

The Culture of Food and Beverage Marketing in Children's Sport: What does it look like and how do parents experience it?

by

Rachel Joyce Lian Prowse

A thesis submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Health Promotion & Sociobehavioral sciences

School of Public Health  
University of Alberta

© Rachel Joyce Lian Prowse, 2018

## Abstract

Unhealthy food and beverage marketing impacts dietary attitudes and behaviours of children and youth and is a risk factor for childhood obesity. Canada is exploring policy options to restrict unhealthy food marketing to children, as recommended by the World Health Organization. However, the Government of Canada is proposing to exempt children's sport sponsorship from the marketing regulation due to concerns of negative impacts on sport access. Using sport to market products is a recognized strategy in many commercial sectors including the food industry. When unhealthy food marketing includes some aspect of physical activity, individuals misperceive those foods to be healthy, creating a health halo. The health halo attached to food marketing with sports or physical activity is concerning for public health.

The goal of this research was to investigate the nature and extent of food and beverage marketing in recreation facilities and to understand parents' perceptions of food and beverage marketing in recreation facilities. Using an explanatory sequential mixed methods study design driven by critical realism, we assessed the objective and perceived food marketing environments in recreation facilities. Two types of interventions on food marketing environments were evaluated using a reliable, validated tool [Food and beverage Marketing Assessment Tool (FoodMATS)]: (a) having voluntary provincial nutrition guidelines (through a natural experiment between three provinces with provincial nutrition guidelines for recreation and one province without nutrition guidelines), and (b) a capacity-building intervention (CBI) to improve food marketing environments (via a randomized controlled trial in recreation facilities in provinces with voluntary nutrition guidelines). Next, we explored the culture of food and beverage marketing in and around children's sport and physical activity in municipal recreation facilities from parents' perceptions through a photo-based focused ethnography study.

The first study found that food and beverage marketing was present in almost all recreation facilities, and approximately half were for unhealthy foods and beverages products, brands, and retailers. Recreation facilities in provinces with voluntary provincial nutrition guidelines had a significantly lower proportion of unhealthy food and beverage marketing than recreation facilities in a province without nutrition guidelines, but did not have different levels of exposure to food and beverage marketing. Recreation facilities that participated in the CBI did not improve their food marketing environments after the 18-month intervention period. Parents had a low awareness of the breadth of food marketing, mentioning food marketing from concessions and vending most often. Parents believed children were impacted by certain visual food marketing influences present in recreation facilities, but were less sure whether or how other types of marketing (e.g. sport sponsorship) have impacts. Parents reported using a variety of strategies to reduce their children's unhealthy food requests and choices in recreation facilities.

This research is extremely timely with the spotlight on food marketing to children in Canada. In order to effectively protect children from unhealthy food marketing, the field should reflect on how to define the problem and generate policies that will change the exposure to and power of unhealthy food marketing in children's lives, including recreation settings. Current approaches may fail to shift food marketing environments in recreation facilities. Critical social marketing may be a suitable approach for public health researchers, practitioners, and policy-makers to bridge commercial and social marketing through upstream and downstream actions that will generate health promoting food marketing environments in recreation facilities supportive of healthy diets in children.

## Preface

This thesis is original work by Rachel Prowse. Some of the research conducted for this thesis forms part of a national research collaboration called Eat Play Live (EPL), led by Dr. Kim Raine, University of Alberta and Dr. PJ Naylor, University of Victoria. I, Rachel Prowse, led the food marketing assessment component of EPL. The data analyses in Chapter 3, 4 and 5 are my original work within the EPL study. The scoping review in chapter 2 and the qualitative investigation in Chapter 6 are original studies designed, executed, and analyzed by me.

Chapter 3 of this dissertation has been published as Prowse, R. J., Naylor, P. J., Olstad, D. L., Carson, V., Mâsse, L. C., Storey, K., Kirk, S. F. L., & Raine, K. D. (2018). Reliability and validity of a novel tool to comprehensively assess food and beverage marketing in recreational sport settings. *International Journal of Behavioral Nutrition and Physical Activity*, 15(1), 38.

Chapter 4 of this dissertation has been published as Prowse, R. J., Naylor, P. J., Olstad, D. L., Carson, V., Storey, K., Mâsse, L. C., Kirk, S. F. L., & Raine, K. D. (2018). Food marketing in recreational sport settings in Canada: a cross-sectional audit in different policy environments using the Food and beverage Marketing Assessment Tool for Settings (FoodMATS). *International Journal of Behavioral Nutrition and Physical Activity*, 15(1), 39.

For Chapters 3 and 4, I developed the FoodMATS tool used for data collection, collected the data with help from other EPL provincial coordinators, and analyzed and interpreted data. As the Alberta project coordinator, I was lead for the 18-month capacity building intervention in six recreation facilities in Alberta assigned to the intervention group. (In the other provinces, another provincial coordinator facilitated the capacity-building intervention). I developed the manuscript with critical editorial support from DLO, VC, LCM, KA, SFLK, PJN, and KDR. PJN, LCM,

SFLK, and KDR contributed to the design of the project. All authors read and approved the final manuscript.

EPL received research ethics approval from the University of Alberta Research Ethics Board, Project Name “Eat, Play, Live”, No. Pro00058906 on August 21, 2015. EPL also received ethics approval from all other participating universities (University of Victoria, University of Waterloo, and Dalhousie University). The qualitative component of this dissertation received research ethics approval from the University of Alberta Research Ethics Board, Project Name “Understanding the Culture of Food and Beverage Marketing in and around Children’s Sport and Recreation from the Perspective of Parents: A Focused Ethnography”, No. Pro00068598 on December 1, 2017.

## Dedication

I dedicate this work to the special kids in my life, Izzy, Charlie, Leo, Sage, Ana, Jack, Bingley,  
and Finn, for being their Aunt gives me extreme joy and motivation.

---

Working hard.

“Will I ever be done?”

Yes, you will!

Kori Cuthbert, February 2016

~ titled *A Haiku for Rachel*

## Acknowledgements

I have an overwhelming number of people that have invaluable contributed to my journey. First and foremost, my supervisor, Dr. Kim Raine, has been an incredibly motivating, admirable, brilliant, compassionate, and magical supervisor. I cannot extend enough thanks for the guidance and support you have provided over our many years together. Thank you for persuading me to tackle a PhD, offering me countless opportunities to gain new experiences, treating me like a colleague, and providing career and life advice.

Thank you to my supervisory committee (Dana Olstad, Valerie Carson, and Kate Storey) who have always genuinely and enthusiastically supported my work. I appreciate the opportunities you have offered to me to advance my skills as a researcher and a teacher. I would like to extend special thanks to Dana who sparked my work in recreation facilities, was always eager to discuss challenging issues, and always went the extra mile to support my learning.

The Eat Play Live team (PJ Naylor, Louise Masse, Dona Tomlin, Rhona Hanning, Sue Caswell, Sara Kirk, Jessi-Lee McIssac, Sherry Jarvis) were crucial in making my research possible. Thank you for all of your guidance and support to develop the FoodMATS tool, collect data and interpret the findings. Thank you to all Eat Play Live recreation facilities and parents that participated in the research. The Eat Play Live study would also not be possible without the Collaborative for Healthy Eating in Recreation Settings and many public health dietitians from Alberta Health Services. A special thank you to Lisa MacLaughlin and Pam Boyson who were so willing to collaborate, support the Eat Play Live study, and share research findings to continue the momentum of the project. Thank you to my incredible research assistants (Trudy Tran, Ruby Yang, and Kyra Parayko) who provided invaluable support for Eat Play Live so we could make a difference to our participating partners.

I have so many incredible friends that have shared my challenges, successes, and emotions through this journey. I would not be here without the motivation, courage, advice, love, and understanding you have given me over the years. Thank you to Kayla Atkey and Walie Aktary, my other POWER-UP lab mates. Thank you to my other two Amigos, Keely Stenberg and Elizabeth Campbell. Thank you to Alexa Ferdinands for being my PhD partner-in-crime. Thank you to all of my incredible friends from home who always kept me grounded. Thank you to Dallas Ingbritson for your unparalleled encouragement to conquer academic and adventure challenges.

Thank you to all of my siblings, Paul, Sarah, Matt, and Chad, and their partners. A special thank you to Matt, Christy, Leo, and Ana (and the new Finn) who made it possible to survive this journey. Thank you for all of the meals, sleepovers, costume parties, and everything else. Finally, to my Mom and Papa, words cannot express the gratitude I hold for having such incredible parents. You have been a source of inspiration through this process and in my everyday life.

I would also like to thank the many funders who have supported me and my research: Canadian Institute of Health Research Canada, Women's and Children's Health Research Initiative, Faculty of Graduate Studies, School of Public Health, Graduate Students Association, and the University of Alberta.



## Table of Contents

Abstract.....	ii
Preface .....	iv
Dedication .....	vi
Acknowledgements.....	vii
List of Tables .....	xiv
List of Figures .....	xvi
CHAPTER 1 - INTRODUCTION .....	1
Childhood, Food Marketing, and Health.....	1
Food Marketing in Sports.....	4
Control of Food Marketing in Canada.....	5
Research Gaps.....	8
Research Objectives.....	9
Research Design .....	10
Explanatory Sequential Mixed Methods Design.....	11
Critical Realism.....	11
Structure of the Dissertation .....	12
References .....	14
CHAPTER 2 – RESULTS STUDY A.....	24
Food marketing to children in Canada: a settings-based scoping review on exposure, power and impact .....	24
Introduction .....	24
Methods.....	30
Results.....	33
Exposure and power of food marketing to children in Canada .....	34
Exposure to food marketing in the home: on television .....	34
Power of food marketing in the home: on television.....	35
Exposure to food marketing in the home: online.....	36
Power of food marketing in the home: online .....	37
Exposure to food marketing in schools.....	38
Power of food marketing in schools .....	39

Exposure to food marketing in supermarkets .....	39
Power of food marketing in supermarkets .....	40
Impact of food marketing on Children in Canada.....	41
Discussion.....	57
Implications for Policy and Research .....	60
Strengths and Limitations .....	62
Conclusion.....	62
References .....	64
CHAPTER 3 – RESULTS STUDY 1 .....	73
Reliability and validity of a novel tool to comprehensively assess food and beverage marketing in recreational sport settings.....	73
Background .....	73
Methods.....	76
Setting, Participants & Measures.....	76
Data Collection.....	82
Data Analysis.....	85
Results.....	87
Reliability.....	87
FoodMATS Score Validity .....	88
Discussion.....	92
Reliability.....	92
FoodMATS Scores Validity .....	93
Limitations.....	95
Strengths.....	96
Conclusions & Implications.....	97
References .....	99
CHAPTER 4 – RESULTS STUDY 2 .....	106
Food marketing in recreational sport settings in Canada: a cross-sectional audit in different policy environments using the Food and beverage Marketing Assessment Tool for Settings (FoodMATS) ..	106
Background .....	106
Results.....	114
Exposure.....	117

Power .....	118
FoodMATS Scores .....	121
Discussion.....	121
Conclusions .....	127
References .....	128
CHAPTER 5 – RESULTS STUDY 3 .....	133
Impact of building capacity to implement nutrition guidelines in recreation facilities on food marketing .....	133
Introduction .....	133
Methods.....	134
Study Design.....	134
Participants and Recruitment .....	135
Procedures .....	135
Instruments and Measures .....	136
Data Analysis.....	137
Results.....	140
Within group change in food marketing environments between T1 and T2 .....	140
Between group change in food marketing environments .....	141
Discussion.....	144
Limitations.....	146
Implications for Research and Practice.....	147
References .....	148
CHAPTER 6 – RESULTS STUDY 4 .....	153
Food messages in recreation facilities: A photo-based investigation of parents’ awareness, reactions, and experiences of food and beverage marketing around children’s sports .....	153
Introduction .....	153
Methods.....	154
Study design .....	154
Participants & Recruitment.....	155
Procedures .....	156
Data Generation & Analysis .....	157
Rigor .....	157

Results.....	158
Parents' Awareness of Food Marketing.....	163
Parents Reactions to Food Marketing .....	163
Parents Experiences of Food Marketing .....	167
Discussion.....	171
Limitations.....	178
Conclusions .....	179
References .....	180
CHAPTER 7 - DISCUSSION.....	186
Redefining Food Marketing in Recreation Facilities for Change.....	186
Critical Realism in Food Marketing in Recreation Facilities .....	186
Summary of research .....	188
What this dissertation adds .....	190
Possible Underlying Structures, Mechanisms and Implications .....	192
Defining marketing to children .....	192
Defining marketing in recreation facilities.....	195
Defining (and addressing) marketing comprehensively .....	201
Strengths & Limitations .....	206
Conclusions .....	208
References .....	209
BIBLIOGRAPHY .....	212
Appendix A.....	242
Eat Play Live (EPL) Study .....	244
Food Marketing Assessment Tool for Settings (FoodMATS) .....	249
Data Collection Procedures.....	253
Data Analysis Procedures.....	260
Methods of S4.....	276
Critical Realism's Inference Processes .....	288
References .....	290
Appendix B – Food and beverage Marketing Assessment Tool for Settings (FoodMATS) .....	297
Appendix C - Components, definitions, and process of scoring data collected by the FoodMATS .....	308

Appendix D - Nutrient and ingredients assessed in Canadian provincial nutrition guidelines for the recreation sector.....	309
Appendix E - Categorization of food and beverage products recorded on FoodMATS and in concession sales data by harmonized criteria.....	311
Appendix F - Facility Invitation Letter .....	315
Appendix G - Facility Agreement for Eat, Play, Live Alberta: Food Marketing .....	318
Appendix H – Recruitment Poster .....	321
Appendix I – Recruiting email sent to parents from facilities.....	322
Appendix J - Photo Interview Consent Form for Eat, Play, Live Alberta: Food Marketing .....	323
Appendix K - Participant Information Form.....	327
Appendix L - Eat, Play, Live Alberta Initial Meeting Guide.....	329
Appendix M - Eat, Play, Live Alberta Follow-up Interview Guide .....	331

## List of Tables

Table 1. Types of regulatory control of food marketing to children in Canada .....	27
Table 2 Systematic review of food marketing to children in Canada: systematic search criteria and process.....	30
Table 3: Synthesis of Canadian literature on exposure, power, and impact of food marketing to children in Canada, and the influence of the QCPA and the CAI on the same .....	44
Table 4. Summary of influence of current regulation in Canada on exposure to and power of food marketing to children by setting .....	56
Table 5 FoodMATS Operational Definitions of 4Ps Marketing Mix.....	80
Table 6 FoodMATS Operational Definitions of Exposure and Power of Marketing.....	81
Table 7 Inter-rater reliability statistics from pilot testing FoodMATS.....	88
Table 8 Descriptive statistics of “Least Healthy” food and beverage sales and FoodMATS scores .....	88
Table 9 Sequential multiple regression analyses predicting square root transformed weekly sales of "Least Healthy" <sup>a</sup> foods and beverages from FoodMATS scores and facility size.....	91
Table 10 Classification of Marketing Occasions by Healthfulness (Prowse et al., 2018).....	112
Table 11 Number and proportion of sports areas with food marketing present (n=188) .....	115
Table 12 Number and proportion of food marketing occasions found in food, sports, and other area by type (n=1740).....	116
Table 13 Exposure to food and beverage marketing occasions for facility areas for guideline and non-guideline provinces (n=1740).....	118
Table 14 Power of food and beverage marketing occasions for guideline and non-guideline provinces (n=1740).....	118

Table 15 Measures Evaluated by the Food and beverage Marketing Assessment Tool for Settings (FoodMATS) between T1 and T2.....	139
Table 16 Food and Beverage Marketing Outcomes by Facility Condition and Facility Area ...	142
Table 17 Change in FoodMATS Outcomes Between T1 and T2 Within and Between Guidelines+CBI, Guidelines-Only, and Non-Guideline Sites .....	143
Table 18 Sociodemographic Characteristics of Participants .....	158
Table 19 Definitions of Themes and Exemplar Quotes.....	161
Table 20 Sample Size of Recreation Facilities per Province .....	246
Table 21 Eat Play Live Outcome Constructs and Measurement Tools .....	259
Table 22 Ranking of Food Retailers Healthfulness .....	263
Table 23 Description and Application of Critical Realism Thought Processes.....	289

## List of Figures

Figure 1 Flow chart of systematic search .....	32
Figure 2 Distribution by healthfulness for child-targeted and non-child-targeted marketing occasions comparing sites in guideline and non-guideline provinces (n=1377) .....	119
Figure 3 Distribution by healthfulness for sports-related and non-sports-related marketing occasions comparing sites in guideline and non-guideline provinces (n=1377) .....	120
Figure 4 Relationship between themes and sub-themes in parents' reactions and experiences to food marketing in and around children's sport and physical activity in their municipal recreation facility .....	173
Figure 5 Levels of food marketing realities adapted from Bhaskar (Bhaskar, 1989).....	187
Figure 6 Food marketing definitions and components .....	206
Figure 7 Study flow chart .....	243
Figure 8 Logic model of FoodMATS scoring and validation analyses adapted from the World Health Organization (World Health Organization, 2012).....	257
Figure 9 Scatterplot of FoodMATS scores compared to annual dollars received by facilities from food-related organizations for sponsorship or advertising.....	271
Figure 10 Scatterplot of FoodMATS scores compared to total annual dollars received by facilities for sponsorship or advertising from food and non-food related organizations with truncated outlier. ....	271



## CHAPTER 1 - INTRODUCTION

This dissertation presents a series of research projects that investigate the culture of food and beverage marketing in and around children's sport settings. In the following pages, a short literature review will provide context for the research objectives and design. The structure of the dissertation will be outlined.

### *Childhood, Food Marketing, and Health*

“Children live within the context of their families, their communities, culture, and society” (Gluckman, Nishtar, & Armstrong, 2015, p. 1049). Child development is embedded in these contexts that coincide with their everyday settings, such as home, schools, or community facilities. According to the life course perspective, early experiences and environmental factors can influence a child's trajectory towards health later in life (Halfon, Larson, Lu, Tullis, & Russ, 2014). For example, both dietary and physical activity behaviours in childhood or adolescence influence diets and activity levels in adulthood (Craigie, Lake, Kelly, Adamson, & Mathers, 2011). Also, there is strong evidence that excess weight in childhood is associated with an increased risk of overweight and obesity in adulthood (Singh, Mulder, Twisk, Van Mechelen, & Chinapaw, 2008). It is believed that weight status is impacted by eating and physical activity behaviours, which are influenced by the environments in which these behaviours take place (Giskes, van Lenthe, Avendano-Pabon, & Brug, 2010).

