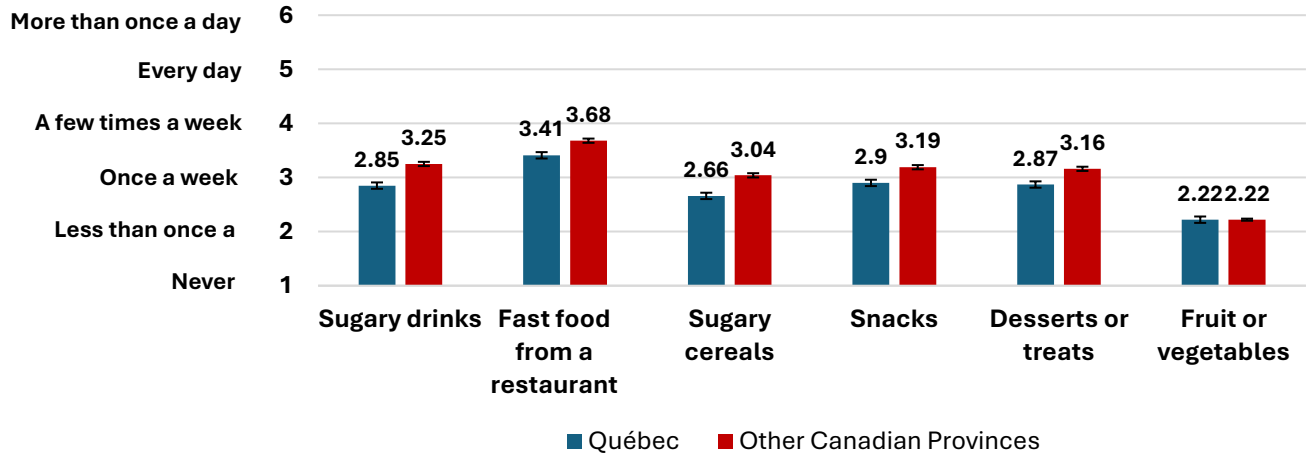
### 3.1.4.3 Differences in Location Exposure to Unhealthy Food or Drink Advertisements by Policy Coverage

Table 3-2b shows the percentage of participants who reported seeing or hearing advertisements for any ‘unhealthy’ foods or drinks in the past 30 days in various locations grouped by policy coverage in Québec. Model results show that across all policy coverage categories, prevalence of exposure to unhealthy food or drink advertisements was lower in Québec ( $p < 0.001$  for all in unadjusted and adjusted models). In terms of locations covered under the policy, participants from Québec were less likely to see advertisements in both ‘TV and digital’ (48.8% vs 56.7%) and ‘other mostly physical’ (33.5% vs 37.9%) marketing locations, compared with those in the other provinces (‘TV and digital’ AOR: 0.72, CI: 0.66 – 0.78; ‘other mostly physical’ AOR: 0.83, CI: 0.77 – 0.91). Even for locations not covered under the policy, participants from Québec were less likely to report seeing/hearing advertisements for unhealthy foods or drinks compared with those in the other provinces (22.7% vs 32.8%, AOR: 0.58, CI: 0.53 – 0.63). There was no evidence of an interaction between jurisdiction and age for any policy coverage category (locations not covered  $p = 0.724$ , ‘TV and digital’ locations  $p = 0.665$ , ‘other mostly physical’ locations  $p = 0.101$ ).

### 3.1.4.4 Frequency of Exposure to Advertisements for Specific Food or Drink Categories

Figure 3-1 shows the mean frequency of seeing or hearing advertisements for specific food or drink categories in the past 30 days, with adjusted model results in Table 3-3 indicating that participants in Québec reported seeing/hearing advertisements for all five tested unhealthy food or drink categories less frequently than in the other provinces ( $p < 0.001$  for all). Specifically, participants from Québec reported seeing/hearing advertisements less frequently for sugary drinks ( $\beta$ : -0.40, CI: -0.46 – -0.34), fast food ( $\beta$ : -0.30, CI: -0.36 – 0.24), sugary cereals ( $\beta$ : -0.38, CI: -0.44 – 0.32), snacks ( $\beta$ : -0.27, CI: -0.33 – 0.22), and desserts/treats ( $\beta$ : -0.28, CI: -0.34 – 0.22) compared to those in the other provinces. There were no differences observed in frequency of seeing/hearing advertisements for fruits/vegetables ( $\beta$ : 0.04, CI: -0.02 – 0.09,  $p = 0.239$ ).

**Figure 3-1:** Mean frequency of seeing or hearing advertisements for specific food or drink categories in the past 30 days (unadjusted, range: 1-6), 2019-2022 (weighted estimates, n=12,437)



**Table 3-3:** Frequency of seeing or hearing advertisements for specific food or drink categories in the past 30 days (range: 1-6), 2019-2022 (weighted estimates, n=12,437)

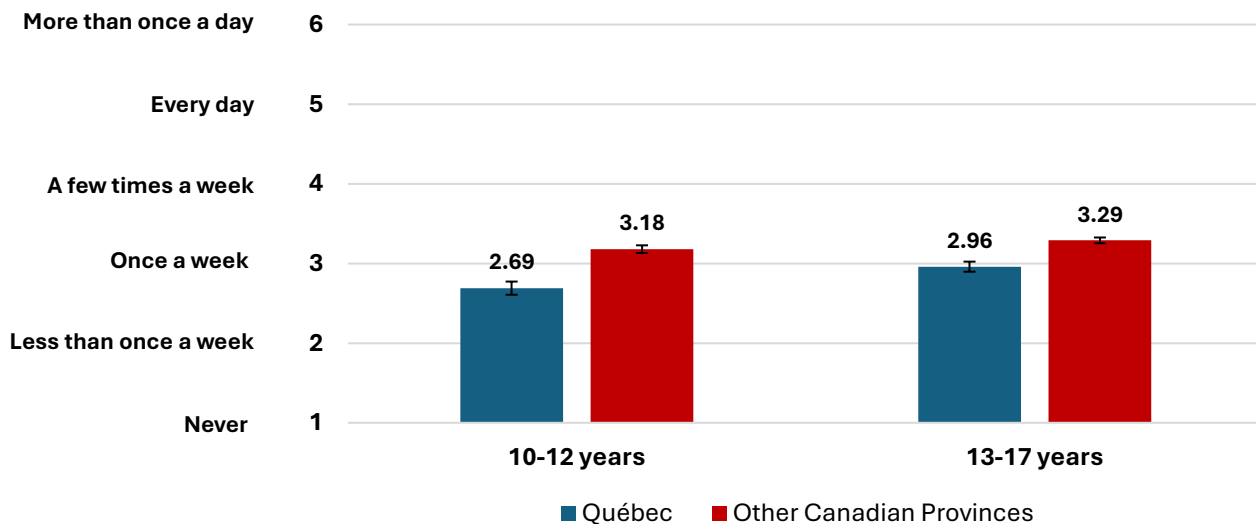
	<b>Québec</b> Unadjusted mean (SE)	<b>Other Canadian Provinces</b> Unadjusted mean (SE)	<b>β</b> (SE)	<b>Unadjusted 95% CI†</b>	<b>P value</b>	<b>β*</b> (SE)	<b>Adjusted 95% CI†</b>	<b>P value</b>
Sugary drinks	2.85 (0.03)	3.25 (0.02)	-0.40 (0.03)	-0.46 - -0.34	<0.001	-0.40 (0.03)	-0.46 -- 0.34	<0.001
Fast food	3.41 (0.03)	3.68 (0.02)	-0.27 (0.03)	-0.33 - -0.21	<0.001	-0.30 (0.03)	-0.36 -- 0.24	<0.001
Sugary cereals	2.66 (0.03)	3.04 (0.02)	-0.38 (0.03)	-0.44 - -0.32	<0.001	-0.38 (0.03)	-0.44 -- 0.32	<0.001
Snacks	2.90 (0.03)	3.19 (0.01)	-0.29 (0.03)	-0.35 - -0.23	<0.001	-0.27 (0.03)	-0.33 -- 0.22	<0.001
Desserts or treats	2.87 (0.03)	3.16 (0.02)	-0.29 (0.03)	-0.34 - -0.23	<0.001	-0.28 (0.03)	-0.34 -- 0.22	<0.001
Fruits/vegetables	2.22 (0.03)	2.22 (0.01)	-0.01 (0.03)	-0.06 - 0.05	0.853	0.04 (0.03)	-0.02 - 0.09	0.239

† 95% confidence interval

\* Estimated regression coefficient for Québec compared to other Canadian provinces in a multiple linear regression model adjusted for age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

There was a significant interaction between jurisdiction and age for frequency of seeing/hearing advertisements for sugary drinks ( $F=4.48$ ,  $p=0.034$ ), as shown in Figure 3-2. Within Québec, participants aged 13-17 years reported greater frequency of exposure than those aged 10-12 years (mean: 2.96 vs 2.69,  $\beta$ : 0.18, CI: 0.07-0.28,  $p=0.001$ ) while no differences by age were observed ( $p=0.131$ ) within the other provinces. The difference in exposure between Québec and the other provinces was greater for participants 10-12 years (mean: 2.69 vs 3.29,  $\beta$ : -0.52, CI: -0.62 - -0.43,  $p<0.001$ ), compared to those aged 13-17 years (mean: 2.96 vs 3.18,  $\beta$ : -0.30, CI: -0.38 - -0.22,  $p<0.001$ ). There was no evidence of an interaction between jurisdiction and age across any other food or drink categories (fast food  $p=0.209$ , sugary cereals  $p=0.277$ , snacks  $p=0.808$ , desserts/treats  $p=0.069$ , fruits/vegetables  $p=0.391$ ).

**Figure 3-2:** Mean frequency of seeing or hearing advertisements for sugary drinks in the past 30 days (unadjusted, range: 1-6) by jurisdiction and age group, 2019-2022 (weighted estimates,  $n=12,437$ )



### 3.1.4.5 Exposure to Advertisements using Specific Marketing Techniques

Table 3-4a shows the prevalence of seeing unhealthy foods or drinks advertised using specific marketing techniques in the past 30 days. Adjusted model results show that all marketing techniques were less likely to be reported by participants in Québec than those in the other provinces ( $p<0.001$  for all). Specifically, participants from Québec were less likely to report seeing advertisements featuring cartoons/characters from movies/TV (16.5% vs 26.8%, AOR: 0.57, CI: 0.51-0.63), cartoons/characters made by food companies (26.5% vs 39.2%, AOR: 0.56, CI: 0.51-0.61), or famous people (19.7% vs 30.4%, AOR: 0.57, CI: 0.52-0.63) compared with those from the other provinces. There was no evidence of an interaction between jurisdiction and age across any marketing techniques

(cartoons/characters from movies/TV  $p=0.429$ , cartoons/characters made by food companies  $p=0.358$ , famous people  $p=0.226$ ).

**Table 3-4:** Prevalence of seeing unhealthy foods or drinks advertised using specific marketing techniques in the past 30 days and overall prevalence of owning an item with branding or restaurant toy from a company selling unhealthy food or drinks, 2019-2022 (weighted estimates, n=14,288)

<b>A) Specific marketing techniques</b>	<b>Québec</b> Unadjusted % (n)	<b>Other Canadian Provinces</b> Unadjusted % (n)	<b>OR</b>	<b>Unadjusted 95% CI†</b>	<b>P value</b>	<b>AOR*</b>	<b>Adjusted 95% CI†</b>	<b>P value</b>
Cartoons/characters from movies or TV	16.5% (603)	26.8% (2,848)	0.54	0.49 – 0.60	<0.001	0.57	0.51 – 0.63	<0.001
Cartoons/characters made by food companies	26.5% (968)	39.2% (4,162)	0.56	0.51 – 0.61	<0.001	0.56	0.51 – 0.61	<0.001
Famous people	19.7% (721)	30.4% (3,226)	0.56	0.51 – 0.62	<0.001	0.57	0.52 – 0.63	<0.001
<b>B) Owning an item with branding or restaurant toy</b>	<b>Québec</b> Unadjusted % (n)	<b>Other Canadian Provinces</b> Unadjusted % (n)	<b>OR</b>	<b>Unadjusted 95% CI†</b>	<b>P value</b>	<b>AOR*</b>	<b>Adjusted 95% CI†</b>	<b>P value</b>
Clothing, posters, stickers, or other things with the name or logo of unhealthy food/drink companies	16.6% (609)	21.8% (2,313)	0.72	0.65 – 0.79	<0.001	0.75	0.67 – 0.83	<0.001
‘Happy meal’ toys or other toys from fast-food restaurants	31.5% (1,152)	46.8% (4,977)	0.52	0.48 – 0.57	<0.001	0.53	0.49 – 0.58	<0.001

† 95% confidence interval

\* Adjusted odds ratio from a logistic regression model for Québec compared to other Canadian provinces adjusted for age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

#### *3.1.4.6 Differences in Owning an Item with Branding or Restaurant Toy for a Company Selling Unhealthy Food or Drinks*

Table 3-4b also shows the prevalence of owning an item with branding for a company selling unhealthy food or drinks (16.6% in Québec and 21.8% in other provinces) or a restaurant toy (31.5% in Québec and 46.8% in other provinces). Adjusted model results show that participants from Québec had lower odds of reporting owning clothing, posters, stickers, or other things with the name or logo of unhealthy food or drink companies compared to those in the other provinces (AOR: 0.75, CI: 0.67-0.83,  $p < 0.001$ ). Similarly, participants from Québec had lower odds of reporting owning 'Happy meal' toys or other toys from fast-food restaurants, compared to the those from the other provinces (AOR: 0.53, CI: 0.49-0.58,  $p < 0.001$ ). There was no evidence of an interaction between jurisdiction and age for neither owning an item with branding ( $p = 0.342$ ) nor restaurant toys ( $p = 0.409$ ).

#### *3.1.4.7 Exposure to Beverage and Restaurant Brand Advertisements*

Table 3-5a shows the number of beverage brands (range: 0-3) and restaurant brands (range: 0-4) seen in advertisements in the past 30 days. Participants from Québec saw advertisements for fewer beverage brands ( $\beta$ : -0.15, CI: -0.19 – -0.11) and fewer restaurant brands ( $\beta$ : -0.18, CI: -0.24 – -0.13,  $p < 0.001$  for both) in the past 30 days than participants in the other provinces as shown in the adjusted model findings. See Appendix F Supplemental Figure F-S1 for a visualization. There was no evidence of an interaction between jurisdiction and age for neither beverage ( $p = 0.287$ ) nor restaurant brands ( $p = 0.489$ ).

#### *3.1.4.8 Perception of Beverage and Restaurant Brand Advertisement as Targeting Children*

Table 3-5b shows the prevalence of perceiving advertisements for beverage (21.0% in Québec and 27.2% in other provinces) and restaurant brands (49.6% in Québec and 55.1% in other provinces) as usually aimed at children 12 years and under. Participants in Québec had lower odds than those in the other provinces of perceiving advertisements for beverage brands (AOR: 0.72, CI: 0.65-0.79) and restaurant brands (AOR: 0.83, CI: 0.76-0.90,  $p < 0.001$  for both) as targeting children 12 and under. There was no evidence of an interaction between jurisdiction and age for neither beverage ( $p = 0.349$ ) nor restaurant brands ( $p = 0.504$ ).

#### *3.1.4.9 Desire to Consume Products from Advertised Beverage and Restaurant Brands*

Table 3-5c shows the mean desire to consume products from advertised beverage and restaurant brands. In adjusted models, jurisdiction was associated with desire to consume products from beverage ( $p = 0.002$ ) but not restaurant brands ( $p = 0.192$ ).

Participants from Québec were less likely to report interest in consuming products from tested beverage brands compared to participants from the other provinces ( $\beta$ : -0.10, CI: -0.17 – -0.04). See Appendix F Supplemental Figure F-S2 for a visualization. There was no evidence of an interaction between jurisdiction and age for neither beverage ( $p=0.917$ ) nor restaurant brands ( $p=0.483$ ).

**Table 3-5:** Number of beverage and restaurant brands seen in advertisements in the past 30 days (beverage brand range: 0-3, restaurant brand range: 0-4); Prevalence of advertisements for beverage and restaurant brands perceived as usually aimed at children under 12 years of age; Desire to consume products from advertised beverage and restaurant brands) (range:1-7); 2019-2022 (weighted estimates, n=14,480 for beverage and n=14,467 for restaurant models)

<b>A) Brand exposure indices</b>	<b>Québec</b>	<b>Other Canadian Provinces</b>	<b>Unadjusted</b>			<b>Adjusted</b>		
	Unadjusted mean (SE)	Unadjusted mean (SE)	$\beta$ (SE)	95% CI <sup>†</sup>	P value	$\beta^*$ (SE)	95% CI <sup>†</sup>	P value
Beverage brands	1.37 (0.02)	1.52 (0.01)	-0.15 (0.02)	-0.19 – 0.11	<0.001	-0.15 (0.02)	-0.19 – -0.11	<0.001
Restaurant brands	2.15 (0.02)	2.34 (0.02)	-0.18 (0.03)	-0.24 – 0.13	<0.001	-0.18 (0.03)	-0.24 – -0.13	<0.001
<b>B) Perception of brand as aimed at children</b>	<b>Québec</b>	<b>Other Canadian Provinces</b>	<b>OR</b>	<b>95% CI<sup>†</sup></b>	<b>P value</b>	<b>AOR**</b>	<b>95% CI<sup>†</sup></b>	<b>P value</b>
	Unadjusted % (n)	Unadjusted % (n)						
Beverage brands	21.0% (781)	27.2% (2,932)	0.71	0.65 – 0.78	<0.001	0.72	0.65 – 0.79	<0.001
Restaurant brands	49.6% (1,838)	55.1% (5,923)	0.80	0.74 – 0.87	<0.001	0.83	0.76 – 0.90	<0.001
<b>C) Desire to consume products from brand</b>	<b>Québec</b>	<b>Other Canadian Provinces</b>	<b><math>\beta</math></b>	<b>95% CI<sup>†</sup></b>	<b>P value</b>	<b><math>\beta^{***}</math></b>	<b>95% CI<sup>†</sup></b>	<b>P value</b>
	Unadjusted mean (SE)	Unadjusted mean (SE)	(SE)			(SE)		
Beverage brands	3.87 (0.03)	4.01 (0.02)	-0.14 (0.04)	-0.22 – 0.07	<0.001	-0.10 (0.03)	-0.17 – -0.04	0.002
Restaurant brands	4.91 (0.03)	4.96 (0.02)	-0.04 (0.03)	-0.10 – 0.02	0.201	-0.04 (0.03)	-0.10 – 0.02	0.192

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† 95% confidence interval

\* Estimated regression coefficient for Québec compared to other Canadian provinces in a multiple linear regression model adjusted for: age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

\*\* Adjusted odds ratio from a logistic regression model for Québec compared to other Canadian provinces adjusted for age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

\*\*\* Estimated regression coefficient for Québec compared to other Canadian provinces in a multiple linear regression model adjusted for age, sex-at-birth, race/ethnicity, income adequacy, screentime, survey year, and brand seen

### **3.1.5 Discussion**

The current study is among the first to compare self-reported exposure to unhealthy food and beverage marketing among youth in Québec and other Canadian provinces. Self-reported exposure to advertisements for unhealthy foods and beverages among youth was lower in Québec than the other provinces, including across food categories, child-appealing marketing techniques, and brand advertisements. Additionally, youth in Québec were less likely to identify brand advertisements as targeted to children and reported lower desire to consume products from advertised beverage brands. There is thus evidence to suggest that the *Consumer Protection Act* may have a protective effect on children's marketing exposure and power, including potentially conferring benefits for marketing locations not included in the *Consumer Protection Act* and some spillover of effects for adolescents 13-17 years as the effect of jurisdiction largely did not differ by age. Nonetheless, marketing remains prevalent in Québec, particularly on TV and in digital media, as well as for youth over the age of 12.

Youth in Québec reported seeing advertisements in fewer locations and for fewer beverage and restaurant brands. This aligns with previous research indicating lower advertising expenditures in Québec across all marketing locations compared to Ontario, Canada's largest province [10], and may speak to the lack of impact of Canada's voluntary industry self-regulation in other provinces. Despite marketing exposure in Québec being lower than other provinces for both marketing locations covered and not covered by the *Consumer Protection Act*, marketing was still prevalent. Around 50% of Québec youth reported seeing unhealthy food advertisements on TV and digital locations despite being covered under the *Consumer Protection Act*; in line with other studies [10,11]. This may result from exposure to general advertising not targeted to children [36], as research shows that up to 90% of children's unhealthy food marketing exposure occurs on general television stations that are not child-directed and thus not covered by the *Consumer Protection Act* [37]. Moreover, although we hypothesised that differences between Québec and the other provinces would be most pronounced for marketing locations covered under the *Consumer Protection Act*, this was not the case. The greatest difference in self-reported exposure was for locations not covered under the *Consumer Protection Act* (store posters, special displays, magazines and newspapers). This points to an unintended positive spillover of the protective effect of the *Consumer Protection Act* into other marketing locations not explicitly included in the law.

Québec youth reported seeing advertisements for all unhealthy food and drink categories less frequently than those in other provinces, consistent with other literature

which shows lower exposure for most food categories [10,38,39]. However, youth across Canada were equally likely to report seeing advertisements for fruit and vegetables. This may be due to advertisements for fruits and vegetables being significantly less common (including across all of Canada) compared with advertisements for unhealthy foods [12]. The lower frequency of unhealthy food marketing and unchanged frequency of healthy food marketing observed in Québec further highlight the potential protective effect of the *Consumer Protection Act*, though it does not appear that the gap left by elimination of unhealthy food advertising is filled by more healthy food advertising. This is a potential gap in the policy as there is evidence to suggest that healthy food promotion may positively influence dietary intake among youth [40].

Youth in Québec were also roughly 60% less likely to report seeing advertisements featuring known child-appealing marketing techniques, in line with previous research [36,39] and indicating that the *Consumer Protection Act* may be reducing the power of marketing. Notably, out of all marketing techniques, the magnitude of difference in exposure between Québec and the other provinces was smallest for ‘items with the name or logo of unhealthy food or drink companies’. This may be attributed to the exceptions for brand marketing (e.g., logos or mascots) stipulated in the *Consumer Protection Act* [22]. Children are known to have a preference for foods that are presented in branded packaging, impacting consumption and general product appeal [41,42]. Thus, the exclusion of brand marketing from the *Consumer Protection Act* limits the potential protective effects for children, possibly shifting marketing from restricted to unrestricted techniques [26]. The use of company-owned brand equity characters (i.e., those designed specifically to promote products, such as Tony the Tiger created to promote Kellogg’s Frosted Flakes cereal) is likewise associated with increased preference for promoted products [43]; except in Chile, they are often not covered by marketing restrictions [25]. Despite the fact that advertisements using brand-equity characters are likely to be classified as ‘child-directed’ in Québec, the use of cartoons/characters made by food companies was the second most commonly reported marketing technique in the current study after restaurant toys. Indeed, the World Health Organization’s guideline on ‘policies to protect children from the harmful impact of food marketing’ states that restricting the use of promotional characters has greater impact on the promotional power of marketing, as compared with restricting a broader range of child-appealing persuasive techniques [16].

Québec youth were less likely to identify advertisements for beverage and restaurant brands as usually aimed at kids 12 and under, compared to youth in the other provinces. This may in part be due to the lower prevalence of child-appealing marketing

techniques. In prior research examining youth's perceptions of targeted advertising, adolescents aged 13-17 indicated several brands as targeting them directly, including McDonald's, Coca-Cola and Tim Hortons (included in the present study) [44]. Research suggests that awareness of targeting does not impact youth's advertised product appeal [45]. In the present study, Québec youth reported lower desire to consume products from advertised beverage brands, compared to youth in other provinces; desire to consume products from advertised restaurant brands was equally high across all of Canada. This may be related to relatively lower expenditures for beverage brand advertising in Canada and comparatively greater exposure to fast food/restaurant advertisements [9,46] – demonstrating the association between marketing and appeal.

The effect of jurisdiction largely did not differ by age, with children and adolescents experiencing similar patterns of marketing exposure and power between Québec and the other provinces. This is contrary to a recent study by Vergeer et al. which found age-related patterns of self-reported exposure to differ between Québec and Ontario [39]. This contrast in findings may be related to methodological heterogeneity as the study by Vergeer et al. was focused on digital marketing locations and provided comparison to one province only, whereas the present study included additional marketing locations and all Canadian provinces. No further studies examining age-related differences in advertising exposure by province were identified by the authors. Notably, one exception to the findings generally observed in the present study was frequency of advertisements for sugary drinks. Adolescents 13-17 years in Québec reported lower exposure to sugary drink advertisements compared to children 10-12 years in other provinces—in line with the previously described research [39]. Overall, given that the *Consumer Protection Act* only applies to children 12 and under, these trends may point to two key take-aways: 1) as youth in Québec largely had lower exposure than youth in other provinces regardless of age, there may be a spillover effect wherein adolescents are also being protected by the *Consumer Protection Act*; and 2) since adolescents consistently reported greater exposure across all of Canada, the *Consumer Protection Act* may not be as impactful for adolescents as it is for children. Research shows that adolescents have similar, and at times higher, levels of exposure to unhealthy food marketing as children [16,30]. In fact, despite mandatory regulations that cover children over the age of 12 years being found to be more effective in evaluations [21], adolescents largely remaining excluded from food marketing policies [17].

Sensitivity analyses revealed that overall mean location exposure was lower in Québec compared to the other provinces when comparing French-to-French, and separately English-to-English speakers. Mean exposure for Anglophone youth in Québec was more similar to exposure of both Francophone and Anglophone youth in the other

provinces, than to Francophone youth's exposure in Québec. Previous studies comparing exposure in Québec and Ontario found that Francophone children in Québec were exposed to fewer child-directed advertisements than Anglophone children in Québec, who in turn were exposed to levels comparable to those of Anglophone children in Ontario [10,47]. The difference in exposure may be related to Anglophone youth's consumption of English-language media produced outside of Québec, with the *Consumer Protection Act's* impact being more pronounced for Francophone media. There may thus be potential for reduced cross-border exposure if advertising in Anglophone media is better regulated at a federal level. Further research is needed with more robust sample sizes of non-dominant language speakers in Québec and other provinces.

#### **3.1.5.1 Strengths and Limitations**

The IFPS recruits participants through nonprobability-based sampling, which may limit the representativeness of the findings [29]. However, the data were weighted by age group, sex, and province to align with population distributions from the census. Study data were collected after Québec's advertising policy was implemented; therefore, no 'pre-policy' baseline data were available with which to conduct a pre-post analysis. Comparisons with other provinces offer a quasi-experimental alternative for assessing potential policy impact. Additionally, self-reported marketing exposure is likely subject to recall bias due to the large amount of marketing individuals are exposed to everyday [48]. Though there is potential for actual exposure to be underestimated, relative differences identified in this study are likely to be reflective. Evidence from research on tobacco marketing has shown a strong association between self-reported exposure and objective exposure data, such as advertising expenditures, among youth and young adults [49–51]. Present study findings are also in alignment with differences in advertising expenditures between Québec and the other provinces reported in the literature [10]. Although other types of data collection can provide more objective estimates of marketing exposure, such as wearable equipment and device monitoring, these methods are less feasible for large population-level studies and large datasets of this nature do not currently exist in Canada.

#### **3.1.6 Conclusions**

An increasing number of countries are implementing policies to restrict marketing of unhealthy foods to children. The current study suggests that Québec's existing restrictions are associated with lower exposure and power of unhealthy food marketing, including conferring protective effects for marketing locations not covered under the *Consumer Protection Act*. Despite this, exposure to marketing remains prevalent in Québec, particularly on TV and online, as well as for youth over the age of 12. These findings indicate

that the existing law in Québec does not appear to sufficiently address marketing in all places where children may be exposed, including English-language media, non-child-targeted marketing locations and/or techniques, and brand marketing. The prevalence and impact of brand marketing in particular should be examined, given its exclusion from many marketing regulations globally. Given that no differences in healthy food marketing were observed, with exposure low across all of Canada, there may also be a need for policy to promote healthy food marketing as an accompaniment to unhealthy marketing restriction. Further, the great exposure and power of marketing in other Canadian provinces speaks to the lack of impact of Canada's voluntary industry self-regulation and highlights the need to address child-directed unhealthy food marketing at a federal level.

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### 3.2 More Details on Sensitivity Analysis for Language

As described in the study manuscript, language of survey completion was highly dependent on the province, with over 97% of participants in provinces other than Québec completing the survey in English (see Table 3-6).

**Table 3-6.** Language of survey completion by jurisdiction, 2019-2022 (weighted estimates)

	<b>Overall</b> (N=14,599) % (N)	<b>Québec</b> (n=3,741) % (n)	<b>Other Canadian Provinces</b> (n=10,858) % (n)
<b>Language of survey completion</b>			
French	21.1% (3,087)	76.2% (2,851)	2.2% (236)
English	78.9% (11,512)	23.8% (890)	97.8% (10,622)

Sensitivity analyses revealed that mean location exposure was lower in Québec than other provinces when comparing French-to-French, and separately English-to-English speakers (see Table 3-7). Mean exposure for Anglophone youth in Québec was more similar to exposure of both Francophone and Anglophone youth in other provinces (0.17 and 0.12 absolute difference, respectively), than to Francophone youth's exposure in Québec (0.47 absolute difference).