Creating environments that support healthy dietary and physical activity behaviours is a priority in Canada as a strategy to reduce the prevalence of childhood obesity (Public Health Agency of Canada, 2011). As of 2015, 26% of 2-17 year old Canadian children were overweight or obese (Statistics Canada). Obesity has substantial adverse health effects stretching across the lifespan. Obese children suffer from high blood pressure, high blood lipids, insulin resistance,

asthma, obstructive sleep apnea (Colman & Hayward, 2010), depression, and social exclusion (Roberts, Shields, de Groh, Aziz, & Gilbert, 2012). Obesity in adults contributes to cases of heart disease, diabetes, cancer, osteoarthritis, and premature death (Colman & Hayward, 2010; Lobstein, Baur, & Uauy, 2004).

Unhealthy food and beverage marketing is one obesogenic feature (World Health Organization, 2013) pervasive across many environments where children live, grow, and play, including at home, school, food venues, recreation venues, and other public spaces (Signal et al., 2017). Food marketing is woven throughout children's lives as they are exposed to unhealthy food marketing "multiple times a day across various settings and via multiple media" (Signal et al., 2017, p.9). Using wearable cameras to capture children's exposure to food marketing, researchers found that children were exposed to more than twice as many non-core (unhealthy) food marketing occasions as core (healthy) food marketing occasions (Signal et al., 2017). Foods high in calories, fat, sugar, and sodium are most commonly marketed (Cairns, Angus, Hastings, & Caraher, 2013). Fruits and vegetables are infrequently advertised, representing only 1-2% of all food or beverages advertised on television (Adams et al., 2009a).

Children's exposure to food and beverage marketing impacts their beliefs, attitudes, preferences, or behaviours (Gootman, McGinnis, & Kraak, 2006) as their cognitive immaturity makes them especially vulnerable to the effects of marketing (Elliott, 2012). Until the age of eight (Elliott & Cook, 2013), possibly up to twelve years old (Carter, Patterson, Donovan, Ewing, & Roberts, 2011), children are unable to correctly identify the intent of food advertisements. Harris (2014) suggests that even up to age 17, adolescents are not fully able to defend against food marketing.

Systematic reviews have consistently found that unhealthy food marketing impacts the

dietary attitudes and behaviors of children and youth. The Institute of Medicine (Gootman et al., 2006) (now the National Academy of Medicine) found that there is strong evidence that exposure to television advertising influences dietary preferences, purchase requests, dietary intake in the short term, and fatness in young children (two to 11 year olds). Among older children (12-18 year olds), there is strong evidence that exposure to television advertising is associated with fatness, but weak evidence that it influences these individuals' usual dietary intake (Gootman et al., 2006). A more recent systematic review by Cairns et al. (2013) found that several diverse types of food promotion techniques had a modest effect on two to 15 year olds' nutrition knowledge, food preferences, consumption behaviours, and diet-related health status, and a strong effect on children's purchasing of advertised foods (Cairns et al., 2013). Two systematic reviews found that short (seconds to minutes long) exposure to unhealthy food marketing has significant impacts on increasing immediate intake (Boylard et al., 2016; Sadeghirad, Duhaney, Motaghipisheh, Campbell, & Johnston, 2016) and preference (Sadeghirad et al., 2016) for unhealthy foods in children.

Is it surprising, then, that the diets of North American children do not reflect national guidelines? The 2004 Canadian Community Health Survey Nutrition Module (the most recently released data from population nutrition surveys in Canada) reported that only three out of every ten children (four to eight years old) consumed at least five servings of vegetables and fruit daily (Garriguet, 2004). Similarly, less than four out of every ten children (four to nine years old) met the recommended intake of milk product servings per day (Garriguet, 2004). On the other hand, children and youth between the ages of two and 18 consume 40% of their calories from high energy, nutrient poor foods (Graff, Kunkel, & Mermin, 2012).

In a systematic review, Nelson et al. (2011) found that active 6-18 year olds consume more

fast food and sugary drinks than their less active peers. Nelson et al. (2011) posits that increased availability, marketing and consumption of unhealthy foods and beverages in sporting settings may contribute to this unexpected finding.

### ***Food Marketing in Sports***

Using sport to market products is a recognized strategy in many commercial sectors (O'Reilly & Horning, 2013; Rowe, Moore, & Zemanek Jr; P. Taylor & Gratton, 2002) including the food industry (Bragg et al., 2013; Bragg et al., 2018; Bragg, Roberto, Harris, Brownell, & Elbel, 2017; Carter, Edwards, Signal, & Hoek, 2012; Rowe et al.). The food industry uses a wide variety of techniques to attach sports-themes to their products or situate their brand and products into sport, such as athlete endorsement with foods or beverages (Bragg et al., 2013; Bragg et al., 2017); sports-related images or promotions on product packaging (Bragg et al., 2013); product placement in sport video games (Bragg et al., 2017); and corporate sponsorship of professional (Bragg et al., 2018; Bragg et al., 2017; Rowe et al.) and junior or recreational sports (Carter et al., 2012; O'Reilly & Horning, 2013). O'Reilly explains that sport sponsorship may include many additional marketing strategies to build relationships between the sponsor and the target audience, such as digital marketing, displays, samples, licensed merchandise, or giveaways (O'Reilly & Horning, 2013). Similar to other food marketing to children, sports-related marketing often promotes energy-dense, nutrient poor foods and beverages (Bragg et al., 2013; Bragg et al., 2018; Bragg et al., 2017; Kelly, Baur, et al., 2010). Kelly, Bauman, and Baur (2014) estimated that five to 14 year old children participating in organized sports in Australian sport clubs may be exposed to up to 63,662 person-hours of food and beverage sponsorship per week. It is argued that the food industry often overemphasizes the importance of physical activity deliberately (Brownell & Warner, 2009b) to “[deflect] attention from its possible role in the

obesity epidemic” (Folta, Goldberg, Economos, Bell, & Meltzer, 2006, p. 244).

Unhealthy food marketing within sports and food marketing associated with the theme of physical activity has been shown to have potentially harmful impacts on product likeability and perception of health. Historically, tobacco and alcohol sport sponsorship was associated with increased brand recognition and use of advertised products (Carter et al., 2012). A similar effect is expected of food and beverage sponsorship (Carter et al., 2012) and has been demonstrated in a cross-sectional study by Kelly et al. (2011b): 68% of respondents (ten to 14 year olds participating in sports at a local club) could recall at least one food and beverage company sponsor of their sports club and almost 3 in every 5 children “liked to return the favour to these sponsors by buying their products” (p.4).

When unhealthy food marketing includes some aspect of physical activity, individuals misperceive those foods to be healthier (Folta et al., 2006; Van Kleef, Shimizu, & Wansink, 2011). Adults and children both experience a “halo effect” when food is paired with physical activity: their perception of the healthfulness of the food or nutrient increases when it is associated with an ingredient or activity that they believe is good for them (Castonguay, 2015a). For example, children who reviewed a commercial for sugary cereal that contained physical activity had more positive reactions to the cereal and believed the cereal to be healthier than the children who viewed the same commercial without physical activity (Castonguay, 2015a). The health halo attached to food marketing with sports or physical activity is concern for public health (Batty & Gee, 2018).

### ***Control of Food Marketing in Canada***

To adequately protect children and youth, the WHO (2010a) recommends limiting unhealthy food and beverage marketing in settings where children gather, such as schools or sporting areas.

Canada is exploring policy options to restrict unhealthy food marketing to children. In 2016, Bill S-228 “An Act to amend the Food and Drugs Act (prohibiting food and beverage marketing directed at children)” was introduced by Senator Nancy Greene Raine and this bill has just passed third reading at the House of Commons (“An Act to amend the Food and Drugs Act (prohibiting food and beverage marketing directed at children),” 2017). As part of the federal Minister of Health’s mandate, Health Canada is in the processes of developing criteria to implement the proposed restrictions, including defining unhealthy food and marketing to children (Government of Canada, 2018). Currently, Health Canada is proposing to exempt children's sport sponsorship from the marketing regulation due to concerns of negative impacts on sport access (Government of Canada, 2018). Health Canada states that, “Only specific techniques designed to appeal to children under 13 (e.g., mascots, product giveaways, etc.) are proposed to be prohibited, as in Quebec. Marketing to children would be allowed for community sports teams, sporting events, sporting leagues/associations, and individual child athletes.” (Government of Canada, 2018).

Currently, three separate actions exist to protect children from unhealthy food and beverage marketing in Canada. First, Quebec enacted statutory regulation (*Quebec Consumer Protection Act* [QCPA]) of all commercial advertising to children under 13 years in 1980 (Office de la protection du consommateur, 2012). Secondly, the food industry has introduced a voluntary initiative to reduce unhealthy food marketing to children, known as the Canadian Children’s Food and Beverage Advertising Initiative (CAI). The CAI restricts marketing of foods to children under 12 years by stating that only healthy products can be marketed (defined by the industry), and restricting the use of games, licensed characters, celebrities, movie tie-ins, product placement, and schools in advertising (Advertising Standards Canada, 2015b). Finally, the

broadcasting industry self-regulates commercial marketing to children on television, radio, print media, internet and billboards through the *Broadcast Code for Advertising to Children* (Advertising Standards Canada, 2015a). The industry has non-specific recommendations that food products should not discourage consumption of healthy food products and should not encourage overeating.

Self-regulation, and to a lesser extent statutory regulation, have failed to improve food marketing environments for children possibly due to several reasons, including but not limited to (Galbraith-Emami & Lobstein, 2013; Raine et al., 2013; World Health Organization, 2013):

- poor, potentially biased monitoring with no penalties for non-compliance,
- low participation among food industry or other settings (i.e. schools ensuring there is no marketing to children),
- insufficient threshold for specifying child audiences,
- lack of specificity regarding what food products can and cannot be advertised, and
- narrow definitions of marketing which excludes several techniques and settings in which children are marketed to.

The last reason is becoming extremely important because narrow coverage of food marketing methods could result in unintended increases in marketing techniques not controlled. For example, in the United States, dollars spent on television food marketing decreased by 19.5%, but marketing by new media (e.g. marketing via the internet or viral word-of-mouth) increased by 50% between 2006-2009 (Leibowitz, Rosch, Ramirez, Brill, & Ohlhausen, 2012). Also in this time, expenditures on other traditional marketing techniques, including athletic sponsorship, and philanthropy, increased from 13% to 18% of total dollars spent on marketing to children (Leibowitz et al., 2012). None of these existing regulations explicitly protect children's sports or

sport settings from unhealthy food marketing. Kelly et al. (2013) suggests that sport sponsorship could be an extremely powerful marketing technique by “allow[ing] brands to become embedded within cultures and children’s experiences with entertainment, enjoyment and socialisation” (p.130).

### ***Research Gaps***

Currently, there are no known initiatives in Canada to investigate the marketing of unhealthy foods and beverages to children in recreation settings. Several studies have been conducted in Australia; however they mainly focused on sponsorship (Bestman, Thomas, Randle, & Thomas, 2015; Kelly, Bauman, et al., 2014; Kelly, Baur, et al., 2010; Kelly et al., 2011a, 2012, 2013; Pettigrew, Rosenberg, Ferguson, Houghton, & Wood, 2013; Watson, Brunner, Wellard, & Hughes, 2016) and do not comprehensively measure food marketing in children’s recreation settings. Previous research has evaluated food availability in recreation facilities finding that foods and beverages of low nutritional value are most often offered (Carter et al., 2012; Chaumette, Morency, Royer, Lemieux, & Tremblay, 2008; Naylor, Bridgewater, Purcell, Ostry, & Wekken, 2010; Olstad, Poirier, Naylor, Shearer, & Kirk, 2014). Unhealthy food and beverages in recreation facilities is viewed as normal and profitable by sports administrators in New Zealand (Carter, Signal, Edwards, & Hoek, 2018) and recreation managers in Canada (Olstad, Downs, Raine, Berry, & McCargar, 2011). Some Canadian provinces have voluntary nutrition guidelines that recommend increasing healthy foods and beverages and limiting unhealthy foods and beverages in concession and vending machines at recreation facilities (Alberta Health and Wellness, 2010; Government of Nova Scotia, 2015; British Columbia Ministry of Health, 2014) but unfortunately, these guidelines do not provide much in terms of recommendations for reducing unhealthy marketing to children. Similarly, healthy food policies in sports facilities



usually focused on increasing availability of healthy products and decreasing availability of unhealthy food products (Carter et al., 2012) rather than food marketing.

Research is needed to understand “the nature, extent and impact of food sponsorship and marketing...and the views of children, parents, athletes, spectators and sports officials on food availability and food sponsorship and marketing in sports settings” (Carter et al., 2012, pp. 1378-1379). Comprehensive understanding of the issue to inform future policy action is necessary; thus, it is critical to measure both the existence of marketing (objective food environment) and the interpretation and experiences of marketing (perceived food environment) (Bowen, Barrington, & Beresford, 2015; Penney, Almiron-Roig, Shearer, McIsaac, & Kirk, 2014).

### **Research Objectives**

Through a review and three studies, the following research objectives will be fulfilled:

#### Study A: Scoping Review:

- A) Review Canadian research on the extent and impact of food marketing to children

#### Study 1 (S1): Tool Development & Validation

- 1) Develop a reliable tool to measure the exposure and power of food and beverage marketing in municipally owned recreation facilities
- 2) Validate a scoring algorithm to classify food and beverage marketing environments

#### Study 2 (S2): Marketing Assessment

- 3) Document the exposure to and power of food and beverage marketing in municipally owned recreation facilities
- 4) Assess differences in exposure to and power of food and beverage marketing in

municipally owned recreation facilities between provinces with and without provincial nutrition guidelines

- 5) Evaluate the impact of a capacity-building intervention (CBI) in recreation facilities on food marketing environments

### Study 3 (S3): Marketing Culture Exploration

- 6) Explore parents' awareness, reactions, and experiences to food and beverage marketing in and around their child's sport in municipally owned recreation facilities.

This research is embedded in a larger research study called Eat Play Live (EPL). EPL studied food environments in public recreation facilities in Canada. EPL evaluated the impact of voluntary provincial nutrition guidelines on food availability, sales, marketing, and facility capacity to support healthy eating, and policy development in three provinces with nutrition guidelines compared to one province without nutrition guidelines. In the three guideline provinces, there was an additional randomized controlled trial component: facilities located in provinces with provincial nutrition guidelines were randomly assigned to an intervention group to receive 18 months of capacity building (CBI) to improve their food environments (Guidelines+CBI) or to a comparison group to receive no capacity building (Guidelines-Only). All facilities in the province without guidelines were assigned to another comparison group (Non-Guidelines).

### **Research Design**

To address the objectives of this thesis, an explanatory sequential mixed methods design was used (Creswell & Plano Clark, 2011) theoretically driven by critical realism (Bhaskar, 1989;

Danermark, Eskstrom, Jakobsen, & Karlsson, 2002). These features will be described below.

### ***Explanatory Sequential Mixed Methods Design***

There are two reasons why mixed methods are suitable for food environment research. First, researchers (Bowen et al., 2015; Penney et al., 2014) recommend measuring both objective and perceived factors, assuming that objective and perceived food environment characteristics are separate but complementary components of a whole understanding of food environments and behaviours. Secondly, research should also explore how individuals interact with environments (Ball, Timperio, & Crawford, 2006; Brug, Kremers, Lenthe, Ball, & Crawford, 2008; Penney et al., 2014). Combining quantitative and qualitative data through mixing methods balances strengths and weaknesses of different methods (Johnson & Onwuegbuzie, 2004) and generates more convincing comprehensive conclusions about phenomena (Pluye & Hong, 2014). Mixed methods may support informative research findings that adequately describe the complex system of food environments and individuals.

Using an explanatory sequential mixed methods design (QUAN -> QUAL) (Creswell & Plano Clark, 2011), the quantitative component (S1 and S2) informed the qualitative component (S3). S3 helps to explain the findings from S2 on the objective food marketing environment by investigating perceived attributes of the food environment and the relationship between the individual and the food environment.

### ***Critical Realism***

Several theoretical approaches and research paradigms have been proposed for mixed methods research (Johnson & Onwuegbuzie, 2004; McEvoy & Richards, 2006; Janice M Morse, Niehaus, Wolfe, & Wilkins, 2006; Pluye & Hong, 2014). This project will maintain methodological coherence with critical realism (Bhaskar, 1989), an appropriate philosophical

perspective for mixed methods research (Danermark et al., 2002; McEvoy & Richards, 2006; Zachariadis, Scott, & Barrett, 2013).

Critical realism (CR) approaches science with ontological realism and epistemological relativism, supporting that “there is a real world that exists independently of our perceptions, theories, and constructions” but “our *understanding* of this world is inevitably a construction from our own perspectives and standpoint” (emphasis in the original) (Maxwell & Mittapalli, 2010, p. 145). Critical realists believe that knowledge cannot be value-free, rather, knowledge is always theory-laden (Danermark et al., 2002). Based in the writings of Bhaskar (1989), CR suggests that reality is stratified and the purpose of science is to investigate the “deep” reality, not immediately observable, to understand underlying mechanisms of observable reality (Danermark et al., 2002). Because of the multilayered nature of reality, it is expected that multiple quantitative and qualitative methods are necessary to investigate “each dimension and layer” of phenomena (Riazi & Candlin, 2014).

### **Structure of the Dissertation**

This is a paper-based dissertation in which manuscripts are presented as individual chapters, followed by a concluding discussion chapter.

Chapter 2 presents a published manuscript with findings from a scoping literature review, which provides a rationale for evaluating food marketing from a settings-perspective. This scoping review was informed by a request from government to understand the scope and content of Canadian research on various settings where children may be exposed to food marketing.

Chapter 3 is a published manuscript that describes the development, reliability, and validity of the Food and beverage Marketing Assessment Tool for Settings (FoodMATS) developed for the EPL study.