**Table 3-7.** Participants seeing or hearing advertisements for 'unhealthy' foods or drinks in the past 30 days in any locations across jurisdictions, overall and by language, 2019-2022 (weighted estimates)

	<b>Overall</b> (N=14,563) Unadjusted mean (SE)	<b>Québec</b> (n=3,730) Unadjusted mean (SE)	<b>Other Canadian Provinces</b> (n=10,833) Unadjusted mean (SE)
<b>Overall</b>	1.92 (0.02)	1.57 (0.03)	2.04 (0.02)
<b>Language</b>			
French	1.48 (0.03)	1.46 (0.04)	1.76 (0.13)
English	2.04 (0.02)	1.93 (0.07)	2.05 (0.02)

As seen in Table 3-8, there was a very strong effect of language in Québec, but only a weak effect was observed in other Canadian provinces. As discussed in the study, this may be related to Québec youth’s consumption of both French-language Québec-produced media and English-language non-Québec-produced media; in contrast, youth’s consumption of French-language Québec-produced media is not common outside of Québec. This highlights the potential protective effect the *Consumer Protection Act*. Indeed, previous studies comparing exposure in Québec and Ontario found that Francophone children in Québec were exposed to fewer child-directed advertisements than Anglophone children in Québec, who in turn were exposed to levels comparable to those of Anglophone children in Ontario [52,137]. It can thus be hypothesised that if mandatory marketing restrictions on unhealthy food advertisements were to be implemented at a federal level, the language specific differences in exposure may be reduced.

**Table 3-8.** Participants seeing or hearing advertisements for ‘unhealthy’ foods or drinks in the past 30 days in any locations for French vs English language, by jurisdiction, 2019-2022 (weighted estimates)

Jurisdiction	Unadjusted			Adjusted		
	$\beta$ (SE)	95% CI†	P value	$\beta^*$ (SE)	95% CI†	P value
Québec (n=3,730)	-0.48 (0.08)	-0.63 – - 0.33	<b>&lt;0.001</b>	-0.47 (0.08)	-0.62 – -0.32	<b>&lt;0.001</b>
Other Canadian Provinces (n=10,833)	-0.27 (0.13)	-0.54 – - 0.03	<b>0.026</b>	-0.24 (0.13)	-0.50 – 0.02	0.065

\* Adjusted odds ratio from a logistic regression model for French compared to English language, adjusted for age, sex-at-birth, race or ethnicity, income adequacy, screentime, and survey year

Nonetheless, these findings are largely speculative as, due to the high co-linearity of language with jurisdiction, the current study was not able to include both language and jurisdiction in one model. Further research is thus needed with more robust sample sizes of non-dominant language speakers in Québec and other provinces which can further explore the how language may impact exposure frequency. Interestingly, though most marketing across jurisdictions is for unhealthy food products, foods advertised to Francophone children in Québec have been found to be marginally healthier than those viewed by Anglophone children in Québec and Ontario [10,84]. This raises an additional area for consideration in further research.

## CHAPTER 4: EXEMPTIONS FOR 'BRAND-ONLY' ADVERTISEMENTS

### 4.1 Study 2: Efficacy of restrictions on unhealthy food advertising to children: An experimental study of 'brand-only' advertisement impact on hypothetical menu item selection

**Status:** in preparation

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### 4.1.1 Overview

**Objective:** Brand-only marketing (i.e., marketing featuring brand imagery, such as logos or mascots, without any food/beverage products) is commonly excluded from marketing regulations which are rooted in the application of nutrient profile model thresholds to foods. This study examined the impact of ‘brand-only’ versus product advertisements on product selection among youth.

**Methods:** An online between-group experiment was conducted in 2023 with 5,744 youth aged 10-17 years from six countries. Youth were randomised to view advertisements according to four conditions: 1) control (video game), 2) ‘brand-only’ (McDonald’s logo), 3) ‘brand and unhealthy food’ (McDonald’s logo and hamburger), and 4) ‘brand and healthy food’ (McDonald’s logo and salad). Youth subsequently completed a hypothetical product selection task, selecting one-of-six McDonald’s menu items wherein only one met nutrient profile model thresholds (garden salad). Regression models tested differences in menu items selected and nutrient levels by condition.

**Results:** Youth in the ‘brand and healthy food’ condition were more likely to select the garden salad (5.7%) than youth in the ‘brand and unhealthy food’ (3.8%, OR:1.53) and ‘brand-only’ (3.5%, OR: 1.49) conditions ( $p<0.05$ ). Youth in the ‘brand and healthy food’ condition selected items with less saturated fat and calories than youth in the ‘brand and unhealthy food’ (saturated fat  $\beta$ : -0.66; calories  $\beta$ : -25.50) and ‘brand-only’ (saturated fat  $\beta$ : -0.62; calories  $\beta$ : -26.06) conditions ( $p<0.01$  for all). Youth in the ‘brand and unhealthy food’ condition (17.5%) were only slightly more likely to select the item featured in the ‘brand and unhealthy food’ condition than youth in the ‘brand and healthy food’ (14.2%, OR: 1.29,  $p=0.013$ ) and ‘brand-only’ (15.0%, OR: 1.20,  $p=0.068$ ) conditions.

**Conclusions:** Brand-only advertisements may have a similar impact on youth’s food selections as advertisements featuring unhealthy foods. Advertisements featuring healthy products may increase selection of healthy items.

**Keywords:** food marketing, marketing policy, brand-only advertisements, diet, nutrition

#### **4.1.2 Background**

Marketing of unhealthy foods and non-alcoholic beverages (hereafter ‘food marketing’) to children is a public health concern gaining increasing attention internationally. Children are exposed to a vast amount of food marketing, approximately 90% of which promotes unhealthy foods [1]. Food marketing can influence nutrition behaviours directly by increasing awareness and appeal of unhealthy foods, and indirectly by altering attitudes towards products and companies [2]. Advertising (paid communication messages part of marketing [3]) increases purchase intent, with exposure to advertising associated with increased habitual consumption of the advertised products among children [4]. Systematic reviews demonstrate an increase in caloric intake among children following exposure to unhealthy food advertisements [5,6]. Studies suggest that increases in children’s intake following unhealthy food advertising exposure are not compensated for at other eating occasions, with energy-dense foods displacing nutrient-dense foods and contributing to lower diet quality [7,8].

Over a dozen high-income countries have implemented mandatory restrictions on child-directed unhealthy food marketing to date [9]. Comprehensive marketing restrictions have generally been associated with reductions in exposure to unhealthy food advertising and purchasing of unhealthy foods [10–12]. However, national-level marketing restrictions differ in their scope and strength, including how child-directed marketing is defined, and the scope of marketing content and channels that are restricted [9]. These differences can influence the impact of marketing restrictions, including the extent to which they reduce exposure to child-directed marketing [10,13,14]. To date, no country has established comprehensive regulations that restrict all forms of unhealthy food marketing [9].

Recent guidelines released by the WHO Regional Office for Europe recommend that, to increase policy effectiveness, mandatory policies should use a government-led (as opposed to an industry-led) nutrient profile model to identify ‘unhealthy’ foods for which marketing should be restricted [15]. Nutrient profile models are tools that classify foods according to their nutritional composition [16,17], and can be applied to all foods/beverages or to specific food/beverage categories [10]. For example, while the United Kingdom and Chile apply a nutrient profile model to all foods/beverages to identify products subject to marketing restrictions, Mexico has specific nutrient thresholds that are only applied to confectionary, sweetened drinks, and snacks (e.g., potato chips) [10]. Nutrient profile models are typically based on levels of sodium; total, added, and/or free sugars and/or non-sugar sweeteners; total fat, saturated fat, and/or trans-fat; and energy [10,16,17]. Though less common, nutrient profile models used by some countries,

including the UK and Mexico, account for beneficial components (e.g., fruits and vegetables, fibre, protein), [10].

Most marketing regulations only restrict advertising of unhealthy foods if products classified as ‘restricted’ by a nutrient profile model appear in advertisements [14,18–20], with brand-only marketing commonly excluded from regulations [15,21]. Brand marketing refers to the use of brand imagery recognizable as a representation of the brand, such as logos or mascots (e.g., McDonald’s golden arches or Kellogg’s Tony the Tiger) [15,21]. Brand-only marketing does not show or reference any identifiable food or beverage products that could be evaluated by a nutrient profile model, in contrast to product marketing which features both brand imagery and food products [15,21]. For example, advertisements for fast food chains (like McDonald’s) would be permitted under most marketing restrictions if they display the company’s logo and brand imagery, so long as they do not display an identifiable food product (e.g., McDonald’s burgers or Kellogg’s Frosted Flakes cereal). The exclusion of brand-only marketing represents a potentially large ‘loophole’ in marketing regulations [15,22,23].

It is not well understood whether brand-only advertisements have a different impact on product selection compared to advertisements for specific unhealthy food products. Most research has examined how branding influences product awareness and preference without accounting for the inclusion of food products – the impact of branding alone could thus not be isolated [24–30], or has, to a lesser degree, characterised nutrient profiles of brand product lines [31,32]. The objectives of the current study, using a hypothetical product selection task, were to examine differences in the impact of brand-only marketing compared with product marketing on youth’s menu item selection (while the term ‘children’ was used thus far in line with marketing restriction terminology, ‘youth’ will be used hereafter to refer to both children 10-12 years and adolescents 13-17 years as both groups are known to be similarly impacted [15]). Specifically, the study sought to examine differences in selection of a menu item meeting nutrient profile model thresholds and nutrient levels of selected items by i) type of advertisement (i.e., brand-only versus product advertisement), and ii) type of product featured in advertisement (i.e., healthy versus unhealthy products). It was hypothesised that youth who view a brand-only advertisement will have greater odds of selecting the menu item which meets nutrient profile model thresholds and will on average select menu items lower in saturated fat, sugar, sodium, and calories, compared to those who view a product advertisement. Additionally, it was hypothesised that youth who view a product advertisement for a healthy food will have greater odds of selecting healthier menu items compared with those who view either a product advertisement for an unhealthy food or a brand-only advertisement.

### **4.1.3 Methods**

#### *4.1.3.1 Participants*

The experiment was conducted online as part of the IFPS Youth Surveys in Australia, Canada, Chile, Mexico, the UK, and the US. Youth aged 10-17 years completed web-based surveys in November-December 2023. The youth were recruited through parents/guardians enrolled in the Nielsen Consumer Insights Global Panel and their partners' panels using probability and non-probability sampling methods. Adult panellists were asked for consent for their child to complete the survey (only one child per household was invited). After eligibility screening, all potential child participants were provided with information about the study and asked to provide assent. Surveys were conducted in English in Australia and the UK; Spanish in Chile and Mexico; English or French in Canada; and English or Spanish in the US. Members of the research team who are native in each language reviewed the French and Spanish translations independently, including all images and measures. Survey questions were in Spanish for those who completed the Spanish version of the US survey. However, text incorporated in the images was shown in English to mimic the US retail environment in which most advertisements are presented in English. The child's parent/guardian received remuneration in accordance with their panel's usual incentive structure. The IFPS has been reviewed by and received ethics clearance through a University of Waterloo Research Ethics Board (REB# 41477). A full description of the IFPS surveys and methodology can be found in the 2023 IFPS Youth Technical Report available online at [www.foodpolicystudy.com/methods](http://www.foodpolicystudy.com/methods) [33].

#### *4.1.3.2 Design*





An online between-group experiment was conducted, in which participants were randomised to view a static digital advertisement according to one of four conditions (see Figure 4-1):

- 1) Control advertisement condition: a non-food advertisement for a Nintendo video game console;
- 2) 'Brand-only' advertisement condition: an advertisement for McDonald's that displays the logo and slogan but no food product;
- 3) Brand and unhealthy food advertisement condition: an advertisement featuring branding and an unhealthy menu item (McDonald's hamburger); and
- 4) Brand and healthy food advertisement condition: an advertisement featuring branding and a healthy menu item (McDonald's garden salad).

Images and text (including font typeface and punctuation) in each condition were adapted from actual advertisements for McDonald's and Nintendo identified online. The logo was relatively smaller in the two product conditions compared with the brand-only

condition, and both product conditions were accompanied by descriptive text (hamburger: “big. beefy. bliss.”, garden salad: “crisp, flavourful, and freshly prepared.”). All products displayed in the advertisements and measures were real McDonald’s offerings. McDonald’s was selected as the brand for this experiment given its international profile and established brand imagery [34]. Following randomization, participants were subsequently administered a hypothetical product selection task, described below. Please see supplemental file for information on alternative appeal task administered to participants.

**Figure 4-1.** Condition images shown to survey participants.

Condition 1 Control	Condition 2 'Brand-only'	Condition 3 Brand +unhealthy food	Condition 4 Brand + healthy food
			

#### 4.1.3.3 Measures

##### 4.1.3.3.1 Hypothetical product selection task

Participants were shown an image consisting of six menu options from McDonald’s: Big Mac, Chicken McNuggets, Quarter Pounder Deluxe (named McNifica in Chile and Mexico), grilled chicken salad, Chicken & Bacon McWrap with Grilled Chicken, and garden salad (see Figure 4-2). The Quarter Pounder Deluxe and garden salad were featured in the ‘Brand and unhealthy food advertisement’ and ‘Brand and healthy food advertisement’ conditions, respectively. Participants were asked: “If you could eat one of these foods right now, which one would you choose?”, and could select one of the six images of the McDonald’s menu items or ‘none of the above’/ ‘don’t know’/ ‘refuse to answer’. Dichotomous variables were created for each item to indicate whether or not it was selected by each participant.

##### 4.1.3.3.2 Selection of menu item meeting nutrient profile thresholds

Nutrient profile model thresholds were applied to the menu items to identify foods that would be permitted for advertising according to marketing restrictions. As six countries were included in the survey (countries did not belong to the same WHO regional office), the nutrient profile model included in federal advertising regulations proposed by Health Canada was used in this study [19,35]. Foods restricted from advertising are those that 1) have added sodium, free sugars, or added fat, and 2) exceed proposed nutrient thresholds of 6% of the daily value for sodium, 5% for sugars, and/or 10% for saturated fat [19,35]. These nutrient thresholds are based on the ‘low in’ sodium, sugars, and saturated fat nutrient content claims for prepackaged foods outlined in the Food and Drug Regulations [19,35]. Similar to most other marketing regulations globally, Canada’s proposed regulations would not apply to brand-only marketing [19,35,36]. Given that prior research based on Canadian advertising expenditure data estimates that over 99% of child-targeted products would be restricted for advertising to children according to the model [37], these thresholds were used in the present study to understand how the proposed regulations would apply to current product lines. The garden salad featured in the ‘Brand and healthy food advertisement’ condition was the only item identified at the time of measure creation for which the nutrients of interest were below the thresholds (based on a review of the six survey countries’ McDonald’s menus – see Supplemental Figure G-S1 in Appendix G). A dichotomous variable was created to indicate whether garden salad was selected.

#### 4.1.3.3 Nutrient levels of selected menu items

Participants’ menu selections were also coded according to their content of sodium, sugar, saturated fat, and calories as these are the nutrients included in most nutrient profile models [10,16,17]. Nutrient information for each menu item was determined from McDonald’s websites for each of the six countries. Where the menu item ingredients were the same, nutrient data from the Canadian website was used; where the ingredients differed, nutrient data were pulled from the website of the country which most closely matched the menu item image.

**Figure 4-2.** Hypothetical product selection task images shown to survey participants.

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**If you could eat one of these foods right now, which one would you choose?**

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#### 4.1.3.3.4 Demographic characteristics

Demographic characteristics were queried to characterise the sample and assess whether randomization was successful. Characteristics included country, age (continuous variable, categorised as 10-12 vs 13-17 years as most marketing restrictions only apply to children under 13), sex-at-birth (Male vs Female), race or ethnicity (census measures from each country were used to create country-specific response options categorised as Majority vs Minority vs Not stated), and perceived income adequacy as a measure of relative household income (assessed with the question “Does your family have enough money to pay for things your family needs?” with response options: Not enough money vs Barely enough money vs Enough money vs More than enough money vs Not stated) [33].

#### 4.1.3.4 Data Analysis

A total of 12,065 youth completed the IFPS survey in 2023. Participants were excluded for the following reasons: ineligible region; invalid response to a data quality question; below minimum survey completion time based on median survey time; and/or multiple invalid responses to open-ended measures (n=544). Among the remaining 11,521 youth, approximately half (5,744) were randomly assigned to participate in the experiment, including 1,919 in Canada, 626 in Australia, 789 in the UK, 789 in the US, 821 in Mexico, and 800 in Chile. An additional 24 participants who had missing data due to ‘don’t know’ or ‘refuse to answer’ responses were excluded from the analytic sample (remaining sample n=5,720). Analysis used ‘listwise’ deletion in which all participants with complete data were included in each model; participants who selected ‘none of the above’ (n=282) were excluded from the nutrient content models but were included in the menu item selection models.

Preliminary analyses using Rao-Scott Chi-Square Tests checked whether randomization to the four experimental conditions was successful by comparing conditions on age, sex-at-birth, and country. Six separate binary logistic regression models were run to examine differences among experimental conditions in the proportion of participants who selected each menu item, including a model assessing selection of the

garden salad. Additionally, four separate linear regression models tested differences between conditions in the mean levels of sodium, sugar, saturated fat, and calories in the selected menu items. An indicator variable for experimental condition was used in all models. Given large sample size, the study was powered to detect 2-4% differences in effect size between conditions. Inferences were made based on certainty of evidence thresholds [38], recognizing that broad marketing reach may translate small effect sizes into practically meaningful impacts at the population level. All analyses were conducted using SAS Enterprise v8.4 (SAS Institute Inc., North Carolina).

#### **4.1.4 Results**

##### *4.1.4.1 Sociodemographic Characteristics of Sample*

Sample characteristics are shown in Table 4-1, both overall and by experimental condition. Distributions of country, age, sex-at-birth, ethnicity, and perceived income adequacy were similar across experimental conditions. No significant differences between experimental conditions were observed, indicating that randomization to conditions was successful.

**Table 4-1.** Sample characteristics, by experimental condition, 2023 (N=5,720), % (n)

	<b>Overall</b> (N=5,720)	<b>Control</b> (n=1,361)	<b>Brand-only</b> (n=1,445)	<b>Brand + unhealthy food</b> (n=1,473)	<b>Brand + healthy food</b> (n=1,441)	<b>Chi- Square*</b>	<b>P</b>
<b>Country</b>						13.17	0.589
Australia	10.8% (620)	10.6% (144)	11.7% (169)	10.7% (157)	10.4% (150)		
Canada	33.5% (1913)	33.1% (451)	33.7% (487)	34.2% (504)	32.7% (471)		
Chile	13.9% (794)	13.7% (186)	14.5% (210)	13.2% (194)	14.2% (204)		
Mexico	14.3% (819)	15.7% (214)	13.9% (201)	14.5% (213)	13.3% (191)		
UK	13.7% (786)	12.6% (171)	14.1% (203)	13.4% (198)	14.8% (214)		
US	13.8% (788)	14.3% (195)	12.1% (175)	14.0% (207)	14.6% (211)		
<b>Age (years)</b>						4.15	0.246
10-12	34.3% (1962)	33.6% (457)	35.6% (515)	32.6% (480)	35.4% (510)		
13-17	65.7% (3758)	66.4% (904)	64.4% (930)	67.4% (993)	64.6% (931)		
<b>Sex-at-birth</b>						3.93	0.269
Male	53.2% (3041)	54.8% (746)	52.9% (765)	53.8% (792)	51.2% (738)		
Female	46.8% (2679)	45.2% (615)	47.1% (680)	46.2% (681)	48.8% (703)		
<b>Ethnicity</b>						8.49	0.204
Majority	74.0% (4234)	73.3% (997)	75.0% (1083)	75.9% (1118)	71.9% (1036)		
Minority	24.4% (1398)	24.8% (338)	23.6% (342)	22.8% (336)	26.5% (382)		
Not stated	1.6% (88)	1.9% (26)	1.4% (20)	1.3% (19)	1.6% (23)		
<b>Perceived income adequacy</b>						13.99	0.301
Not enough money	4.8% (273)	5.1% (70)	4.2% (61)	4.7% (69)	5.1% (73)		
Barely enough money	25.0% (1431)	26.0% (353)	25.7% (371)	24.9% (367)	23.6% (340)		
Enough money	57.9% (3314)	57.3% (780)	55.8% (806)	59.1% (870)	59.5% (858)		
More than enough money	11.0% (627)	10.4% (142)	12.5% (181)	10.1% (149)	10.8% (155)		

Not stated	1.3% (75)	1.2% (16)	1.8% (26)	1.2% (18)	1.0% (1%)
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\* Rao-Scott Chi-Square testing for differences across conditions

4.1.4.2 Hypothetical Product Selection Task & Selection of Menu Item Meeting Nutrient Profile Thresholds

Table 4-2 shows the percent of participants who selected each menu item by experimental condition, with likelihood of selection shown in Table 4-3. No differences by condition were observed in the likelihood of selecting Chicken McNuggets ( $F=0.48$ ,  $p=0.697$ ) or the Chicken & Bacon McWrap with Grilled Chicken ( $F=2.03$ ,  $p=0.108$ ). Moderate differences by condition were observed for the Quarter Pounder Deluxe ( $F=2.35$ ,  $p=0.070$ ). Moderate-to-strong differences were observed for the Big Mac ( $F=3.05$ ,  $p=0.027$ ), the grilled chicken salad ( $F=6.66$ ,  $p<0.001$ ), and the garden salad ( $F=3.54$ ,  $p=0.014$ ).

**Table 4-2.** Percent of participants who selected each menu item, by experimental condition (n=5,720)

<b>Menu Item</b>	<b>Overall % (n)</b>	<b>Control (n=1,361) % (n)</b>	<b>Brand-only (n=1,445) %(n)</b>	<b>Brand + unhealthy food (n=1,473) %(n)</b>	<b>Brand + healthy food (n=1,441) %(n)</b>
Big Mac	25.9% (1,481)	25.8% (351)	28.5% (412)	25.7% (378)	23.6% (340)
Chicken McNuggets	26.9% (1,538)	26.3% (358)	27.0% (390)	28.0% (412)	26.2% (378)
Quarter Pounder Deluxe	15.4% (883)	15.0% (204)	15.0% (217)	17.5% (258)	14.2% (204)
Grilled Chicken Salad	8.9% (507)	8.9% (121)	7.8% (113)	7.2% (106)	11.6% (167)
Chicken & Bacon McWrap with Grilled Chicken	13.8% (788)	15.2% (207)	12.0% (174)	14.0% (206)	14.0% (201)
Garden Salad †	4.2% (241)	3.9% (53)	3.5% (50)	3.8% (56)	5.7% (82)
None of the above	4.9% (282)	4.9% (67)	6.2% (89)	3.9% (57)	4.8% (69)

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Youth in the ‘brand-only’ condition (28.5%) were more likely to select the Big Mac than those in the ‘brand and healthy food’ condition (23.6%, OR: 1.29, CI: 1.09 – 1.53,  $p=0.003$ ). There was moderate-to-weak evidence to suggest that youth in the ‘brand-only’ condition were also more likely to select the Big Mac than those in the ‘brand and unhealthy food’ condition (25.7%, OR: 1.16, CI: 0.98 – 1.36,  $p=0.084$ ). No differences in selection of the Big Mac were observed between the ‘brand and unhealthy’ and ‘brand and healthy’ food conditions ( $p=0.196$ ) or between the ‘control’ and other three conditions.

Youth in the ‘brand and unhealthy food’ condition (17.5%) were more likely to select the Quarter Pounder Deluxe than those in the ‘brand and healthy food’ condition (14.2%, OR: 1.29, CI: 1.05 – 1.57,  $p=0.013$ ). There was moderate-to-weak evidence to suggest that youth in the ‘brand and unhealthy food’ condition were also more likely to select the Quarter Pounder Deluxe than those in the ‘brand-only’ (15.0%, OR: 1.20, CI: 0.99 – 1.46,  $p=0.068$ ) and ‘control’ conditions (15.0%, OR: 1.20, CI: 0.99 – 1.47,  $p=0.069$ ). No differences in selection of the Quarter Pounder Deluxe were observed between the ‘control’, ‘brand-only’, ‘brand and healthy food’ conditions.

Youth in the ‘brand and healthy food’ condition (11.6%) were more likely to select the grilled chicken salad than those in the ‘brand and unhealthy food’ condition (7.2%, OR: 1.69, CI: 1.31 – 2.18,  $p<0.001$ ). Youth in the ‘brand and healthy food’ condition were also more likely to select the grilled chicken salad than those in the ‘brand-only’ (7.8%, OR: 1.55, CI: 1.20 – 1.99,  $p<0.001$ ) and control (8.9%, OR: 1.34, CI: 1.05 – 1.72,  $p=0.019$ ) conditions. No differences in selection of the grilled chicken salad were observed between the ‘control’, ‘brand-only’, ‘brand and unhealthy food’ conditions.

Youth in the ‘brand and healthy food’ condition (5.7%) were more likely to select the garden salad than those in the ‘brand and unhealthy food’ condition (3.8%, OR: 1.53, CI: 1.08 – 2.16,  $p=0.017$ ). Youth in the ‘brand and healthy food’ condition were also more likely to select the garden salad than those in ‘brand-only’ (3.5%, OR: 1.68, CI: 1.18 – 2.41,  $p=0.005$ ) and ‘control’ (3.9%, OR: 1.49, CI: 1.05 – 2.12,  $p=0.027$ ) conditions. No differences in selection of the garden salad were observed between the ‘control’, ‘brand-only’, ‘brand and unhealthy food’ conditions.

**Table 4-3.** Likelihood of selecting each menu item, by experimental condition (n=5,720)

Experimental Condition Vs Experimental Condition		Big Mac		Chicken McNuggets		Quarter Pounder Deluxe		Grilled Chicken Salad		Chicken & Bacon McWrap with Grilled Chicken		Garden Salad †	
		F value	P	F value	P	F value	P	F value	P	F value	P	F value	P
Overall		3.05	<b>0.027</b>	0.48	0.697	2.35	0.070	6.66	<b>&lt;0.001</b>	2.03	0.108	3.54	<b>0.014</b>
		<b>OR*</b> (95%CI)	<b>P</b>	<b>OR*</b> (95%CI)	<b>P</b>	<b>OR*</b> (95%CI)	<b>P</b>	<b>OR*</b> (95%CI)	<b>P</b>	<b>OR*</b> (95%CI)	<b>P</b>	<b>OR*</b> (95%CI)	<b>P</b>
Brand-only	Control (ref)	1.15 (0.97 – 1.36)	0.106	1.04 (0.88 – 1.23)	0.682	1.00 (0.81 – 1.23)	0.983	0.87 (0.67 – 1.14)	0.306	0.76 (0.61 – 0.95)	<b>0.015</b>	0.89 (0.60- 1.31)	0.542
Brand-only	Brand and unhealthy food (ref)	1.16 (0.98 – 1.36)	0.084	0.95 (0.81- 1.12)	0.553	0.83 (0.68 – 1.01)	0.068	1.09 (0.83 – 1.44)	0.523	0.84 (0.68 – 1.05)	0.119	0.91 (0.62 – 1.24)	0.622
Brand-only	Brand and healthy food (ref)	1.29 (1.09 – 1.53)	<b>0.003</b>	1.04 (0.88 – 1.23)	0.645	1.07 (0.87 – 1.32)	0.513	0.65 (0.50 – 0.83)	<b>&lt;0.001</b>	0.85 (0.68 – 1.05)	0.128	0.59 (0.42 – 0.85)	<b>0.005</b>
Brand and unhealthy food	Control (ref)	0.99 (0.84 – 1.18)	0.938	1.09 (0.92 – 1.28)	0.320	1.20 (0.99- 1.47)	0.069	0.80 (0.61 – 1.04)	0.098	0.91 (0.74 – 1.12)	0.356	0.98 (0.67 – 1.43)	0.898
Brand and unhealthy food	Brand and healthy food (ref)	1.12 (0.94 – 1.32)	0.196	1.09 (0.93 – 1.29)	0.292	1.29 (1.05 – 1.57)	<b>0.013</b>	0.59 (0.46 – 0.76)	<b>&lt;0.001</b>	1.00 (0.81 – 1.24)	0.977	0.66 (0.46 – 0.93)	<b>0.017</b>
Brand and healthy food	Control (ref)	0.89 (0.75 – 1.06)	0.178	1.00 (0.84 – 1.18)	0.965	0.94 (0.76 – 1.15)	0.533	1.34 (1.05 – 1.72)	<b>0.019</b>	0.90 (0.73 – 1.12)	0.345	1.49 (1.05- 2.12)	<b>0.027</b>

† Garden salad is the only menu item which would not be subject to restriction under Health Canada’s proposed nutrient profile model thresholds

\* Unadjusted odds ratios from a logistic regression model for experimental condition

#### 4.1.4.3 Nutrient Levels of Selected Menu Items

Table 4-4 shows nutrient levels from the selected menu items by experimental condition for sodium, sugar, saturated fat, and calories, with differences in levels shown in Table 4-5. While there was no evidence that levels of sodium ( $F=1.52$ ,  $p=0.206$ ) and sugar ( $F=1.65$ ,  $p=0.175$ ) were different between conditions, levels of saturated fat ( $F=5.01$ ,  $p=0.002$ ) and calories ( $F=4.91$ ,  $p=0.002$ ) did differ by experimental condition.