Chapter 4 is a published manuscript with findings from using the FoodMATS to explore the state of food and beverage marketing in municipally owned recreation facilities across Canada and assess differences between provinces with and without provincial nutrition guidelines for recreation facilities for the EPL study.

Chapter 5 is a prepared manuscript assessing changes in FoodMATS score and components pre- and post- the EPL CBI in Guidelines+CBI, Guidelines-Only, and Non-Guidelines sites.

Chapter 6 is a prepared manuscript of the focused ethnography conducted with parents from three EPL recreation facilities in Alberta to assess parents' awareness, reactions, and experiences of food marketing in and around their children's sports and physical activity in municipal recreation facilities.

Chapter 7 is a concluding discussion chapter that triangulates the findings from the earlier chapters to generate a more complete and new understanding of food environments in recreation facilities and provide recommendations for researchers, practitioners, and policy-makers.

The dissertation is followed by Appendices including a methods appendix that provides additional methodological details that were not included in the (published) manuscripts. Other appendices include data collection tools and related supplemental files.

## References

- An Act to amend the Food and Drugs Act (prohibiting food and beverage marketing directed at children), S-228, Senate of Canada (2017).
- Adams, J., Hennessy-Priest, K., Ingimarsdóttir, S., Sheeshka, J., Østbye, T., & White, M. (2009). Changes in food advertisements during ‘prime-time’ television from 1991 to 2006 in the UK and Canada. *British Journal of Nutrition*, *102*(4), 584-593.
- Advertising Standards Canada. (2015a). Broadcast Code for Advertising to Children - The Code. Retrieved from <http://www.adstandards.com/en/clearance/childrens/broadcastCodeForAdvertisingToChildren-TheCode.aspx#social>
- Advertising Standards Canada. (2015b). *The Canadian Children's Food and Beverage Advertising Initiative: 2014 Compliance Report*. Retrieved from Toronto, Ontario: <http://www.adstandards.com/en/childrensinitiative/2014ComplianceReport.pdf>
- Alberta Health and Wellness. (2010). *The Alberta Nutrition Guidelines for Children and Youth*. Retrieved from: <https://www.albertahealthservices.ca/nutrition/Page2929.aspx>
- Ball, K., Timperio, A. F., & Crawford, D. A. (2006). Understanding environmental influences on nutrition and physical activity behaviors: Where should we look and what should we count? *International Journal of Behavioral Nutrition and Physical Activity*, *3*, 33.
- Batty, R. J., & Gee, S. (2018). Fast food, fizz, and funding: Balancing the scales of regional sport organisation sponsorship. *Sport Management Review*.
- Bestman, A., Thomas, S. L., Randle, M., & Thomas, S. D. (2015). Children’s implicit recall of junk food, alcohol and gambling sponsorship in Australian sport. *BMC Public Health*, *15*(1), 1022.

- Bhaskar, R. (1989). *Reclaiming reality: A critical introduction to contemporary philosophy*. New York, NY: Verso.
- Bowen, D. J., Barrington, W. E., & Beresford, S. A. (2015). Identifying the effects of environmental and policy change interventions on healthy eating. *Annual Review of Public Health, 36*, 289-306.
- Boyland, E. J., Nolan, S., Kelly, B., Tudur-Smith, C., Jones, A., Halford, J. C., & Robinson, E. (2016). Advertising as a cue to consume: A systematic review and meta-analysis of the effects of acute exposure to unhealthy food and nonalcoholic beverage advertising on intake in children and adults. *The American Journal of Clinical Nutrition, 103*(2), 519-533.
- Bragg, M. A., Liu, P. J., Roberto, C. A., Sarda, V., Harris, J. L., & Brownell, K. D. (2013). The use of sports references in marketing of food and beverage products in supermarkets. *Public Health Nutrition, 16*(4), 738-742.
- Bragg, M. A., Miller, A. N., Roberto, C. A., Sam, R., Sarda, V., Harris, J. L., & Brownell, K. D. (2018). Sports sponsorships of food and nonalcoholic beverages. *Pediatrics, 141*(4).
- Bragg, M. A., Roberto, C. A., Harris, J. L., Brownell, K. D., & Elbel, B. (2017). Marketing food and beverages to youth through sports. *Journal of Adolescent Health, 62*(1), 5-13.
- British Columbia Ministry of Health. (2014). *Healthier Choices in Vending Machines in BC Public Buildings*. Victoria, BC: Province of British Columbia. Retrieved from [www.healthlinkbc.ca/foodguidelines](http://www.healthlinkbc.ca/foodguidelines).
- Brownell, K. D., & Warner, K. E. (2009). The perils of ignoring history: Big Tobacco played dirty and millions died. How similar is Big Food? *Milbank Quarterly, 87*(1), 259-294.

- Brug, J., Kremers, S. P., Lenthe, F., Ball, K., & Crawford, D. (2008). Environmental determinants of healthy eating: In need of theory and evidence. *Proceedings of the Nutrition Society, 67*(3), 307-316.
- Cairns, G., Angus, K., Hastings, G., & Caraher, M. (2013). Systematic reviews of the evidence on the nature, extent and effects of food marketing to children. A retrospective summary. *Appetite, 62*, 209-215.
- Carter, M. A., Edwards, R., Signal, L., & Hoek, J. (2012). Availability and marketing of food and beverages to children through sports settings: A systematic review. *Public Health Nutrition, 15*(08), 1373-1379.
- Carter, M. A., Signal, L. N., Edwards, R., & Hoek, J. (2018). Competing teammates: Food in New Zealand sports settings. *Health Promotion International.*
- Carter, O. B., Patterson, L. J., Donovan, R. J., Ewing, M. T., & Roberts, C. M. (2011). Children's understanding of the selling versus persuasive intent of junk food advertising: Implications for regulation. *Social Science & Medicine, 72*(6), 962-968.
- Castonguay, J. (2015). Sugar and sports age differences in children's responses to a high sugar cereal advertisement portraying physical activities. *Communication Research.*
- Chaumette, P., Morency, S., Royer, A., Lemieux, S., & Tremblay, A. (2008). [Food environment in the sports, recreational and cultural facilities of Quebec City: a look at the situation]. *Canadian Journal of Public Health/Revue canadienne de sante publique, 100*(4), 310-314.
- Colman, R., & Hayward, K. (2010). *Childhood overweight and obesity: Summary of evidence from the cost of obesity in Alberta report.* Retrieved from



<http://www.albertahealthservices.ca/poph/hi-poph-surv-phids-childhood-overweight-obesity-2010.pdf>

- Craigie, A. M., Lake, A. A., Kelly, S. A., Adamson, A. J., & Mathers, J. C. (2011). Tracking of obesity-related behaviours from childhood to adulthood: A systematic review. *Maturitas*, 70(3), 266-284.
- Creswell, J., & Plano Clark, V. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage.
- Danermark, B., Eskstrom, M., Jakobsen, L., & Karlsson, J. C. (2002). *Explaining society: Critical realism in the social sciences*. New York, NY: Talyor & Francis Books Ltd.
- Elliott, C. (2012). Marketing foods to children: Are we asking the right questions? *Childhood Obesity*, 8(3), 191-194.
- Elliott, C., & Cook, B. (2013). Not so grrreat: Ten important myths about food advertising targeted to children in Canada. *Childhood Obesity*, 9(4), 286-291.
- Folta, S. C., Goldberg, J. P., Economos, C., Bell, R., & Meltzer, R. (2006). Food advertising targeted at school-age children: A content analysis. *Journal of Nutrition Education And Behavior*, 38(4), 244-248.
- Galbraith-Emami, S., & Lobstein, T. (2013). The impact of initiatives to limit the advertising of food and beverage products to children: A systematic review. *Obesity Reviews*, 14(12), 960-974.
- Garriguet, D. (2004). Nutrition: Findings from the Canadian Community Health Survey. Overview of Canadians' eating habits 2004. Retrieved from <http://publications.gc.ca/Collection/Statcan/82-620-M/82-620-MIE2006002.pdf>

- Giskes, K., van Lenthe, F., Avendano-Pabon, M., & Brug, J. (2010). A systematic review of environmental factors and obesogenic dietary intakes among adults: Are we getting closer to understanding obesogenic environments? *Obesity Reviews*, *12*(5), e95-e106.
- Gluckman, P., Nishtar, S., & Armstrong, T. (2015). Ending childhood obesity: A multidimensional challenge. *The Lancet*, *385*(9973), 1048-1050.
- Gootman, J. A., McGinnis, J. M., & Kraak, V. I. (2006). *Food Marketing to Children and Youth: Threat or Opportunity?* : National Academies Press.
- Government of Canada. (2018). Restricting marketing of unhealthy food and beverages to children: An update on proposed regulations. Retrieved from <https://www.canada.ca/en/health-canada/programs/consultation-restricting-unhealthy-food-and-beverage-marketing-to-children/update-proposed-regulations.html>
- Government of Nova Scotia. (2015). *Healthy Eating in Recreation and Sport Settings Guidelines*. Retrieved from <http://www.recreationns.ns.ca/wp-content/uploads/2016/01/HERSS-Guidelines.pdf>.
- Graff, S., Kunkel, D., & Mermin, S. E. (2012). Government can regulate food advertising to children because cognitive research shows that it is inherently misleading. *Health Affairs*, *31*(2), 392-398.
- Halfon, N., Larson, K., Lu, M., Tullis, E., & Russ, S. (2014). Lifecourse health development: Past, present and future. *Maternal and Child Health Journal*, *18*(2), 344-365.
- Harris, J. L. (2014, June 26). Protecting children from unhealthy food marketing [Webinar]. In *Childhood Obesity Foundation and the Heart and Stoke Foundation of BC and Yukon Marketing 2 Kids*. Retrieved from: <http://childhoodobesityfoundation.ca/videos/>

- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14-26.
- Kelly, B., Bauman, A. E., & Baur, L. A. (2014). Population estimates of Australian children's exposure to food and beverage sponsorship of sports clubs. *Journal of Science and Medicine in Sport*, 17(4), 394-398.
- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2010). Food and drink sponsorship of children's sport in Australia: Who pays? *Health Promotion International*, 26(2), 188-195.
- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2011a). " Food company sponsors are kind, generous and cool": (Mis)conceptions of junior sports players. *International Journal of Behavioral Nutrition and Physical Activity*, 8(1), 95.
- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2012). Restricting unhealthy food sponsorship: Attitudes of the sporting community. *Health Policy*, 104(3), 288-295.
- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2013). Views of children and parents on limiting unhealthy food, drink and alcohol sponsorship of elite and children's sports. *Public Health Nutrition*, 16(01), 130-135.
- Leibowitz, J., Rosch, J., Ramirez, E., Brill, J., & Ohlhausen, M. (2012). A review of food marketing to children and adolescents: Follow-up report. *Washington (DC): US Federal Trade Commission*.
- Lobstein, T., Baur, L., & Uauy, R. (2004). Obesity in children and young people: A crisis in public health. *Obesity Reviews*, 5(s1), 4-85.

- Maxwell, J., & Mittapalli, K. (2010). Realism as a stance for mixed methods research. *Handbook of mixed methods in social & behavioral research*, 145-168.
- McEvoy, P., & Richards, D. (2006). A critical realist rationale for using a combination of quantitative and qualitative methods. *Journal of Research in Nursing*, 11(1), 66-78.
- Morse, J. M., Niehaus, L., Wolfe, R. R., & Wilkins, S. (2006). The role of the theoretical drive in maintaining validity in mixed-method research. *Qualitative Research in Psychology*, 3(4), 279-291.
- Naylor, P. J., Bridgewater, L., Purcell, M., Ostry, A., & Wekken, S. V. (2010). Publically funded recreation facilities: Obesogenic environments for children and families? *International Journal of Environmental Research and Public Health*, 7(5), 2208-2221.
- Nelson, T. F., Stovitz, S. D., Thomas, M., Lavoie, N. M., Bauer, K. W., & Neumark-Sztainer, D. (2011). Do youth sports prevent pediatric obesity? A systematic review and commentary. *Current Sports Medicine Reports*, 10(6), 360-370.
- O'Reilly, N., & Horning, D. L. (2013). Leveraging sponsorship: The activation ratio. *Sport Management Review*, 16(4), 424-437. doi:10.1016/j.smr.2013.01.001
- Office de la protection du consommateur. (2012). *Advertising Directed at Children under 13 Years of Age: Guide to the Application of Sections 248 and 249 Consumer Protection Act*. Quebec City, Quebec: Gouvernement du Quebec.
- Olstad, D. L., Downs, S. M., Raine, K. D., Berry, T. R., & McCargar, L. J. (2011). Improving children's nutrition environments: A survey of adoption and implementation of nutrition guidelines in recreational facilities. *BMC Public Health*, 11(1), 423.

- Olstad, D. L., Poirier, K., Naylor, P.-J., Shearer, C., & Kirk, S. F. (2014). Policy outcomes of applying different nutrient profiling systems in recreational sports settings: The case for national harmonization in Canada. *Public Health Nutrition*, 1-12.
- Penney, T. L., Almiron-Roig, E., Shearer, C., McIsaac, J.-L., & Kirk, S. F. (2014). Modifying the food environment for childhood obesity prevention: Challenges and opportunities. *Proceedings of the Nutrition Society*, 73(02), 226-236.
- Pettigrew, S., Rosenberg, M., Ferguson, R., Houghton, S., & Wood, L. (2013). Game on: Do children absorb sports sponsorship messages? *Public Health Nutrition*, 16(12), 2197-2204.
- Pluye, P., & Hong, Q. N. (2014). Combining the power of stories and the power of numbers: mixed methods research and mixed studies reviews. *Public Health*, 35(1), 29.
- Public Health Agency of Canada. (2011). Overview: Curbing childhood obesity. A federal, provincial and territorial framework for action to promote healthy weights.
- Raine, K. D., Lobstein, T., Landon, J., Kent, M. P., Pellerin, S., Caulfield, T., Finegood D., Mongeau L., Neary N., & Spence, J. C. (2013). Restricting marketing to children: Consensus on policy interventions to address obesity. *Journal of Public Health Policy*, 34(2), 239-253.
- Riazi, A. M., & Candlin, C. N. (2014). Mixed-methods research in language teaching and learning: Opportunities, issues and challenges. *Language Teaching*, 47(02), 135-173.
- Roberts, K. C., Shields, M., de Groh, M., Aziz, A., & Gilbert, J.-A. (2012). Overweight and obesity in children and adolescents: Results from the 2009 to 2011 Canadian Health Measures Survey. *Health Reports*, 23(3), 37-41.

- Rowe, W. J., Moore, M. E., & Zemanek Jr, J. E. Three-tiered sponsorship: a study of decision heuristics across multiple levels of sport sponsorship. *Innovative Marketing*, 9(2).
- Sadeghirad, B., Duhaney, T., Motaghipisheh, S., Campbell, N., & Johnston, B. (2016). Influence of unhealthy food and beverage marketing on children's dietary intake and preference: A systematic review and meta-analysis of randomized trials. *Obesity Reviews*, 17(10), 945-959.
- Signal, L., Stanley, J., Smith, M., Barr, M., Chambers, T., ... McKerchar, C. (2017). Children's everyday exposure to food marketing: An objective analysis using wearable cameras. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1), 137.
- Singh, A. S., Mulder, C., Twisk, J. W., Van Mechelen, W., & Chinapaw, M. J. (2008). Tracking of childhood overweight into adulthood: A systematic review of the literature. *Obesity Reviews*, 9(5), 474-488.
- Statistics Canada. *Table 13-10-0797-01 Measured children and youth body mass index (BMI) (Cole classification), by age group and sex, Canada and provinces, Canadian Community Health Survey - Nutrition.*
- Taylor, P., & Gratton, C. (2002). *The economics of sport and recreation: An economic analysis.* New York, NY: Routledge.
- Van Kleef, E., Shimizu, M., & Wansink, B. (2011). Food compensation: Do exercise ads change food intake? *International Journal of Behavioral Nutrition and Physical Activity*, 8(6), 661-664.
- Watson, W. L., Brunner, R., Wellard, L., & Hughes, C. (2016). Sponsorship of junior sport development programs in Australia. *Australian and New Zealand Journal of Public Health*, 40(4), 326-328.

World Health Organization. (2010). Set of recommendations on the marketing of foods and non-alcoholic beverages to children.

World Health Organization. (2013). Marketing of foods high in fat, salt and sugar to children: update 2012-2013. *Copenhagen, Denmark: WHO Regional Office for Europe.*

Zachariadis, M., Scott, S., & Barrett, M. (2013). Methodological implications of critical realism for mixed-methods research. *MIS Quarterly*, 37(3), 855-879.

## CHAPTER 2 – RESULTS STUDY A

### **Food marketing to children in Canada: a settings-based scoping review on exposure, power and impact**

*A version of this chapter has been published as Prowse, R. (2017). Food marketing to children in Canada: a settings-based scoping review on exposure, power and impact. Health Promotion and Chronic Disease Prevention in Canada: Research, Policy and Practice, 37(9), 274-292.*

#### **Introduction**

Child development takes place in their everyday settings (Gluckman et al., 2015, p. 1049). The places children live, learn, and play are critical factors determining in their current and future health (Halfon et al., 2014). In fact, the Ottawa Charter for Health Promotion emphasizes the importance of everyday settings in preventing disease (World Health Organization, 1986). To this end, the World Health Organization (2013) recommends that the places where children gather be free from unhealthy food and beverage marketing. “Place” is also a critical factor for marketers, as it is one of the four components of marketing known as the “four Ps”: product, promotion, place, and price. Corporations strategically mix the 4Ps to effectively reach their target audience and influence attitudes and behaviours (Lee & Kotler, 2011).

Food marketing impacts children’s food knowledge, preferences, behaviours, and health (Cairns et al., 2013). Factors that promote a poor diet are of concern since, according to Statistics Canada, one-quarter of the calories eaten by 4-18 year old Canadians are from “other foods” (e.g. foods to be limited according to Canada’s Food Guide), including soft drinks, fruit drinks, chocolate and chips (Statistics Canada, 2004). More than half of children in Canada consume fewer than five servings of vegetables and fruit per day (Garriguet, 2004). The impact of food marketing on children’s food preferences and behaviours depends on their exposure to and



power of marketing messages where exposure is defined as “the reach and frequency of the marketing message”, and power is “the creative content, design and execution of the marketing message” (World Health Organization, 2012, p.11).