**Table 4-4.** Key nutrient level means, by experimental condition (n=5,438)

<b>Nutrition Criteria</b>	<b>Overall mean (SE)</b>	<b>Control (n=1,361) mean (SE)</b>	<b>Brand-only (n=1,445) mean (SE)</b>	<b>Brand + unhealthy food (n=1,473) mean (SE)</b>	<b>Brand + healthy food (n=1,441) mean (SE)</b>
Sodium (mg)	677.30 (4.02)	682.94 (8.14)	683.95 (8.00)	680.04 (7.88)	662.59 (8.12)
Sugars (g)	4.84 (0.05)	4.84 (0.10)	4.95 (0.10)	4.92 (0.10)	4.66 (0.10)
Saturated fat (g)	6.32 (0.07)	6.32 (0.14)	6.51 (0.14)	6.55 (0.13)	5.89 (0.14)
Calories (kcal)	380.32 (2.76)	383.13 (5.60)	388.26 (5.48)	387.70 (5.35)	362.20 (5.59)

Youth in the ‘brand and healthy food’ condition (mean: 5.89g) selected items with 0.66g less saturated fat than those in the ‘brand and unhealthy food’ (mean: 6.55g, CI: -1.04 – -0.29,  $p<0.001$ ), 0.62g less saturated fat than those in the ‘brand-only’ (mean: 6.51g, CI: -0.99 – -0.24,  $p=0.001$ ), and 0.43g less saturated fat than those in the ‘control’ condition (mean: 6.32, CI: -0.81 – -0.06,  $p=0.03$ ). No differences in the saturated fat content of selected items were observed between the ‘control’, ‘brand-only’, ‘brand and unhealthy food’ conditions.

Youth in the ‘brand and healthy food’ condition (mean: 362.20) selected items with 25.50 fewer calories than those in the ‘brand and unhealthy food’ (mean: 387.70, CI: -40.68 – -10.33,  $p=0.001$ ), 26.06 fewer calories than those in the ‘brand-only’ (mean: 388.26, CI: -41.42 – -10.70,  $p<0.001$ ), and 20.93 fewer calories than those in the ‘control’ condition (mean: 383.13, CI: -36.45 – -5.42,  $p=0.008$ ). No differences in the calorie content of selected items were observed between the ‘control’, ‘brand-only’, ‘brand and unhealthy food’ conditions.

**Table 4-5.** Differences in key nutrient levels, by experimental condition (n=5,438)

Experimental Condition Vs Experimental Condition		Sodium (mg)		Sugars (g)		Saturated fat (g)		Calories (kcal)	
		F value	P	F value	P	F value	P	F value	P
Overall		1.52	0.206	1.65	0.175	5.01	<b>0.002</b>	4.91	<b>0.002</b>
		<b>β*</b> (95%CI)	<b>P</b>	<b>β*</b> (95%CI)	<b>P</b>	<b>β*</b> (95%CI)	<b>P</b>	<b>β*</b> (95%CI)	<b>P</b>
Brand-only	Control (ref)	1.02 (-21.36 – 23.39)	0.929	0.11 (-0.18 – 0.40)	0.457	0.18 (-0.20 – 0.56)	0.343	5.13 (-10.24 – 20.49)	0.513
Brand-only	Brand and unhealthy food (ref)	3.91 (-18.11 – 25.93)	0.728	0.03 (-0.25 – 0.32)	0.819	-0.05 (-0.42 – 0.33)	0.805	0.56 (-14.46 – 15.60)	0.942
Brand-only	Brand and healthy food (ref)	21.37 (-0.99 – 43.72)	0.061	0.29 (0.01 – 0.57)	<b>0.043</b>	0.62 (0.24 – 0.99)	<b>0.001</b>	26.06 (10.70 – 41.42)	<b>&lt;0.001</b>
Brand and unhealthy food	Control (ref)	-2.89 (-25.11 – 19.32)	0.798	0.08 (-0.21 – 0.36)	0.603	0.23 (-0.15 – 0.61)	0.232	4.57 (-10.60 – 19.75)	0.555
Brand and unhealthy food	Brand and healthy food (ref)	17.46 (-4.73 – 39.64)	0.123	0.26 (-0.02 – 0.54)	0.072	0.66 (0.29 – 1.04)	<b>&lt;0.001</b>	25.50 (10.33 – 40.68)	<b>0.001</b>
Brand and healthy food	Control (ref)	-20.35 (-42.89 – 2.20)	0.077	-0.18 (-0.46 – 0.10)	0.209	-0.43 (-0.81 – 0.06)	<b>0.025</b>	-20.93 (-36.45 – 5.42)	<b>0.008</b>

\*Unadjusted estimated regression coefficients from a multiple linear regression model for experimental condition

#### **4.1.5 Discussion**

The current study is among the first to examine differences in the effect of ‘brand-only’ marketing as compared with product marketing on menu item selection among youth. Few differences in product selection or nutrient levels were observed between an advertisement that featured a food company brand—which would be permitted under proposed Canadian and many global regulations—and an advertisement that featured the same brand information along with a food that would be restricted under Health Canada’s proposed nutrient profile model, with a couple exceptions. The few observed differences point to the possibility that choosing unhealthy food may be the ‘default’ for youth, particularly in the context of established preferences within a brand product line. This is also evidenced by the lack of difference observed between the ‘control’ and the ‘brand-only’ and ‘brand and unhealthy food’ advertisements, with youth more likely to choose the ‘default’ regardless of advertisement exposure type. The Big Mac and Chicken McNuggets were selected at about 4-5 times the rate of garden salad by participants in all conditions. The differences observed between the ‘control’ and the ‘brand and healthy food’ advertisements may thus speak to the potential for advertisements to influence product choice for youth who are less inclined towards unhealthy options as ‘default’ or who may be less familiar with McDonald’s product lines. This is supported by literature that suggests exposure to marketing accumulates over time, with each subsequent exposure reinforcing the overall impact on behaviour [2,26]. As such, prolonged exposure to unhealthy food advertisements may develop conscious and subconscious preferences, with individual unhealthy food advertisements not necessarily impacting behaviour regardless of food product presence.

There were two notable exceptions to the identified trend. First, there was some evidence to suggest that more youth who saw the ‘brand and unhealthy food’ advertisement were choosing the Quarter Pounder Deluxe, compared to youth who saw the ‘brand and healthy food’, ‘brand-only’, or ‘control’ advertisements. The Quarter Pounder Deluxe was the product featured in the ‘brand and unhealthy food’ advertisement. This supports the main assumption underlying current marketing restriction policies; namely, that unhealthy food marketing promotes unhealthy menu item selection if the food product is featured in the advertisement [2,4]. Second, there was moderate-to-weak evidence to suggest that youth who saw the ‘brand-only’ advertisement were more likely to choose a Big Mac, compared to youth who saw either the ‘brand and unhealthy food’ or ‘brand and healthy food’ advertisements. Given the popularity of the Big Mac [39,40], it can generally be considered one of the flagship items of McDonald’s. As such, youth who saw the ‘brand-only’ advertisement may have associated the McDonald’s logo with the Big Mac subconsciously. For both cases, the magnitude of differences was modest, with few-to-no

differences compared to the ‘control’ advertisement as discussed above; differences in product selection did not translate into significant differences when analysed in terms of the nutrient levels of product choices. Further research is needed to explore these potential relationships, though the findings provide some initial evidence that ‘brand-only’ marketing may possibly influence menu item selection and highlight the need to consider restricting brand marketing of highly recognizable food brands. Prior research has also shown that brand marketing may impact selection, though to an unknown extent [8,41–44]. If this is the case, then existing marketing regulations which only cover product marketing may not be wholly effective. If marketing restrictions continue to exclude brand-only marketing, advertisements may shift from product (restricted) to brand (unrestricted) marketing [15,23]. There is heterogeneity in the impact of mandatory marketing regulations on exposure to unhealthy food advertisements, with variations in effect sizes identified in a recent systematic review [9–11], which may in part be attributed to shifts from product to brand marketing.

Brand classification has been suggested by researchers and public health agencies as an alternative to nutrient profile models in determining which products marketing restrictions should be applied to. Under brand classification, the top five selling items by market share are identified and brand marketing is restricted if three or more of the identified products would not be permitted under the relevant nutrient profile model [23]. The marketing restrictions due to be implemented in the first half of 2026 in the UK initially intended to address this nuance [18,45]. The UK regulations stipulate that non-broadcast media brand advertising is subject to restriction if it promotes a specific high salt, sugar, or fat product by using branding that is synonymous with it (e.g., Tony the Tiger is synonymous with Kellogg’s Frosted Flakes cereal) [18,45]. These restrictions also apply to product lines (i.e., a range of products offered by the company, such as different burgers or ice cream shakes) if the product line is made up of at least 50% high salt, sugar, or fat products [18,45]. Though consultation were being conducted to investigate applying similar regulations to other UK media, as of June 2025 the UK government issued a ministerial statement asserting its aim to introduce further legislation which would reinforce limiting restrictions to product advertisements and exempt brand advertising on broadcast and digital media from restrictions [46]; no further updates are available at the time of manuscript writing. The WHO has proposed a similar approach as part of the CLICK framework wherein a brand is categorised as ‘healthy’ or ‘unhealthy’ based on the nutrient levels of the top-selling and/or most visible product [32,47]. There is presently no scientific consensus on the best method to categorise brands as healthy or unhealthy, particularly given the legislative difficulty of the endeavour as food companies typically do not disclose item sales, complicating compliance monitoring [23,32]; however, a threshold model

based on product-line nutrient profiling for brand classification, and similar to the UK regulations described, has demonstrated some feasibility [32]. Though the brand classification approach may be able to address the increased selection of the Big Mac by youth who saw the ‘brand-only’ advertisements, most products offered by top food companies exceed proposed nutrient thresholds with few healthy options [31,37].

Two ‘healthier’ menu items were included in the hypothetical product selection task administered in this study – the grilled chicken salad and the garden salad. Although only the garden salad would not be subject to restriction under Health Canada’s proposed nutrient thresholds, youth who saw the ‘brand and healthy food’ advertisements were more likely to select either salad option compared to youth who saw the ‘brand and unhealthy food’, ‘brand-only’, or ‘control’ advertisements. This is notable, as it was initially hypothesised that the presence of McDonald’s branding may ‘outweigh’ the presence of healthy food and increase the likelihood of selecting flagship items. Further, youth who saw the ‘brand and healthy food’ advertisement tended to select items with less saturated fat and fewer calories than those who saw the ‘brand and unhealthy food’, ‘brand-only’, or ‘control’ advertisements. These findings are contrary to a 2015 study which administered a similar hypothetical product selection task where children were shown McDonald’s advertisements featuring healthier foods (fish fingers, fruit bag, mineral water) [48]. The study found that children who saw the healthy food advertisements did not select a significantly healthier meal bundle than those in the control (no food seen) [48]. However, the study was limited to a sample size of 58 children and did not include any children above the age of 10; menu items used in the described study would not meet the nutrient profile model thresholds applied in the current study. No other studies testing menu item selection have been identified by the authors. Given the more robust sample size and expanded age range of the current study, there is a need for further research on the impact of advertisements featuring healthy foods on youth’s product selection. In particular, while the garden salad was included in the hypothetical selection task due to its adherence to nutrient thresholds, it may not represent an appealing choice for youth. Research is thus needed with more menu item options across a wider spectrum of ‘healthfulness’ balanced with appeal. Healthier menu item selection can also be increased through the inclusion of toys in meal bundles, indicating that the ‘default’ unhealthy choice can indeed be altered [49–51]. Rather than just restricting unhealthy products or brands (which may continue be selected by children as ‘default’), regulation which also explicitly incentivises companies to both 1) expand product lines to include healthier options, and 2) advertise healthier menu items may help shift demand towards these choices and be better positioned to address the negative impacts of unhealthy food marketing.

#### *4.1.5.1 Strengths and Limitations*

The IFPS recruits participants through nonprobability-based sampling, which may limit the representativeness of the findings [52]. However, given that participants were randomised to conditions per the experimental design, internal validity of the study was high, supporting causal inferences [53]. Further, participants were only exposed to the conditions for a brief time, and exposure occurred within the context of an online experiment. These two constraints have the potential to underestimate the effect of advertisements in the ‘real’ world, which often consist of repeated exposures over time reinforcing the overall impact on behaviour [2]. The study also did not assess the impact of advertisements on ‘downstream’ behaviours, such as purchasing or dietary intake. However, the measure used in the current study was adapted from previous studies [8,29,54] and is based on established mediators for the impact of advertisement on consumer behaviour [2,55]. Additionally, the brand used in the current study (McDonald’s) is very familiar to youth. While this has ecological validity and provides a real-world translational element, it may also introduce preconceptions of products based on potentially pre-existing purchasing patterns being associated with the brand. Due to the nutritional composition of the selected items, ceiling and floor effects may have also resulted in no differences being observed in sodium and sugar across experimental conditions; sodium was high across all items (except the garden salad) and sugar content was relatively low across all items (due to no dessert items being included). However, these items were chosen to reflect product line availability. Last, the ‘control’ condition featured a Nintendo Switch video game console. This was chosen as a neutral advertisement that children may be familiar with, and all condition images were based on existing advertisements identified by the authors. However, the selected advertisement may have impeded the ‘control’ from being a neutral comparator as there is some evidence to suggest that playing video games has been associated with consumption of unhealthy foods (e.g., hamburgers, pizza, hot dogs, chips) [56–58]. As such, the inclusion of a video game console in the ‘control’ image may have subconsciously made youth more likely to select unhealthy foods. Further research could repeat this experiment with a more ‘neutral’ control.

#### **4.1.6 Conclusions**

Brand-only marketing is a common strategy in child-directed marketing, with food being one of the most highly branded commercial products [25,59]. The current study reinforces that unhealthy foods tend to be the ‘default’ choice for youth and suggests that both brand-only and product marketing may contribute to unhealthy menu item selection, though further research with direct selection tasks is needed. The study also provides

evidence for the positive effect of featuring healthy foods in advertisements by food companies typically associated with unhealthy product options. There is a need to further consider a 'healthy food first' approach to mitigating the influence of marketing on children. These considerations are important to safeguard the effectiveness of proposed marketing regulations in curbing the impact of child-directed unhealthy food marketing internationally.

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## 4.2 Brand appeal task

This study was initially conceptualised to include two tasks. Participants were randomised to view an advertisement according to their experimental condition and complete one of the two tasks either: 1) appeal task, wherein participants were presented with the hamburger from the ‘brand and unhealthy food’ experimental condition and asked to rate their desire to consume it on an emoji scale (range: 1-7); or 2) hypothetical product selection task, described above in Section 4.1. The two different tasks were both used to address the same main objective: assess whether there are differences in the impact of ‘brand-only’ food marketing compared to marketing featuring food products. The purpose of using two distinct approaches to test the same principle was to increase the potential to correctly approximate the hypothetical downstream impact of marketing on behavioural responses as described in the seminal work by Kelly et al. [38]. Although the study was carried out as originally planned, there was no difference in youth’s self-reported appeal between the control and other conditions – indicating that the manipulation did not work. Given that both tasks set out to answer the same objective (and being mindful of the need to sufficiently describe the tasks within publication word-limits), only the hypothetical product selection task was presented in the manuscript. Results of the appeal task are briefly described below (for details on methods see Chapter 2 section 2.3), and will be included as a supplemental file at the time of manuscript submission.

Sample characteristics of participants randomised to the appeal task are shown in Table 4-6, both overall and by experimental condition. Distributions of country, age, sex-at-birth, ethnicity, and perceived income adequacy were similar across experimental conditions. No significant differences between experimental conditions were observed, indicating that randomization to conditions was successful.

**Table 4-6.** Sample characteristics of participants randomised to appeal task, by experimental condition, 2023 (N=5,748), %(n)

	<b>Overall</b> (N=5,748)	<b>Control</b> (n=1,408)	<b>Brand-only</b> (n=1,429)	<b>Brand + unhealthy food</b> (n=1,466)	<b>Brand + healthy food</b> (n=1,445)	<b>Chi- Square*</b>	<b>P</b>
<b>Country</b>						15.94	0.386
Canada	33.3 (1,916)	32.2 (454)	34.6 (494)	34.2 (502)	32.2 (466)		
Australia	11.3 (650)	11.4 (160)	10.4 (149)	12.8 (187)	10.7 (154)		
UK	14.1 (811)	14.2 (200)	13.6 (195)	13.2 (193)	15.4 (223)		
US	14.7 (845)	14.0 (197)	15.6 (223)	13.4 (196)	15.8 (229)		
Mexico	13.3 (763)	14.1 (198)	12.6 (180)	13.3 (195)	13.1 (190)		
Chile	13.3 (763)	14.1 (199)	13.2 (188)	13.2 (193)	12.7 (183)		
<b>Age (years)</b>						2.66	0.447
10-12	35.6 (2,049)	37.0 (521)	35.0 (500)	34.4 (504)	36.3 (524)		
13-17	64.4 (3,699)	63.0 (887)	65.0 (929)	65.6 (962)	63.7 (921)		
<b>Sex-at-birth</b>						2.65	0.448
Male	52.5 (3,016)	53.4 (752)	53.0 (758)	52.8 (774)	50.7 (732)		
Female	47.5 (2,732)	46.6 (656)	47.0 (671)	47.2 (692)	49.3 (713)		
<b>Ethnicity</b>						6.65	0.354
Majority	74.6 (4,286)	74.6 (1,051)	75.4 (1,078)	74.6 (1,093)	73.6 (1,064)		
Minority	23.9 (1,374)	23.7 (334)	22.7 (325)	23.7 (348)	25.4 (367)		
Not stated	1.5 (88)	1.6 (23)	1.8 (26)	1.7 (25)	1.0 (14)		
<b>Perceived income adequacy</b>						9.62	0.650
Not enough money	5.2 (300)	6.0 (85)	5.5 (78)	5.0 (74)	4.4 (63)		

Barely enough money	24.2 (1,390)	22.7 (320)	23.7 (339)	25.2 (369)	25.1 (362)
Enough money	58.2 (3,347)	59.2 (833)	58.8 (840)	57.6 (844)	57.4 (830)
More than enough money	10.7 (616)	10.5 (148)	10.7 (153)	10.3 (151)	11.3 (164)
Not stated	1.7 (95)	1.6 (22)	1.3 (19)	1.9 (28)	1.8 (26)

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\* Rao-Scott Chi-Square testing for differences across conditions

Recall that the research question to be addressed by the appeal task was the following: Are there differences in the impact of ‘brand-only’ compared with product advertising on product appeal among youth, including for advertisements featuring ‘healthy’ versus ‘unhealthy’ food products? Table 4-7 shows the mean product appeal ratings overall and by experimental condition. No evidence of differences in appeal scores was observed by experimental condition ( $F=2.0$ ,  $p=0.111$ ). Since the main effect of experimental condition was not significant, no further analyses or interpretation of this task were carried out.

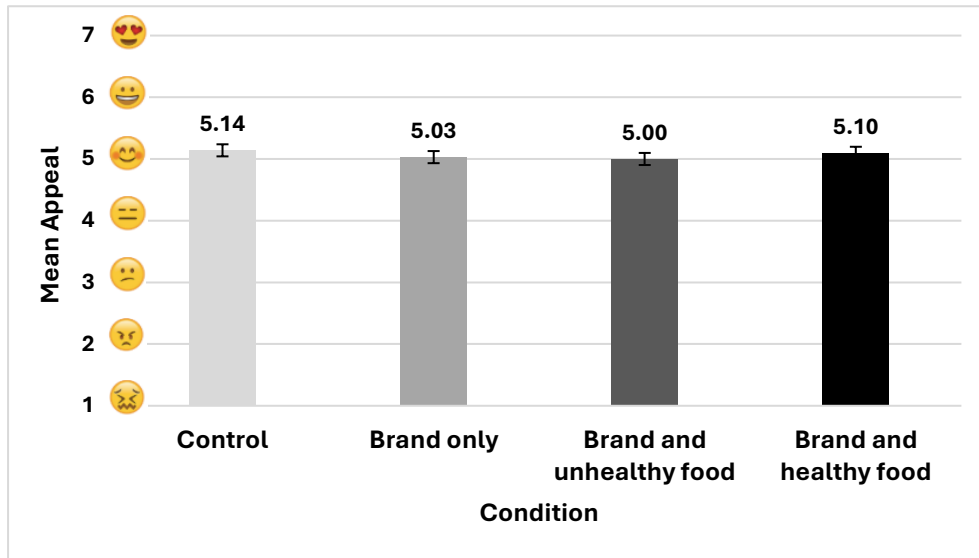
**Table 4-7.** Mean product appeal, overall and by experimental condition, 2023 (n=5,748)

Overall Mean (SE)	Control (n=1,408)		Brand-only (n=1,429)		Brand + unhealthy food (n=1,466)			Brand + healthy food (n=1,445)		
	Mean (SE)	Mean (SE)	$\beta^*$ (95%CI)	P	Mean (SE)	$\beta^*$ (95%CI)	P	Mean (SE)	$\beta^*$ (95%CI)	P
5.07 (0.02)	5.14 (0.05)	5.03 (0.05)	-0.11 (-0.24 – 0.02)	0.092	5.00 (0.05)	-0.15 (-0.28 – 0.02)	<b>0.026</b>	5.10 (0.05)	-0.05 (-0.17 – 0.08)	0.488

\* Unadjusted estimated regression coefficients from a multiple linear regression model for experimental condition

There are several factors which may have contributed to the lack of significant effect. While a total of 12,065 participants completed the survey, after removing participants for data quality concerns (n=544), splitting the sample in half to randomise participants into one of the two tasks, and removing missing data (n=29), the final analytic sample for the appeal task consisted of 5,748 participants. ‘Don’t know’ was recoded to a neutral rating for the appeal task (n=53) to preserve sample size, consistent with the other two studies in the thesis. This resulted in an average of 1,437 participants in each experimental group. Initial sample size calculations indicated that with a sample size of 1,442 in each condition/task combination, the study had 80% power to detect a 0.12 change in appeal between any two experimental conditions (assuming baseline mean appeal of 5.2,  $SD=1.5$ ), for which  $\alpha=.05$  for a 2-tailed test. These calculations were based on the 2021 IFPS Youth survey and were consistent with the final sample achieved and relatively in line with the resulting differences in mean appeal ratings between conditions (as shown in Table 4-7). It is unlikely that the study did not have sufficient statistical power to detect differences. A more probable explanation for the observed lack of difference is a potential ceiling effect.

**Figure 4-3.** Mean product appeal of the hamburger, by experimental condition, 2023 (n=5,748)



As illustrated by Figure 4-3, the hamburger in the appeal task was rated similarly highly across the conditions. It could thus be possible that any potential differences were negated by the high desirability of the product selected for inclusion in the task which produced low variability in responses. In selecting the product, the aim was to have participants in the control condition identify product appeal without any associations with McDonald’s, in contrast to participants in the other conditions who may have associated the hamburger with the McDonald’s branding that was displayed in the advertisement due to McDonald’s flagship items being hamburgers. It was hypothesised that appeal would be greatest for those in the ‘brand and unhealthy food condition’ (as they would have seen the same hamburger in the advertisement), followed by those in the ‘brand-only’ condition, ‘brand and healthy food condition’, and finally the control condition; however, the advertisement was not enough to shift overwhelming preference. Further research is needed which would repeat the experiment with a food product that does not have such ‘universal appeal’. The use of a food product which has a more variable appeal for youth may be better able to ascertain whether the effect of brand-only and product marketing differ; for example, drinkable fruit-flavoured yogurt may be used instead.

The universally high rating of the hamburger in the appeal task is consistent with results from the hypothetical product selection task described in section 4.1. Few differences were observed between the ‘control’ and the ‘brand-only’ and ‘brand and unhealthy food’ advertisements; unhealthy items such as the Big Mac and the Chicken McNuggets were selected at higher rates than healthier items like the grilled chicken or garden salads by participants in all conditions. Taken in tandem, the two tasks illustrate

that youth may be more likely to choose the unhealthy foods as ‘default’, including regardless of advertisement exposure type.

## CHAPTER 5: HEALTH MESSAGES IN ADVERTISEMENTS FOR UNHEALTHY FOODS

### 5.1 Study 3: Efficacy of health messages displayed on ‘unhealthy food’ advertisements in altering product perceived healthiness and appeal among youth: exploring a potential alternative to marketing restriction

**Status:** in preparation

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### **5.1.1 Overview**

**Background:** France, along with several other countries, requires health messages to be displayed on advertisements for unhealthy foods in an effort to mitigate the impact of marketing on children. This study examined the impact of a health message displayed on a SSB advertisement on product perceived healthiness and appeal among youth.

**Methods:** An online between-group 2-by-2 experiment was conducted with 11,521 youth aged 10-17 years in six countries. Youth were randomised to view one of two SSB (soda or fruit drink) advertisements either with or without a health message displayed at the bottom of the advertisement, and were asked to rate the SSB on perceived healthiness and appeal. Separate linear regression models tested the effect of experimental condition on perceived healthiness and appeal, including 2-way interactions between beverage type and message presence.

**Results:** Youth who saw an advertisement with a health message rated the advertised beverage as healthier (mean: 2.60) than those who saw an advertisement without a health message (mean: 2.54,  $\beta$ :0.06, CI:0.02-0.10,  $p=0.002$ ). No differences in appeal were observed by health message presence ( $F=1.09$ ,  $p=0.256$ ). There was no evidence of an interaction between beverage type and message presence for neither perceived healthiness ( $F=0.96$ ,  $p=0.327$ ) nor appeal ( $F=1.09$ ,  $p=0.296$ ), indicating no differences in effect between the soda and fruit drink.

**Conclusions:** The current design of health messages on SSBs as implemented in countries such as France—small text that appears on the bottom of advertisements— may be ineffective in discouraging unhealthy food consumption and may even promote misperceptions of SSBs as healthy.

**Keywords:** health messages, sugar-sweetened beverages, youth, perceived healthiness

### **5.1.2 Background**

The food environment, including food and beverage marketing (hereafter ‘food marketing’), plays a large role in the diet and health outcomes of children [1,2]. Child-directed food marketing has been shown to increase product awareness, promote positive brand/product attitudes, and increase habitual consumption of advertised products among children [3,4]. Marketing exposure has thus been associated with the development of less healthy eating practices, which may be carried forward into adulthood, contributing to increased risk of diet-related chronic disease [4,5]. An increasing number of countries have implemented or are seeking to implement mandatory restrictions on child-directed unhealthy food marketing [6]. However, lack of political support and strong food industry influence have been identified as barriers to marketing regulation implementation [7].

In 2007, after unsuccessful attempts to restrict food marketing to children [8], France mandated that health messages be displayed on all advertisements (one component of marketing) promoting processed food products or drinks with added sugars, salt or artificial sweeteners [9,10]. This legislation is part of the government’s national healthy nutrition program (Programme National Nutrition Santé) and applies to print, TV, digital, cinema, and radio advertising [9,10]. Four health messages are provided to advertisers to be used on rotation, with message options differing based on marketing channel and target audience (see Table 5-1) [10]. For advertisements targeting children, health messages promote increased fruit/vegetable consumption, physical activity, and decreased processed food and snack intake [10]. France’s mandated health messages differ from traditional health messages, such as those found on tobacco, that convey ‘warnings’ or dissuasive messages and instead encourage healthy behaviours. The legislation for mandatory health messages was accompanied by a voluntary charter signed in 2009 by private stakeholders and supported by government ministries and public agencies; the charter aims to promote healthy eating and physical activity in advertisements, rather than discourage unhealthy food promotion [8,11]. In 2016, additional mandatory restrictions were legislated for, wherein any advertisements targeted to children under 12 are not permitted during/within 15 minutes of any programming run by France’s national TV broadcast company - France Télévisions [12,13]. The legislation also applies to advertisements on any websites hosted by France Télévisions which offer programming primarily intended for children under twelve [12,13]. Advertisements for products/services “related to the health and development of children” are exempt from restrictions, as are all advertisements outside of France Télévisions’ mandate [12].

**Table 5-1.** General and youth specific health messages legislated for in France under article L. 2133-1 of the Public Health Code [10].