There are three main mechanisms by which food marketing to children is currently “controlled” in Canada (Table 1): (1) Québec statutory regulation [Québec *Consumer Protection Act* (QCPA) (Office de la protection du consommateur, 2012)]; (2) industry voluntary regulation [Canadian Children’s Food and Beverage Advertising Initiative (CAI) (n.d.)]; and (3) broadcast industry self-regulation (*The Broadcast Code for Advertising to Children*) (Advertising Standards Canada, 2015a). Additionally, in 2016, the Canadian Health Minister announced forthcoming new statutory regulations on food marketing (Health Canada, 2016). School food policies may also regulate food marketing to children, but provincial/territorial policies are limited and inconsistent in their address of food marketing (Table 1).

Current and proposed regulations may control exposure and power by restricting the amount of food marketing to children and the use of powerful (persuasive) promotional techniques (discussed in the Results section of the article). Unfortunately place, a key component of marketers’ strategies (Lee & Kotler, 2011) and of health promotion interventions (Dooris, 2009), is poorly considered in current regulations with the exception of the CAI restricting some marketing in elementary schools (CAI, 2015b)\*. It is reasonable to expect that regulations that ignore this key component of marketing will not generate maximal impact on children’s exposure to or the power of food marketing. Place is often misinterpreted as the location of marketing messages, which is in fact a component of promotion (Edgar, Huhman, & Miller, 2015). A more accurate interpretation of place, from a marketing perspective, is the location

---

\* Price, another component of the 4Ps, is also not targeted in marketing regulations; however, discussion of that component is beyond the scope of this review.

where behaviours are performed or related goods and services are acquired (Lee & Kotler, 2011). In the context of food marketing, place may represent where we eat, purchase, or learn about food.

Notably, the settings children are marketed to is a policy consideration of proposed regulations in Canada (Health Canada, 2017); however no research has explored what these settings are. It is critical to understand food marketing in the context in which children experience it in order to form effective policies. Using a settings-based approach (Whitelaw et al., 2001), this review aims to explore the places where children may be exposed to food marketing by reviewing the extent of their exposure to and the power of food marketing by setting; (2) the influence of statutory (QCPA) and voluntary (CAI) regulations on exposure and power;<sup>†</sup> and (3) the impact of food marketing on the attitudes, perceptions and behaviours of Canadian children.

---

<sup>†</sup> *The Broadcast Code for Advertising to Children* has not been evaluated by researchers; therefore, this review includes only the influence of the QCPA and the CAI.

**Table 1. Types of regulatory control of food marketing to children in Canada**

Regulatory control	Year introduced	Location	Type	Restriction on food marketing (Product)	Marketing channels and techniques covered (Promotion)
Québec <i>Consumer Protection Act</i> (QCPA) (Office de la protection du consommateur, 2012)	1980	Québec	Statutory	No commercial marketing to children under 13 years. <sup>a</sup>	Television Radio Print media Internet Mobile phones Signs Other promotional items
Canadian Children's Food and Beverage Advertising Initiative (CAI) (2015b)	2007	All of Canada (except Québec)	Voluntary self-regulation of food industry	Committed companies agree to not advertising to children at all or only advertising "better-for-you" foods, as defined by a uniform nutrition criteria developed by the food industry (Advertising Standards Canada, 2014).	Television Radio Print media Internet Mobile Phones Video Games Movies Elementary Schools Select marketing techniques (licenced characters, movie-ties, celebrities, product placement)
The <i>Broadcast Code for Advertising to Children</i> (Advertising Standards Canada, 2015a) of the <i>Canadian Code of Advertising Standards</i> (Advertising Standards Canada, 2015c)	2004; 2004	All of Canada (except Québec)	Self-regulation of broadcast media	Advertising to children under 12 years should not discourage a healthy lifestyle or Canada's Food Guide; advertising should not show excessive amounts of food being consumed or in general.	Television Radio Print media Internet Billboards
Proposed regulations on food marketing to children (Health Canada, 2017)	Forthcoming	Not disclosed	Statutory	Possible restrictions of unhealthy food marketing for select age groups (to be determined).	Possible restriction of select marketing channels, techniques, and settings (to be determined).
Provincial/ territorial School Food Policies <sup>b</sup>	2008	British Columbia (Government of British Columbia, 2005, 2013)	Mandatory adoption of nutrition guidelines in public schools		Optional unhealthy food marketing restrictions. Examples of marketing: posters, coupons, equipment, notebooks.

2010	Ontario (Government of Ontario, 2010)	Mandatory adoption of nutrition guidelines in public schools	Discourages unhealthy food marketing.	Posters Coupons Branded equipment
2005	New Brunswick (Government of New Brunswick, 2008a, 2008b)	Mandatory adoption of nutrition guidelines in public schools	Does not restrict food marketing.	Not applicable
2006	Nova Scotia (Government of Nova Scotia, 2006)	Mandatory adoption of nutrition guidelines in public schools	Recommends healthy food marketing and discourages unhealthy food marketing. <sup>c</sup>	Rewards Incentives Vending machine promotions Fundraising
2011	Prince Edward Island (Government of Prince Edward Island, 2011)	Mandatory adoption of nutrition guidelines in public schools	Recommends healthy food marketing. <sup>c,d</sup>	Advertising (non-specific) Fundraising Rewards
2009	Saskatchewan (Government of Saskatchewan, 2009, 2014)	Voluntary nutrition guidelines for mandatory school board food policies	Restricts unhealthy food marketing. <sup>c,d</sup>	Advertising (non-specific)
2009	Manitoba (Government of Manitoba, 2014)	Voluntary nutrition guidelines for mandatory public school food policies	Recommends healthy food marketing.	Rewards Fundraising
2008	Alberta (Alberta Health and Wellness, 2010)	Voluntary nutrition guidelines	Recommends healthy food marketing. <sup>c,d</sup>	“Daily special” promotions
2007	Québec (Government of Québec, 2007)	Voluntary nutrition guidelines	Recommends healthy food marketing.	Posters

2009	Newfoundland & Labrador (Government of Newfoundland and Labrador, 2009)	Voluntary nutrition guidelines	Recommends healthy food marketing.	Fundraising
2008	Yukon (Government of Yukon, 2008)	Voluntary nutrition guidelines	Does not restrict food marketing.	Not applicable

---

<sup>a</sup> The QCPA uses three criteria to identify child-directed marketing: (1) purpose of advertised product, (2) advertisement presentation, and (3) time and place of advertisement. Advertising in schools or at point-of-purchase is not explicitly restricted by the QCPA but may be prohibited depending on these criteria.<sup>10</sup>

<sup>b</sup> There were no publicly available policies in Northwest Territories and Nunavut.

<sup>c</sup> Includes food pricing statements.

<sup>d</sup> Includes food placement statements.

## Methods

The author systematically searched eight health, psychology and business databases (Table 2) identified by a research librarian for research on the exposure to and power of food marketing to children in Canada, its impact and the influence of regulations in July 2015 and updated the search in September 2016. All references were imported into an online reference manager. The author selected articles based on a priori inclusion criteria (Table 2) through systematic title, abstract and full-text screening (Figure 1). After title and abstract reviewing, three Canadian researchers with expertise in the topic area were consulted to identify missing research and confirm comprehensiveness of search results. Twenty-one new items were provided, but only four (Brierley & Elliott, 2015; Elliott, 2012c, 2014; Kelly, Halford, et al., 2010) met the inclusion criteria (Figure 1). This scoping review was limited to peer-reviewed, English-language studies using Canadian data. Two French language articles (Laperrière, 2009; Lebel, Hamelin, Lavallée, Bédard, & Dubé, 2005) were excluded as no individual fluent in French was able to review them. The author reviewed all studies and extracted the data.

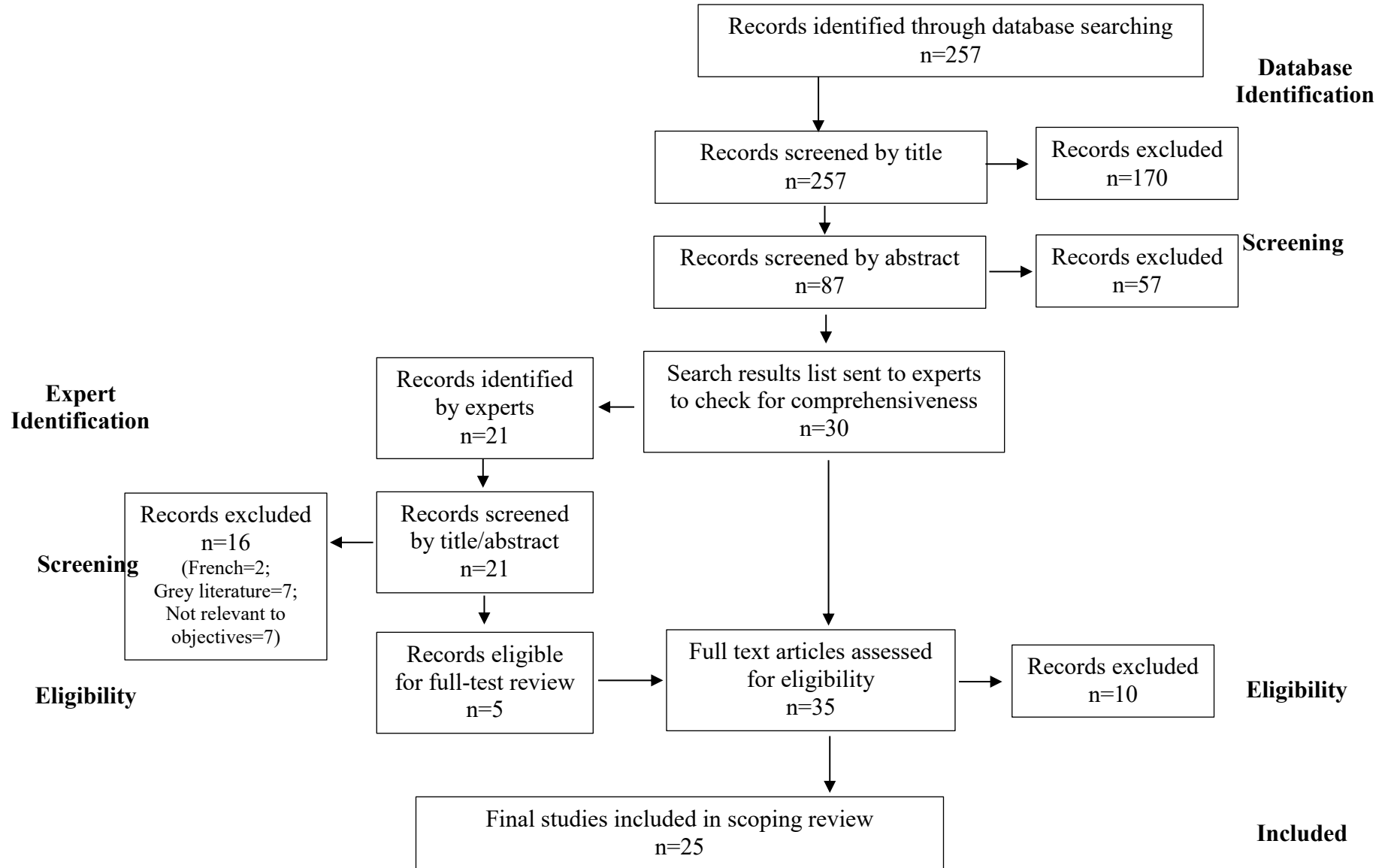
**Table 2 Systematic review of food marketing to children in Canada: systematic search criteria and process**

<b>Inclusion Criteria</b>	<ul style="list-style-type: none"> <li>• English language</li> <li>• Canadian data</li> <li>• Published between January 2000 and September 2016</li> <li>• Original research</li> <li>• Evidence on exposure to, power of, and/or impact of food marketing to children (aged 2-17 years), or the influence of Canadian food marketing regulations</li> <li>• Evidence on exposure, power and regulation must identify the setting</li> <li>• Evidence on impact must clearly identify the setting, or study the collective impact of food marketing across settings</li> </ul>
<b>Exclusion Criteria</b>	<ul style="list-style-type: none"> <li>• Grey literature</li> <li>• Evidence on infants and toddlers (less than 2 years old)</li> <li>• Evidence on parents only</li> <li>• Commentaries on policy interventions</li> </ul>

---

<b>Search string</b>	(food or beverage or diet or nutrition [TIAB]), AND (marketing or advertis*[TIAB]), AND (child* or youth or teen or adolescen*[TIAB]), AND (Canad*[TIAB]).
<b>Databases searched</b>	ABI Inform Complete, CBCA Complete, CINAHL, MEDLINE, ProQuest Dissertation and Theses, PsychInfo, Scopus, Web of Science Core

---



**Figure 1** Flow chart of systematic search



## Results

Twenty-five articles met inclusion criteria (Figure 1). The literature available examined the exposure to, power of or impact of food marketing in Canada in general (Elliott, 2011, 2014), on television (Adams et al., 2009a; Adams et al., 2009b; Hudson & Elliott, 2013; Kelly, Halford, et al., 2010; Potvin Kent, Dubois, & Wanless, 2011a, 2011b, 2012; Potvin Kent, Martin, & Kent, 2014; Potvin Kent & Wanless, 2014), online (Brady, Farrell, Wong, & Mendelson, 2008; Brady, Mendelson, Farrell, & Wong, 2010; Potvin Kent, Dubois, Kent, & Wanless, 2013), in public schools (Velazquez, Black, & Ahmadi, 2015), on product packaging in grocery stores (Berry & McMullen, 2008; Brierley & Elliott, 2015; Elliott, 2008, 2012b, 2012c; Elliott & Brierley, 2012; Elliott, 2009; Murray, 2014), and in fast food restaurants (Elliott, Den Hoed, & Conlon, 2013; Hobin, Hammond, Daniel, Hanning, & Manske, 2012) (Table 3). The majority of articles were cross-sectional (n=14) (Adams et al., 2009b; Berry & McMullen, 2008; Brady et al., 2008; Brady et al., 2010; Elliott, 2008, 2012b, 2012c; Kelly, Halford, et al., 2010; Murray, 2014; Potvin Kent et al., 2013; Potvin Kent et al., 2011a, 2011b, 2012; Velazquez et al., 2015). Two articles reviewed the impact of the QCPA (Potvin Kent et al., 2011a, 2012) and four reviewed that of the CAI (Murray, 2014; Potvin Kent et al., 2011b; Potvin Kent et al., 2014; Potvin Kent & Wanless, 2014) on exposure and power of food marketing. Table 4 provides a summary of the influence of regulations on exposure and power by setting. Nine studies explored how food marketing impacted food attitudes, preferences, and behaviours – three using experimental (Elliott et al., 2013; Hobin et al., 2012; Hudson & Elliott, 2013), cross-sectional (Brady et al., 2008), and qualitative methods (Brierley & Elliott, 2015; Elliott, 2011, 2014; Elliott & Brierley, 2012; Elliott, 2009).

## ***Exposure and power of food marketing to children in Canada***

### *Exposure to food marketing in the home: on television*

Six articles reviewed the exposure to food marketing on television (Adams et al., 2009a; Adams et al., 2009b; Kelly, Halford, et al., 2010; Potvin Kent et al., 2011a, 2011b, 2012). In these studies, exposure was measured by the proportion of all television advertisements that were for food (overall and unhealthy) and the rate of food advertisements per hour per channel.

One-fifth of advertisements recorded on three popular children's channels in Canada in 2007 and 2008 were for food [unpublished data by Kelly et al. (2010)]. Potvin Kent et al. studied the top 30 hours of television watched by ten to 12 year old children in Ontario and Québec in 2009, which included general and children's channels, and found that 24 to 27% of advertisements watched were for food (Potvin Kent et al., 2011a).

The studies reported varying rates of food advertising, from three to seven advertisements per hour per channel (Adams et al., 2009a; Bridget Kelly, Halford, et al., 2010; Potvin Kent & Wanless, 2014) [unpublished data by Kelly et al. (2010)]. This variability may be related to differences in study methods, including heterogeneity in the number and type of channels recorded, times and number of days recorded, and location and dates of data collection.

Exposure to unhealthy food television advertisements was evaluated by determining the proportion of foods advertised that were high in energy, fat, sugar, or salt (Adams et al., 2009b; Bridget Kelly, Halford, et al., 2010; Potvin Kent et al., 2012). According to Kelly et al. (2010), 80% of food advertisements on children's channels were for "noncore foods" that were high in fat, sodium or energy. Using the UK Nutrient Profiling system, Adams et al. (2009b) found that 66% of all food advertisements on general television were "less healthy" but Potvin Kent et al. (2012) found that 88% of food advertisements watched by children were "less healthy" using the same nutrient profiling system.

Influence of regulation on exposure. Potvin Kent and colleagues researched the impact of statutory regulation in 2009 (Potvin Kent et al., 2011a) and voluntary industry regulation in 2011 (Potvin Kent et al., 2014) in Canada and found that neither were associated with reduced children's exposure to television food marketing. Specifically, French-speaking children in Québec, and English-speaking children in Québec and Ontario were found to be exposed to the same rate of food advertisements per hour per channel (Potvin Kent et al., 2011a). Potvin Kent and Wanless (2014) estimated that children's overall exposure to television food advertising has increased by 6% in Vancouver and 17% in Toronto between 2006 and 2011, since the introduction of the CAI. Although food advertisements on children's television from CAI companies decreased by 24% between 2006 and 2011, the same kind of advertisements by non-CAI companies increased by 76%.

The nutritional quality of the advertised foods was better in French-language advertisements than English-language advertisements. Significantly fewer advertisements watched by children were found on French Québec television for "less healthy" foods than on English-language television in Ontario (Potvin Kent et al., 2012); however, 81% of the former were still "less healthy". On the other hand, there was no significant change in the proportion of "less healthy" foods advertised by CAI companies between 2006 and 2011 (Potvin Kent et al., 2014).

#### *Power of food marketing in the home: on television*

The power of food marketing is evaluated by the prevalence of child targeting in food advertisements and the use of powerful promotional techniques. On general television (between 7:00-11:00 p.m.), 7% of food advertisements were of particular appeal to children (aged 2-17 years) in 2006 (Adams et al., 2009b). On television watched by French-speaking children (10-12 years) in Québec in 2009, only 30% of food advertisements were targeted at children compared

to 76% and 65% of advertisements watched by English-speaking children (10-12 years) in Québec and Ontario, respectively (Potvin Kent et al., 2011a). In 2011, approximately one-quarter of food advertisements by CAI and non-CAI companies on children's specialty channels targeted children and teens (Potvin Kent et al., 2014).

A variety of marketing techniques were used on television food advertisements including premiums (such as giveaways, vouchers), promotional characters, fun and health appeals (Kelly, Halford, et al., 2010; Potvin Kent et al., 2014). Foods advertised with these powerful techniques were often unhealthy (Kelly, Halford, et al., 2010; Potvin Kent et al., 2014). For example, Kelly et al. (2010) found that almost 100% of televised food advertisements that used promotional characters on children's channels in 2007 and 2008 in Canada were for "non-core" foods, compared to only 80% overall.

Influence of regulation on power. In 2009, the QCPA was associated with fewer food advertisements targeted to French-speaking children in Québec, but did not prove to fully protect all children in Québec since English-speaking children view television originating outside Quebec which is not restricted by Quebec's law (Potvin Kent et al., 2011a). Overall, there was no change in the prevalence of targeting children in food advertisements by CAI or non-CAI companies between 2006 and 2011 (Potvin Kent et al., 2014). In fact, there is some evidence that it has worsened, since more unhealthy food advertisements targeted children in 2011 than 2006 (Potvin Kent et al., 2014). For example, between 2006 and 2011 the use of fun and licensed characters to advertised "less healthy" products increased by 38% and 234% between 2006 and 2011 by CAI companies, respectively (Potvin Kent et al., 2014).

#### *Exposure to food marketing in the home: online*

Online food marketing in Canada is captured by two studies evaluating marketing to children on food company websites (Brady et al., 2010; Potvin Kent et al., 2013). This evidence

does not assess the multitude of emerging electronic marketing techniques used to target children, including viral marketing (online word-of-mouth by consumers), social networking and direct marketing by e-mail (World Health Organization, 2013). The author found no studies that assessed these techniques in Canada. Studies from other countries may be informative since Canadians can access international websites; however that was beyond the scope of this review. The two included studies focused on documenting the powerful characteristics of food company websites and were not designed to measure exposure – for example, the proportion of websites visited by children with food marketing. Thus, the available evidence does not reveal children’s exposure to food marketing online, or the impact of regulation on the degree of exposure.

*Power of food marketing in the home: online*

In 2010, Potvin Kent et al. (2013) reviewed websites tied to food or beverages advertised on television watched by ten to 12 year old children to evaluate whether the impact of the QCPA and the CAI. Of 148 websites, approximately one-third were child-directed, which was defined as having “child-oriented marketing features such as spokes-characters, cartoons, contests, activities, or games directed at children; and used simple vocabulary easily understood by children”(p. 801). In a separate evaluation of only CAI company websites, 83% contained marketing directed to children under 12 years (Brady et al., 2010).

Multiple techniques urged children to engage with the food marketing on CAI websites (Brady et al., 2010):

- memberships, incentives, and leaderboards for repeated and prolonged use of online media,
- “advergames”, music, animation, and e-buttons to interact with the product or brand,
- electronic word-of-mouth techniques to share brand or website information, and

- downloadable features (computer wallpaper, growth charts, shopping lists, board games) to embed brands into children's daily lives.

Influence of regulation on power. No statistical differences in the power of food marketing (e.g. whether or not they targeted children, the type or frequency of promotional techniques used) were found between French- and English-language websites, nor between CAI and non-CAI websites in 2010 (Potvin Kent et al., 2013).

#### *Exposure to food marketing in schools*

With only one study on marketing in schools conducted in the last decade (Velazquez et al., 2015), evidence is lacking in this setting. Velazquez et al. (2015) examined the extent of commercial and non-commercial (made by the school or students) food promotions in a representative sample of 23 Vancouver public schools in the 2012/13 school year. Through observation, Velazquez et al. (2015) found that 87% of schools displayed food promotions. Schools had a median of 17 promotions (range=0-57). Secondary schools had more advertising than elementary schools (Velazquez et al., 2015).

Velazquez et al. (2015) used British Columbia's school nutrition guidelines (Government of British Columbia, 2013) to assess the healthfulness of observed food and beverage promotions. Over half of schools promoted foods or beverages prohibited by the provincial guidelines (Velazquez et al., 2015). Almost one-quarter of all promotions were for "Choose Least Often"/"Not Recommended" items (Velazquez et al., 2015). On the other hand, 80% of the schools had promotions for "Choose Most Often" items which made up 45% of all promotions.

Influence of regulation on exposure. No studies have evaluated the impact of the QCPA or the CAI on exposure to food marketing in schools. The lower levels of food marketing in elementary schools documented by Velazquez et al. (2015), a setting partially covered by the CAI, may reflect the influence of the CAI; however, this finding more likely reflects the fact that secondary

schools have more food services (vending machines and concessions) than elementary schools (Velazquez et al., 2015) and thus more food promotion.

#### *Power of food marketing in schools*

Velazquez et al. (2015) found that observable food promotions in schools often promoted specific products or brands, and rarely used animated characters or celebrities, and premium offers. The low use of these powerful techniques may be related to the finding that half of promotions recorded noncommercial promotions created by the students or the school (Velazquez et al., 2015).

Influence of regulation on power. Not documented.

#### *Exposure to food marketing in supermarkets*

Two studies documented the proportion of products that targeted children through product packaging. From 15 randomly audited grocery stores in Ontario, Berry and McMullen (2008) found 2755 cereal boxes at child height (defined as 48 inches from the ground, which takes into account the eye level of a child sitting in a shopping cart as well as standing or walking). Up to half of breakfast cereal shelf space at child height contained cereal boxes with at least one child-directed feature (described in the “Power of food marketing in supermarkets” section of this article). From the University of Toronto’s Food Label Information Program database, which contains over 10 000 packaged food products collected between 2010 and 2011, Murray (2014) found that 415 (4%) targeted children, defined as depicting fun or play, or using cartoons or child-like fonts. One other study (Elliott 2012b) identified products that were targeted to children only, without collecting a total product denominator. In two supermarkets in Alberta, Elliott (2012b) found over 350 everyday foods (not junk foods) that targeted children, defined as being designed for children, or displaying cartoons, cross-merchandising, unusual shapes, colours, tastes, or games on its packaging. The estimates of exposure in these three

studies are not complete; true exposure may be underestimated, since none of the studies explored food marketing in checkout areas, store display, or other features of grocery stores.

Overall, most foods marketed to children in supermarkets were high in sugar, fat, or sodium (Elliott, 2008) and/or low in desirable nutrients (Murray, 2014). Almost one-quarter of foods marketed to children were labelled “better for you” according to the CAI definition; however, two-thirds of the “better for you” foods were still high in sugar, fat or sodium (Elliott, 2012c). A significantly greater proportion of some food categories (snacks, beverages, cereals, crackers, pudding, and combination dishes not measurable by a cup, such as pizza) were considered “less healthy” according to the UK’s Nutrient Profiling system when they were marketed to children compared to when they were not marketed to children (Murray, 2014). Elliott (2012b) and Murray (2014) both found that 1% or less of foods marketed to children were vegetables or fruits.

Influence of regulation on exposure. Neither the QCPA nor the CAI explicitly applies to product packaging. No research exists on the impact of the QCPA on product packaging. The impact of the CAI on the overall exposure to product packaging targeted to children is not documented; however Murray found that the CAI did not impact the nutritional quality of foods marketed to children through product packaging (Murray, 2014).

#### *Power of food marketing in supermarkets*

The majority of grocery store products Elliott (2008) reviewed had “fun” features on product packaging, including cartoons and cartoonish fonts. Murray found that unusual flavours, shapes, and colours, characters, and graphics or lettering were the most commonly used marketing techniques on products targeting children (Murray, 2014). In an analysis of breakfast cereals boxes, 48% had child oriented colours, 35% had incentives or premium offers, and 34% had characters (Berry & McMullen, 2008).



Similar to research on television food advertisements, powerful marketing techniques on product packaging were associated with poor quality foods (Berry & McMullen, 2008; Elliott, 2008). In particular, breakfast cereals were more likely to be higher in sugar if their packaging targeted children (Berry & McMullen, 2008). As well, over two-thirds of non-junk, high-sugar products had a nutrition claim, compared to only half of “healthier” products (Elliott, 2008). Berry and McMullen suggested that the marketing landscape in the cereal aisle in Canada is “health-exploitive” (Berry & McMullen, 2008, p.334) meaning that it uses child-directed marketing techniques on less healthy products, encouraging their consumption.

Influence of regulation on power. Not documented.

### ***Impact of food marketing on Children in Canada***

The evidence of a causal impact of food marketing on children’s food attitudes, preferences, and behaviours is compelling and has been discussed elsewhere (Boyland et al., 2016; Cairns et al., 2013; Norman, Kelly, Boyland, & McMahon, 2016). Although limited, Canadian studies provide local insight into how children in Canada are impacted by food marketing. Experimental and qualitative studies in Canada have shown that television product placement (Hudson & Elliott, 2013), online advertising (Brady et al., 2008), product packaging (Brierley & Elliott, 2015; Elliott & Brierley, 2012; Elliott et al., 2013; Elliott, 2009), and toy premiums (Hobin et al., 2012) can impact Canadian children’s attitudes, preferences, and behaviours.

Hudson and Elliott (2013) found that although only 17% of children (7-12 years) were aware of product placement, children who viewed a television program with unhealthy product placements (vs. no product placement or healthy product placement) were most likely to recall

the advertised products. Almost one-quarter of 7 to 13 year olds said they purchased or requested a food advertised online (most commonly soft drinks, chocolate, and candy) (Brady et al., 2008).

Researchers used focus groups with children aged 5 to 12 year to assess children's preferences, perceptions, and interpretations of packaged foods (Brierley & Elliott, 2015; Elliott & Brierley, 2012; Elliott, 2009). Preferences were commonly influenced by packaging that used themes of fun and was esthetically pleasing or interactive (Elliott, 2009). When asked to identify healthy products, children created their own, often inaccurate, rationales based on colours (Elliott, 2009), nutrition or organic claims (Brierley & Elliott, 2015; Elliott, 2009), ingredient lists (Brierley & Elliott, 2015; Elliott, 2009), and sometimes nutrition facts tables (Brierley & Elliott, 2015; Elliott, 2009). Results from focus groups with 225 children across Canada revealed that marketing features (colours, words, pictures, spokes-characters, and front-of-pack claims) were more regularly used than nutrition facts and ingredient lists in evaluating the healthfulness of packaged foods (Elliott & Brierley, 2012).

Elliott et al. (2013) investigated whether six to 11 year old children's taste preferences differed based on food packaging design. When compared to food in plain packaging, children preferred the food in McDonald's packaging; however, this preference was not maintained when food in McDonald's packaging was compared to colourful or Starbucks packaging. Exploring a method of healthy food promotion, Hobin et al. (2012) assessed the impact of toy premiums on meal choice. Children (aged 6-12 years) who were offered toy premiums with healthy options only (vs. healthy and unhealthy options) were over three times as likely to select the healthy meal (Hobin et al., 2012).

Finally, evidence from qualitative studies that were not setting-specific show that children across Canada (Quebec children not studied) may have similar attitudes towards food,

(Elliott, 2011, 2014) suggesting that cumulative exposures to food marketing may have a greater impact on children's food culture than a single exposure in a study. Focus groups conducted in Alberta, Ontario and New Brunswick with children aged 6 to 11 years showed that children distinguished between food for themselves and for others (Elliott, 2011). They reported that "kids' food" is junk food, sugary, associated with cartoons, comes in fun shapes or colours and is something you can play with or eat with your hands (Elliott, 2011). These symbolic features identified by children mimic the powerful techniques listed in this review and used by the food industry to market to children. Conversely, children saw adult food as plain, unprocessed, healthy, responsible food, and not for them (Elliott, 2011). As well, Elliott (2014) concluded that adolescents (aged 12-14 years) personify food in a consistent manner across Canada: broccoli is "shy, unpopular, and boring", and milk is "athletic" (p.87). Junk food, on the other hand, is seen as a "party person" who is "funny and fun to hang around with" (p. 87). Children's food attitudes may have been socially constructed by commercial food marketing, or lack thereof, and may partly explain why the children's diets do not align with Canada's Food Guide.

**Table 3: Synthesis of Canadian literature on exposure, power, and impact of food marketing to children in Canada, and the influence of the QCPA and the CAI on the same**

Author	Setting	Population; Location	Design	Purpose	Data Collection Period	Overview of Methods	Key Outcome Measures	Key Results
Kelly, Halford et al. (2010)	Home: TV	Children's TV; Alberta, Ontario	Cross-sectional	Identify frequency, nutritional quality and persuasive techniques used in food advertising on children's TV channels in 11 countries	Oct. 2007–Mar. 2008	Recorded all ads on 3 most popular children's TV channels for 2 weekdays and 2 weekend days between 6:00-22:00. Food ads were coded for promotional techniques and nutritional quality (core, noncore, or miscellaneous). $\chi^2$ tests compared country-level differences.	<ul style="list-style-type: none"> <li>• number and rate of food advertising;</li> <li>• proportion of food ads by program type, product type, and nutritional quality;</li> <li>• proportion of food ads with persuasive techniques</li> </ul>	<ul style="list-style-type: none"> <li>• In Canada, one-fifth of ads were for food, the second most advertised product. (E)</li> <li>• Overall, food advertising was 4-7 ads/hr/channel and was higher on weekends.</li> <li>• 80% of ads were for non-core foods. Fast food most commonly advertised. (E)</li> <li>• Canada had one of the lowest proportions of food ads with premium offers (0-4%) but had the second highest proportion of food ads with promotional characters (33-36%) of which almost all were for non-core foods. (P)</li> </ul>
Adams, et al. (2009b)	Home: TV	General TV; Ontario, Québec	Cross-sectional	Compare frequency, nutritional quality of food advertising on children's TV in Canada and the UK prior to the introduction of UK regulations	30 Oct., 2006–5 Nov., 2006	Recorded all ads on 4 free viewing channels (24h/d). Ads were coded as "of particular appeal to (OPAT) children" <sup>29p.658</sup> if >20% of viewing population were children. UK Food Standards Agency definition used to identify "less healthy" food ads. Fischer's exact tests compared OPAT children and non-OPAT children groups.	<ul style="list-style-type: none"> <li>• number and rate of food advertising;</li> <li>• proportion food ads OPAT children;</li> <li>• nutritional quality of food ads</li> </ul>	<ul style="list-style-type: none"> <li>• In Canada, 2315 food ads were identified from 4 channels over 7 days. (E)</li> <li>• 7% of ads were OPAT children (defined as 2-17 years in Canada). (P)</li> <li>• 66% of food ads were for "less healthy" foods. (E)</li> <li>• No significant differences between proportion of "less healthy" food ads that were OPAT children compared to ads not OPAT children in Canada (<math>p=0.15</math>). (P)</li> <li>• No significant differences in the product type advertised between ads that were OPAT children compared to those not OPAT children were found in Canada, except for sweets and candy which was advertised less to children.(P)</li> </ul>

Adams, et al. (2009a)	Home: TV	General TV; Ontario, Québec	Longitudinal	Compare frequency, nutritional quality of food ads on prime time TV between 1991-2006 in Canada and the UK	26 Oct., 1991-1 Nov., 1991; 30 Oct., 2006 – 5 Nov., 2006	Recorded ads on 5 and 4 free channels in 1991 and 2006, respectively, between 19:00-22:59. Food ads were coded food type and promotional technique. “TV diets” were generated by summing one serving of each food advertised and were compared to reported diets from national surveys. $\chi^2$ tests compared within and across countries.	<ul style="list-style-type: none"> <li>• number and rate of food advertising;</li> <li>• product type and nutritional quality of food ads</li> </ul>	<ul style="list-style-type: none"> <li>• No change in rate of TV food advertising from 1991-2006 (5/hour) in Canada. (E)</li> <li>• Fast food product and restaurant ads significantly increased five-fold in Canada and were the most commonly advertised items at 29.5% and 15.6% of food ads. Fruits, vegetables and juices significantly decreased from 8% of ads to 2% in Canada. (E)</li> <li>• TV diets from 1991 and 2006 were similar, but 2006 had less energy from alcohol. The 1991 and 2006 TV diets contained less fibre and energy from protein than reported intakes. The 2006 TV diet had greater levels of energy from sugar and higher sodium levels than reported intake in 2006. (E)</li> </ul>
Potvin Kent, et al. (2011a)	Home: TV	TV viewed by English and French speaking 10-12 year olds; Ontario, Québec	Cross-sectional	Compare frequency of food marketing on children’s preferred TV in two Canadian provinces	26 Mar, 2009 – 1 Apr. 2009	Recorded 90 hours of TV watched between 6:00-0:00 by 428 children over 1 week. Ads were coded by day/time, program type, station, ad type/length, food type, and target audience. $\chi^2$ tests compared differences between French-speaking children in Quebec, English-speaking children in Quebec, and English-speaking children in Ontario.	<ul style="list-style-type: none"> <li>• number and rate of food ads;</li> <li>• characteristics of ads by station, channel, and time;</li> <li>• type of food advertised;</li> <li>• type of promotion used</li> </ul>	<ul style="list-style-type: none"> <li>• Neither the number of food ads nor the rate of TV food advertising (3-5/hour) differed significantly between groups (<math>p &lt; 0.06</math>). (IR-E)</li> <li>• More food ads targeted preschoolers (<math>p &lt; 0.001</math>), children (<math>p &lt; 0.001</math>), and teenagers (<math>p &lt; 0.03</math>) in the English groups compared to the French group. (IR-P)</li> <li>• More ads were for snacks and candy, and grain products in English groups compared to the French group. (IR-E)</li> <li>• Significantly more persuasive marketing techniques (fun appeal, characters/celebrities, contests) were seen in English groups compared to the French group. (IR-P)</li> </ul>