Category*	Original Message (French)	Translated Message (English)
General Public	<p>« Pour votre santé, mangez au moins cinq fruits et légumes par jour »</p> <p>« Pour votre santé, pratiquez une activité physique régulière »</p> <p>« Pour votre santé, évitez de manger trop gras, trop sucré, trop salé »</p> <p>« Pour votre santé, évitez de grignoter entre les repas »</p>	<p>“For your health, eat at least five fruits and vegetables per day”</p> <p>“For your health, practice regular physical activity”</p> <p>“For your health, avoid eating too many fatty, sweet, or salty foods”</p> <p>“For your health, avoid snacking between meals”</p>
Youth	<p>« Pour bien grandir, mange au moins cinq fruits et légumes par jour »</p> <p>« Pour être en forme, dépense-toi bien »</p> <p>« Pour bien grandir, ne mange pas trop gras, trop sucré, trop salé »</p> <p>« Pour être en forme, évite de grignoter dans la journée »</p>	<p>“To grow up healthy, eat at least five fruits and vegetables per day”</p> <p>“To be in good shape, exercise”</p> <p>“To grow up healthy, don’t eat too much fatty, sweet, or salty food”</p> <p>“To be in good shape, avoid snacking during the day”</p>

\* There are three categories of messages: those for the general public, those for youth, and those meant to be broadcast on the radio. Radio broadcast messages have been omitted from this table for relevance

National surveys conducted in France suggest relatively high levels of support and perceived effectiveness for the health messages. A national survey conducted shortly after the legislation was introduced in 2007 found that 21% of those 15 years and older indicated they had modified their eating habits and 17% stated they had changed their food purchasing behaviours as a result of the messages [14]. Subsequent surveys have found that while the messages generally increased public awareness of the government’s nutrition policy efforts, message visibility varied by media type [10]. Outside of government reports, few research studies have examined the impact of France’s health messages among children. An eye-tracking study [15] found that over two-thirds of children made no or only one eye fixation on health messages displayed on a TV advertisement, and over 90% did not make any fixations on health messages displayed on a print advertisement, demonstrating a lack of attention to the messages. Qualitative interviews with children [16,17] found that while the messages were relatively well understood and recalled, within three years of the messages being introduced they were perceived as “trivial”. Children interviewed indicated that they were paying less attention to the messages than prior, and reported only marginal changes to dietary patterns [16,17]. Concerns have also been raised about the health messages creating an unintended ‘health halo’ around the products shown in the advertisement, whereby the use of a health promoting message may

endorse the product and increase its' perceived healthiness [10,18]. The messages may also reinforce incorrect beliefs about the healthiness of products. For example, fruit drinks have been shown to be perceived by adults as healthier than sodas [19,20], even though both are considered SSBs – a drink category for which marketing is recommended to be restricted by the World Health Organization [2].

Similar legislation requiring health messages on advertisements for unhealthy foods has been implemented in Chile. In addition to mandatory front-of-pack labels and restrictions on marketing, any mass communication targeted at children under 14 and featuring products with added saturated fats, sugars or sodium exceeding threshold limits must display a message promoting 'healthy lifestyle habits' [21,22]. Unlike in France, the Chilean requirement for health messages is included in addition to, rather than in place of, marketing restrictions [21,23]. To our knowledge, no evaluations of Chile's health messages have been published. Spain has also required health messages in TV advertising of foods and drinks since 2013 through a collaboration between the Spanish Food Safety Agency (*Agencia Española de Seguridad Alimentaria y Nutrición*) and leading food and drink manufacturers [24]. Similarly to France, Spain does not currently have any marketing restrictions [24]. However, unlike in Chile and France, in Spain health messages are required on all foods/beverages regardless of nutrient composition, though only in the context of TV advertisements [24]. One experimental study conducted among adolescents in Spain found no differences in desire to consume or perceived healthiness of unhealthy products advertised, regardless of the presence of health messages, with relatively low awareness and recall of the health messages [24]. No further evaluations of the Spanish policy, including among children, have been identified by the authors.

Overall, there is little evidence around the efficacy of health messages in reducing the influence of unhealthy food marketing among children or adolescents (collectively referred to as 'youth' hereafter). Additionally, while literature examining 'health halo' effects in marketing has illustrated that the use of health promoting messages or imagery increases the promotional power of advertising [18,25,26], research in the context of health messages specifically is sparse. As such, there is a need to examine whether requirements to display health messages may be an effective policy alternative for countries where mandatory marketing restrictions have not/cannot be legislated. This study investigated the following two research questions: 1) Does the presence of a health message on a SSB advertisement alter the perceived healthiness and/or appeal of SSBs among youth?, and 2) Does the effect of a health message on an SSB advertisement differ based on the type of SSB, including a soda versus a fruit drink? The following was hypothesised: H<sub>1</sub> – if the health messages function as intended by the French legislation, youth who view the

advertisement with a health message will perceive the SSBs as less healthy and will have lower desire to consume the SSBs, compared to youth who view an advertisement without a health message; H<sub>2</sub> – if the health messages are subject to a ‘health halo’ effect, youth who view the advertisement with a health message will perceive the SSBs as more healthy and will have greater desire to consume the SSBs, compared to youth who view an advertisement without a health message. In either case, the effects were hypothesised to be different by beverage type (H<sub>3</sub>); in the case of H<sub>1</sub> the effects would be greater for soda, while in the case of H<sub>2</sub> the effects would be greater for the fruit drink.

### **5.1.3 Methods**

#### *5.1.3.1 Participants*

The experiment was conducted online as part of the 2023 IFPS Youth Surveys carried out in Australia, Canada, Chile, Mexico, UK, and US. The IFPS Youth Survey are self-completed cross-sectional web-based surveys conducted annually in November-December. Participants 10 to 17 years of age were recruited through parents/guardians enrolled in the Nielsen Consumer Insights Global Panel and their partners’ panels using both probability and non-probability sampling methods. Adult panelists were asked for consent for their child to participate in the survey (only one child per household was invited). After eligibility screening, all potential child participants were provided with information about the study and asked to provide assent. Surveys were conducted in English or French in Canada; English in Australia and the UK; English or Spanish in the US; and Spanish in Mexico and Chile. The text on the advertisement images was translated into French for the French version of the Canada survey, and Spanish for the Mexico and Chile surveys. The images shown to participants in the US were in English regardless of the survey language to mimic the US retail environment in which most advertisements are presented in English. Members of the research team who are native in each language reviewed the French and Spanish translations, including all images and measures. The child’s parent/guardian received remuneration in accordance with their panel’s usual incentive structure. The IFPS has been reviewed by and received ethics clearance through a University of Waterloo Research Ethics Board (REB# 41477). A full description of the 2023 IFPS youth survey methodology is available online at [www.foodpolicystudy.com/methods](http://www.foodpolicystudy.com/methods) [27].

#### *5.1.3.2 Design*

An online between-group 2-by-2 experiment was conducted, in which participants were randomised to view one of four static digital advertisements, adapted from actual advertisements identified online, for one of two SSB beverages: a soda from an established

brand (Sprite) or a fruit drink from a no-name brand (titled ‘fruit punch’). Fruit punch was selected because fruit drinks are typically perceived as being a ‘healthier’ beverage than other SSBs [19,20]. Participants were further randomised to view their assigned SSB advertisement either with or without a health message, such that there were four experimental conditions in total: 1) soda without a health message, 2) soda with a health message, 3) fruit drink without a health message, and 4) fruit drink with a health message (see Figure 5-1). The size, location, and text of the health messages were based on the regulations in France, which stipulate that the message should be displayed in a horizontal banner occupying at least 7% of the advertisement surface and accompanied by a link to a national public health website (e.g., in the case of France, Santé Publique France’s healthy eating and exercise website [www.mangerbouger.fr](http://www.mangerbouger.fr) must be mentioned) [10,15,28,29]. Requirements for the font size, typeface and font colour are not defined in the legislation [28,30]. The following health message was used: “To grow up healthy, don’t eat too much fatty, sweet, or salty food” along with a link to a fictitious non-functional country-specific public health website. Aside from the different website links and translated text, advertisement images were identical in all countries. Participants were initially shown a survey screen featuring one of the four advertisements and asked to look at the advertisement and to click next when they were ready to proceed to the next screen. They were subsequently asked two questions, described below.

**Figure 5-1.** Experimental condition images shown to survey participants.

Condition 1 Soda – No health message	Condition 2 Soda – Health message	Condition 3 Fruit drink – No health message	Condition 4 Fruit drink – Health message
			

### 5.1.3.3 Measures

#### 5.1.3.3.1 Perceived Healthiness

With the advertisement on screen, participants were asked: “Is this type of drink unhealthy or healthy”. This measure was based on an item used in a prior IFPS publication examining beverage perceptions [31]. A continuous variable ranging from 1 to 5 was created based on the response options, which included a Likert scale of options ranging from ‘Very unhealthy’ to ‘Very healthy’, as well as ‘Don’t know’ and ‘Refuse to answer’ options.

#### 5.1.3.3.2 Appeal

With the advertisement on screen, participants were asked: “How much would you like to have this drink?”. This measure was based on an IFPS survey measure previously used to examine beverage brand preference [32] and adapted from Lima et al. [33]. A continuous variable ranging from 1 to 7 was created based on the response options, which included 7 emojis ranging from communicating displeasure to extreme desire (😞😓😐😌😍😘😏), as well as ‘Don’t know’ and ‘Refuse to answer’ options.

#### 5.1.3.3.3 Demographic characteristics

Demographic characteristics were queried to characterise the sample and assess whether randomization was successful. Characteristics included country, age (continuous variable, categorised as 10-12 vs 13-17 years as most marketing restrictions only apply to children under 13), sex-at-birth (Male vs Female), race or ethnicity (census measures from each country were used to create country-specific response options available in the 2023 IFPS Technical Report [34], categorised as Majority vs Minority vs Not stated), and perceived income adequacy as a measure of relative household income (assessed with the question “Does your family have enough money to pay for things your family needs?” with response options: Not enough money vs Barely enough money vs Enough money vs More than enough money vs Not stated) [35].

#### 5.1.3.4 Data Analysis

A total of 12,065 participants completed the 2023 IFPS youth survey. Participants were excluded for the following reasons: ineligible region; invalid response to a data quality question; below minimum survey completion time (i.e., three times less than median survey time); and/or multiple invalid responses to open-ended measures (n=544) [34]. Additionally for this analysis, participants missing data on perceived healthiness (Don’t know/Refuse; n=232) and appeal (Refuse/Missing; n=56) were excluded. ‘Don’t know’ was excluded from analysis for perceived healthiness as no reasonable interpretation could be

made and cell size was too small for inclusion as a separate category but was recoded to a neutral rating for appeal ('4' on Emoji scale, n=254). The final analytic sample consisted of 11,236 participants (1,234 from Australia; 3,743 from Canada; 1,539 from Chile; 1,570 from Mexico; 1,560 from UK; and 1,590 from US).

Preliminary analysis using Rao-Scott Chi-Square tests was conducted to check whether randomization to experimental conditions was successful by comparing groups on country, age, sex-at-birth, ethnicity, and perceived income adequacy. Separate linear regression models tested the effect of experimental condition on perceived healthiness and appeal, each in two steps. First, main effects of beverage type and health message presence were modelled. Second, the 2-way interaction between beverage type and health message presence was added. Inferences were made based on certainty of evidence thresholds [36]. All analyses were conducted using SAS Enterprise v8.4 (SAS Institute Inc., North Carolina).

## **5.1.4 Results**

### *5.1.4.1 Sociodemographic Characteristics*

Distributions of country, age, sex-at-birth, ethnicity, and perceived income adequacy were similar across experimental conditions (Table 5-2), with no significant differences between conditions indicating that randomization was successful.

**Table 5-2.** Sample characteristics, by experimental condition, 2023 (N=11,236), % (n)

	<b>Overall</b> (N=11,236)	<b>Soda – No Health Message</b> (n=2,725)	<b>Soda – Health Message</b> (n=2,820)	<b>Fruit Drink – No Health Message</b> (n=2,787)	<b>Fruit Drink – Health Message</b> (n=2,904)	<b>Rao-Scott Chi- Square*</b>	<b>P</b>
<b>Country</b>						8.53	0.901
Australia	11.0% (1,234)	10.9% (296)	11.4% (320)	10.9% (304)	10.8% (314)		
Canada	33.3% (3,743)	32.9% (897)	32.7% (922)	33.8% (942)	33.8% (982)		
Chile	13.7% (1,539)	13.7% (374)	13.9% (393)	13.2% (367)	13.9% (405)		
Mexico	14.0% (1,570)	13.6% (369)	13.3% (376)	14.3% (398)	14.7% (427)		
United Kingdom	13.9% (1,560)	14.7% (401)	14.0% (394)	13.7% (383)	13.2% (382)		
United States	14.1% (1,590)	14.2% (388)	14.7% (415)	14.1% (393)	13.6% (394)		
<b>Age (years)</b>						5.42	0.143
10-12	35.0% (3,929)	34.3% (934)	36.6% (1,033)	33.8% (943)	35.1% (1,019)		
13-17	65.0% (7,307)	65.7% (1,791)	63.4% (1,787)	66.2% (1,844)	64.0% (1,885)		
<b>Sex-at-birth</b>						5.60	0.133
Male	52.9% (5,944)	51.7% (1,408)	54.6% (1,541)	52.9% (1,474)	52.4% (1,521)		
Female	47.1% (5,292)	48.3% (1,317)	45.4% (1,279)	47.1% (1,313)	47.6% (1,383)		
<b>Ethnicity</b>						7.20	0.303
Majority	74.4% (8,355)	74.7% (2,036)	73.8% (2,081)	74.3% (2,071)	74.6% (2,167)		
Minority	24.1% (2,712)	24.0% (654)	24.3% (686)	24.5% (684)	23.7% (688)		
Not stated	1.5% (169)	1.3% (35)	1.9% (53)	1.2% (32)	1.7% (49)		
<b>Perceived income adequacy</b>						20.06	0.066
Not enough money	5.0% (556)	5.3% (146)	4.7% (132)	5.2% (145)	4.6% (133)		
Barely enough money	24.8% (2,785)	24.2% (659)	25.9% (731)	25.7% (715)	23.4% (680)		
Enough money	58.1% (6,534)	58.2% (1,585)	57.7% (1,628)	57.5% (1,602)	59.2% (1,719)		
More than enough money	10.8% (1,215)	10.5% (286)	10.6% (298)	10.3% (288)	11.8% (343)		

Not stated	1.3% (146)	1.8% (49)	1.1% (31)	1.3% (37)	1.0% (29)
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\* Rao-Scott Chi-Square testing for differences across conditions

#### 5.1.4.2 Perceived Healthiness

Perceived healthiness differed by both beverage type ( $F=2026.17$ ,  $p<0.001$ ) and health message presence ( $F=9.73$ ,  $p=0.002$ ) (Table 5-3). Perceived healthiness of advertised beverage was greater for youth who saw the fruit drink advertisement (mean: 2.99, SE: 0.01) compared to those who saw the soda advertisement (mean: 2.14, SE: 0.01; range: 1-5,  $\beta:0.84$ , CI: 0.81-0.88,  $p<0.001$ ). Youth who saw an advertisement with a health message rated the advertised beverage as healthier (mean: 2.60, SE: 0.01) than those who saw an advertisement without a health message (mean: 2.54, SE: 0.01; range: 1-5,  $\beta:0.06$ , CI:0.02-0.10,  $p=0.002$ ). Pairwise contrasts in Appendix H in Supplemental Table H-S1 show that the fruit drink was perceived as healthier than the soda regardless of health message presence. The contrasts provide strong-to-moderate evidence that the presence of the health message was associated with increased perceived healthiness for fruit drink ( $\beta: 0.08$ ,  $p=0.004$ ) and weak-to-no evidence of such an association for soda ( $\beta: 0.04$ ,  $p=0.128$ ), suggesting that main effect of health message may be driven by fruit drink. However, the overall interaction provides little-to-no evidence that the effect of health message was larger for fruit drink than for soda ( $F=0.96$ ,  $\beta: 0.04$ ,  $p=0.327$ ).

#### 5.1.4.3 Appeal

Appeal was significantly different by beverage type ( $F=23.44$ ,  $p<0.001$ ) (Table 5-3). Appeal of advertised beverage was greater for youth who saw the fruit drink advertisement (mean: 4.66, SE: 0.02) compared to those who saw the soda advertisement (mean: 4.52, SE: 0.02; range: 1-7,  $\beta:0.14$ , CI:0.08-0.20,  $p<0.001$ ). No differences were observed by health message presence ( $F=1.09$ ,  $p=0.256$ ). There was no evidence of an interaction between beverage type and health message presence ( $F=1.09$ ,  $p=0.296$ ); pairwise contrasts in Appendix H Supplemental Table H-S1 show that the fruit drink was rated as more appealing than the soda, regardless of health message presence.

**Table 5-3.** Mean perceived healthiness and appeal, by drink type and health message presence (N=11,236)

	Beverage type						Health Message Presence					
	Soda (n=5,545)			Fruit Drink (n=5,691)			No Health Message (n=5,512)			Health Message (n=5,724)		
	Mean (SE)	$\beta^*$ (95%CI)	P	Mean (SE)	$\beta^*$ (95%CI)	P	Mean (SE)	$\beta^*$ (95%CI)	P	Mean (SE)	$\beta^*$ (95%CI)	P
<b>Perceived healthiness<sup>†</sup></b>	2.14 (0.01)	Ref	-	2.99 (0.01)	0.84 (0.81 – 0.88)	<b>&lt;0.00</b> <b>1</b>	2.54 (0.01)	Ref	-	2.60 (0.01)	0.06 (0.02 – 0.10)	<b>0.00</b> <b>2</b>
<b>Appeal<sup>††</sup></b>	4.52 (0.02)	Ref	-	4.66 (0.02)	0.14 (0.08 – 0.20)	<b>&lt;0.00</b> <b>1</b>	4.57 (0.02)	Ref	-	4.61 (0.02)	0.03 (-0.03 – 0.09)	0.29 6

\* Unadjusted estimated regression coefficients from a multiple linear regression separately modelling perceived healthiness and appeal by beverage type and health message presence

<sup>†</sup> Range: 1-5

<sup>††</sup> Range: 1-7

### **5.1.5 Discussion**

Overall, the presence of a health message had a small effect on perceived healthiness (0.06 on a scale of 1-5) and did not have any effect on appeal among youth. Further, there is insufficient evidence to suggest that the effect of health message presence differed across beverage types. The fruit drink was consistently perceived as healthier and more appealing than the soda, regardless of health message presence. These findings are in line with findings from a similar experiment in Spain which found that health messages had no impact on the perceived healthiness or desire to consume the unhealthy products advertised [24].

The slightly greater perceived healthiness observed for advertisements featuring a health message points to the possibility of a ‘health halo’. Reports published by Santé Publique France found that health messages may be perceived as endorsing the products presented in the advertisements, particularly when physical activity was mentioned both in the message and featured in the advertisement itself [10]. Research has shown that the inclusion of healthy lifestyle messages (e.g., encouraging fruit consumption and exercise) in promotions of nutrient-poor foods/drinks is associated with youth perceiving the advertised products as healthier [18]. Healthy lifestyle messages in marketing are often used by food companies to implicitly position their products as part of a ‘healthy diet’ [37]. As such, the inclusion of explicit health messages may add to this implicit positioning, amplifying the promotional power of the marketing.

In the current study, the healthiness rating of the fruit drink was greater than the healthiness rating of the soda (each rated by youth who saw the respective beverage advertisement) by the equivalent of almost one whole category – in line with other literature [19,20]; both beverages in the study were SSBs that would be prohibited from advertising to children under comprehensive marketing restrictions [2]. Research with adults has shown that heuristics are commonly used to assess the healthiness of products; for example, ‘fruit sugar’ is perceived as healthier than ‘sugar’ due to the inclusion of the word ‘fruit’ [38]. There is thus a possibility that a ‘health halo’ manifests for items which have a more ‘ambiguous healthiness’, with the use of the word ‘fruit’ reinforcing such heuristics for fruit drinks as demonstrated by the observed potential for the effect of health message to be greater for the fruit drink rather than the soda. Further, unlike Sprite, a major brand that falls into the category of soda and is commonly recognised as ‘unhealthy’ [39], the fruit drink used in this experiment did not display a brand name (instead generically titled “fruit punch”) which minimised pre-existing brand associations with healthiness; however, it should be noted that both images were based on real brands available in some of the study

countries, meaning the fruit drink has some potential of being recognised despite no brand name being used. Further research is needed to understand the impact of established versus novel brands.

A potential strategy for addressing the ‘health halo’, as suggested by Santé Publique France, is to have the messages appear before a commercial break in order to temporarily separate the effect of the message from the advertisement and avoid forming an association with a single advertisement [40]. However, this would only be logistically feasible for TV, radio, and non-static digital marketing; print or static digital advertisements (such as the one used in the current study) would still require the message and advertisement to be overlaid. In such a case, an insert is recommended to be included with the print advertisements which would contain the health messages [40] – however, this would nonetheless create associations with a single brand/product line.

Notably, the presence of a health message did not alter the appeal of the products, indicating that health messages may not be sufficient to discourage unhealthy food consumption. The current study did not assess whether such messages may help promote healthy food consumption. Research shows that the potential for health messages to increase healthy food consumption is mixed, with weak-to-no evidence suggesting that health messages altered children’s attitudes about the importance of eating healthy or affinity for healthy or unhealthy foods [18,24,41]. In the present study, the fruit drink was found to be more appealing than the soda regardless of health message presence on either drink. This may be due to social desirability bias, whereby youth participating in a nutrition survey selected the response option which they thought may be ‘correct’ as fruit drinks are more commonly given to children by parents than soda [39,42]. Additionally, the perceived healthiness question was asked before the appeal question, which may have contributed to the bias.

The lack of any effect on appeal and the potential for a ‘health halo’ may reflect limitations in the design of the health messages. The health message used in the current study was designed to align with the French regulations, such that it was displayed in a horizontal banner occupying at least 7% of the advertisement surface [10,28,29]. The resulting text size is quite small, potentially translating to low levels of noticing, consistent with previous studies demonstrating a lack of attention to France’s health messages [15]. The health messages were presented online in the context of a survey, which may further impede noticing as participants may be focused on completing the survey. The extent to which health messages are able to alter attitudes and behaviours, including dietary intake, is dependent on noticing [43–45]. The efficacy of health messages in reducing appeal may

thus be improved through the application of best practice guidelines for increasing noticing that have been described in the health warning literature, as research on health message noticing is scarce. Research on tobacco, alcohol, and nutrition health warnings shows higher levels of noticing and recall for messages when they are larger [46–49] and more prominent, including having a clear border distinguishing the advertisement from the warning [50] and providing high contrast between the warning and the advertisement (e.g., white box with black letters, as in France’s current health messages) [51–53]. The inclusion of a signal word such as ‘warning’ and more specific health consequences can also increase attention to and recall of health messages (i.e., referring to chronic disease, such as type 2 diabetes) [44,51], but may not be appropriate for child-directed messaging.

Nevertheless, given the observed possibility of a ‘health halo’ effect, it is important that these changes are paired with alterations in message framing to ensure increased noticing is not reinforcing the effect. Health messages may be framed to either highlight the benefits of engaging in a healthy behaviour (gain-framed) or the risks associated with engaging in an unhealthy behaviour (loss-framed) [54]. Gain-framed health messages have been shown to be more effective for health promotion, including in encouraging fruit intake [54,55]. However, in the context of discouraging unhealthy consumption (e.g., of SSBs), there is potential for loss-framed messages to be more effective [56,57]. While gain-framed messages appear to have greater effects on cognition (e.g., information processing), loss-framed messages have greater effects on intention and behaviour, making them more likely to influence changes in consumption [56]. The health message used in this study (“to grow up healthy, don’t eat too much fatty, sweet, or salty food”) is gain-framed as it focuses on the benefit of “growing up healthy” rather than the risk of consuming unhealthy food; this framing may be unintentionally contributing to the observed potential for a ‘health halo’. The other health messages included in the French legislation (shown in Table 5-1) are also gain-framed. Further research is needed to assess whether, after reframing, the existing health messages would continue to be associated with a ‘health halo’ or if reframing may instead lead to behaviour change. Additionally, there is a need to explore whether a combination of loss- and gain-framed messages (as suggested in some literature [57]) may be the most effective approach given that the French health messages are mandated to be used on rotation throughout the advertisement campaign.

#### *5.1.5.1 Strengths and Limitations*

The IFPS recruits participants through nonprobability-based sampling, which may limit the representativeness of the findings [58]. However, given that participants were randomised to study conditions, internal validity remains high and supports causal

inferences [59]. Study participants saw the condition image on three survey screens (initial randomization screen, perceived healthiness question screen, and appeal question screen), for a median of 21.3 second of total exposure (initial screen: 8.5 seconds, perceived healthiness question screen median: 6.8 seconds, appeal question screen median: 6.0 seconds). Though this may appear low, the French legislation does not specify a required duration for the health message; when viewed on TV or cinema, the message must be displayed on a “fixed or scrolling banner maintained for the entire duration of the advertising message, or presented on a screen immediately following the advertising message” [28]. Health promotional videos developed based on this legislation by France Télévision for youth programs were only 7 to 8 seconds long [40]. Nonetheless, given that exposure to experimental conditions occurred within the context of an online experiment, the study is not able to mimic repeated exposures over time that occur in the real world and may reinforce the overall impact [3]. The study also did not assess the impact of advertisements on ‘downstream’ behaviours, such as purchasing or dietary intake. However, the measures of appeal used in the current study are based on established mediators for the impact of advertisement on consumer behaviour [3,60]. Additionally, the study did not examine differences in outcomes by country. Due to scant existing research, the study focused on the main effects of experimental conditions to provide foundational understanding of how health messages may impact perceived healthiness and appeal. Additional research should examine whether different policy regimes may predict differences in outcomes, accounting for differences in cultural contexts. Last, the study was carried out with only two SSBs. Further research is needed to explore differences in health message impact across more beverage types, including efficacy of health messages in promoting healthier beverages (e.g., health messages on plain milk versus chocolate milk).

### **5.1.6 Conclusions**

Health messages have been implemented as an alternative to restrictions on unhealthy food marketing in several countries, including Chile, Spain, and France. The current study suggests that health messages may not be able to mitigate the impacts of unhealthy food advertisements on dietary behaviours: health messages led to small increases (and not decreases) in the perceived healthiness of SSBs and were not associated with any differences in appeal. The results suggest that there is potential for health messages to have the opposite of the intended effect: rather than reinforcing the advertised food as unhealthy and encouraging consumption of healthier alternatives, the messages may increase the promotional power of the advertisements. Future research should examine whether health messages that are designed in accordance with best

practices in health warnings design—sufficient size, prominence, and loss-framing—may be more effective in reducing appeal and increasing perceptions of risk, including in ‘real-world’ food selection tasks.

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## CHAPTER 6: DISCUSSION

### 6.1 Overview

Marketing has been shown to negatively influence children's diets [38,179–181], with an increasing number of countries seeking to regulate marketing of unhealthy foods to children [74–76]. In Canada, only one province currently has mandatory restrictions on child-directed unhealthy food advertising (Québec's *Consumer Protection Act*); other provinces rely on voluntary industry self-regulation (the *Food and Beverage Advertising Code*) [122,161]. Health Canada is currently looking to amend the *Food and Drug Regulations* to include restrictions on child-directed unhealthy food advertising which would apply federally [33]. However, there is a lack of evidence on several key considerations relevant to policy development. In particular, Canadian, and most other child-directed marketing regulations, have exemptions for brand-only marketing (i.e., marketing featuring brand imagery but no identifiable food/beverage products) [135,158]; yet, the extent to which brand-only marketing's impact on diet is similar to marketing featuring food products is unknown. The primary aim of this thesis was to examine key characteristics of food marketing policy that may strengthen or weaken policy impact. To do this, studies were conducted to collect evidence on aspects of current, proposed, and alternative marketing policies. In assessing characteristics of Canadian and international marketing policy, key themes emerged which are discussed in more detail below.

### 6.2 Current Canadian Policy: a Mix of Mandatory and Voluntary Regulation

In the context of existing Canadian policy, self-reported exposure to advertisements for unhealthy foods and beverages was lower among youth in Québec compared to the other Canadian provinces. Youth in Québec reported seeing unhealthy food advertisements in fewer locations, including less advertisements for beverage and restaurant brands, and across all product categories. Notably, youth in Québec reported seeing/hearing approximately 60% less advertisements featuring known child-appealing marketing techniques, in line with previous research [182]. This provides strong evidence for the protective effect of the *Consumer Protection Act* on marketing exposure (i.e., reach and frequency) and power (i.e., the content and design) [34,37]. Youth in Québec were also less likely to identify brand advertisements as targeted to children 12 years and under, and reported lower desire to consume products from advertised beverage (but not restaurant<sup>6</sup>) brands.