Potvin Kent, et al. (2012)	Home: TV	TV viewed by English and French speaking 10- 12 year olds; Ontario, Québec	Cross- sectional	Compare nutritional quality of foods advertised on children's preferred TV in two Canadian provinces	26 Mar, 2009 – 1 Apr. 2009	Recorded 90 hours of TV watched between 6:00-0:00 by 428 children over 1 week. Nutritional quality of foods advertised was assessed by a 100g reference size and classified as high in fats, sugar, sodium, and/or low in fibre, and identified as "less healthy" using the UK Food Standards Agency definition. One-way ANOVA with post hoc tests compared group differences (Potvin Kent et al., 2011a).	<ul style="list-style-type: none"> <li>• mean nutrients per 100g advertised;</li> <li>• percentage energy from energy, fats, carbohydrates;</li> <li>• proportion of high sugar/fat/salt, low fibre food ads;</li> <li>• proportion of "less healthy" food ads</li> </ul>	<ul style="list-style-type: none"> <li>• English and French food ads significantly differed in macronutrient content: French higher in total fat, saturated fat, trans fat, and lower in carbohydrates, sugar, energy than English groups (<math>p&lt;0.001</math>). (IR-E)</li> <li>• Statistically significantly more English ads were for "less healthy" (68.3-68.9%) foods than French ads (60.6%) (<math>p&lt;0.001</math>). (IR-E)</li> </ul>
Potvin Kent, et al. (2011b)	Home: TV	TV viewed by English and French speaking 10- 12 year olds; Ontario, Québec	Cross- sectional	Compare presence of food marketing to children on children's preferred TV by companies committed and not committed to CAI	26 Mar, 2009 – 1 Apr. 2009	Recorded 99.5 hours of TV watched between 6:00-0:00 by 272 children over 1 week. Ads were coded by food type, use of media characters, and whether the ad was from a CAI or non-CAI company. Nutritional quality was assessed by 100g and using the UK Food Standards Agency definition for "less healthy" foods. $\chi^2$ tests and t-tests compared differences between CAI and non-CAI ads.	<ul style="list-style-type: none"> <li>• number of food promotions;</li> <li>• type of food products promoted;</li> <li>• proportion of use of media characters;</li> <li>• proportion of "less healthy" products</li> </ul>	<ul style="list-style-type: none"> <li>• 24% (n=418) of all ads recorded were for foods or beverages. (E)</li> <li>• Food companies committed to CAI provided 63% of all ads recorded. (IR-E)</li> <li>• Ads by CAI companies has significantly more energy, fats, sugar, and sodium (<math>p&lt;0.001</math>). (E)</li> <li>• Significantly more ads by CAI companies were "less healthy" than non-CAI companies (<math>p=0.001</math>). (IR-E)</li> <li>• CAI ads used media characters more often (<math>p&lt;0.001</math>) and were significantly more likely to promote "less healthy" products with media characters (<math>p&lt;0.001</math>) than non-CAI. (IR-P)</li> </ul>

Potvin Kent, et al. (2014)	Home: TV	Children's specialty TV; British Columbia, Ontario	Long- itudinal	Compare frequency, nutritional quality of food marketing on children's TV between 2006- 2011 by companies committed and not committed to voluntary industry regulation (CAI)	May 2006; May 2011	4 weeks of food ads for 11 food categories aired between 6:00-0:00 on two children specialty channels were purchased for two time periods. Ads were coded for target audience, use of persuasive marketing techniques, and food company commitment to the CAI in 2011. Nutritional content was assessed by 100g reference size. The UK Food Standards Agency definition identified "less healthy" foods. t-tests compared mean group differences.	<ul style="list-style-type: none"> <li>• mean nutrient content;</li> <li>• proportion "less healthy";</li> <li>• proportion targeting children, teens, and adults;</li> <li>• proportion using persuasive marketing techniques;</li> </ul>	<ul style="list-style-type: none"> <li>• Proportion of food ads decreased by 24% by CAI companies and increased by 76% by non- CAI companies between 2006 and 2011. (IR- E)</li> <li>• No change in proportion of CAI ads considered "less healthy" (<math>p=0.235</math>). (IR-E)</li> <li>• Significant decrease in proportion of non-CAI ads considered "less healthy" (<math>p&lt;0.001</math>). (IR- E)</li> <li>• Increased targeting of "less healthy" ads to children and teens by CAI companies in 2011 than 2006. (IR-P)</li> <li>• Increased use of fun appeals and characters by CIA companies in 2011 than 2006. (IR-P)</li> </ul>
Potvin Kent & Wanless (2014)	Home: TV	Children's specialty TV and general TV viewed by 2-11 year olds; British Columbia, Ontario	Long- itudinal	Compare changes in children's exposure to food marketing on TV between 2006- 2011	May 2006; May 2009; May 2011	4 weeks of food ads for 11 food categories aired between 6:00-0:00 on 27 channels (2 children specialty channels and 25 general channels) were purchased for three time periods. Exposure levels of food ads by children were estimated and compared across time periods.	<ul style="list-style-type: none"> <li>• number and rate of food ads;</li> <li>• children's overall average exposure to food advertising</li> </ul>	<ul style="list-style-type: none"> <li>• Number and rate of food ads increased between 2006 and 2011. (IR-E)</li> <li>• There was a decrease in food ads of children's channels (5%) but increase on general channels (44-45%) between 2006-2011. (IR-E)</li> <li>• Overall exposure increased by 7-17% between 2006-2009. (IR-E)</li> <li>• Children's exposure to candy and cereal ads was mostly from children's specialty channels but ads for chocolate, juice, diet soft drinks and fast food came from general TV. (IR-E)</li> </ul>



Hudson & Elliott (2013)	Home: TV	7-12 year olds; Canada	Experimental	Assess the impact of TV product placement on snack behavior in children	Not stated.	225 children were randomly assigned to view a 20 minute children's TV program with healthy, unhealthy, or no product placement. After viewing, children recalled brands, sponsors or advertising messages in the program, and chose a food and beverage from a set selection. Questionnaires were used to children's experiences of the show. Logistic regression tested the predictive ability of multiple variables, including recall of product placement, on snack behaviour.	<ul style="list-style-type: none"> <li>• recall of product placement;</li> <li>• immediate choice of food and beverage;</li> <li>• impact of other variables on relationship between product placement and behaviour (TV viewing habits, likeness of TV program, likeness of products)</li> </ul>	<ul style="list-style-type: none"> <li>• Children were unaware of product placement as a marketing technique. (I)</li> <li>• Children (especially 10-12 year olds) who viewed an unhealthy product placement in a TV program had better recall of products. (I)</li> <li>• There was a modest but mixed impact on snack choice immediately after viewing. Pepsi or Coke and Fruit Gushers were most popular regardless of the experimental group, which may be due to children selecting "treats" during the experiment. (I)</li> <li>• Strongest predictors of snack choice were whether the child liked the product packaging, and whether the product looked fun or yummy. (I)</li> </ul>
Brady, et al., (2010)	Home: online	Websites of CAI companies with marketing targeted to 6-12 year olds; Canada	Cross-sectional	Compare marketing to children on the websites of CAI companies	Not stated	24 websites of CAI companies were identified and evaluated for 379 items related to the presence and type of online marketing techniques. Five marketing objectives were evaluated: target market appeal, increased engagement, increased awareness of the brand and websites, increased brand engagement, and influencing children's brand preferences and consumption norms	<ul style="list-style-type: none"> <li>• proportion of targeting children</li> <li>• number of marketing objectives, techniques and strategies observed on websites.</li> </ul>	<ul style="list-style-type: none"> <li>• 83% of websites targeted children under 12. (P)</li> <li>• Websites commonly encouraged prolonged engagement through free memberships (63%), high score leader boards (50%), and game rewards (46%). Interaction with product/brand was promoted through advergames music, sounds, animation, and buttons (88%). (P)</li> <li>• Half encouraged sharing brand or website with friends. The majority of websites had material that could be downloaded by children for use in their everyday lives, such as screensavers, wallpaper, placemats, and growth charts. (P)</li> <li>• Foods advertised were similar to those advertised on TV and were inconsistent with Canada's Food Guide. (E)</li> <li>• One third provided nutrient information, 21% health benefits, and 42% promoted physical activity. (P)</li> </ul>

Potvin Kent, et al. (2013)	Home: online	Restaurant websites; Canada	Cross- sectional	Compare content of English and French food company websites, and websites by CAI and non-CAI companies	Spring 2010	77 English and 70 French restaurant websites, identified from food ads on children's preferred TV <sup>30</sup> were analyzed for child-directed content. Websites with child content was coded for marketing features, child protection features, and health promotion messages. $\chi^2$ and t-tests compared group differences between English and French websites, and between CAI and non-CAI websites.	<ul style="list-style-type: none"> <li>• frequency of marketing techniques, child protection features, and healthy living messages</li> </ul>	<ul style="list-style-type: none"> <li>• Frequency of child-directed content was not statistically different between French/English (<math>p &lt; 0.640</math>), and between CAI/non-CAI websites (<math>p &lt; 0.877</math>). (IR-P)</li> <li>• No significance difference in the proportion of marketing to children or online marketing techniques between English and French food company websites, nor between CAI and non-CAI company websites. (IR-P)</li> <li>• French websites had more healthy living messages but this was not statistically significant. (IR-P)</li> <li>• Non-CAI used no child protective features while 14.3-28.6% of CAI companies did. CAI companies were also more likely to promote healthy living. (IR-P)</li> </ul>
Brady, et al. (2008)	Home: online	7-13 year olds; Canada	Cross- sectional	Explore children's awareness and use of online food marketing features and its impact on food requests	Jul. 2007 – Aug. 2007	A convenience sample of 83 children at a summer day camp was recruited and completed an interview and questionnaire on the awareness and engagement with online marketing and relationships with requesting foods.	<ul style="list-style-type: none"> <li>• prevalence of engagement with online marketing</li> <li>• prevalence of requests, purchases of food advertised online</li> </ul>	<ul style="list-style-type: none"> <li>• Significantly fewer children (68%) believed there was food marketing on the internet compared to TV (99%) (<math>p &lt; 0.001</math>). (I)</li> <li>• Over one-third visited food company websites advertised on TV or on product packaging (I)</li> <li>• 13% shared these websites with friends.(I)</li> <li>• 35% wanted to try a food advertised online and 21% requested or purchased the product. (I)</li> <li>• Soft drinks, chocolate and candy were the top foods children wanted to try. (I)</li> </ul>
Velazquez, et al. (2015)	School	Public schools; British Columbia	Cross- sectional	Identify frequency and type of food marketing in public schools in Vancouver	Nov. 2012 – Apr. 2013	Observational audit of food promotions in common areas of 23 public schools. Promotions were coded by location, size, advertised product/brand, ad purpose, marketing techniques healthfulness as per provincial nutrition guidelines. $\chi^2$ and Fisher's exact tests compared school group differences.	<ul style="list-style-type: none"> <li>• number of food promotions;</li> <li>• frequencies of product type advertised, presence of marketing type, and provincial nutrition category</li> </ul>	<ul style="list-style-type: none"> <li>• 87% of schools contained food marketing (median 17/school, range 0-57/school), with more in secondary schools than elementary (<math>p &lt; 0.01</math>). (E)</li> <li>• 60% of promotions were located in schools' hallways. (E)</li> <li>• 55% of schools promoted "prohibited" foods and beverages according to the provincial guidelines. Only 13% of promotions were nutrition education. (E)</li> <li>• Products/brands were promoted on 18%/26% of promotions; characters/premium offers were rare (3%/4% of promotions) (P)</li> </ul>

Berry & McMullen, (2008)	Grocery store	Breakfast cereals at eye level of 8 year olds or younger in Canadian supermarkets; Ontario	Cross-sectional	Explore associations between marketing techniques and nutritional quality of breakfast cereals	Mar.2005 – Nov. 2005	Recorded breakfast cereals in a representative sample of 15 grocery stores that were 0-48 inches off ground. Product packaging was coded for marketing features. Nutritional content and ingredients were recorded. Multivariate regression using marketing features as predictors and nutritional content as outcomes to determine whether the cereal aisle is “health-protective” or “health-exploitive” <sup>40p.333</sup>	<ul style="list-style-type: none"> <li>• frequency of marketing features (spokes-characters, colours, child-orientation, reachable by child, oversized box)</li> <li>• sugar, whole grain, and trans fat content</li> <li>• relationship between features and nutrition</li> </ul>	<ul style="list-style-type: none"> <li>• 2755 cereal boxes identified at children’s height. (E)</li> <li>• Spokes-characters, child themed colours and shapes, and child-oriented incentives were used on 32%, 17%, and 34% of boxes, respectively. (P)</li> <li>• Cereals with these marketing techniques were also significantly higher in sugar, refined grain, and/or trans-fat. (P)</li> <li>• Boxes that could be reached by children had mixed results on nutritional content (no difference in sugar, but more likely to have whole grain and less trans fat). (P)</li> </ul>
Elliott, (2008)	Grocery store	Regular (non-junk) foods targeted to children in Canadian supermarkets; location not provided	Cross-sectional	Assess the nutritional quality of foods marketed to children in Canadian grocery stores	Dec. 2005	367 foods targeted to children (“fun foods” <sup>41p.359</sup> ) were purchased from Loblaws Superstore and coded for 36 variables related to the food type and packaging marketing features (graphics, nutrition claims). “Poor nutritional quality” products were identified using US Centre for Science in the Public Interest benchmarks. $\chi^2$ , phi and Cramer’s V assessed group differences.	<ul style="list-style-type: none"> <li>• frequency of food types by nutritional quality;</li> <li>• frequency of marketing techniques;</li> <li>• differences by groups (food type, nutrient quality, presence of marketing technique)</li> </ul>	<ul style="list-style-type: none"> <li>• Dry goods (cereal, crackers, cookies, granola bars, etc.) were the most common “fun foods” (61%). Vegetables and fruit were only 1% of the “fun foods”. (E)</li> <li>• 89% of “fun foods” were high in fat, sugar, or sodium. Acceptable cut-offs for sugar content were most frequently violated at 70% of products. Total fat and sodium cut-offs were violated in 23% and 17% of products. (E,P)</li> <li>• Products high in fat, sugar, or sodium were significantly more likely to have a front-of-pack nutrition claim (<math>p&lt;0.0001</math>) (P)</li> </ul>
Elliott, (2012b)	Grocery store	Regular (non-junk) foods targeted to children in Canadian supermarkets; Alberta	Cross-sectional	Identify regular grocery foods marketed to children in Canadian grocery stores	2009	354 foods targeted to children (“fun foods” <sup>42p.305</sup> ) were purchased from The Real Canadian Superstore and Safeway and coded for 37 variables related to food type, packaging marketing features, target audience and nutritional quality. $\chi^2$ , phi and Cramer’s V assessed group differences.	<ul style="list-style-type: none"> <li>• frequencies and relationships between food types, packaging characteristics, target audience, nutritional quality</li> </ul>	<ul style="list-style-type: none"> <li>• The majority of “fun foods” were dry goods (64%), only 1% were fruits or vegetables. (E)</li> <li>• Parents targeted on 55% of products. (P)</li> <li>• Marketing techniques included: colours, shapes, cartoons, highlighting “fun food”, nutrition claims, small portion sizes and convenient packaging.(P)</li> </ul>

Elliott, (2012c)	Grocery store	Regular (non-junk) packaged foods targeted to children in Canadian supermarkets; Alberta	Cross-sectional	Compare nutritional quality of “regular” and “better-for-you” foods marketed to children in Canadian grocery stores	2009	354 foods targeted to children (“fun foods” <sup>24p.267</sup> ) were purchased from The Real Canadian Superstore and Safeway and coded for 37 variables related to food type and packaging marketing features, including claims that the product is healthier or “better-for-you” <sup>24p.268</sup> . “Poor nutritional quality” products were identified using US Centre for Science in the Public Interest benchmarks. $\chi^2$ and Fisher exact tests were used to assess group differences.	<ul style="list-style-type: none"> <li>• frequency of healthier or “better-for-you” products;</li> <li>• nutritional quality</li> </ul>	<ul style="list-style-type: none"> <li>• 23% of foods marketed to children (“fun foods”) were considered “better-for-you” as per its packaging. (E,P)</li> <li>• Overall, a lower proportion of “better-for-you” foods were high in fat, sugar, or sodium than regular foods (65% versus 91% respectively). However, when considering the fixed-effects of dry goods, there is no statistically significant difference in the proportion of regular and “better-for-you” foods that are of poor nutritional quality. (P)</li> <li>• Almost all “better-for-you” foods that were high in fat, sugar, or sodium has a front-of-pack nutrition claim. More “better-for-you” foods were marketed as “fun”. (P)</li> </ul>
Murray, (2014)	Grocery store	Packaged foods and beverages; Canada in Canadian supermarkets; location not provided	Cross-sectional	Assess the presence of foods with product packaging that market to children, and their nutritional quality	2010 - 2011	10,488 packaged food labels in Canadian grocers from Food Label Information Program 2010 were assessed for product packaging marketing to 2-13 year olds from CAI and non-CAI companies. The UK Food Standards Agency definition was used to identify ads for “less healthy” foods. Wilcoxon rank sum test compared nutrient levels and $\chi^2$ or Fisher exact tests examined group differences.	<ul style="list-style-type: none"> <li>• frequency and proportion of foods marketing to children;</li> <li>• nutritional quality</li> </ul>	<ul style="list-style-type: none"> <li>• 415 packaged foods (4%) were marketed to children. (E)</li> <li>• The highest frequencies of products marketed to children were baked goods, desserts, cereals/ grain products, snacks, and combination dishes. (E)</li> <li>• Graphics, lettering, characters, and unusual flavours, shapes, and colours were most common marketing techniques used. (P)</li> <li>• Mixed results of nutrient content differences between foods marketed and not marketed to children. (E)</li> <li>• 81% of the foods and beverages marketed to children were considered “less healthy”. (E)</li> <li>• There was no significant difference in the nutritional quality of foods marketed to children by CAI companies and by non-CAI companies (<math>p=0.090</math>). (IR-E)</li> </ul>

---

Elliott & Brierley (2012)	Grocery store	5-12 year olds; Alberta, Ontario, New Brunswick	Qualitative	Explore how children identify healthy products using packaging	2009	225 children participated in 52 focus groups divided by gender and age. Children were asked to evaluate the healthfulness of foods by looking at their packaging. Grounded theory approach was used for data analysis.	<ul style="list-style-type: none"> <li>• identify the features of product packaging used by children to evaluate foods healthfulness</li> </ul>	<ul style="list-style-type: none"> <li>• Ingredient lists and nutrition facts tables were used less frequently than front-of-pack claims. The children provided only vague explanations of how they used nutrition information to decide on a healthy product.(I)</li> <li>• Colours, spokes-characters, language, and pictures influenced perceptions of healthy. (I)</li> <li>• Products with bright, multiple colours were less healthy than muted colours; green was healthy.</li> <li>• Pictures of foods not included in the package (i.e. strawberries in cereal) were often used in the analysis of products' healthfulness. (I)</li> <li>• Spokes-characters were reported to be associated with both healthy and unhealthy products. (I)</li> </ul>
Elliott, (2009)	Grocery store	5-12 year olds; Ontario	Qualitative	Explore children's understanding, responses, and perceptions of packaged foods	Feb. 2007	36 children participated in 6 focus groups divided by gender and grade to explore children's preferences, perceptions of food, and process of assessing nutrition and health of food. Children participated in several activities: draw and rationalize their favourite dinner meal, individually select most appealing foods from multiple standard selections of products, identify and rationalize healthy products. Grounded theory approach was used for data analysis.	<ul style="list-style-type: none"> <li>• understanding of and response to child-targeted food packaging</li> <li>• understanding of how children identify healthy food products</li> <li>• Differences by age and gender</li> </ul>	<ul style="list-style-type: none"> <li>• Younger grades preferred foods with unusual shapes/colours and cross-merchandising, whereas older grades chose foods based on appealing or appetizing packages. (I)</li> <li>• Fun was an important feature in food choice across all ages. (I)</li> <li>• Boys appeared to select products that they could play with; girls appeared to select products that were "pretty"<sup>44p.369</sup> or they personally related to. (I)</li> <li>• Ingredient lists, font-of-pack packaging (colours, package seriousness) and labelling were "clues"<sup>44p.371</sup> used to decide if a product was healthy, however their interpretation was not usually accurate. Many children were unaware of nutrition facts tables. (I)</li> </ul>

---

Brierley & Elliott (2015)	Grocery store	5-12 year olds; Alberta	Qualitative	Explore boy's interpretations of "healthy" and "less healthy" packaged foods	Not stated.	58 children (27 boys) from a high socioeconomic school participated in 12 focus groups divided by age and gender to explore interpretations of "healthy" and "less healthy" foods. Children participated in two activities: individually identify the "healthiest" and "less healthy" crackers, cookies, yogurt from a selection, sort cereals into "healthy" and "less healthy" as a group. Descriptive and topic coding were used for data analysis.	<ul style="list-style-type: none"> <li>• understanding of how boys classify packaged food as "healthy" and "less healthy"</li> </ul>	<ul style="list-style-type: none"> <li>• Discussions in focus groups with boys revolved around using nutrition facts tables to decide whether a food was healthy. (I)</li> <li>• Boys focused more on the foods' content of calories, fat, sugar, and salt than girls did in deciding whether a food was healthy and were often in reference in to being healthy, having a healthy weight, or playing sports. (I)</li> <li>• Boys felt that foods besides vegetables and fruit were healthy, considering things like "protein", "meaty", "seeds" as well<sup>22p.30</sup>. (I)</li> <li>• "Organic" was often used by both genders to identify a healthy food<sup>22p.31</sup>. (I)</li> </ul>
Hobin, et al. (2012)	Fast Food Outlet	6-12 year olds; Ontario	Experimental	Compare impact of toy premiums on healthy fast food meal selection in 6-12 year olds	Jul. 2011 – Aug. 2011	A convenience sample of 337 children at a summer day camp was recruited and randomly allocated to choose their lunch from an intervention menu (2 healthy meals with toys and 2 less healthy meals without toys) or a control menu (all 4 meals, healthy and less healthy, with toys). $\chi^2$ tests compared group level differences. Logistic regression tested group differences controlling for age and gender.	<ul style="list-style-type: none"> <li>• proportion of children who selected the healthy meal versus the less healthy meal.</li> </ul>	<ul style="list-style-type: none"> <li>• Children who were offered a toy only with the healthy meal were significantly more likely to pick the healthy meal (Odds ratio=3.19, 95% confidence interval: 1.89-5.40). (I,P)</li> <li>• There was a significant two-way interaction between the intervention and gender (<math>\chi^2=0.433</math>, <math>p=0.038</math>): "pairing toys with healthier meal options had a stronger effect on boys compared to girls"<sup>46p.c246</sup>.</li> </ul>

Elliott, et al. (2013)	Fast Food Outlet	3-5 year olds; Alberta	Experimental	Compare impact of branding and colourful packaging on taste preferences in 3-5 year olds	Not stated.	77 children randomly were given identical foods in two different packages. Children selected their preferred food between their two options. Parents completed a questionnaire on child demographics, TV habits, eating habits, and income. Wilcoxon signed rank, Mann-Whitney U- and Kruskal-Wallis tests examined experimental impact and relationship with child characteristics.	<ul style="list-style-type: none"> <li>• child preferred food</li> <li>• child characteristics</li> <li>• impact of packaging on food choice</li> </ul>	<ul style="list-style-type: none"> <li>• Children preferred food that was presented in McDonald's packaging when compared plain packaging (<math>p&lt;0.009</math>), but not compared to coloured (<math>p&lt;0.240</math>) or Starbucks packaging (<math>p&lt;0.404</math>). (I,P)</li> <li>• Carrots in McDonald's packaging were believed to be tastier than those in plain packaging (<math>p=0.0497</math>) but not as tasty as carrots in colour packaging (<math>p=0.0327</math>). (I,P)</li> <li>• Taste did not differ for any other product (burger, nuggets, dessert), except fries which were more tasty in McDonald's than plain packaging (<math>p=0.0484</math>). (I,P)</li> <li>• Frequency of visiting McDonald's impacted taste preferences in the McDonald's versus plain packaging group only (<math>p&lt;0.044</math>). (I,P)</li> </ul>
Elliot, (2011)	n/a	6-11 year olds; Alberta, Ontario, New Brunswick	Qualitative	Explore how children perceive food for kids and food for adults	Not stated.	225 children were recruited for focus groups to explore food preferences, food categories ("kids' food", "adult food" <sup>27p.133</sup> ), and nutrition. Focus groups contained 4-6 children and were separated by gender and grade level. Grounded theory approach was used for data analysis.	<ul style="list-style-type: none"> <li>• perceptions on food types, preferences, and nutrition</li> </ul>	<ul style="list-style-type: none"> <li>• Children's views were consistent across age, gender, and location. (I)</li> <li>• Children view "kids' food" as unhealthy junk food that may be presented in an unusual shape or colour, be in a small serving or that you could play with. (I)</li> <li>• Adult food was perceived to be healthy, plain, responsible, such as salad and protein. (I)</li> </ul>
Elliot, (2014)	n/a	12-14 year olds; not provided	Qualitative	Explore how adolescents perceive non-branded food items	Spring 2013	5 focus groups of 6 adolescents each separated by gender and grade level were completed to explore the meaning of food to adolescents through topic of "food as people" <sup>23p.86</sup> . Grounded theory approach was used for data analysis.	<ul style="list-style-type: none"> <li>• perceptions of personality traits of non-branded foods</li> </ul>	<ul style="list-style-type: none"> <li>• Adolescents reported socially constructed perspectives on several food categories (broccoli, milk, meat, eggs, junk food, organic food) that do not have specific marketing campaigns. (I)</li> <li>• Adolescents generate consistent "brand personalities" regardless of whether that foods is commercially branded or promoted.(I)</li> </ul>

**Abbreviations:** ad(s), advertisement(s); ANOVA, analysis of variance; CAI, Canadian Children's Food and Beverage Advertising Initiative; CI, confidence interval; d, day; E, exposure; h, hour; I, impact; IR-E, influence of regulation on exposure; IR-P, influence of regulation on power; min, minute; OPAT, of particular appeal to; P, power; QCPA, Quebec *Consumer Protection Act*; TV, television;  $\chi^2$ , chi-square; yr(s), year(s).

**Table 4. Summary of influence of current regulation in Canada on exposure to and power of food marketing to children by setting**

Setting	Influence of QCPA			Influence of CAI		
	Exposure <sup>a</sup> to food marketing overall	Exposure <sup>a</sup> to unhealthy food marketing	Power <sup>b</sup>	Exposure <sup>a</sup> to food marketing overall	Exposure <sup>a</sup> to unhealthy food marketing	Power <sup>b</sup>
Home (TV)	No influence	Positive influence	Positive influence	Negative influence	No influence	Negative influence
Home (Online)	-	-	No influence	-	-	No influence
School	-	-	-	-	-	-
Supermarket	-	-	-	-	No influence	-

Abbreviations: CAI, Canadian Children's Food and Beverage Advertising Initiative; QCPA, Québec Consumer Protection Act; "-"="not documented"

<sup>a</sup> Exposure is defined as "the reach and frequency of the marketing message" (World Health Organization, 2012, p.11)

<sup>b</sup> Power is defined as "the creative content, design and execution of the marketing message" (World Health Organization, 2012, p.11)



## Discussion

This scoping review found evidence of multiple exposures of food marketing to children in different settings - at home, at school, and in supermarket. With the exception of television and product packaging, the evidence base is limited. Fast food restaurants represent another setting where food marketing would be expected, but only the impact of promotional techniques used in fast food restaurants (Elliott et al., 2013; Hobin et al., 2012) was explored in Canadian literature. International research has documented food marketing in other settings (restaurants (Ohri-Vachaspati et al., 2015), sport centres (Kelly, Bauman, et al., 2014), and outside (Kelly, Cretikos, Rogers, & King, 2008) and thus, this review likely underestimates Canadian children's exposure. High energy, fat, sugar, and salt foods were commonly marketed in all settings which is consistent with other research (Cairns et al., 2013). Children were often targeted with powerful promotional techniques which were multiple and varied, but overlapped across settings; food marketers have an arsenal of marketing tools.

With the exception of limited positive influences of the statutory regulation in Québec on, television food advertising, current evidence suggests that statutory and self-regulations in Canada have not improved either children's exposure to or the power of food marketing; however more research is needed to understand regulations' impact across settings. Dhar and Baylis estimated that the QCPA has positively impacted population health by reducing weekly household fast food expenditures in French-speaking, but not English-speaking, households with children in Québec since English-speaking households may view non-Quebec food marketing not covered under the QCPA (Dhar & Baylis, 2011). Although the influence of regulation in schools has not been measured, a 2004 survey of all Canadian public schools found that prevalence of commercial (food and non-food) advertising was lower in Québec than the rest of

Canada (Froese-Germain, 2006). Québec's statutory regulation, a rights-based approach to child health (World Health Organization, 2013), may better influence the settings and context in which children live, compared to industry regulation.

The research presented here shows that food attitudes, preferences, and behaviours of Canadian children are impacted by single exposures to food marketing. More important, however, may be the similarity of attitudes towards food in children and youth, which is suggestive of a non-specific collective impact of food marketing exposure over time and place. As children become more immersed in marketing throughout their lives, and as promotional techniques and channels integrate and overlap more often (Leibowitz et al., 2012), it is reasonable to ask whether unhealthy food marketing exposures have a greater impact cumulative impact (Boyland et al., 2016) than when viewed separately by promotion type.

The body of evidence presented in this scoping review must be considered within the daily life of an average Canadian child who watches two to three hours of television (Statistics Canada, 2011), uses the computer or plays video games for one to two hours (Statistics Canada, 2011), sits in school for five to six hours (Canadian Education Association, 2013), and whose family shops for groceries almost every second day (Canadian Grocer Staff, 2013). In that light, it becomes more obvious that children in Canada (with some exception of those in Québec) are at risk of exposure to an astounding volume of powerful food marketing. Furthermore, the settings where food marketing occurs that the author has identified in this review are common places for children to eat, buy or learn about food.

The study of Vancouver schools may suggest that children's exposure to unhealthy food marketing is less frequent and the marketing is less powerful in schools than in other settings, since only one-quarter of foods advertised were unhealthy and powerful promotional techniques

were rare (Velazquez et al., 2015). This finding may be noteworthy, as it may signify that settings-based policies, such as British Columbia's mandatory school food policy with recommendations to restrict unhealthy food marketing (Government of British Columbia, 2005, 2013), are more comprehensive than traditional promotion-focused regulations. The latter may not reach the extensive food-related commercialization in Canadian public schools previously reported, including exclusive agreements with Coca-Cola and Pepsi, incentive programs (Campbell's Labels for Education) and sponsored educational materials (Pizza Hut's "Book it", Mr. Christie's "Smart Cookie") (Froese-Germain, 2006). Unfortunately, the limited research precludes conclusions about the state of marketing in schools especially since variability in school food policies likely contributes to different food marketing environments across Canada.

Experts have recommended strong, comprehensive statutory regulations with independent monitoring and compliance penalties to effectively reduce children's exposure to powerful unhealthy food marketing (Galbraith-Emami & Lobstein, 2013; Raine et al., 2013). Nevertheless, those planning interventions must consider how multiple exposures to food marketing interact and socially construct food attitudes and behaviours in children's everyday settings. The tendency for regulations to focus on the promotional aspects of food marketing<sup>74</sup> without considering the settings where children eat, buy or learn about food may increase the risk of policies that inadequately intercept marketers' plans to reach children. Settings as a component in the proposed Canadian food marketing regulations (Health Canada, 2017) is valuable if the regulations consider settings not as just promotional marketing channels, but as the places where behaviours are performed or related goods and services are acquired<sup>5</sup> – where children eat, buy and learn about food.

### ***Implications for Policy and Research***

A comprehensive approach that addresses product, promotion, place and price may require action by policymakers, industry, and communities.

In the United States, Palakshappa et al. found that lower childhood obesity prevalence was associated with strong laws regulating the sale of unhealthy foods (OR=0.68, 95% CI:0.48-0.96) and food advertising in schools (OR=0.63, 95% CI:0.46-0.86), compared to states with no laws (Palakshappa, Fiks, Faerber, & Feudtner, 2016). Furthermore, states with multiple strong school food laws (two or more) compared to states with no laws had reduced risks of obesity in elementary schools and of overweight in middle schools (Palakshappa et al., 2016). The success of this kind of regulation demonstrates that government policy regulating the food industry, if it follows research-based recommendations (Raine et al., 2013) can be paired with local settings-based initiatives to prohibit unhealthy food marketing in the places where children live, learn and play, such as schools and recreation facilities. The places where we eat, buy and learn about food are critical points of intervention for health promotion, just as they are critical targets for the food industry.

The goal of marketing restrictions should be to improve children's everyday lives, not just limit the marketing channels used to reach them. Solely focusing on the promotional aspects of food marketing may allow marketers continued access to children by simply switching from one marketing technique to another. The increase in new media marketing techniques and decrease in television marketing observed in the United States after the introduction of industry self-regulation (Leibowitz et al., 2012) may be evidence of such a consequence. The sectors that disseminate food marketing (schools, media, retailers, sports organizations, etc.) are key actors in supporting food marketing restrictions (World Health Organization, 2012).

Using the broadcast industry's code as an example of sector-based action (Advertising Standards Canada, 2015a), organizations and communities can take the lead in place-based interventions by developing their own marketing or sponsorship policies which address the promotion, place, and pricing of unhealthy food and beverages. Setting-based health promotion helps to shift focus from an individualistic risk factor approach to generating interventions that appreciate the complexity of interconnecting environmental and individual factors influencing health (Dooris, 2009). Whole-system approaches, a feature of settings-based interventions, with actions by government, industry, and communities may impact culture more widely than traditional reductionist approaches that view issues linearly with single causes and outcomes (Dooris, 2009). For example, school food policies, which may include multiple aspects of marketing (see Table 1), can be expanded to comprehensively address all 4Ps. In addition to proposed marketing regulations, policy makers may also consider adopting additional supporting interventions that target broader aspects of marketers' 4Ps, such as product availability through industry reformulation, or food pricing via taxes and subsidies, in a whole-system intervention to reduce the impact of food marketing. A 4Ps policy strategy may help address unhealthy food marketing in situations where it is not applicable or feasible to introduce a settings-based policy, such as in the business sector.

Further research is needed to fully examine the exposure, power, and impact of food marketing within the settings of children's everyday lives and consider the influence of all 4Ps. Specifically, more research is needed on how settings, such as schools, recreation centres, daycares, retailers and other spaces, can be targeted when creating policy to protect children from unhealthy food marketing. More research is also needed on children older than 12 years and

population subgroups (e.g. by income or ethnicity) to completely understand the state of food marketing to children in Canada and its impact.

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

The settings-based approach (Whitelaw et al., 2001) used to conduct the review diverges from the usual siloed media/promotion perspective and provides fresh insight into the exposure, power and impact of food marketing in children's lives. By critiquing the literature through the 4Ps marketing lens, this review bridges the population health and business disciplines and provides a novel perspective on population health interventions and research on food marketing to children.

Restricted to peer-reviewed, English-language research in Canada, however, the findings in this review may underestimate children's exposure to and the power of food marketing in Canada. The limited search strategy may have excluded studies that cursorily measured food marketing to children as a part of broader study objectives irrelevant to this review. With only 23 studies (mostly cross-sectional) published over the last decade, the temporal aspects of marketing are not well documented. Due to the mix of study designs, the quality of studies was not evaluated.

### **Conclusion**

Creating environments that support healthy diets is a priority in Canada as a strategy to reduce the prevalence of childhood obesity (Public Health Agency of Canada, 2011). However, food marketing in the settings children eat, buy, and learn about food encourage "fun" junk foods inconsistent with healthy diets. The findings from this scoping review suggest that statutory and voluntary regulations are not adequately protecting Canadian children from exposure to powerful unhealthy food marketing. Complementary actions from government, industry and communities,

such as strong, enforced, and monitored statutory regulations and broadened school food policies, may be needed to address the multifaceted nature of powerful food marketing. With almost seven million children (Statistics Canada, 2015b) in Canada and 400,000 new births every year (Statistics Canada, 2015a), the places children live, learn, and play must be protected in order to protect the future health of Canada.