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<sup>6</sup> Desire to consume products from advertised restaurant brands was equally high across all of Canada, while desire to consume beverages from advertised beverage brands was lower in Québec. The difference in impact on appeal observed between the beverage

Exposure to marketing among Québec youth was lower for locations that were both covered by the law (e.g., TV, digital, radio, billboards, schools, amongst others), as well as those that were not covered by the law (e.g., store posters/special displays and magazines/newspapers). In contrast to initial hypotheses, the greatest difference in self-reported exposure was observed for locations not covered under the law. This pattern of findings could indicate a broad protective effect of the law extending across all marketing locations. Alternatively, the lack of ‘specificity’ in the findings may reflect factors other than the policy effect, including potential cultural or language differences between provinces. Youth in Québec consume both French-language Québec-produced media and English-language non-Québec-produced media, whereas youth in other Canadian provinces primarily consume English-language media. Sensitivity analyses were conducted to compare French-to-French and English-to-English speakers. Regardless of language, the mean number of locations where youth were exposed to marketing was lower in Québec compared to other provinces, providing support for policy effect. However, mean exposure for Anglophone youth in Québec was more similar to exposure of both Francophone and Anglophone youth in other provinces, than to Francophone youth’s exposure in Québec, consistent with prior research [52,137]. This raises the questions about whether the law is equally applied for English and French-language media. It is possible that while exposure in Québec is lower across media in both languages compared to the other provinces, French-language media has greater compliance than English-language media. Additional research is needed to examine exposure in the context of both dominant language and language of media consumption, including evaluations of compliance monitoring, to understand how to further strengthen Québec marketing policy.

The high rates of marketing exposure and power among youth in other Canadian provinces speak to the ineffectiveness of voluntary industry self-regulation. This is consistent with previous Canadian research which found child-directed marketing to be common even from food companies which have specific policies concerning promotion of unhealthy foods to children [71]. Voluntary industry self-regulation has similarly been found to be ineffective in other countries globally, including Spain, US, and Australia [128,184–187]. In Australia, among complaints filed for non-adherence to voluntary industry advertising codes for child-directed unhealthy food advertising, less than 12% were upheld – an average of about one to four complaints per year [185]. Notably, one of the main reasons for complaints being overturned was the use ‘primarily directed to children’ wording in the Australian Association of National Advertisers Children’s

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and restaurant brands may be a result of differences in exposure. Previous research has identified expenditures for restaurant brands to be higher than for beverage brands [136,183]; these differences in reach may account for different impacts on desire to consume.

Advertising Code [185]; similar wording is used in the voluntary *Food and Beverage Advertising Code* in Canada, highlighting potential for similar industry non-adherence in a Canadian setting [122]. Overall, the findings are consistent with previous literature in supporting the need for a shift away from voluntary self-regulation of marketing in Canada.

### **6.2.1 TV, Digital Marketing, and ‘Child-directed’ Language**

Although lower than in other Canadian provinces, youth exposure to unhealthy food marketing remains widespread in Québec. Exposure was highest on TV and digital marketing locations, particularly for youth over the age of 12. In line with other studies [52,68], approximately 50% of youth in Québec reported seeing unhealthy food advertisements on TV and digital media despite being covered under the law. This highlights the need for further consideration of how to effectively regulate marketing in TV and digital environments, particularly due to the potential for cross-border exposure.

The high reported exposure on TV may in part be attributed to advertising not directly targeted to children, such as marketing during general programming (e.g., hockey games). Decreases in marketing on child-directed TV channels due to limits on viewership thresholds, like the 15% viewership threshold for TV specified in the *Consumer Protection Act*, have previously been associated with a parallel increase in marketing exposure during other non-child directed broadcast programming [114]. The inclusion of general audience programming in marketing restrictions, in addition to children’s programming, is thus needed to achieve net decreases in children’s marketing exposure [88]. A 9pm ‘watershed’ system, such as the one currently being legislated for in the UK (wherein no unhealthy food advertising is permitted in any TV programming before this time, regardless of the nature of the programming), has the potential to address limitations of Québec’s policy and has been endorsed by the WHO [59,74,79,114].

At the same time, youth are moving away from live TV to digital content and digital marketing locations account for larger proportions of youth marketing exposure [86,188,189]. Marketing on digital media is particularly effective among youth given that is difficult to differentiate from non-marketing content [6]. Digital marketing often features ‘natural’ product integration, which is not perceived as marketing [190], and may use ‘micro-targeting’ via user data [113]. This seamless integration of marketing and digital content can amplify the persuasive power of the marketing according to the Food and Beverage Cues in Digital Marketing model developed by Maksi et al. [191]. The model hypothesises that repeated exposure to digital marketing of unhealthy foods does not simply impact immediate behaviour (e.g., food choice), but may also alter broader social norms around food [191]. Digital marketing includes user-generated content which may

contribute to descriptive norms that certain unhealthy foods are liked and consumed often by children, while influencer content can solidify injunctive norms around the popularity of products [65,191].

Robust guidelines for digital marketing are needed. For example, new UK regulations to be implemented in the beginning of 2026 incorporate restrictions on digital marketing, including advergames and social media/influencer marketing. On-demand programme services under the jurisdiction of the UK (i.e., regulated by Ofcom, the UK broadcast authority) will also be covered under the 9pm ‘watershed’ to be implemented on TV, while programmes not under Ofcom’s jurisdiction will be subject to the stricter online restrictions [80,81]. In parallel to the new advertising restrictions being legislated for in UK’s *Health and Care Act*, a new Media bill was introduced to be implemented in a similar timeframe [192]. The Media bill would place new standards on on-demand programme services and would bring them under the jurisdiction of Ofcom [192]. The revision means that streaming services such as Netflix (which is currently outside of Ofcom’s jurisdiction due to being based in the Netherlands and thus regulated by the Dutch media regulator [193]) would fall under Ofcom’s jurisdiction and hence would be subject to the new digital marketing restrictions. The inclusion of on-demand services in marketing restrictions is important due to the ongoing shift from TV to digital media: in 2020, 96% of UK children watched TV programmes via on-demand services, while only 56% of children watched TV live [86]. Marketing mirrors this trend, with a 13% decrease in per capita expenditures on TV advertisements reported in Canada [52,113]. While previously on-demand services had fewer advertisements, this is changing with different levels of paid subscriptions, some of which are less expensive but allow for paid advertisements during programming (e.g., Netflix’s ‘ad-supported experience’ [194]). In terms of broadcast advertising on TV, Québec’s *Consumer Protection Act* applies for TV programs where more than 15% of the viewership is composed of children under 13 years (and the proposed product is direct at/appeals to children); however, while the law indicates that it encompasses ‘the web and mobile phones’ and makes reference to ‘online games’, it does not currently provide any guidelines specifically for digital marketing [161]. The *Consumer Protection Act* could be strengthened by making explicit what digital marketing locations and techniques are covered under the law, including to what extent on-demand services are included. The proposed Canadian federal regulations provide some details on scope of digital marketing restrictions (including on video/audio streaming services) but would likewise benefit from additional clarification around restriction parameters to support monitoring and compliance.

Digital marketing poses a particular concern for older youth. A recent Canadian study found that adolescents spent more time on digital devices and had around two times

higher exposure to digital marketing than children [195]. Adolescents are known to experience increasing online engagement as part of their social development, which may increase marketing exposure [58,86,87]. Current findings show similar patterns, with adolescents over 13 consistently reporting greater exposure to marketing in digital locations compared to 10–12-year-olds. Despite higher exposure [195], most marketing restrictions including the *Consumer Protection Act*, only apply to children under 13 years [74,161]. This was reflected in the current study as adolescents reported similar patterns of marketing exposure and power across both Québec and the other provinces. Existing ‘child-directed’ approaches may thus not be sufficiently comprehensive and, similarly to the pitfalls of using this language in industry codes discussed above, highlight the need for youth older than 12 to be included in regulations.

### **6.3 Proposed Canadian Policy & the Brand Loophole**

Brand-only marketing refers to advertisements which feature brand imagery but do not promote a specific product [74,96]. This is a common marketing practice for marketing of unhealthy foods and is widely exempt from both voluntary and mandatory marketing policies (including the *Consumer Protection Act* and proposed Canadian federal regulations) [74,96,141,161]. Indeed, in Study 1, the magnitude of difference in exposure between Québec and other Canadian provinces was smallest for “items with the name or logo of unhealthy food or drink companies”, while the use of cartoons/characters made by food companies was the second most commonly reported marketing technique after restaurant toys.

Brand-only marketing presents a challenge to marketing regulations as the regulations are typically based on applying nutrient thresholds to ‘unhealthy’ foods [74,96]. The experimental study design used in this thesis to examine brand-only marketing yielded several notable findings. We hypothesised that viewing a McDonald’s advertisement featuring a hamburger would increase the number of participants who choose this specific hamburger in the hypothetical product selection task and generally result in participants choosing less healthy items, compared to ‘control’ participants who viewed an advertisement for a video game. There was only modest evidence that this occurred: as hypothesised, seeing the hamburger featured in the advertisement resulted in a small increase in choosing the same hamburger in the hypothetical selection task, both compared to control and the brand-only conditions. This may suggest that food marketing promotes unhealthy menu item selection if the food product is featured in the advertisement [38,41]; however, the magnitude of this difference was modest, and differences in product selection did not translate into significant differences when

analysed in terms of the nutrient levels of product choices. There was also some evidence to suggest that youth who saw a brand-only advertisement were more likely to choose a Big Mac, the most recognizable item at McDonald's; however, no differences with the control condition were observed. Further research on the association of branding with flagship items and impacts of this association on item selection is needed. Overall, findings may reflect limitations in the study design, in which participants viewed a static digital advertisement for a limited amount of time. Familiarity with McDonald's food is almost ubiquitous among young people [196,197], such that pre-existing associations and appeal of McDonald's food products are likely to have affected product choices regardless of experimental condition. 'Unhealthy food' may be the 'default' choice for youth, with exposure to marketing accumulating over time, creating conscious and subconscious preferences and reinforcing impact on behaviour [38,198]. This is evidenced by youth's greater self-reported selection of less healthy items, as items like the Big Mac and Chicken McNuggets were selected at substantially higher rates than healthier options like the grilled chicken and garden salads. The accumulation of marketing exposure and resulting food preferences may also explain why the manipulation did not work in the appeal task. To assess appeal, participants were presented with the hamburger from the 'brand and unhealthy food' experimental condition and asked to rate their desire to consume it on an emoji scale. Although it was hypothesised that seeing the advertisement featuring that specific hamburger would increase appeal, the advertisement was insufficient to shift overwhelming preference. A ceiling effect was observed, in which the hamburger was rated similarly highly by participants from all experimental conditions. This baseline high appeal of items like the hamburger in the appeal task and selection of the less healthy options as 'default' may be related to social norms of unhealthy foods being considered 'popular' or desirable by children [61].

To our knowledge, only one other study has investigated brand-only marketing using an experimental design. Mulligan et al. conducted an online experiment to assess the impact of brand marketing on children's food preferences and behavioural intention, compared with product-based advertising [199]. Participants were randomised to view one of four advertisement conditions: 1) familiar product from popular Canadian food brand; 2) familiar Canadian food brand with no identifiable food product; 3) unfamiliar foreign product; or 4) unfamiliar foreign brand [199]. Advertisements featuring familiar products from popular Canadian food brands had greater impact on children's preference, purchase intent, and pester power compared to all other advertisement conditions [199]. This suggests that the impact of product advertising appears to be greater than brand-only advertising [199], contrary to current findings which saw differences between the brand and unhealthy food conditions to be limited. However, study methodology has de-

identified the brands used in the experiment, simply indicating that products from snack, fast-food, yogurt, and cereal categories were used; child-appealing techniques used were noted to differ across conditions which may introduce additional variability [199]. The study was also limited to children aged 9-12 years and did not assess menu items selection directly, rather focusing on upstream predictors of selection (i.e., how much children would like to eat/drink the food, whether they would choose to buy products from the brand in the future, and if they would ask an adult to buy them brand products) [199]. These limitations complicate comparisons with current findings, similarly to a recent systemic review on brand marketing by Boyland et al. which generally found evidence to be limited and of mixed quality [158]. Nonetheless, the branding experiment conducted by Mulligan et al. supports familiarity and brand loyalty as important [199], and it cannot be disputed that food product presence increases the persuasive power of advertisements. Evidence, outside of this thesis, of the impact of brand-only marketing on youth's product selection, as compared with product marketing, remains limited.

The most notable finding from this thesis study concerned the effects of an advertisement featuring the one McDonald's item whose nutrients of interest were below the nutrient profile model thresholds. Youth who saw an advertisement featuring a garden salad were more likely to select healthier products, including items lower in saturated fat and calories. The results highlight the potential to positively impact food selection through the inclusion of healthier items in marketing. While impacts of unhealthy food promotion on youth's diets have been relatively well studied, research examining the impact of healthy food marketing is scarce [200]. A recent narrative review identified a potential positive effect of healthy food marketing on children's diets, including improved attitudes and preference for healthy foods, as well as increased purchase intention, selection and consumption [200]. These findings are contrary to a 2015 experimental study where children were either shown toy advertisements or McDonald's advertisements featuring healthy foods (fish fingers, fruit bag, and mineral water) [156]. No differences in nutrient levels (fat, salt, sugar, and energy) were identified between conditions; children who saw the healthy food advertisement did not select a significantly healthier meal bundle [156]. However, the study was limited to a sample size of 58 children and thus may not have been adequately powered to detect a difference [156]. Additionally, the study did not include any children above the age of 10 [156]. No other studies testing menu item selection following healthy food advertisement exposure have been identified; however, experimental studies where children were presented with healthy and unhealthy meal bundles with or without toy premiums (a separate component of marketing) have shown that children were more likely to select healthier meals when the meals are paired with a toy [201–203]. Similarly, a UK study found that the use of Disney characters was associated with increased sales of

some healthier food items (e.g., fruits and non-sugar baked beans) [204]. This suggests that the 'default' unhealthy choice can be altered through health promotion-oriented marketing. Therefore, rather than just restricting unhealthy products or brands (which may continue to be selected by children as 'default'), regulation which also explicitly incentivises companies to both expand product lines to include healthier options and advertise healthier menu items may help to shift social norms and subsequently consumer behaviour. Presently, marketing for healthy food options is uncommon: studies show that more than 90% of all food marketing to children promotes unhealthy foods [34,70,71]. Indeed, youth across both Québec and other Canadian provinces were least likely to report seeing or hearing advertisements for fruits and vegetables in Study 1. Nutrient profile models should thus not only be used for monitoring of unhealthy food advertisements, but should also be leveraged to encourage product reformulation, expansion of product lines to include more healthy options, and subsequent marketing of the expanded lines.

Overall, the findings suggest that marketing regulations that only cover product marketing may not be wholly effective. Notably, adolescents, in particular, have been shown to interact with brand marketing online [205], which given the concerns identified above in section 6.2 further highlights the need to include brand-only marketing in mandatory restrictions. If marketing restrictions continue to exclude brand-only marketing, advertisements may shift from product (restricted) to brand (unrestricted) marketing, as has previously been described for shifts from child-directed to general audience programming [72,74]. Parallels can be drawn with the stages of tobacco regulation, as product marketing restrictions were likewise implemented long before brand marketing was included in regulations [158,206].

#### **6.4 Health Messages as a Policy Alternative to Restriction**

Using health messages to mitigate the effect of unhealthy food marketing is an alternative to restricting marketing practices that is often championed by the industry. However, the current study found that health messages on advertisements for unhealthy foods, as they are designed in France, had no effect on advertised product appeal [155]. This suggests that health messages may not be effective in combating the impact of unhealthy food marketing on dietary outcomes and as such may not present an effective policy alternative to restriction. Interestingly, a small effect of health message was observed for perceived healthiness, wherein the inclusion of health messages increased the perceived healthiness of advertised unhealthy products. Rather than discouraging unhealthy food consumption and promoting healthy dietary behaviours, the health messages may thus have an unintended negative consequence of increasing the promotional power of the marketing. Although there was insufficient evidence to conclude

that the effect of health message presence differed across beverage types, some weak evidence suggests that the identified effect of health message presence on perceived healthiness can be isolated to advertisements for the fruit drink (but not the soda). The difference may be due to the presence of a ‘health halo’, wherein health messages may be incorrectly reinforcing the heuristic of fruit drinks as ‘healthy’ [171,172].

Healthy lifestyle messages in marketing are often used by food companies to implicitly position their products as part of a ‘healthy diet’, including in child-directed marketing [207]. For example, one in three advertisements on children’s channels in the UK featured health/nutrition claims [207]. An experimental study examined health-related advertisements by randomizing children to view either: 1) an advertisement for a fruit drink with healthy lifestyle messaging (e.g., fruit, wheat field, children on a playground or dancing); 2) an advertisement for similar fruit drink with non-health-related messaging; or 3) an advertisement for a healthy beverage [152]. The experiment found that children who saw a fruit drink advertisement with healthy lifestyle messaging rated the advertised beverage as healthier than children in the other conditions, in line with current findings [152]. No evidence of a positive impact on children’s health-related attitudes around nutrition were identified [152]. An experimental study conducted among adolescents in Spain assessing the inclusion of public health messages on unhealthy food advertisements similarly found no impact on desire to consume the unhealthy products advertised or their perceived healthiness [21]. Public health messages included in advertisements for unhealthy foods may thus be functioning in a similar manner to the healthy lifestyle messaging already prevalent in marketing.

#### **6.4.1 Health Messages & Design-related Factors**

The public health messages tested in the current study were based on the messages used in France, which are guided by the ‘well-informed consumer’ paradigm. The ‘well-informed consumer’ paradigm states that if consumers are provided information on the importance of a healthy lifestyle (i.e., nutrition, physical activity) they will act on this information and change their behaviour [142,143]. Such a paradigm limits the amount of restrictions placed on manufacturers and shifts the responsibility onto the consumers [143]. The legislation thus provides an education-based alternative to marketing restrictions, aiming to counteract the power of marketing by reminding consumers of the importance of a healthy lifestyle [142,143]. The current thesis findings do not support the ‘well-informed consumer’ paradigm as an appropriate approach for addressing child-directed unhealthy food marketing.

Prior research has demonstrated a lack of attention to France’s health messages [150]. The messages must be displayed in a horizontal banner occupying at least 7% of the advertisement surface [143,173,174]. Based on a review of advertisements available online, most companies do not exceed the minimum recommendations, with small text size potentially resulting in the identified low levels of noticing and the small effects observed in the current study. The efficacy of health messages depends on design-related factors [208–210]. Research on tobacco, alcohol, and nutrition warnings demonstrates higher levels of noticing and message recall when health warnings<sup>7</sup> are larger [211–214], incorporate a signal word such as ‘caution’ or ‘warning’ [209,215], and are more prominent, including having a clear border distinguishing the advertisement from the warning [216] and high contrast between the warning and the advertisement (e.g., white box with black letters, as in France’s current health messages) [215,217,218]. The inclusion of more specific health consequences can also increase attention to and recall of health messages (i.e., referring to chronic disease, such as type 2 diabetes) [209], though this may not be appropriate for child-directed messaging. The City of San Francisco sought to implement such health warnings on sugar sweetened beverages in 2020, but removed the regulation after challenges from the beverage industry [219].

Given the observed possibility of a ‘health halo’ effect, it is important that any changes made to increase noticing are paired with alterations in message framing to ensure increased noticing is not reinforcing this effect. The messages used in France are all gain-framed, meaning that they highlight the benefits of engaging in healthy behaviours [220]. These messages are widely believed to be effective for health promotion (e.g., encouraging fruit intake) [220,221], and are preferred by food companies as they avoid casting advertised products in a negative light. However, loss-framed messages (i.e., messages which centre the risks associated with engaging in an unhealthy behaviour) have been shown to be more effective for discouraging unhealthy food intake [222,223]. Loss-framed messages act on intention and behaviour which may be more effective than gain-framed messages which act on cognition [222]. It may thus be possible to reduce the ‘health halo’ effect and improve the efficacy of the health messages by reframing them. For example, the existing message “To grow up healthy, don’t eat too much fatty, sweet, or salty food” [143] can be reframed to: “Eating too much fatty, sweet, and salty food increases risk of poor health as you grow up”. While loss-framed messages may receive greater opposition from the food industry, they will nonetheless be easier to implement than marketing restriction. Overall, while it is unlikely that health messages would be as

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<sup>7</sup> Note that best-practice guidelines are taken from health warning literature as literature on health message noticing is scarce.

effective in changing dietary patterns as marketing restrictions, messages that adhere to design ‘best practices’ may have greater potential for impact.

## **6.5 Strengths and Limitations**

With respect to the overall IFPS study in which the three sub-studies are embedded, the IFPS recruited participants through nonprobability-based sampling [164]. This may limit the representativeness of the findings, particularly for Study 1 for which results may not be nationally or provincially representative. However, Study 1 data were weighted by age group, sex, and province to align with the population distribution. The same sample was randomised to experimental conditions for Studies 2 and 3, providing a diverse sample profile for the between-group experimental design. In addition, tests were conducted to ensure that randomization was ‘successful’ with no differences in sociodemographic profile across conditions.

An overall strength of this thesis is that it included both observational and experimental studies. The observational design of Study 1 provided the opportunity to examine ‘real world’ effects with a higher level of external validity, whereas the experimental designs in Studies 2 and 3 provided a higher level of internal validity to support causal inferences [224]. In addition, Study 1 employed a ‘natural experiment’ design. Comparisons of Québec with the other Canadian provinces offered a quasi-experimental alternative for assessing potential policy impact, wherein Québec served as an intervention group and the other provinces served as a comparison group. Additionally, Study 1 analysis compares marketing exposure for locations included in and excluded from Québec’s policy, providing an opportunity to examine the potential differences based on policy coverage. Due to data for Study 1 being collected after Québec’s advertising law was implemented, no ‘pre-policy’ baseline data were available with which to conduct a pre-post analysis.

There are notable limitations to self-reported marketing exposure data. Marketing exposure is likely subject to recall bias due to the large amount of marketing individuals are exposed to everyday, and this recall bias may differ between media types. Self-reported exposure thus likely underestimates actual exposure to unhealthy food marketing [225]. However, evidence from research on tobacco marketing has shown a strong association between self-reported exposure and objective exposure data among youth and young adults, including advertising expenditures [226–228]. Current study findings are in alignment with data on child-directed food advertising expenditures, which show overall expenditures to be 32% lower in Québec compared to the other provinces [52, 136]. Data

on marketing expenditures have important strengths in estimating the volume of marketing; however, they do not reflect individual differences in attention and awareness, including potential differences among population sub-groups [120,163]. Marketing expenditure data may also underestimate the impact of digital marketing given that digital marketing can achieve a relatively large reach through comparatively low spending [113]. An assessment by Tatlow-Golden and Parker found that digital advertising expenditures are consistently and substantially underestimated and do not adequately reflect digital marketing activity, contributing to an underestimation of total marketing exposure in digital media [229]. Self-reported data have been shown to be sensitive to changes in marketing practices following policy changes [230]. Although other types of data collection can provide more objective estimates of marketing exposure (such as wearable equipment and device monitoring for online advertisements), these methods are less feasible for large population-level studies and large datasets of this kind do not currently exist in Canada.

The experimental setting in Studies 2 and 3 also has several limitations. Participants were only exposed to the conditions for a brief time, and exposure occurred within the context of an online experiment. In Study 2, participants saw the condition image on two screens (initial randomization screen and one of two measure screens) for a median of 10 seconds of total exposure for those randomised to the appeal task, and 17 seconds of total exposure for those randomised to the hypothetical product selection task. In Study 3, participants saw the condition image on three screens (initial randomization screen, appeal question screen, and perceived healthiness question screen), for a median of 21 seconds of total exposure. Though this may initially appear low, advertising exposure can often occur quickly, particularly in the online environment where it is more closely integrated with non-marketing content [190]. Additionally, Article L. 2133-1 of the French Public Health Code does not specify a required duration for the health message; when viewed on TV or cinema, the message must be displayed on a “fixed or scrolling banner maintained for the entire duration of the advertising message, or presented on a screen immediately following the advertising message” [173]. In fact, health promotional videos developed based on this legislation by France Télévision for youth programs were only 7 to 8 seconds long [231]. Nonetheless, given that exposure to experimental conditions occurred within the context of an online experiment, the studies were not able to account for repeated exposures over time which are common in the real-world and reinforce the overall impact on behaviour [38]; this may underestimate the effect observed. In parallel, the limited research conducted on health messages in France has shown that message noticing waned over time, as did message effectiveness [148–151]. These nuances were not captured in the experiment, which collected measures in the context of a cross-sectional survey.

In addition, studies 2 and 3 did not assess the impact of advertisements on ‘downstream’ behaviours, such as purchasing or dietary intake. However, the measures of appeal used in the studies are based on established mediators for the impact of advertisements on consumer behaviour and have been examined in previous studies [169,178]. Further, due to the nutritional composition of the menu items selected for use in Study 2, ceiling and floor effects may have resulted in no differences being observed in sodium and sugar across experimental conditions; sodium was high across all items (except the Garden Salad) and sugar was relatively low across all items (due to no dessert items being included). However, these items were chosen to reflect product line availability. Additionally, the ‘control’ condition featured a Nintendo Switch video game console. This was chosen as a neutral advertisement that children may be familiar with, and all condition images were based on existing advertisements identified by the authors. There is potential for the selected advertisement to have impeded the ‘control’ from being a neutral comparator as some cross-sectional studies suggest that playing video games is associated with consumption of unhealthy foods (e.g., hamburgers, pizza, hot dogs, chips) [232–234]. There is thus a possibility that the video game console used in the ‘control’ image may have subconsciously influenced youth’s menu item selection. Further, studies 2 and 3 did not examine between-country differences in outcomes. Due to scant existing research, the studies focused on the main effects of experimental conditions to provide foundational understanding of brand-only advertisements and health messages, respectively. Additional research is warranted which could evaluate whether different policy regimes may predict differences in outcomes, accounting for differences in cultural contexts. Last, in terms of Study 3 specifically, the experiment was carried out with only two SSBs, which may limit generalizability.

## **6.6 Future Directions**

This thesis highlights several areas for future research. First, due to the absence of sampling targets within Québec for Anglophone versus Francophone participants, language of survey completion was highly correlated with jurisdiction. The current study conducted sensitivity analyses to address this; however, more work is needed to comprehensively discern the effect of language on exposure and power of marketing. Further research is needed which can include more robust sample sizes of non-dominant language speakers in Québec and other provinces, including asking about the language in which participants consume content. This will be important to understand similarities in marketing exposure on French and English-language media within Québec, i.e., is the *Consumer Protection Act* similarly impacting French and English-language media? As on-

demand streaming services are becoming increasingly more popular [86], it will become particularly important to characterise the reach and content of marketing in these locations, including language-differences.

Second, though some studies have assessed advertising expenditures [52,136] or conducted content analysis of advertisements [87,127,137,195,235,236], research objectively quantifying frequency of child-directed unhealthy food marketing across all of Canada is scarce. Only one study has been identified by the author which directly measures advertisement quantity specifically; however, it is limited to TV advertisements aired in Québec [237]. While self-reports offer an approximation (which may in some ways better speak to noticing), it is important to understand the absolute number of advertisements present in both a voluntary and mandatory policy environment. In particular, it would be beneficial to replicate in a Canadian context the study conducted by Watson et al. in Australia [185], which quantified and analysed complaints made to Ad Standard regarding violations of the voluntary advertising codes. Investigating the efficacy of the self-regulatory environment can provide important evidence around the need to implement mandatory federal marketing policy in Canada. Comparisons made on the frequency and nature of complains received by Ad Standards Canada versus the Office de la protection du consommateur in Québec may also help inform development of the monitoring and compliance process federally. Further research examining age-related differences in advertising exposure by province is also needed to inform expansion of age-ranges in regulatory frameworks.

Third, future research should continue to explore the impact of advertisements featuring healthy foods on youth's product selection. It is important to understand if the influence of unhealthy marketing is best addressed through overall reduction in volume of all marketing (including brand and product) or shifts towards healthy food marketing. Similarly, while this thesis was able to provide insight in the context of unhealthy products, further research is needed to explore the impact of health messages on the appeal and perceived healthiness of healthy products. Direct 'real world' selection tasks which replicate experimental methods presented in this thesis are suggested. Future research should include a greater variety of unhealthy food company brands. Research should also include a broader range of ultra-processed and minimally/unprocessed foods, including more beverage types (e.g., plain milk, chocolate milk).

Finally, research is needed to understand how best practice guidelines for health warnings identified in the literature may be applied for health message design. Discrete choice experiments may be useful in discerning which factors (including font size, signal

words, borders, contrast, specification of health consequences) are most impactful in increasing noticing and attention to the messages. There is also a need to assess the framing of health messages, including whether a combination of loss- and gain-framed messages may improve message efficacy as suggested in some literature [223]. Combinations of messages would also more accurately mimic the French legislation which states that health messages are to be used on rotation throughout the advertisement campaign.

## **6.7 Conclusions**

A number of countries, including Canada, are seeking to restrict marketing of unhealthy foods to children. There is an immediate need for evidence to guide these policies. This thesis presents novel evidence on key aspects of food marketing policy that may strengthen or weaken policy impact, including efficacy of existing Canadian regulations, exemptions for brand-only marketing, and the potential of an education-based alternative. In particular, the nuances around digital marketing, child-directed language, and branding identified in this thesis help contextualise why exposure to unhealthy food advertisements does not appear to consistently differ following implementation of mandatory regulations [75,121,184]. This thesis also offers evidence for the prospect of healthy food marketing and provides suggestions for improving health message efficacy. The presented findings are critical to safeguarding the efficacy of proposed marketing regulations in curbing child-directed unhealthy food marketing impact in Canada and abroad and to upholding children's rights to a healthy future as ratified in the United Nations Convention on the Rights of the Child [82].

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## APPENDICES

### Appendix A – Legislated Health Messages in France

**Table A-1.** General and youth specific health messages legislated for in France under article L. 2133-1 of the Public Health Code [143].

Category*	Original Message (FR)	Translated Message (ENG)
General Public		
	« Pour votre santé, mangez au moins cinq fruits et légumes par jour »	“For your health, eat at least five fruits and vegetables per day”
	« Pour votre santé, pratiquez une activité physique régulière »	“For your health, practice regular physical activity”
	« Pour votre santé, évitez de manger trop gras, trop sucré, trop salé »	“For your health, avoid eating too many fatty, sweet, or salty foods”
	« Pour votre santé, évitez de grignoter entre les repas ».	“For your health, avoid snacking between meals”
Children		
	« Pour bien grandir, mange au moins cinq fruits et légumes par jour »	“To grow up healthy, eat at least five fruits and vegetables per day”
	« Pour être en forme, dépense-toi bien »	“To be in good shape, exercise”
	« Pour bien grandir, ne mange pas trop gras, trop sucré, trop salé »,	“To grow up healthy, don’t eat too much fatty, sweet, or salty food”
	« Pour être en forme, évite de grignoter dans la journée ».	“To be in good shape, avoid snacking during the day”

\* There are three categories of messages: those for the general public, those for youth, and those meant to be broadcast on the radio. Radio broadcast messages have been excluded from this table for relevance.

## Appendix B – Sample Size and Response Rate

**Table B-1.** Participation and cooperation rate by survey year; sample sizes by survey year.

Survey year	Total participation rate (%) <sup>*</sup>	Cooperation rate (%) <sup>**</sup>	Participants (n)	
			Total	
2019	1.5%	76.8%	<b>Total</b>	<b>11,108</b>
			Australia	1,435
			Canada	3,682
			Chile	1,252
			Mexico	1,616
			UK	1,520
			US	1,603
2020	3.5%	79.6%	<b>Total</b>	<b>12,031</b>
			Australia	1,595
			Canada	3,895
			Chile	1,615
			Mexico	1,823
			UK	1,521
			US	1,582
2021	4.7%	81.9%	<b>Total</b>	<b>10,459</b>
			Australia	914
			Canada	3,499
			Chile	1,112
			Mexico	1,617
			UK	1,577
			US	1,740
2022	3.9%	81.6%	<b>Total</b>	<b>11,492</b>
			Australia	1,388
			Canada	3,576
			Chile	1,584
			Mexico	1,603
			UK	1,599
			US	1,742
2023	5.3%	82.9%	<b>Total</b>	<b>11,521</b>
			Australia	1,279
			Canada	3,846
			Chile	1,567
			Mexico	1,586
			UK	1,603
			US	1,640

\* Total participation rate: amount of survey completes as a percent of total eligible invites sent

\*\* Cooperation rate: amount of survey completes as a percent of those eligible who accessed the survey link














### Appendix C – Survey Document, Relevant Sections<sup>8</sup>




<p><b>EXPOSURE TO UNHEALTHY FOOD MARKETING – LOCATION</b></p> <p>REVISED 2020 REVISED 2022</p> <p>COUNTRY SPECIFIC WORDING</p>	<p><b>Think about the last 30 days.</b> <b>Have you seen or heard <u>advertisements for ‘unhealthy’ foods or drinks</u> in any of these places?</b></p> <p><i>Unhealthy food and drinks include processed foods high in sugar, salt, or saturated fat, such as soda/pop, fast food, chips, sugary cereals, cookies and chocolate bars.</i></p> <p><i>Select all that apply.</i></p> <p>TV shows, series or movies Website or social media Video or computer games Stores (such as posters, special displays) Radio Magazine or newspaper Billboard Buses, bus stops and other public transit Movie theatres School Recreation or community centre Sports event, concert or community event Contests, free samples or coupons Price discounts (e.g., 30% off, buy-one-get-one-free) Other (please specify): [open-ended] I haven’t seen any ads for unhealthy food or drinks in the last 30 days Don’t know Refuse to answer</p>
<p><b>EXPOSURE TO UNHEALTHY FOOD MARKETING - FREQUENCY</b></p>	<p><b>In the last 30 days, <u>how often</u> did you see or hear advertisements for these kinds of food or drinks?</b></p> <p><b>Ads for sugary drinks</b> <b>Ads for fast food from a restaurant</b> <b>Ads for sugary cereals</b> <b>Ads for fruit or vegetables</b> <b>Ads for snacks</b> like crackers, chips or granola bars</p>


<sup>8</sup> Only survey items analysed in this thesis are included in the appendix. The appendix reflects the general order of the survey items. The 2022 Canadian survey wave version is provided for the marketing exposure measures used in Study 1; the 2023 Canadian survey wave version is provided for the experiments in Studies 2 and 3. The full surveys for each year and country are available online on the IFPS website: <https://foodpolicystudy.com/methods/>






	<p><b>Ads for desserts or treats</b> like cookies, ice cream or candy [Show options for each as radio buttons]</p> <p>Never Less than once a week Once a week A few times a week Every day More than once a day Don't know Refuse to answer</p>
<p><b>EXPOSURE TO MARKETING STRATEGIES</b></p> <p>REVISED 2020 (DK/R response format)</p>	<p><b>In the last 30 days, have you seen unhealthy food or drinks advertised with any of the following?</b></p> <p>Sports teams or athletes Cartoons or characters from movies or TV (e.g., Superheroes, Disney) Cartoons or characters made by food companies (e.g., Tony the Tiger, Ronald McDonald) Famous people</p> <p>[PROGRAMMER NOTE: Use table with yes/no/DK/R for each personality]</p> <p>Yes No Don't know Refuse to answer</p>
<p><b>OWN – PRODUCTS</b></p> <p>REVISED 2022</p>	<p><b>Think about the <u>clothing, posters, stickers, or other things</u> you have.</b></p> <p><b>Do any of them show a <u>name or logo</u> of <u>unhealthy</u> food or drink companies?</b></p> <p>[PROGRAMMER NOTE: show note in grey font] <i>Remember: Unhealthy food and drinks include processed foods high in sugar, salt, or saturated fat, such as soda/pop, fast food, chips, sugary cereals, cookies and chocolate bars.</i></p> <p>Yes No Don't know Refuse to answer</p>
<p><b>OWN – TOY</b></p>	<p><b>Do you have <u>'Happy Meal'</u> toys or other toys from fast-food restaurants?</b></p>









	 <p>Don't know Refuse to answer</p>				
<p><b>RESTAURANT BRAND ASSOCIATIONS</b></p> <p>REVISED 2020 (added Tim Hortons in Canada)</p>	<p>[PROGRAMMER NOTE: Prevent participants from using back button to return to previous question. Ask for each brand image one at a time; randomise order of screens]</p> <p><b>Have you seen an advertisement for this restaurant in the last 30 days?</b> [Show image]</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>[McDonald's]</p>  </td> <td style="width: 50%; vertical-align: top;"> <p>[Subway]</p>  </td> </tr> <tr> <td style="width: 50%; vertical-align: top;"> <p>[KFC]</p>  </td> <td style="width: 50%; vertical-align: top;"> <p>[Tim Hortons] (Canada only)</p>  </td> </tr> </table> <p>Yes No Don't know Refuse to answer</p>	<p>[McDonald's]</p> 	<p>[Subway]</p> 	<p>[KFC]</p> 	<p>[Tim Hortons] (Canada only)</p> 
<p>[McDonald's]</p> 	<p>[Subway]</p> 				
<p>[KFC]</p> 	<p>[Tim Hortons] (Canada only)</p> 				
<p><b>RESTAURANT TARGET AUDIENCE</b></p> <p>REVISED 2020 (added Tim Hortons in Canada)</p>	<p><b>Are advertisements for this restaurant usually aimed at...</b> [Show same brand image as above]</p> <p>[PROGRAMMER NOTE: Use table with yes/no for each group]</p> <p>Kids 12 and under Teenagers aged 13 to 17 Adults I've never seen an advertisement for this restaurant</p>				

	<p>Don't know Refuse to answer</p>
<p><b>RESTAURANT PREFERENCE</b></p> <p>Adapted from Lima et al. 2019</p> <p>REVISED 2020 (added Tim Hortons in Canada)</p>	<p><b>How much would you like to go to this restaurant?</b> [Show same brand image as above]</p> <p>  </p> <p>Don't know Refuse to answer</p>
<p><b>HEALTH MESSAGE EXPERIMENT – CONDITION ASSIGNMENT</b></p> <p>NEW 2023</p> <p>COUNTRY SPECIFIC IMAGES</p>	<p>[PROGRAMMER NOTE: Randomise each participant to view ONE of the four advertisements (either one of the two Coca-Cola ads, or one of the two fruit drink ads)]</p> <p><b>Please look at the advertisement below. Click 'next' when you are ready to continue to the next screen.</b></p> <p>[Condition 1: Sprite original]      [Condition 2: Sprite with health message]</p> <div style="display: flex; justify-content: space-around;"> <div>  </div> <div>  </div> </div>

	<p>[Condition 3: Fruit drink original]    [Condition 4: Fruit drink with health message]</p> 
<p><b>HEALTH MESSAGE EXPERIMENT – PERCEIVED HEALTHINESS</b></p> <p>NEW 2023</p>	<p>[PROGRAMMER NOTE: Prevent participants from using back button to return to previous screen]</p> <p><b>Is this type of drink unhealthy or healthy?</b>  [PROGRAMMER NOTE: Display advertisement participant was randomised to]</p> <p>Very unhealthy  Unhealthy  In the middle  Healthy  Very healthy  Don't know  Refuse to answer</p>
<p><b>HEALTH MESSAGE EXPERIMENT – APPEAL</b></p> <p>NEW 2023</p>	<p>[PROGRAMMER NOTE: Prevent participants from using back button to return to previous screen]</p> <p><b>How much would you like to have this drink?</b>  [PROGRAMMER NOTE: Display advertisement participant was randomised to]</p> <p>[PROGRAMMER NOTE: For horizontal screens - display equally spaced emojis horizontally with radio buttons centered underneath; for vertical screens – display equally spaced emojis vertically with radio buttons centered on the left]</p>

	 <p>Don't know Refuse to answer</p>
<p><b>BRAND EXPERIMENT – CONDITION ASSIGNMENT</b></p> <p>NEW 2023</p> <p>COUNTRY SPECIFIC IMAGES</p>	<p>[PROGRAMMMER NOTE: Randomise each participant to view ONE of the four advertisements with equal number of participants per condition in each country; Prevent participants from using back button to return to previous screen].</p> <p><b>Please look at the advertisement below. Click 'next' when you are ready to continue to the next screen.</b></p> <p>[Condition 1: Control]</p>  <p>[Condition 3: Brand and unhealthy food]</p>  <p>[Condition 2: 'Brand-only']</p>  <p>[Condition 4: Brand and healthy food]</p> 
<p><b>BRAND EXPERIMENT – MEASURE ASSIGNMENT</b></p>	<p>[PROGRAMMMER NOTE: Randomise each participant to complete ONE of the following two measures: perceived taste OR likelihood of consumption, with equal number of participants per question for every condition and in each country.]</p>
<p><b>BRAND EXPERIMENT – PERCEIVED TASTE</b></p>	<p>[PROGRAMMMER NOTE: Prevent participants from using back button to return to previous screen]</p>

<p>NEW 2023</p>	<p><b>How much would you like to eat this food?</b>  [PROGRAMMER NOTE: display image underneath question]</p>  <p>[PROGRAMMER NOTE: For horizontal screens - display equally spaced emojis horizontally with radio buttons centered underneath; for vertical screens – display equally spaced emojis vertically with radio buttons centered on the left]</p>  <p>Don't know  Refuse to answer</p>
<p><b>BRAND EXPERIMENT  – LIKELIHOOD OF  CONSUMPTION</b></p> <p>NEW 2023</p>	<p>[PROGRAMMER NOTE: Prevent participants from using back button to return to previous screen]</p> <p><b>If you could eat one of these foods right now, which one would you choose?</b>  [PROGRAMMER NOTE: display radio buttons with the text to the right and image below; randomise order of menu items when displayed]</p>  <p><b>Big Mac</b>  </p>  <p><b>Chicken McNuggets</b>  </p>



**Quarter Pounder  
Deluxe**



**Grilled Chicken Salad**



**Chicken & Bacon McWrap  
with Grilled Chicken**



**Garden Salad**



None of the above  
Don't know  
Refuse to answer

## Appendix D – Statistical Models

**Table D-1.** Study 1: Exposure to Unhealthy Food Marketing in Québec versus Other Provinces, statistical models.

<b>Research question</b>	<b>Hypothesis</b>	<b>Models</b>	<b>Independent variables</b>	<b>Dependant variables</b>	<b>Additional covariates*</b>
<b>RQ<sub>1</sub>:</b> Does youth’s reported exposure to unhealthy food marketing differ between Québec and the other Canadian provinces, including overall, in marketing locations specifically covered by Québec’s advertising law, as well as for beverage and restaurant brands?	<b>H<sub>1</sub>:</b> Youth in Québec will report seeing or hearing advertisements for ‘unhealthy’ foods or drinks in the last 30 days in fewer locations than youth in other Canadian provinces.	Model 1: Overall exposure to unhealthy marketing across all sources Statistical test: Multiple linear regression	Province (nominal: Québec vs other Canadian provinces)	Location exposure index (count: 0-13)	none
	<b>H<sub>2</sub>:</b> Youth in Québec will have lower odds of reporting seeing or hearing advertisements for ‘unhealthy’ foods or drinks in the last 30 days in locations covered under Québec’s law. No differences will be observed for locations not covered under Québec’s law.	Models 2a-c, correspond to separate tests for each coverage category Statistical test: Binary logistic regression	Province (nominal: Québec vs other Canadian provinces)	[Coverage category] (binary: selected vs not selected)	none
	<b>H<sub>3</sub>:</b> Youth in Québec will have report seeing fewer advertisements for leading beverage and restaurant brands in the last 30 days than youth in other Canadian provinces.	Model 3a: Exposure to branded drink advertising Statistical test: Multiple	Province (nominal: Québec vs other Canadian provinces)	Beverage Brand Index (count: 0-3)	none

		linear regression			
		Model 3b: Exposure to branded restaurant advertising Statistical test: Multiple linear regression	Province (nominal: Québec vs other Canadian provinces)	Restaurant Brand Index (count: 0-4)	none
<b>RQ<sub>2</sub></b> : Does youth's reported exposure to marketing for specific food product categories and using specific child-directed marketing techniques differ between Québec and the other Canadian provinces?	<b>H<sub>4</sub></b> : Youth in Québec will report lower frequency of seeing or hearing advertisements for sugary drinks, fast food from a restaurant, sugary cereals, snacks, and desserts or treats in the last 30 days compared to youth in other Canadian provinces. No differences in frequency of reporting seeing/hearing advertisement for fruits or vegetables will be observed.	Models 4a-f correspond to separate tests for each of the individual food categories Statistical test: Multiple linear regression	Province (nominal: Québec vs other Canadian provinces)	Advertisements for [food category] (count: 1-6)	none
	<b>H<sub>5</sub></b> : Youth in Québec will have lower odds of reporting seeing advertisements for unhealthy food or drinks featuring cartoons or characters from movies/TV, cartoons or characters made by food companies, and famous people in the last 30 days than youth in other Canadian provinces.	Models 5a-c correspond to separate tests for each of the individual child-directed marketing strategies Statistical test:	Province (nominal: Québec vs other Canadian provinces)	Advertisements with [child-directed marketing strategy] (binary: yes vs no)	none

		Binary logistic regression			
	<b>H<sub>6</sub>:</b> Youth in Québec will have lower odds of reporting owning items (e.g., clothing, posters, or stickers) that show a name or logo of unhealthy food or drink companies than youth in other Canadian provinces.	Model 6: Exposure to marketing using logos on personal items Statistical test: Binary logistic regression	Province (nominal: Québec vs other Canadian provinces)	Owned items with name/logo of unhealthy food/drink company (binary: yes vs no)	none
	<b>H<sub>7</sub>:</b> Youth in Québec will have lower odds of reporting owning ‘Happy Meal’ toys or other fast-food restaurant toys than youth in other Canadian provinces.	Model 7: Exposure to marketing using toys Statistical test: Binary logistic regression	Province (nominal: Québec vs other Canadian provinces)	Owned toys from fast food restaurant (binary: yes vs no)	none
<b>RQ<sub>3</sub>:</b> Are there differences between Québec and the other Canadian provinces in whether youth perceive themselves to be the target audience for unhealthy food advertisements	<b>H<sub>8</sub>:</b> Youth in Québec will have lower odds of identifying beverage and restaurant brand advertisements as aimed at ‘kids 12 and under’ than youth in other Canadian provinces.	Model 8a: Perception of beverage brand advertisement as targeting kids 12 and Statistical test: Binary logistic regression	Province (nominal: Québec vs other Canadian provinces)	Kids 10-12 targeted (binary: selected vs not selected)	Drink brand seen (nominal: Coke vs Red Bull vs Country-specific 100% Juice)
		Models 8b:	Province (nominal:	Kids 10-12 targeted (binary:	Restaurant brand seen

and how much they wish to consume products from advertised brands?		Perception of restaurant brand advertisement as targeting kids 12 and Statistical test: Binary logistic regression	Québec vs other Canadian provinces)	selected vs not selected)	(nominal: McDonald's vs Subway vs KFC vs Tim Hortons)
	<b>H<sub>9</sub></b> : No differences will be observed in desire to consume the foods and drinks featured in the branded advertisements for youth in Québec compared to youth in other Canadian provinces.	Model 9a: Desire to consume branded drink Statistical test: Multiple linear regression	Province (nominal: Québec vs other Canadian provinces)	Desire to consume branded drink (count:1-7) [see survey document in Appendix C for images shown in 7-point Likert Emoji scale]	Drink brand seen (nominal: Coke vs Red Bull vs Country-specific 100% Juice)
		Model 9b: Desire to visit branded restaurant Statistical test: Multiple linear regression	Province (nominal: Québec vs other Canadian provinces)	Desire to visit branded restaurant (count:1-7) [see survey document in Appendix C for images shown in 7-point Likert Emoji scale]	Restaurant brand seen (nominal: McDonald's vs Subway vs KFC vs Tim Hortons)
<b>RQ<sub>4</sub></b> : Are there differences in described	<b>H<sub>10</sub></b> : For all above-described hypotheses, adolescents aged 13-17 years in Québec	Models 10-18: Interaction of age with	Province x age interaction	Correspond to those detailed above	Correspond to those

outcomes by age between Québec and the other Canadian provinces?	will report lower exposure and power than youth of any age in the other provinces.	province added to all above models Statistical tests correspond to those detailed above	(nominal: Québec vs other Canadian provinces) x (binary: 10-12 vs 13-17 years)		detailed above
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\* All models were adjusted for survey year (ordinal: 2019 vs 2020 vs 2021 vs 2022), age (binary: 10-12 vs 13-17 years), sex-at-birth (binary: male vs female), race or ethnicity (nominal: White only vs East or Southeast Asian only vs South Asian only vs Black only vs Indigenous only vs Mixed or other vs Not stated or missing), perceived income adequacy (nominal: not enough money vs barely enough money vs enough money vs more than enough money vs not stated), and screentime (ordinal: quintiles 1-5).

**Table D-2.** Study 2: Experimental Study of ‘Brand-only’ Food Advertisements, statistical models.

<b>Research question</b>	<b>Hypothesis</b>	<b>Models</b>	<b>Independent variables</b>	<b>Dependant variables</b>	<b>Additional covariates</b>
<b>RQ<sub>1</sub>:</b> Are there differences in the impact of ‘brand-only’ compared with product advertising on product appeal among youth, including for advertisements featuring ‘healthy’ versus ‘unhealthy’ food products?	<b>H<sub>1</sub>:</b> Youth in the ‘brand and unhealthy food’ condition will report the greatest desire for the hamburger, followed by those in the ‘brand-only’ and ‘brand and healthy food’ conditions, respectively. Those in the control condition will have the lowest desire for the hamburger.	Model 1: Appeal of marketed product, by experimental condition Statistical test: Multiple linear regression	Condition (nominal: control vs ‘brand-only’ vs ‘brand and unhealthy food’ vs ‘brand and healthy food’)	Desire to consume hamburger (continuous: 1-7) [see survey document in Appendix C for images shown in 7-point Likert Emoji scale]	none
<b>RQ<sub>2</sub>:</b> Are there differences in	<b>H<sub>2</sub>:</b> Youth in the ‘brand-only’ condition will have greater odds of selecting the menu	Model 2: Likelihood of	Condition (nominal:	Garden salad chosen in	none

<p>selection of a menu item meeting nutrient profile model thresholds and nutrient levels of selected items by</p> <p>i) type of advertisement (i.e., brand-only versus product advertisement), and ii) type of product featured in advertisement (i.e., healthy versus unhealthy products).</p>	<p>item which meets the thresholds outlined by Health Canada’s proposed nutrient profile model (Garden Salad), as compared with those in the ‘brand and unhealthy food’ condition.</p>	<p>menu item selection, by experimental condition</p> <p>Statistical test: Binary logistic regression</p>	<p>control vs ‘brand-only’ vs ‘brand and unhealthy food’ vs ‘brand and healthy food’)</p>	<p>menu item selection (binary: selected vs not selected)</p>	
	<p><b>H<sub>3</sub>:</b> Youth in the ‘brand-only’ condition will on average select menu items lower in saturated fat, sugar, sodium, and calories, as compared with those in the ‘brand and unhealthy food’ condition.</p>	<p>Models 3a-d correspond to separate tests for each nutrient, by experimental condition</p> <p>Statistical test: Multiple linear regression</p>	<p>Condition (nominal: control vs ‘brand-only’ vs ‘brand and unhealthy food’ vs ‘brand and healthy food’)</p>	<p>[nutrition criteria in corresponding units e.g., kcal, grams] of food product selected (continuous: 0-2000)</p>	<p>none</p>
	<p><b>H<sub>4</sub>:</b> Youth in the ‘brand and healthy food’ condition will have greater odds of selecting healthier menu items, as compared with those in the ‘brand-only’ and ‘brand and unhealthy food’ conditions, including selecting menu items lower in saturated fat, sugar, sodium, and calories.</p>	<p>Models 4a-f correspond to separate test for each menu item, by experimental condition</p> <p>Statistical test: Binary logistic regression</p>	<p>Condition (nominal: control vs ‘brand-only’ vs ‘brand and unhealthy food’ vs ‘brand and healthy food’)</p>	<p>Menu item selection (binary: selected vs not selected for each item)</p>	<p>none</p>

**Table D-3.** Study 3: Efficacy of Health Messages in Advertisements for Unhealthy Foods, statistical models.

<b>Research question</b>	<b>Hypothesis</b>	<b>Models</b>	<b>Independent variables</b>	<b>Dependant variables</b>	<b>Additional covariates</b>
<b>RQ<sub>1</sub>:</b> Does the presence of a health message on a SSB advertisement alter the perceived healthiness and/or product appeal of SSBs among youth?	<b>H<sub>1</sub>:</b> Youth who view an advertisement with the health message will perceive the advertised SSB as less healthy, compared to youth who view an advertisement without the health message.	Model 1: Perceived healthiness of beverages, by health message presence Statistics test: Multiple linear regression	Health message condition (binary: 'original' vs 'with health message')	Perceived healthiness (continuous: 1-5)	none
	<b>H<sub>2</sub>:</b> Youth who view an advertisements with the health message will have lower desire to consume the advertised SSB, compared to youth who view an advertisement without the health message.	Model 2: Appeal of beverages, by health message presence Statistics test: Multiple linear regression	Health message condition (binary: 'original' vs 'with health message')	Appeal (continuous: 1-7) [see survey document in Appendix C for images shown in 7-point Likert Emoji scale]	none

<p><b>RQ<sub>2</sub>:</b> Does the effect of a health message on a SSB advertisement differ based on the type of SSB, including a soda versus a fruit drink?</p>	<p><b>H<sub>3</sub>:</b> Youth who view the advertisement for Sprite with a health message will perceive it as less healthy, compared to youth who view the advertisement for the fruit drink with a health message.</p>	<p><b>Model 3:</b> Perceived healthiness of beverages, by beverage type and health message presence Statistics test: Multiple linear regression</p>	<p>Beverage type x health message presence interaction (binary: 'Sprite' vs 'Fruit drink') x (binary: 'original' vs 'with health message')</p>	<p>Perceived healthiness (continuous: 1-5)</p>	<p>none</p>
	<p><b>H<sub>4</sub>:</b> Youth who view the advertisement for Sprite with a health message will have lower desire to consume it, compared to youth who view the advertisement for the fruit drink with a health message.</p>	<p><b>Model 4:</b> Appeal of beverages, by beverage type and health message presence Statistics test: Multiple linear regression</p>	<p>Beverage type x health message presence interaction (binary: 'Sprite' vs 'Fruit drink') x (binary: 'original' vs 'with health message')</p>	<p>Appeal (continuous: 1-7) [see survey document in Appendix C for images shown in 7-point Likert Emoji scale]</p>	<p>none</p>

## Appendix E – Advertisement Design

**Table E-1.** Original advertisements and altered condition images.

Condition	Original Advertisement	Condition Image
Study 2: Experimental Study of 'Brand-only' Food Advertisements		
Control	 <p>The original advertisement features a red background with the Nintendo Switch logo at the top left. It displays three models of the console: a standard black and red Switch, a white OLED model being held by a hand, and a white and blue Switch Lite. Labels below each model identify them as 'Nintendo Switch', 'Nintendo Switch OLED Model', and 'Nintendo Switch Lite'.</p>	 <p>The altered condition image shows a red background with the Nintendo Switch logo at the top left. It features only the OLED model of the console, with the label 'Nintendo Switch OLED Model' below it.</p>
'Brand-only'	 <p>The original 'Brand-only' advertisement has a red background with the golden arches logo in the center and the slogan 'i'm lovin' it' in white text below it.</p>	 <p>The altered condition image is identical to the original, showing the golden arches logo and the slogan 'i'm lovin' it' on a red background.</p>
Brand and unhealthy food	 <p>The original advertisement features a red background with the slogan 'big. beefy. bliss.' at the top. Below it are three burgers: a Double Quarter Pounder with Cheese, a Big Mac, and an Angus Deluxe Third Pounder. The McDonald's logo and 'i'm lovin' it' slogan are in the bottom right corner.</p>	 <p>The altered condition image features a red background with the slogan 'big. beefy. bliss.' at the top. Below it is a single burger. The McDonald's logo and 'i'm lovin' it' slogan are in the bottom right corner.</p>
Brand and healthy food	 <p>The original advertisement features a white background with the slogan 'Crisp, flavorful, and freshly prepared.' in green text at the top. Below it is a bowl of salad with chicken and a lemon wedge. The McDonald's logo and 'i'm lovin' it' slogan are in the bottom right corner.</p>	 <p>The altered condition image features a green background with the slogan 'Crisp, flavorful, and freshly prepared.' in white text at the top. Below it is a box of salad. The McDonald's logo and 'i'm lovin' it' slogan are in the bottom right corner.</p>

Study 3: Efficacy of Health Messages in Advertisements for Unhealthy Foods

<p>Sprite</p>		<p>To grow up healthy, don't eat too much fatty, sweet, or salty food <a href="http://www.myhealthyeating.ca">www.myhealthyeating.ca</a></p>
<p>Fruit drink</p>		<p>To grow up healthy, don't eat too much fatty, sweet, or salty food <a href="http://www.myhealthyeating.ca">www.myhealthyeating.ca</a></p>

## Appendix F – Chapter 3 Supplemental Tables and Figures

**Table F-S1:** Location Exposure Index for seeing/hearing advertisements for ‘unhealthy’ foods or drinks in the past 30 days, by demographics (range: 0-13), 2019-2022 (weighted estimates, n=14,599)

	Location Exposure Index Unadjusted mean (SE)	$\beta^*$	Standard Error	95% CI**	P value
<b>Jurisdiction</b>					
Québec	1.56 (0.03)	-0.46	0.04	-0.54 – -0.38	<0.001
Other Canadian provinces	2.04 (0.02)	Ref	-	-	-
<b>Age (years)</b>					
10-12	1.81 (0.03)	Ref	-	-	-
13-17	1.98 (0.02)	0.07	0.04	-0.01 – 0.14	0.070
<b>Sex-at-birth</b>					
Male	1.89 (0.03)	Ref	-	-	-
Female	1.94 (0.03)	0.09	0.04	0.01-0.16	0.019
<b>Race/Ethnicity</b>					
White only	1.88 (0.02)	Ref	-	-	-
East/Southeast Asian only	1.58 (0.06)	-0.36	0.06	-0.48 – -0.24	<0.001
South Asian only	2.09 (0.09)	0.16	0.10	-0.03 – 0.35	0.091
Black only	2.12 (0.11)	0.15	0.11	-0.06 – 0.36	0.160
Indigenous inclusive	2.68 (0.11)	0.64	0.11	0.42 – 0.85	<0.001
Mixed/Other	2.09 (0.07)	0.16	0.07	0.02 – 0.31	0.026
Not stated	1.24 (0.12)	-0.62	0.12	-0.86 – -0.37	<0.001
<b>Income Adequacy</b>					
Not enough money	2.18 (0.14)	Ref	-	-	-
Barely enough money	2.09 (0.05)	-0.02	0.15	-0.30 – 0.27	0.919
Enough money	1.84 (0.02)	-0.16	0.14	-0.43 – 0.12	0.263
More than enough money	2.03 (0.05)	0.03	0.14	-0.25 – 0.31	0.853
Not stated	1.15 (0.13)	-0.77	0.18	-1.13 – -0.41	<0.001
<b>Screentime</b>					
Quintile 1	1.49 (0.04)	Ref	-	-	-
Quintile 2	1.80 (0.04)	0.26	0.05	0.16 – 0.37	<0.001
Quintile 3	1.90 (0.04)	0.36	0.06	0.25 – 0.47	<0.001

Quintile 4	2.11 (0.04)	0.58	0.06	0.47 – 0.69	<0.001
Quintile 5	2.29 (0.05)	0.75	0.06	0.63 – 0.86	<0.001

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\* Estimated regression coefficient for Québec compared to other Canadian provinces in a multiple linear regression model adjusted for: age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

\*\*95% confidence interval

**Table F-S2:** Percentage of participants reporting seeing or hearing any advertisements for ‘unhealthy’ foods or drinks in the past 30 days grouped according to policy coverage, by demographics, 2019-2022 (weighted estimates, n=14,599)

	<b>Proportion seeing/hearing ads in marketing locations not covered under policy Unadjusted % (n)</b>	<b>AOR*</b>	<b>95% CI**</b>	<b>P value</b>
<b>Jurisdiction</b>				
Québec	22.7% (850)	0.58	0.53 – 0.63	<0.001
Other Canadian provinces	32.8% (3,556)	Ref	-	-
<b>Age (years)</b>				
10-12	29.2% (1,621)	Ref	-	-
13-17	30.8% (2,784)	1.03	0.95 – 1.11	0.499
<b>Sex-at-birth</b>				
Male	28.5% (2,121)	Ref	-	-
Female	31.9% (2,285)	1.20	1.12 – 1.29	<0.001
<b>Race/Ethnicity</b>				
White only	30.3% (3,103)	Ref	-	-
East/Southeast Asian only	22.1% (276)	0.59	0.51 – 0.69	<0.001
South Asian only	28.1% (188)	0.83	0.69 – 0.99	0.038
Black only	30.9% (134)	0.98	0.79 – 1.22	0.851
Indigenous inclusive	45.7% (295)	1.71	1.45 – 2.03	<0.001
Mixed/Other	32.6% (367)	1.07	0.93 – 1.22	0.371
Not stated	18.9% (42)	0.53	0.37 – 0.74	<0.001
<b>Income Adequacy</b>				
Not enough money	31.4% (132)	Ref	-	-
Barely enough money	32.6% (761)	1.10	0.87 – 1.39	0.407
Enough money	29.2% (2,649)	1.02	0.82 – 1.27	0.848
More than enough money	32.4% (832)	1.16	0.92 – 1.46	0.214
Not stated	15.1% (31)	0.46	0.29 – 0.72	<0.001
<b>Screentime</b>				
Quintile 1	25.8% (769)	Ref	-	-
Quintile 2	29.2% (900)	1.16	1.03 -1.30	0.016
Quintile 3	29.9% (792)	1.18	1.04 – 1.33	0.009
Quintile 4	32.3% (971)	1.32	1.17 – 1.49	<0.001
Quintile 5	33.9% (973)	1.44	1.28 – 1.63	<0.001

	<b>Proportion seeing/hearing ads in TV and 'digital' marketing locations covered under policy Unadjusted % (n)</b>	<b>AOR*</b>	<b>95% CI**</b>	<b>P value</b>
<b>Jurisdiction</b>				
Québec	48.7% (1,822)	0.72	0.66 – 0.78	<0.001
Other Canadian provinces	56.7% (6,158)	Ref	-	-
<b>Age (years)</b>				
10-12	54.9% (3,047)	Ref	-	-
13-17	54.5% (4,932)	0.92	0.85 – 0.98	0.016
<b>Sex-at-birth</b>				
Male	54.2% (4,032)	Ref	-	-
Female	55.1% (3,948)	1.07	0.99 – 1.14	0.056
<b>Race/Ethnicity</b>				
White only	54.5% (5,584)	Ref	-	-
East/Southeast Asian only	50.8% (634)	0.82	0.72 – 0.93	0.002
South Asian only	58.2% (388)	1.13	0.96 – 1.33	0.148
Black only	61.8% (268)	1.28	1.05 – 1.58	0.017
Indigenous inclusive	61.3% (396)	1.19	1.00 – 1.42	0.044
Mixed/Other	55.0% (620)	0.99	0.87 – 1.12	0.813
Not stated	40.2% (90)	0.57	0.43 – 0.76	<0.001
<b>Income Adequacy</b>				
Not enough money	52.3% (220)	Ref	-	-
Barely enough money	56.5% (1,319)	1.23	0.99 – 1.53	0.056
Enough money	53.9% (4,886)	1.19	0.97 – 1.46	0.096
More than enough money	57.5% (1,476)	1.33	1.11 – 1.71	0.003
Not stated	38.1% (79)	0.65	0.45 – 0.92	0.015
<b>Screentime</b>				
Quintile 1	47.3% (1,413)	Ref	-	-
Quintile 2	53.8% (1,656)	1.30	1.17 – 1.44	<0.001
Quintile 3	55.5% (1,468)	1.39	1.25 – 1.55	<0.001
Quintile 4	57.8% (1,744)	1.54	1.39 – 1.72	<0.001
Quintile 5	59.2% (1,699)	1.66	1.49 – 1.86	<0.001

	Proportion seeing/hearing ads in other mostly 'physical' marketing locations covered under policy Unadjusted % (n)	AOR*	95% CI**	P value
<b>Jurisdiction</b>				
Québec	33.5% (1,253)	0.83	0.77 – 0.91	<0.001
Other Canadian provinces	37.9% (4,114)	Ref	-	-
<b>Age (years)</b>				
10-12	35.5% (1,971)	Ref	-	-
13-17	37.6% (3,397)	1.04	0.97 – 1.12	0.313
<b>Sex-at-birth</b>				
Male	36.3% (2,697)	Ref	-	-
Female	37.3% (2,671)	1.07	0.99 – 1.15	0.065
<b>Race/Ethnicity</b>				
White only	35.9% (3,682)	Ref	-	-
East/Southeast Asian only	30.5% (381)	0.79	0.69 – 0.90	<0.001
South Asian only	40.1% (268)	1.22	1.03 – 1.44	0.021
Black only	45.1% (196)	1.44	1.12 – 1.76	<0.001
Indigenous inclusive	47.7% (308)	1.53	1.29 – 1.81	<0.001
Mixed/Other	42.3% (476)	1.31	1.15 – 1.49	<0.001
Not stated	25.8% (58)	0.63	0.46 – 0.86	0.004
<b>Income Adequacy</b>				
Not enough money	37.9% (160)	Ref	-	-
Barely enough money	40.0% (934)	1.16	0.93 – 1.45	0.185
Enough money	35.8% (3,249)	1.03	0.83 – 1.27	0.794
More than enough money	37.9% (973)	1.11	0.89 – 1.39	0.342
Not stated	25.1% (52)	0.65	0.44 – 0.95	0.026
<b>Screentime</b>				
Quintile 1	31.2% (931)	Ref	-	-
Quintile 2	35.8% (1,102)	1.21	1.08 – 1.35	<0.001
Quintile 3	35.9% (950)	1.22	1.09 – 1.37	<0.001
Quintile 4	40.5% (1,222)	1.49	1.33 – 1.66	<0.001
Quintile 5	40.5% (1,162)	1.47	1.31 – 1.65	<0.001

\* Adjusted odds ratio from a logistic regression model for Québec compared to other Canadian provinces adjusted for age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

\*\*95% confidence interval

**Table F-S3:** Frequency of seeing or hearing advertisements for specific food or drink categories in the past 30 days, by demographics, 2019-2022 (weighted estimates, n=12,437)

	<b>Sugary Drinks</b> Unadjusted mean (SE)	<b>β*</b>	<b>Standard Error</b>	<b>95% CI**</b>	<b>P value</b>
<b>Jurisdiction</b>					
Québec	2.85 (0.03)	-0.40	0.03	-0.46 – -0.34	<0.001
Other Canadian provinces	3.25 (0.02)	Ref	-	-	-
<b>Age (years)</b>					
10-12	3.05 (0.02)	Ref	-	-	-
13-17	3.21 (0.02)	0.08	0.03	0.03 – 0.13	0.003
<b>Sex-at-birth</b>					
Male	3.16 (0.02)	Ref	-	-	-
Female	3.14 (0.02)	0.01	0.03	-0.03 – 0.06	0.697
<b>Race/Ethnicity</b>					
White only	3.14 (0.02)	Ref	-	-	-
East/Southeast Asian only	2.91 (0.04)	-0.29	0.05	-0.38 – -0.20	<0.001
South Asian only	3.28 (0.06)	0.10	0.06	-0.02 – 0.22	0.107
Black only	3.42 (0.07)	0.20	0.07	0.06 – 0.35	0.005
Indigenous inclusive	3.45 (0.06)	0.18	0.06	0.06 – 0.30	0.005
Mixed/Other	3.21 (0.05)	0.03	0.05	-0.06 – 0.12	0.529
Not stated	3.20 (0.12)	0.05	0.12	-0.19 – 0.28	0.700
<b>Income Adequacy</b>					
Not enough money	3.30 (0.09)	Ref	-	-	-
Barely enough money	3.31 (0.03)	0.05	0.09	-0.12 – 0.23	0.568
Enough money	3.11 (0.02)	-0.07	0.09	-0.23 – 0.10	0.029
More than enough money	3.15 (0.03)	-0.02	0.09	-0.20 – 0.15	0.446
Not stated	2.80 (0.14)	-0.34	0.16	-0.65 – -0.04	0.784
<b>Screentime</b>					
Quintile 1	2.76 (0.03)	Ref	-	-	-
Quintile 2	3.07 (0.03)	0.28	0.04	0.21 – 0.36	<0.001
Quintile 3	3.22 (0.03)	0.41	0.04	0.33 – 0.49	<0.001
Quintile 4	3.32 (0.03)	0.51	0.04	0.43 – 0.59	<0.001
Quintile 5	3.42 (0.03)	0.62	0.04	0.54 – 0.70	<0.001

	<b>Fast food from a restaurant</b> Unadjusted mean (SE)	<b>β*</b>	<b>Standard Error</b>	<b>95% CI**</b>	<b>P value</b>
<b>Jurisdiction</b>					
Québec	3.41 (0.03)	-0.30	0.03	-0.36 – -0.24	<0.001
Other Canadian provinces	3.68 (0.02)	Ref	-	-	-
<b>Age (years)</b>					
10-12	3.51 (0.02)	Ref	-	-	-
13-17	3.67 (0.02)	0.07	0.03	0.01 – 0.12	0.017
<b>Sex-at-birth</b>					
Male	3.60 (0.02)	Ref	-	-	-
Female	3.62 (0.02)	0.05	0.03	-0.00 – 0.10	0.056
<b>Race/Ethnicity</b>					
White only	3.63 (0.02)	Ref	-	-	-
East/Southeast Asian only	3.28 (0.04)	-0.37	0.05	-0.47 – -0.28	<0.001
South Asian only	3.49 (0.06)	-0.15	0.06	-0.27 – -0.03	0.015
Black only	3.90 (0.07)	0.19	0.07	0.05 – 0.33	0.007
Indigenous inclusive	3.83 (0.07)	0.08	0.07	-0.05 – 0.21	0.226
Mixed/Other	3.66 (0.05)	0.00	0.05	-0.10 – 0.10	0.999
Not stated	3.57 (0.13)	-0.06	0.12	-0.30 – 0.19	0.654
<b>Income Adequacy</b>					
Not enough money	3.79 (0.09)	Ref	-	-	-
Barely enough money	3.79 (0.03)	0.04	0.09	-0.14 – 0.21	0.656
Enough money	3.57 (0.02)	-0.10	0.09	-0.27 – 0.06	0.228
More than enough money	3.59 (0.03)	-0.06	0.09	-0.24 – 0.11	0.473
Not stated	3.20 (0.15)	-0.42	0.17	-0.74 – -0.09	0.013
<b>Screentime</b>					
Quintile 1	3.14 (0.03)	Ref	-	-	-
Quintile 2	3.53 (0.03)	0.36	0.04	0.28 – 0.44	<0.001
Quintile 3	3.68 (0.03)	0.49	0.04	0.41 – 0.57	<0.001
Quintile 4	3.76 (0.03)	0.56	0.04	0.48 – 0.65	<0.001
Quintile 5	3.96 (0.03)	0.77	0.04	0.68 – 0.85	<0.001

	<b>Sugary cereals</b> Unadjusted mean (SE)	<b>β*</b>	<b>Standard Error</b>	<b>95% CI**</b>	<b>P value</b>
<b>Jurisdiction</b>					
Québec	2.66 (0.03)	-0.38	0.03	-0.44 – -0.32	<0.001
Other Canadian provinces	3.04 (0.02)	Ref	-	-	-
<b>Age (years)</b>					
10-12	2.91 (0.02)	Ref	-	-	-
13-17	2.96 (0.02)	-0.03	0.03	-0.08 – 0.02	0.277
<b>Sex-at-birth</b>					
Male	2.95 (0.02)	Ref	-	-	-
Female	2.94 (0.02)	0.02	0.03	0.03 – 0.07	0.492
<b>Race/Ethnicity</b>					
White only	2.93 (0.02)	Ref	-	-	-
East/Southeast Asian only	2.71 (0.04)	-0.27	0.05	-0.36 – 0.18	<0.001
South Asian only	3.06 (0.06)	0.09	0.06	-0.03 – 0.21	0.158
Black only	3.34 (0.08)	0.32	0.08	0.17 – 0.47	<0.001
Indigenous inclusive	3.26 (0.06)	0.18	0.07	0.05 – 0.31	0.007
Mixed/Other	2.92 (0.05)	-0.06	0.05	-0.15 – 0.04	0.237
Not stated	2.92 (0.12)	-0.03	0.12	-0.27 – 0.22	0.841
<b>Income Adequacy</b>					
Not enough money	3.17 (0.09)	Ref	-	-	-
Barely enough money	3.16 (0.03)	0.05	0.09	-0.13 – 0.22	0.618
Enough money	2.90 (0.02)	-0.14	0.09	-0.32 – 0.03	0.102
More than enough money	2.90 (0.03)	-0.13	0.09	0.31 – 0.05	0.149
Not stated	2.52 (0.14)	-0.50	0.16	-0.81 – -0.18	0.002
<b>Screentime</b>					
Quintile 1	2.57 (0.03)	Ref	-	-	-
Quintile 2	2.85 (0.03)	0.26	0.04	0.18 – 0.33	<0.001
Quintile 3	3.00 (0.03)	0.40	0.04	0.32 – 0.48	<0.001
Quintile 4	3.06 (0.03)	0.46	0.04	0.38 – 0.54	<0.001
Quintile 5	3.26 (0.03)	0.67	0.04	0.58 – 0.74	<0.001

	<b>Snacks</b> Unadjusted mean (SE)	<b>β*</b>	<b>Standard Error</b>	<b>95% CI**</b>	<b>P value</b>
<b>Jurisdiction</b>					
Québec	2.90 (0.03)	-0.27	0.03	-0.33 – -0.22	<0.001
Other Canadian provinces	3.19 (0.01)	Ref	-	-	-
<b>Age (years)</b>					
10-12	3.06 (0.02)	Ref	-	-	-
13-17	3.15 (0.02)	0.01	0.03	-0.05 – 0.06	0.779
<b>Sex-at-birth</b>					
Male	3.12 (0.02)	Ref	-	-	-
Female	3.12 (0.02)	0.02	0.03	-0.03 – 0.07	0.376
<b>Race/Ethnicity</b>					
White only	3.09 (0.02)	Ref	-	-	-
East/Southeast Asian only	3.00 (0.04)	-0.13	0.05	-0.23 – -0.04	0.004
South Asian only	3.29 (0.06)	0.19	0.06	0.07 – 0.31	0.002
Black only	3.48 (0.07)	0.32	0.07	0.18 – 0.46	<0.001
Indigenous inclusive	3.32 (0.06)	0.12	0.07	-0.01 – 0.24	0.074
Mixed/Other	3.15 (0.05)	0.02	0.05	-0.07 – 0.11	0.642
Not stated	3.27 (0.12)	0.18	0.12	-0.05 – 0.40	0.132
<b>Income Adequacy</b>					
Not enough money	3.23 (0.09)	Ref	-	-	-
Barely enough money	3.24 (0.03)	0.06	0.09	-0.12 – 0.23	0.518
Enough money	3.08 (0.02)	-0.04	0.09	-0.20 – 0.13	0.671
More than enough money	3.15 (0.03)	0.05	0.09	-0.12 – 0.22	0.570
Not stated	2.89 (0.14)	-0.21	0.16	-0.52 – 0.10	0.177
<b>Screentime</b>					
Quintile 1	2.75 (0.03)	Ref	-	-	-
Quintile 2	3.04 (0.03)	0.29	0.04	0.21 – 0.36	<0.001
Quintile 3	3.19 (0.03)	0.43	0.04	0.35 – 0.51	<0.001
Quintile 4	3.25 (0.03)	0.49	0.04	0.41 – 0.57	<0.001
Quintile 5	3.39 (0.03)	0.64	0.04	0.55 – 0.72	<0.001

	<b>Desserts or treats</b> Unadjusted mean (SE)	<b>β*</b>	<b>Standard Error</b>	<b>95% CI**</b>	<b>P value</b>
<b>Jurisdiction</b>					
Québec	2.87 (0.03)	-0.28	0.03	-0.34 – -0.22	<0.001
Other Canadian provinces	3.16 (0.02)	Ref	-	-	-
<b>Age (years)</b>					
10-12	3.04 (0.02)	Ref	-	-	-
13-17	3.12 (0.02)	-0.01	0.03	-0.07 – 0.04	0.660
<b>Sex-at-birth</b>					
Male	3.08 (0.02)	Ref	-	-	-
Female	3.10 (0.02)	0.05	0.03	-0.00 – 0.08	0.069
<b>Race/Ethnicity</b>					
White only	3.08 (0.02)	Ref	-	-	-
East/Southeast Asian only	2.86 (0.04)	-0.25	0.05	-0.34 – -0.16	<0.001
South Asian only	3.19 (0.06)	0.11	0.06	-0.01 – 0.23	0.079
Black only	3.32 (0.08)	0.16	0.08	0.00 – 0.31	0.044
Indigenous inclusive	3.36 (0.07)	0.16	0.07	0.03 – 0.29	0.020
Mixed/Other	3.09 (0.05)	-0.03	0.05	-0.13 – 0.06	0.507
Not stated	3.18 (0.13)	0.10	0.13	-0.14 – 0.35	0.427
<b>Income Adequacy</b>					
Not enough money	3.26 (0.09)	Ref	-	-	-
Barely enough money	3.29 (0.03)	0.08	0.09	-0.10 – 0.26	0.364
Enough money	3.03 (0.02)	-0.10	0.09	-0.27 – 0.07	0.238
More than enough money	3.09 (0.03)	-0.03	0.09	-0.21 – 0.15	0.728
Not stated	2.76 (0.14)	-0.37	0.16	-0.68 – -0.05	0.024
<b>Screentime</b>					
Quintile 1	2.68 (0.03)	Ref	-	-	-
Quintile 2	3.01 (0.03)	0.31	0.04	0.23 – 0.39	<0.001
Quintile 3	3.14 (0.03)	0.44	0.04	0.36 – 0.52	<0.001
Quintile 4	3.21 (0.03)	0.51	0.04	0.43 – 0.59	<0.001
Quintile 5	3.42 (0.03)	0.72	0.04	0.64 – 0.81	<0.001

	<b>Fruit or vegetables</b> Unadjusted mean (SE)	<b>β*</b>	<b>Standard</b> <b>Error</b>	<b>95% CI**</b>	<b>P value</b>
<b>Jurisdiction</b>					
Québec	2.22 (0.03)	0.04	0.03	-0.02 – 0.09	0.239
Other Canadian provinces	2.22 (0.01)	Ref	-	-	-
<b>Age (years)</b>					
10-12	2.21 (0.02)	Ref	-	-	-
13-17	2.23 (0.02)	-0.03	0.03	-0.08 – 0.02	0.213
<b>Sex-at-birth</b>					
Male	2.25 (0.02)	Ref	-	-	-
Female	2.19 (0.01)	-0.05	0.03	-0.10 – 0.00	0.055
<b>Race/Ethnicity</b>					
White only	2.18 (0.02)	Ref	-	-	-
East/Southeast Asian only	2.24 (0.04)	0.10	0.05	0.02 – 0.19	0.021
South Asian only	2.45 (0.06)	0.33	0.06	0.21 – 0.45	<0.001
Black only	2.83 (0.08)	0.62	0.08	0.46 – 0.78	<0.001
Indigenous inclusive	2.38 (0.06)	0.16	0.06	0.04 – 0.28	0.008
Mixed/Other	2.09 (0.04)	-0.08	0.05	-0.17 – 0.00	0.063
Not stated	2.24 (0.12)	0.10	0.12	-0.13 – 0.33	0.393
<b>Income Adequacy</b>					
Not enough money	2.20 (0.08)	Ref	-	-	-
Barely enough money	2.35 (0.03)	0.20	0.08	0.04 – 0.36	0.017
Enough money	2.19 (0.02)	0.06	0.08	-0.09 – 0.22	0.433
More than enough money	2.22 (0.03)	0.11	0.08	-0.05 – 0.27	0.186
Not stated	1.98 (0.13)	-0.15	0.15	-0.45 – 0.15	0.317
<b>Screentime</b>					
Quintile 1	2.02 (0.03)	Ref	-	-	-
Quintile 2	2.13 (0.03)	0.12	0.04	0.05 – 0.20	<0.001
Quintile 3	2.22 (0.03)	0.22	0.04	0.14 – 0.29	<0.001
Quintile 4	2.31 (0.03)	0.30	0.04	0.22 – 0.37	<0.001
Quintile 5	2.43 (0.03)	0.42	0.04	0.34 – 0.50	<0.001

\* Estimated regression coefficient for Québec compared to other Canadian provinces in a multiple linear regression model adjusted for: age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

\*\*95% confidence interval

**Table F-S4:** Prevalence of seeing unhealthy foods or drinks advertised using specific marketing techniques in the past 30 days, by demographics, 2019-2022 (weighted estimates, n=14,288)

	<b>Cartoons/characters from movies or TV</b>	<b>AOR*</b>	<b>95% CI**</b>	<b>P value</b>
	Unadjusted % (n)			
<b>Jurisdiction</b>				
Québec	16.5% (603)	0.57	0.51 – 0.63	<0.001
Other Canadian provinces	26.8% (2,848)	Ref	-	-
<b>Age (years)</b>				
10-12	25.9% (1,406)	Ref	-	-
13-17	23.1% (2,045)	0.78	0.71 – 0.84	<0.001
<b>Sex-at-birth</b>				
Male	24.2% (1,768)	Ref	-	-
Female	24.1% (1,683)	1.02	0.94 – 1.11	0.603
<b>Race/Ethnicity</b>				
White only	22.3% (2,237)	Ref	-	-
East/Southeast Asian only	25.7% (303)	1.12	0.96 – 1.29	0.142
South Asian only	34.0% (223)	1.68	1.41 – 1.99	<0.001
Black only	35.4% (149)	1.73	1.40 – 2.15	<0.001
Indigenous inclusive	29.4% (185)	1.22	1.01 – 1.47	0.044
Mixed/Other	26.3% (290)	1.16	1.00 – 1.35	0.046
Not stated	23.6% (50)	1.06	0.76 – 1.47	0.735
<b>Income Adequacy</b>				
Not enough money	29.4% (121)	Ref	-	-
Barely enough money	28.3% (644)	1.01	0.80 – 1.29	0.926
Enough money	23.0% (2,046)	0.82	0.66 – 1.03	0.094
More than enough money	24.4% (616)	0.89	0.70 – 1.13	0.333
Not stated	13.1% (26)	0.39	0.24 – 0.64	<0.001
<b>Screentime</b>				
Quintile 1	19.4% (569)	Ref	-	-
Quintile 2	22.7% (684)	1.24	1.09 – 1.41	0.002
Quintile 3	23.5% (608)	1.32	1.15 – 1.51	<0.001
Quintile 4	25.8% (759)	1.50	1.32 – 1.71	<0.001
Quintile 5	29.7% (830)	1.88	1.65 – 2.14	<0.001

	<b>Cartoons/characters made by food companies</b>	<b>AOR*</b>	<b>95% CI**</b>	<b>P value</b>
	Unadjusted % (n)			
<b>Jurisdiction</b>				
Québec	26.5% (968)	0.56	0.51 – 0.61	<0.001
Other Canadian provinces	39.2% (4,162)	Ref	-	-
<b>Age (years)</b>				
10-12	36.7% (1,988)	Ref	-	-
13-17	35.4% (3,142)	0.87	0.81 – 0.94	<0.001
<b>Sex-at-birth</b>				
Male	36.3% (2,645)	Ref	-	-
Female	35.5% (2,484)	0.99	0.93 – 1.07	0.912
<b>Race/Ethnicity</b>				
White only	35.1% (3,517)	Ref	-	-
East/Southeast Asian only	32.4% (399)	0.80	0.70 – 0.92	0.001
South Asian only	38.7% (255)	1.07	0.90 – 1.26	0.462
Black only	41.5% (175)	1.17	0.95 – 1.45	0.131
Indigenous inclusive	44.8% (282)	1.27	1.07 – 1.51	0.007
Mixed/Other	40.0% (442)	1.15	1.01 – 1.32	0.035
Not stated	28.8% (61)	0.72	0.53 – 0.98	0.036
<b>Income Adequacy</b>				
Not enough money	39.8% (163)	Ref	-	-
Barely enough money	39.5% (898)	1.03	0.83 – 1.29	0.786
Enough money	34.9% (3,103)	0.93	0.75 – 1.14	0.476
More than enough money	36.2% (914)	0.98	0.78 – 1.22	0.823
Not stated	26.1% (51)	0.61	0.41 – 0.90	0.012
<b>Screentime</b>				
Quintile 1	28.6% (840)	Ref	-	-
Quintile 2	33.9% (1,023)	1.26	1.13 – 1.42	<0.001
Quintile 3	37.4% (967)	1.47	1.31 – 1.66	<0.001
Quintile 4	38.6% (1,138)	1.56	1.39 – 1.76	<0.001
Quintile 5	41.5% (1,161)	1.80	1.61 – 2.03	<0.001

	<b>Famous people</b> Unadjusted % (n)	<b>AOR*</b>	<b>95% CI**</b>	<b>P value</b>
<b>Jurisdiction</b>				
Québec	19.7% (721)	0.57	0.52 – 0.63	<0.001
Other Canadian provinces	30.4% (3,226)	Ref	-	-
<b>Age (years)</b>				
10-12	25.4% (1,379)	Ref	-	-
13-17	29.0% (2,568)	1.08	0.99 – 1.17	0.079
<b>Sex-at-birth</b>				
Male	27.3% (1,995)	Ref	-	-
Female	27.9% (1,952)	1.07	0.99 – 1.16	0.069
<b>Race/Ethnicity</b>				
White only	26.3% (2,639)	Ref	-	-
East/Southeast Asian only	24.5% (301)	0.82	0.71 – 0.95	0.009
South Asian only	36.4% (239)	1.52	1.28 – 1.81	<0.001
Black only	35.0% (147)	1.33	1.07 – 1.64	0.010
Indigenous inclusive	32.1% (202)	1.09	0.91 – 1.30	0.374
Mixed/Other	33.3% (367)	1.31	1.14 – 1.51	<0.001
Not stated	24.1% (51)	0.90	0.64 – 1.25	0.511
<b>Income Adequacy</b>				
Not enough money	33.0% (135)	Ref	-	-
Barely enough money	31.7% (720)	1.00	0.79 – 1.27	0.973
Enough money	26.2% (2,323)	0.86	0.69 – 1.07	0.179
More than enough money	29.0% (731)	1.00	0.79 – 1.26	0.991
Not stated	19.3% (38)	0.59	0.39 – 0.90	0.014
<b>Screentime</b>				
Quintile 1	18.9% (556)	Ref	-	-
Quintile 2	26.0% (785)	1.48	1.30 – 1.68	<0.001
Quintile 3	27.7% (716)	1.62	1.42 – 1.85	<0.001
Quintile 4	31.1% (917)	1.93	1.70 – 2.19	<0.001
Quintile 5	34.8% (973)	2.32	2.04 – 2.64	<0.001

\*Adjusted odds ratio from a logistic regression model for Québec compared to other Canadian provinces adjusted for age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

\*\*95% confidence interval

**Table F-S5:** Prevalence of owning an item with branding or a restaurant toy for a company selling unhealthy food or drinks, by demographics, 2019-2022 (weighted estimates, n=14,288)

	<b>Clothing, posters, stickers, or other things with the name or logo of unhealthy food or drink companies</b>	<b>AOR*</b>	<b>95% CI**</b>	<b>P value</b>
	Unadjusted % (n)			
<b>Jurisdiction</b>				
Québec	16.6% (609)	0.75	0.67 – 0.83	<0.001
Other Canadian provinces	21.8% (2,313)	Ref	-	-
<b>Age (years)</b>				
10-12	19.1% (1,034)	Ref	-	-
13-17	21.3% (1,888)	1.04	0.95 – 1.14	0.410
<b>Sex-at-birth</b>				
Male	20.9% (1,527)	Ref	-	-
Female	20.0% (1,395)	0.97	0.90 – 1.06	0.534
<b>Race/Ethnicity</b>				
White only	19.5% (1,958)	Ref	-	-
East/Southeast Asian only	20.1% (247)	1.01	0.86 – 1.18	0.939
South Asian only	23.6% (155)	1.27	1.04 – 1.54	0.017
Black only	28.3% (119)	1.47	1.17 – 1.85	0.001
Indigenous inclusive	24.4% (154)	1.16	0.95 – 1.42	0.144
Mixed/Other	22.7% (251)	1.16	0.99 – 1.36	0.058
Not stated	17.8% (38)	0.92	0.63 – 1.34	0.652
<b>Income Adequacy</b>				
Not enough money	24.7% (101)	Ref	-	-
Barely enough money	24.7% (561)	1.06	0.82 – 1.36	0.656
Enough money	19.3% (1,716)	0.84	0.66 – 1.07	0.154
More than enough money	20.5% (517)	0.92	0.71 – 1.18	0.493
Not stated	13.9% (27)	0.57	0.36 – 0.92	0.022
<b>Screentime</b>				
Quintile 1	14.5% (425)	Ref	-	-
Quintile 2	17.8% (537)	1.25	1.08 – 1.44	0.002
Quintile 3	20.4% (527)	1.47	1.27 – 1.71	<0.001
Quintile 4	23.5% (692)	1.77	1.54 – 2.04	<0.001
Quintile 5	26.4% (739)	2.07	1.80 – 2.38	<0.001

	<b>'Happy meal' toys or other toys from fast- food restaurants</b>	<b>AOR*</b>	<b>95% CI**</b>	<b>P value</b>
	Unadjusted % (n)			
<b>Jurisdiction</b>				
Québec	31.5% (1,152)	0.53	0.49 – 0.58	<0.001
Other Canadian provinces	46.8% (4,977)	Ref	-	-
<b>Age (years)</b>				
10-12	58.9% (3,195)	Ref	-	-
13-17	33.1% (2,934)	0.30	0.28 – 0.32	<0.001
<b>Sex-at-birth</b>				
Male	40.7% (2,973)	Ref	-	-
Female	45.1% (3,156)	1.25	1.16 – 1.34	<0.001
<b>Race/Ethnicity</b>				
White only	39.7% (3,985)	Ref	-	-
East/Southeast Asian only	55.2% (679)	1.85	1.62 – 2.11	<0.001
South Asian only	52.6% (345)	1.57	1.32 – 1.87	<0.001
Black only	48.4% (204)	1.23	0.99 – 1.51	0.059
Indigenous inclusive	50.7% (320)	1.34	1.12 – 1.60	0.001
Mixed/Other	46.0% (508)	1.18	1.03 – 1.35	0.016
Not stated	41.2% (88)	0.93	0.69 – 1.24	0.605
<b>Income Adequacy</b>				
Not enough money	49.6% (203)	Ref	-	-
Barely enough money	47.6% (1,083)	0.97	0.77 – 1.22	0.811
Enough money	42.1% (3,793)	0.79	0.64 – 0.99	0.036
More than enough money	39.8% (1,006)	0.74	0.59 – 0.92	0.008
Not stated	50.3% (98)	1.02	0.71 – 1.46	0.918
<b>Screentime</b>				
Quintile 1	41.8% (1,230)	Ref	-	-
Quintile 2	41.1% (1,242)	1.11	0.99 – 1.24	0.064
Quintile 3	41.2% (1,065)	1.21	1.08 – 1.36	0.002
Quintile 4	43.1% (1,271)	1.37	1.22 – 1.53	<0.001
Quintile 5	47.2% (1,321)	1.79	1.60 – 2.02	<0.001

\*Adjusted odds ratio from a logistic regression model for Québec compared to other Canadian provinces adjusted for age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

\*\*95% confidence interval

**Table F-S6:** Number of beverage and restaurant brands seen in advertisements in the past 30 days, by demographics (beverage brand range: 0-3, restaurant brand range: 0-4), 2019-2022 (weighted estimates, n=14,480 for beverage and n=14,467 for restaurant models)

	<b>Beverage brands index</b> Unadjusted mean (SE)	<b>β*</b>	<b>Standard Error</b>	<b>95% CI**</b>	<b>P value</b>
<b>Jurisdiction</b>					
Québec	1.37 (0.02)	-0.15	0.02	-0.19 – -0.11	<0.001
Other Canadian provinces	1.52 (0.01)	Ref	-	-	-
<b>Age (years)</b>					
10-12	1.38 (0.02)	Ref	-	-	-
13-17	1.55 (0.01)	0.12	0.02	0.08 – 0.16	<0.001
<b>Sex-at-birth</b>					
Male	1.49 (0.01)	Ref	-	-	-
Female	1.48 (0.01)	0.01	0.02	-0.03 – 0.04	0.716
<b>Race/Ethnicity</b>					
White only	1.48 (0.01)	Ref	-	-	-
East/Southeast Asian only	1.27 (0.03)	-0.22	0.04	-0.29 – -0.15	<0.001
South Asian only	1.56 (0.04)	0.09	0.05	-0.00 – 0.18	0.051
Black only	1.74 (0.05)	0.22	0.05	0.11-0.32	<0.001
Indigenous inclusive	1.62 (0.05)	0.08	0.05	-0.02 – 0.17	0.121
Mixed/Other	1.61 (0.03)	0.12	0.04	0.05 – 0.19	<0.001
Not stated	1.28 (0.07)	-0.17	0.07	-0.31 – -0.03	0.018
<b>Income Adequacy</b>					
Not enough money	1.54 (0.06)	Ref	-	-	-
Barely enough money	1.60 (0.02)	0.10	0.06	-0.03 – 0.22	0.119
Enough money	1.46 (0.01)	0.00	0.06	-0.11 – 0.12	0.975
More than enough money	1.50 (0.02)	0.05	0.06	-0.08 – 1.17	0.457
Not stated	1.06 (0.08)	-0.36	0.10	-0.55 – -0.18	<0.001
<b>Screentime</b>					
Quintile 1	1.21 (0.02)	Ref	-	-	-
Quintile 2	1.41 (0.02)	0.18	0.03	0.12 – 0.23	<0.001
Quintile 3	1.55 (0.02)	0.30	0.03	0.24 – 0.36	<0.001
Quintile 4	1.58 (0.02)	0.33	0.03	0.27 – 0.39	<0.001
Quintile 5	1.69 (0.02)	0.43	0.03	0.38 – 0.49	<0.001

	<b>Restaurant brands index</b>	<b>β*</b>	<b>Standard Error</b>	<b>95% CI**</b>	<b>P value</b>
	Unadjusted mean (SE)				
<b>Jurisdiction</b>					
Québec	2.15 (0.02)	-0.18	0.03	-0.24 – -0.13	<0.001
Other Canadian provinces	2.34 (0.02)	Ref	-	-	-
<b>Age (years)</b>					
10-12	2.22 (0.02)	Ref	-	-	-
13-17	2.33 (0.02)	0.03	0.03	-0.02 – 0.08	0.296
<b>Sex-at-birth</b>					
Male	2.28 (0.02)	Ref	-	-	-
Female	2.30 (0.02)	0.05	0.03	0.00 – 0.10	0.047
<b>Race/Ethnicity</b>					
White only	2.28 (0.02)	Ref	-	-	-
East/Southeast Asian only	2.03 (0.05)	-0.26	0.05	-0.35 – -0.16	<0.001
South Asian only	2.37 (0.06)	0.11	0.06	-0.01 – 0.23	0.082
Black only	2.66 (0.07)	0.30	0.07	0.16 – 0.44	<0.001
Indigenous inclusive	2.43 (0.06)	0.07	0.06	-0.06 – 0.19	0.288
Mixed/Other	2.44 (0.04)	0.14	0.05	0.05 – 0.23	0.003
Not stated	2.16 (0.10)	-0.07	-0.07	-0.28 – 0.13	0.467
<b>Income Adequacy</b>					
Not enough money	2.42 (0.08)	Ref	-	-	-
Barely enough money	2.42 (0.03)	0.05	0.08	-0.11 – 0.21	0.509
Enough money	2.26 (0.02)	-0.04	0.08	-0.19 – 0.12	0.635
More than enough money	2.27 (0.03)	-0.02	0.08	-0.17 – 0.14	0.850
Not stated	1.85 (0.11)	-0.43	0.13	-0.69 – -0.17	0.001
<b>Screentime</b>					
Quintile 1	1.90 (0.03)	Ref	-	-	-
Quintile 2	2.20 (0.03)	0.28	0.04	0.20 – 0.36	<0.001
Quintile 3	2.37 (0.03)	0.44	0.04	0.36 – 0.52	<0.001
Quintile 4	2.40 (0.03)	0.47	0.04	0.40 – 0.55	<0.001
Quintile 5	2.59 (0.03)	0.66	0.04	0.58 – 0.74	<0.001

\* Estimated regression coefficient for Québec compared to other Canadian provinces in a multiple linear regression model adjusted for: age, sex-at-birth, race/ethnicity, income adequacy, screentime, and survey year

\*\*95% confidence interval

**Table F-S7:** Prevalence of advertisements for beverage and restaurant brands perceived as ‘usually aimed at children under 12 years of age’, by demographics, 2019-2022 (weighted estimates, n=14,480 for beverage and n=14,467 for restaurant models)

	<b>Beverage brands perceptions</b>	<b>AOR**</b>	<b>95% CI***</b>	<b>P value</b>
	Unadjusted % (n)			
<b>Jurisdiction</b>				
Québec	21.0% (781)	0.72	0.65 – 0.79	<0.001
Other Canadian provinces	27.2% (2,932)	Ref	-	-
<b>Age (years)</b>				
10-12	23.7% (1,308)	Ref	-	-
13-17	26.8% (2,404)	1.15	1.06 -1.26	0.001
<b>Sex-at-birth</b>				
Male	26.4% (1,946)	Ref	-	-
Female	24.9% (1,766)	0.93	0.86 – 1.01	0.065
<b>Race/Ethnicity</b>				
White only	24.6% (2,499)	Ref	-	-
East/Southeast Asian only	29.5% (365)	1.20	1.04 – 1.38	0.015
South Asian only	33.6% (222)	1.44	1.19 – 1.73	<0.001
Black only	26.3% (113)	1.15	0.90 – 1.45	0.262
Indigenous inclusive	27.4% (175)	1.13	0.93 – 1.39	0.218
Mixed/Other	25.4% (285)	1.06	0.91 – 1.24	0.470
Not stated	24.6% (54)	1.03	0.74 – 1.42	0.873
<b>Income Adequacy</b>				
Not enough money	23.2% (97)	Ref	-	-
Barely enough money	27.9% (647)	1.19	0.91 – 1.55	0.203
Enough money	25.0% (2,252)	1.06	0.83 – 1.37	0.631
More than enough money	26.9% (686)	1.16	0.89 – 1.51	0.281
Not stated	15.5% (31)	0.63	0.39 – 1.03	0.065
<b>Screentime</b>				
Quintile 1	25.0% (742)	Ref	-	-
Quintile 2	24.4% (744)	0.94	0.82 – 1.06	0.300
Quintile 3	24.2% (635)	0.94	0.83 – 1.08	0.401
Quintile 4	27.1% (810)	1.11	0.98 – 1.27	0.099
Quintile 5	27.5% (781)	1.13	0.99 – 1.29	0.066

	<b>Restaurant brands perceptions</b> Unadjusted % (n)	<b>AOR**</b>	<b>95% CI***</b>	<b>P value</b>
<b>Jurisdiction</b>				
Québec	49.6% (1,838)	0.83	0.76 – 0.90	<0.001
Other Canadian provinces	55.1% (5,923)	Ref	-	-
<b>Age (years)</b>				
10-12	53.4% (2,947)	Ref	-	-
13-17	53.8% (4,813)	0.99	0.92 – 1.07	0.877
<b>Sex-at-birth</b>				
Male	54.3% (3,996)	Ref	-	-
Female	52.9% (3,764)	0.93	0.87 – 1.00	0.057
<b>Race/Ethnicity</b>				
White only	52.2% (5,307)	Ref	-	-
East/Southeast Asian only	55.4% (685)	1.11	0.98 – 1.27	0.0114
South Asian only	63.5% (418)	1.67	1.40 – 2.00	<0.001
Black only	60.6% (260)	1.54	1.25 – 1.91	<0.001
Indigenous inclusive	56.0% (358)	1.15	0.96 – 1.37	0.138
Mixed/Other	55.9% (624)	1.19	1.04 – 1.36	0.013
Not stated	49.2% (107)	0.93	0.69 – 1.27	0.661
<b>Income Adequacy</b>				
Not enough money	51.3% (216)	Ref	-	-
Barely enough money	54.5% (1,261)	1.11	0.87 – 1.40	0.402
Enough money	53.5% (4,816)	1.11	0.89 – 1.39	0.346
More than enough money	54.9% (1,395)	1.17	0.93 – 1.48	0.188
Not stated	36.4% (73)	0.53	0.36 – 0.80	0.002
<b>Screentime</b>				
Quintile 1	50.6% (1,499)	Ref	-	-
Quintile 2	53.0% (1,619)	1.13	1.01 – 1.26	0.033
Quintile 3	54.4% (1,422)	1.20	1.06 – 1.34	0.003
Quintile 4	55.6% (1,664)	1.28	1.14 – 1.43	<0.001
Quintile 5	54.7% (1,556)	1.24	1.10 – 1.39	<0.001

\*\*Adjusted odds ratio from a logistic regression model for Québec compared to other Canadian provinces adjusted for age, sex-at-birth, race/ethnicity, income adequacy, screentime, survey year, and brand seen

\*\*\*95% confidence interval

**Table F-S8:** Desire to consume of products from beverage and restaurant brands, by demographics, 2019-2022 (weighted estimates, n=14,480 for beverage and n=14,467 for restaurant models)

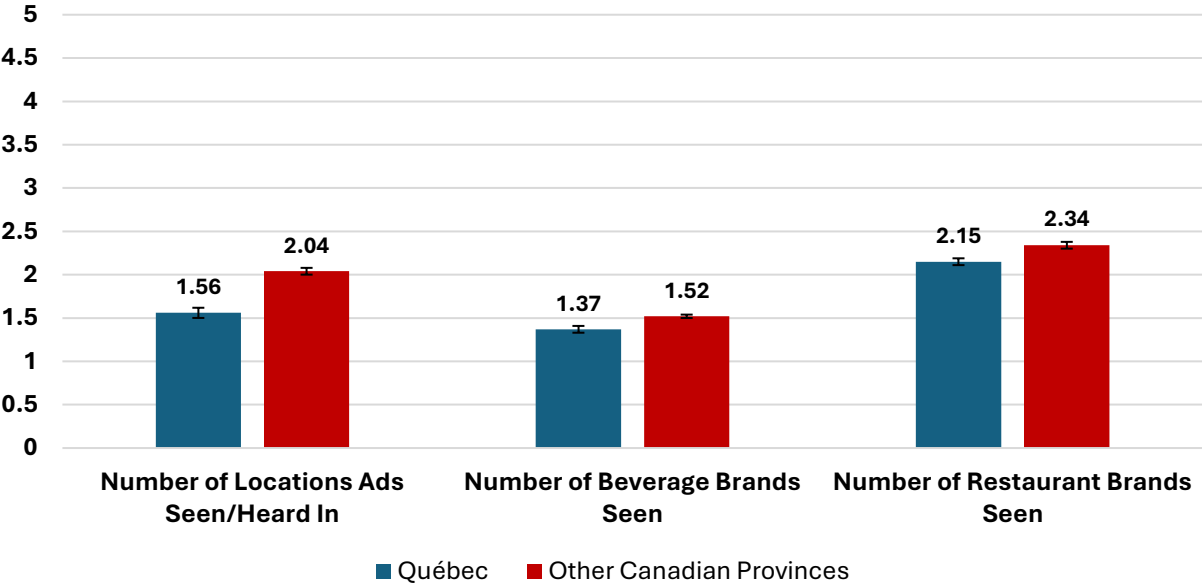
	<b>Beverage brands</b> Unadjusted mean (SE)	$\beta^*$	<b>Standard</b> <b>Error</b>	<b>95% CI**</b>	<b>P</b> <b>value</b>
<b>Jurisdiction</b>					
Québec	3.87 (0.03)	-0.10	0.03	-0.17 – -0.04	0.002
Other Canadian provinces	4.01 (0.02)	Ref	-	-	-
<b>Age (years)</b>					
10-12	3.95 (0.03)	Ref	-	-	-
13-17	3.98 (0.02)	-0.02	0.03	-0.08 – -0.04	0.442
<b>Sex-at-birth</b>					
Male	4.11 (0.02)	Ref	-	-	-
Female	3.82 (0.02)	-0.28	0.03	-0.34 – -0.23	<0.001
<b>Race/Ethnicity</b>					
White only	3.92 (0.02)	Ref	-	-	-
East/Southeast Asian only	4.21 (0.05)	0.26	0.05	0.16 – 0.35	<0.001
South Asian only	4.22 (0.07)	0.23	0.06	0.10 – 0.35	<0.001
Black only	4.18 (0.09)	0.28	0.08	0.12 – 0.44	<0.001
Indigenous inclusive	3.99 (0.08)	0.06	0.07	-0.08 – -0.21	0.385
Mixed/Other	3.99 (0.06)	0.07	0.05	-0.03 – -0.18	0.156
Not stated	3.69 (0.12)	-0.24	0.12	-0.46 – -0.01	0.042
<b>Income Adequacy</b>					
Not enough money	4.03 (0.10)	Ref	-	-	-
Barely enough money	4.09 (0.04)	-0.02	0.09	-0.20 – -0.17	0.877
Enough money	3.94 (0.02)	-0.12	0.09	-0.29 – -0.06	0.181
More than enough money	3.96 (0.04)	-0.11	0.09	-0.30 – -0.07	0.236
Not stated	4.01 (0.13)	0.08	0.15	-0.21 – -0.37	0.595
<b>Screentime</b>					
Quintile 1	3.84 (0.04)	Ref	-	-	-
Quintile 2	3.91 (0.03)	0.06	0.04	-0.03 – -0.14	0.179
Quintile 3	3.89 (0.04)	0.07	0.05	-0.02 – -0.16	0.124
Quintile 4	4.04 (0.03)	0.21	0.04	0.12 – 0.30	<0.001
Quintile 5	4.19 (0.04)	0.35	0.05	0.26 – 0.44	<0.001

	<b>Restaurant brands</b> Unadjusted mean (SE)	$\beta^*$	<b>Standard Error</b>	<b>95% CI**</b>	<b>P value</b>
<b>Jurisdiction</b>					
Québec	4.91 (0.03)	-0.04	0.03	-0.10 – 0.02	0.192
Other Canadian provinces	4.96 (0.02)	Ref	-	-	-
<b>Age (years)</b>					
10-12	5.12 (0.02)	Ref	-	-	-
13-17	4.84 (0.02)	-0.35	0.03	-0.40 – -0.29	<0.001
<b>Sex-at-birth</b>					
Male	5.01 (0.02)	Ref	-	-	-
Female	4.87 (0.02)	-0.13	0.03	-0.18 – -0.08	<0.001
<b>Race/Ethnicity</b>					
White only	4.94 (0.02)	Ref	-	-	-
East/Southeast Asian only	4.88 (0.04)	-0.04	0.04	-0.13 – 0.04	0.329
South Asian only	5.06 (0.06)	0.15	0.06	0.03 – 0.27	0.016
Black only	5.21 (0.07)	0.25	0.08	0.10 – 0.40	<0.001
Indigenous inclusive	5.05 (0.06)	0.05	0.07	-0.08 – 0.18	0.446
Mixed/Other	4.93 (0.05)	0.00	0.05	-0.10 – 0.10	0.983
Not stated	4.64 (0.11)	-0.20	0.10	-0.40 – 0.00	0.047
<b>Income Adequacy</b>					
Not enough money	5.08 (0.09)	Ref	-	-	-
Barely enough money	5.07 (0.03)	0.02	0.09	-0.17 – 0.20	0.871
Enough money	4.94 (0.02)	-0.09	0.09	-0.27 – 0.09	0.323
More than enough money	4.85 (0.03)	-0.14	0.09	-0.33 – 0.05	0.137
Not stated	4.81 (0.11)	-0.18	0.14	-0.46 – 0.09	0.182
<b>Screentime</b>					
Quintile 1	4.73 (0.03)	Ref	-	-	-
Quintile 2	4.84 (0.03)	0.15	0.04	0.07 – 0.23	<0.001
Quintile 3	4.95 (0.03)	0.27	0.04	0.18 – 0.35	<0.001
Quintile 4	5.05 (0.03)	0.38	0.04	0.30 – 0.46	<0.001
Quintile 5	5.17 (0.03)	0.52	0.04	0.44 – 0.60	<0.001

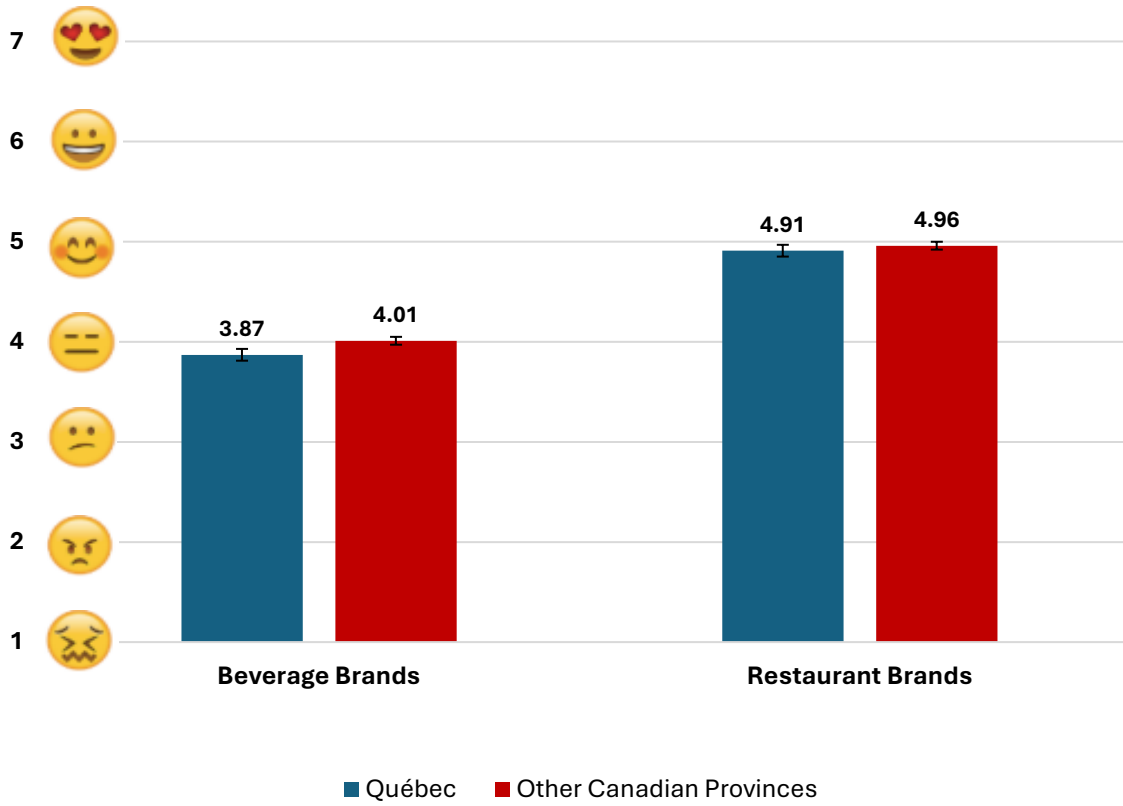
\*\* Estimated regression coefficient for Québec compared to other Canadian provinces in a multiple linear regression model adjusted for age, sex-at-birth, race/ethnicity, income adequacy, screentime, survey year, and brand seen

\*\*\*95% confidence interval

**Figure F-S1:** Number of locations where advertisements for ‘unhealthy’ foods or drinks were seen (unadjusted, range: 0-13) and number of brands seen advertising ‘unhealthy’ foods or drinks in the past 30 days (unadjusted, beverage brand range: 0-3, restaurant brand range: 0-4), 2019-2022 (weighted estimates: n=14,599 generally, n=14,480 for beverage brands, and n=14,467 for restaurant brands)



**Figure F-S2:** Mean desire to consume of products from advertised beverage and restaurant brands (unadjusted, range:1-7); 2019-2022 (weighted estimates, n=14,480 for beverage and n=14,467 for restaurant models)



**Appendix G – Chapter 4 Supplemental Figure**

**Figure G-S1.** Overview of Health Canada’s proposed marketing nutrient profile model thresholds and application to food items in the hypothetical product selection task.

<b>Proposed Thresholds*</b>	<b>Saturated Fat</b>	<b>Sugar</b>	<b>Sodium</b>
% Daily Value equivalent	10% DV	5% DV	6% DV
If main dish with reference amount of 200 <sup>+</sup> g	2 g of saturated fat + trans-fat per reference amount and serving of stated size; or provides 15% energy from saturated fat + trans fat	5 g sugars per 100 g	140 mg sodium per 100 g
If reference amount 30 <sup>+</sup> g and food is not a main dish	2 g of saturated fat + trans-fat per 100 g; or provides 15% energy from saturated fat + trans fat	5 g sugars per reference amount and serving of stated size	140 mg sodium per reference amount and serving of stated size
<b>Application of Proposed Thresholds to Food Items</b>			
Big Mac			
Chicken McNuggets			
Quarter Pounder Deluxe			
Grilled Chicken Salad			
Chicken & Bacon McWrap with Grilled Chicken			
Garden Salad**			

\* Thresholds for ‘If the food has a reference amount of 30 g/30 mL or less’ were omitted from the table as not relevant to product offerings

\*\* Only the Garden Salad would not be subject to restriction under Health Canada’s proposed nutrient profile model thresholds

## Appendix H – Chapter 5 Supplemental Table

**Table H-S1.** Pairwise contrasts of perceived healthiness and appeal by experimental condition, (N=11,236)

		<b>Experimental Condition Vs Experimental Condition</b>	<b>B*</b> (95%CI)	<b>P</b>
<b>Perceived Healthiness<sup>†</sup></b>	Fruit drink – no health message	Fruit drink – health message (ref)	-0.08 (-0.13 – -0.02)	<b>0.004</b>
	Fruit drink – no health message	Soda – health message (ref)	0.78 (0.73 – 0.84)	<b>&lt;0.001</b>
	Fruit drink – no health message	Soda – no health message (ref)	0.82 (0.77 – 0.88)	<b>&lt;0.001</b>
	Fruit drink – health message	Soda – health message (ref)	0.86 (0.81 – 0.91)	<b>&lt;0.001</b>
	Fruit drink – health message	Soda – no health message (ref)	0.90 (0.85 – 0.95)	<b>&lt;0.001</b>
	Soda – health message	Soda – no health message (ref)	0.04 (-0.01 – 0.09)	0.128
	<b>Appeal<sup>††</sup></b>	Fruit drink – no health message	Fruit drink – health message (ref)	-0.06 (-0.14 – 0.02)
Fruit drink – no health message		Soda – health message (ref)	0.11 (0.03 – 0.19)	<b>0.008</b>
Fruit drink – no health message		Soda – no health message (ref)	0.11 (0.03 – 0.19)	<b>0.009</b>
Fruit drink – health message		Soda – health message (ref)	0.17 (0.09 – 0.25)	<b>&lt;0.001</b>
Fruit drink – health message		Soda – no health message (ref)	0.17 (0.09 – 0.25)	<b>&lt;0.001</b>
Soda – health message		Soda – no health message (ref)	0.00 (-0.09 – 0.09)	0.992

\* Unadjusted estimated regression coefficients from a multiple linear regression separately modelling perceived healthiness and appeal by experimental condition

<sup>†</sup> F=0.96, p=0.327

<sup>††</sup> F=1.09, p=0.296