## References

- Adams, J., Hennessy-Priest, K., Ingimarsdóttir, S., Sheeshka, J., Østbye, T., & White, M. (2009a). Changes in food advertisements during 'prime-time' television from 1991 to 2006 in the UK and Canada. *British Journal of Nutrition*, *102*(4), 584-593.
- Adams, J., Hennessy-Priest, K., Ingimarsdóttir, S., Sheeshka, J., Østbye, T., & White, M. (2009b). Food advertising during children's television in Canada and the UK. *Archives of Disease in Childhood*, *94*(9), 658-662.
- Advertising Standards Canada. (2014). Canadian Children's Food and Beverage Advertising Initiative: Uniform Nutrition Criteria White Paper (pp. 19). Toronto, Ontario.
- Advertising Standards Canada. (2015a). Broadcast Code for Advertising to Children - The Code. Retrieved from <http://www.adstandards.com/en/clearance/childrens/broadcastCodeForAdvertisingToChildren-TheCode.aspx#social>
- Advertising Standards Canada. (2015b). *The Canadian Children's Food and Beverage Advertising Initiative: 2014 Compliance Report*. Retrieved from Toronto, Ontario: <http://www.adstandards.com/en/childrensinitiative/2014ComplianceReport.pdf>
- Advertising Standards Canada. (2015c). The Canadian Code of Advertising Standards. Retrieved from <http://www.adstandards.com/en/standards/theCode.aspx>
- Advertising Standards Canada. (n.d.). Children's Food and Beverage Advertising Initiative. Retrieved from <http://www.adstandards.com/en/childrensinitiative/default.htm>
- Alberta Health and Wellness. (2010). *The Alberta Nutrition Guidelines for Children and Youth*. Retrieved from: <https://www.albertahealthservices.ca/nutrition/Page2929.aspx>



- Berry, B., & McMullen, T. (2008). Visual communication to children in the supermarket context: Health protective or exploitive? *Agriculture and Human Values*, 25(3), 333-348.
- Boyland, E. J., Nolan, S., Kelly, B., Tudur-Smith, C., Jones, A., Halford, J. C., & Robinson, E. (2016). Advertising as a cue to consume: A systematic review and meta-analysis of the effects of acute exposure to unhealthy food and nonalcoholic beverage advertising on intake in children and adults. *The American Journal Of Clinical Nutrition*, 103(2), 519-533.
- Brady, J., Farrell, A., Wong, S., & Mendelson, R. (2008). Beyond television: Children's engagement with online food and beverage marketing. *Clinical Medicine: Pediatrics*, 2, 1-9.
- Brady, J., Mendelson, R., Farrell, A., & Wong, S. (2010). Online marketing of food and beverages to children: a content analysis. *Canadian Journal of Dietetic Practice and Research*, 71(4), 166-171.
- Brierley, M., & Elliott, C. (2015). Boys' Healthy Packaged Food Choices. *International Journal of Men's Health*, 14(1), 21.
- Cairns, G., Angus, K., Hastings, G., & Caraher, M. (2013). Systematic reviews of the evidence on the nature, extent and effects of food marketing to children. A retrospective summary. *Appetite*, 62, 209-215.
- Canadian Education Association. (2013). The 2012/2013 School Calendar (pp. 18). Toronto, Ontario: Canadian Education Association.
- Canadian Grocer Staff. (2013). Grocers should look at 'fresh' opportunities in 2013: Nielsen. Retrieved from <http://www.canadiangrocer.com/top-stories/grocers-should-look-at-fresh-opportunities-in-2013-nielsen-20506>

- Dhar, T., & Baylis, K. (2011). Fast-food consumption and the ban on advertising targeting children: The Quebec experience. *Journal of Marketing Research*, 48(5), 799-813.
- Dooris, M. (2009). Holistic and sustainable health improvement: The contribution of the settings-based approach to health promotion. *Perspectives in Public Health*, 129(1), 29-36.
- Edgar, T., Huhman, M., & Miller, G. A. (2015). Understanding “Place” in social marketing: A systematic review. *Social Marketing Quarterly*, 21(4), 230-248.
- Elliott, C. (2008). Assessing ‘fun foods’: nutritional content and analysis of supermarket foods targeted at children. *Obesity Reviews*, 9(4), 368-377.
- Elliott, C. (2009). Healthy food looks serious: How children interpret packaged food products. *Canadian Journal of Communication*, 34(3).
- Elliott, C. (2011). “It’s junk food and chicken nuggets”: Children’s perspectives on ‘kids’ food’ and the question of food classification. *Journal of Consumer Behaviour*, 10(3), 133-140.
- Elliott, C. (2012a). Packaging fun: analyzing supermarket food messages targeted at children. *Canadian Journal of Communication*, 37(2).
- Elliott, C. (2012b). Packaging health: Examining “better-for-you” foods targeted at children. *Canadian Public Policy*, 38(2), 265-281.
- Elliott, C. (2014). Food as people: Teenagers’ perspectives on food personalities and implications for healthy eating. *Social Science & Medicine*, 121, 85-90.
- Elliott, C., & Brierley, M. (2012). Healthy choice?: Exploring how children evaluate the healthfulness of packaged foods. *Canadian Journal of Public Health*, 103(6), e453-e458.

- Elliott, C., Den Hoed, R., & Conlon, M. (2013). Food branding and young children's taste preferences: A reassessment. *Canadian Journal of Public Health, 104*(5), e364-e368.
- Froese-Germain, B., Hawkey, C., Larose, A., McAdie, P., Shaker, E. (2006). *Commercialism in Canadian schools: Who's calling the shots?*
- Galbraith-Emami, S., & Lobstein, T. (2013). The impact of initiatives to limit the advertising of food and beverage products to children: A systematic review. *Obesity Reviews, 14*(12), 960-974.
- Garriguet, D. (2004). Nutrition: Findings from the Canadian Community Health Survey. Overview of Canadians' eating habits 2004. Retrieved from <http://publications.gc.ca/Collection/Statcan/82-620-M/82-620-MIE2006002.pdf>
- Gluckman, P., Nishtar, S., & Armstrong, T. (2015). Ending childhood obesity: A multidimensional challenge. *The Lancet, 385*(9973), 1048-1050.
- Government of British Columbia (2005). *The Guidelines for Food and Beverage Sales in B.C. Schools*. Victoria, BC: Province of British Columbia.
- Government of British Columbia. (2013). *Guidelines for Food and Beverage Sales in B.C. Schools*. Victoria, BC: Province of British Columbia Retrieved from [http://www2.gov.bc.ca/assets/gov/education/administration/kindergarten-to-grade-12/healthyschools/2015\\_food\\_guidelines.pdf](http://www2.gov.bc.ca/assets/gov/education/administration/kindergarten-to-grade-12/healthyschools/2015_food_guidelines.pdf).
- Government of Manitoba. (2017) *The Education Administration Act: C.C.S.M. c. E10*.
- Government of Manitoba. (2014). *Moving forward with school nutrition guidelines*. Retrieved from <http://www.gov.mb.ca/healthyschools/foodinschools/documents/mfsng/mfsng.pdf>.
- Government of New Brunswick. (2008a). *Healthier Eating and Nutrition in Public Schools: A Handbook for Policy 711*.

- Government of Quebec. (2007). *Going the healthy route at school: Framework policy on health eating and active living*. Government of Quebec Retrieved from [http://www.education.gouv.qc.ca/fileadmin/site\\_web/documents/dpse/adaptation\\_serv\\_coompl/Goingtothehealthyrouteatschool\\_policyframework\\_AN.pdf](http://www.education.gouv.qc.ca/fileadmin/site_web/documents/dpse/adaptation_serv_coompl/Goingtothehealthyrouteatschool_policyframework_AN.pdf).
- Government of Newfoundland and Labrador. (2009). *School food guidelines for school food providers*. Retrieved from [http://www.ed.gov.nl.ca/edu/publications/k12/SFG\\_2009.pdf](http://www.ed.gov.nl.ca/edu/publications/k12/SFG_2009.pdf).
- New Brunswick Department of Education. Department of Education; Fredericton (NB): 2008. Healthier eating and nutrition in public schools: A handbook for Policy 711.
- Nova Scotia Department of Education. (2006). Food and nutrition policy for nova scotia public schools: Policy directives and guidelines.
- Ontario Ministry of Education. (2010). Policy/program memorandum No. 150: school food and beverage policy. Available from: <http://www.edu.gov.on.ca/extra/eng/ppm/150.html>.
- Government of Prince Edward Island. (2011) Eastern School District administrative regulation. Charlottetown. School nutrition (for all grade levels- K-12). Retrieved from: [https://www.princeedwardisland.ca/sites/default/files/publications/english\\_schools\\_nutrition\\_policy.pdf](https://www.princeedwardisland.ca/sites/default/files/publications/english_schools_nutrition_policy.pdf).
- Government of Saskatchewan. (2009). *Nourishing minds. Towards comprehensive school community health: Nutrition policy development in Saskatchewan schools*. Retrieved from [https://www.lcsd.ca/uploads/images/student\\_and\\_parents/nourishing\\_minds.pdf](https://www.lcsd.ca/uploads/images/student_and_parents/nourishing_minds.pdf).
- Government of Saskatchewan. (2014). *Healthy Foods for my School: Nutrition Standards for Saskatchewan Schools*.
- Government of Yukon. Whitehorse (2008). School nutrition policy no. 1025. Retrieved from: [http://www.education.gov.yk.ca/pdf/policies/school\\_nutrition\\_policy.pdf](http://www.education.gov.yk.ca/pdf/policies/school_nutrition_policy.pdf).

- Halfon, N., Larson, K., Lu, M., Tullis, E., & Russ, S. (2014). Lifecourse health development: past, present and future. *Maternal and Child Health Journal*, 18(2), 344-365.
- Health Canada. (2016). Healthy Eating Strategy. Retrieved from <http://news.gc.ca/web/article-en.do?mthd=tp&crtr.page=1&nid=1142029>
- Health Canada. (2017, February 28). Health Canada's marketing to children [webinar].
- Hobin, E. P., Hammond, D. G., Daniel, S., Hanning, R. M., & Manske, S. (2012). The Happy Meal® effect: The impact of toy premiums on healthy eating among children in Ontario, Canada. *Canadian Journal of Public Health*, 103(4), e244-e248.
- Hudson, S., & Elliott, C. (2013). Measuring the impact of product placement on children using digital brand integration. *Journal of Food Products Marketing*, 19(3), 176-200.
- Kelly, B., Bauman, A. E., & Baur, L. A. (2014). Population estimates of Australian children's exposure to food and beverage sponsorship of sports clubs. *Journal of Science and Medicine in Sport*, 17(4), 394-398.
- Kelly, B., Cretikos, M., Rogers, K., & King, L. (2008). The commercial food landscape: Outdoor food advertising around primary schools in Australia. *Australian and New Zealand Journal of Public Health*, 32(6), 522-528.
- Kelly, B., Halford, J. C., Boyland, E. J., Chapman, K., Bautista-Castaño, I., Berg, C., . . . Summerbell, C. (2010). Television food advertising to children: A global perspective. *American Journal of Public Health*, 100(9), 1730-1736.
- Laperrière, J.-P. (2009). Analyse comparative de la forme des messages publicitaires pouvant s'adresser aux enfants. (Maîtrise en Sociologie) Université du Québec à Montréal.

- Lebel, E., Hamelin, A.-M., Lavallée, M., Bédard, A., & Dubé, A. (2005). Publicité télévisée sur les aliments visant les enfants québécois. *Communication. Information médias théories pratiques*, 24(1), 65-85.
- Lee, N. R., & Kotler, P. (2011). *Social marketing: Influencing behaviors for good*: Thousand Oaks, CA: Sage.
- Leibowitz, J., Rosch, J., Ramirez, E., Brill, J., & Ohlhausen, M. (2012). A review of food marketing to children and adolescents: Follow-up report. *Washington (DC): US Federal Trade Commission*.
- Murray, C. (2014). *Examining the Nutritional Content of Prepackaged Foods and Beverages Marketed to Children in Canada*. (Master of Science), University of Toronto.
- Norman, J., Kelly, B., Boyland, E., & McMahon, A.-T. (2016). The impact of marketing and advertising on food behaviours: Evaluating the evidence for a causal relationship. *Current Nutrition Reports*, 5(3), 139-149.
- Office de la protection du consommateur. (2012). *Advertising Directed at Children under 13 Years of Age: Guide to the Application of Sections 248 and 249 Consumer Protection Act*. Quebec City, Quebec: Gouvernement du Quebec.
- Ohri-Vachaspati, P., Isgor, Z., Rimkus, L., Powell, L. M., Barker, D. C., & Chaloupka, F. J. (2015). Child-Directed Marketing Inside and on the Exterior of Fast Food Restaurants. *American Journal of Preventive Medicine*, 48(1), 22-30.
- Palakshappa, D., Fiks, A. G., Faerber, J. A., & Feudtner, C. (2016). Association between state school nutrition laws and subsequent child obesity. *Preventive Medicine*, 90, 107-113.

- Potvin Kent, M., Dubois, L., Kent, E., & Wanless, A. (2013). Internet marketing directed at children on food and restaurant websites in two policy environments. *Obesity, 21*(4), 800-807.
- Potvin Kent, M., Dubois, L., & Wanless, A. (2011a). Food marketing on children's television in two different policy environments. *International Journal of Pediatric Obesity, 6*, e433-e441.
- Potvin Kent, M., Dubois, L., & Wanless, A. (2011b). Self-regulation by industry of food marketing is having little impact during children's preferred television. *International Journal of Pediatric Obesity, 6*(5-6), 401-408.
- Potvin Kent, M., Dubois, L., & Wanless, A. (2012). A nutritional comparison of foods and beverages marketed to children in two advertising policy environments. *Obesity, 20*(9), 1829-1837.
- Potvin Kent, M., Martin, C. L., & Kent, E. A. (2014). Changes in the volume, power and nutritional quality of foods marketed to children on television in Canada. *Obesity, 22*(9), 2053-2060.
- Potvin Kent, M., & Wanless, A. (2014). The influence of the Children's Food and Beverage Advertising Initiative: Change in children's exposure to food advertising on television in Canada between 2006-2009. *International Journal Of Obesity, 38*(4), 558-562.
- Public Health Agency of Canada. (2011). Overview: Curbing childhood obesity. A federal, provincial and territorial framework for action to promote healthy weights.
- Raine, K. D., Lobstein, T., Landon, J., Kent, M. P., Pellerin, S., Caulfield, T., . . . Spence, J. C. (2013). Restricting marketing to children: Consensus on policy interventions to address obesity. *Journal of Public Health Policy, 34*(2), 239-253.

Statistics Canada. (2004). Table 3. Percentage of calories, fat, protein and carbohydrates from “other foods,” by selected characteristics, household population aged 4 or older, Canada excluding territories, 2004. In C. Canadian Community Health Survey, Nutrition (2004). Government of Canada.

Statistics Canada. (2011, July 12). General Social Survey - 2010 Overview of the Time Use of Canadians: Highlights. Retrieved from <http://www.statcan.gc.ca/pub/89-647-x/2011001/hl-fs-eng.htm>

Statistics Canada. (2015a). Live births, by sex and geography. In CANSIM Table102-4512: Canadian Vital Statistics, Government of Canada.

Statistics Canada. (2015b). Population by sex and age group. In CANSIM Table051-0001: Canadian Vital Statistics, Government of Canada.

Velazquez, C. E., Black, J. L., & Ahmadi, N. (2015). Food and beverage promotions in Vancouver schools: A study of the prevalence and characteristics of in-school advertising, messaging, and signage. *Preventive Medicine Reports*, 2, 757-764.

Whitelaw, S., Baxendale, A., Bryce, C., MacHardy, L., Young, I., & Witney, E. (2001). ‘Settings’ based health promotion: A review. *Health Promotion International*, 16(4), 339-353.

World Health Organization. (1986). *The Ottawa Charter For Health Promotion: First international conference on health promotion, Ottawa, 21 November 1986.*

World Health Organization. (2012). A framework for implementing the set of recommendations on the marketing of foods and non-alcoholic beverages to children.

World Health Organization. (2013). Marketing of foods high in fat, salt and sugar to children: update 2012-2013. *Copenhagen, Denmark: WHO Regional Office for Europe.*



## CHAPTER 3 – RESULTS STUDY 1

### **Reliability and validity of a novel tool to comprehensively assess food and beverage marketing in recreational sport settings**

*A version of this has been published as Prowse, R. J., Naylor, P. J., Olstad, D. L., Carson, V., Mâsse, L. C., Storey, K., Kirk, S. F. L., & Raine, K. D. (2018). Reliability and validity of a novel tool to comprehensively assess food and beverage marketing in recreational sport settings. *International Journal of Behavioral Nutrition and Physical Activity*, 15(1), 38.*

#### **Background**

Scientific evidence indicates that unhealthy food marketing is a cause of childhood obesity (World Health Organization, 2016a). A systematic review of over 100 studies found modest to strong causal evidence that unhealthy food promotion affected children's food knowledge, preferences, purchases, consumption, and diet-related health (Cairns et al., 2013). Children around the world are exposed to food marketing that originates in and outside of their home country, thus protecting children from unhealthy food marketing is a local and international issue (World Health Organization, 2010b).

The World Health Organization (WHO, 2016b) report of the Commission on Ending Childhood Obesity states that “settings where children and adolescents gather (such as schools and sport facilities or events) ...should be free of marketing of unhealthy foods and sugar-sweetened beverages” (p.18) as a means to reduce and prevent childhood obesity and promote optimal diets. One example of a place where children gather is recreation and sport facilities, which promote physical activity. Recreation and sport facilities represent ideal settings for population health interventions since thousands of children visit these sites to participate in physical activity (Kelly, Bauman, et al., 2014). Recreation and sport facilities are particularly crucial settings in which to measure food marketing because of the common food industry practice of emphasizing physical activity as a solution to obesity (Brownell & Warner, 2009a;

Kirk, Penney, & Freedhoff, 2010). Since many recreation and sport facilities are publicly funded, it is important that these settings offer and promote healthy food (Olstad & Raine, 2013). While modifications to the food environment in settings such as schools have received greater attention, there is increasing evidence that foods sold, marketed, and consumed by children in recreation and sport settings are not consistent with dietary guidelines (Boelsen-Robinson et al., 2017; Naylor, Wekken, Trill, & Kirbyson, 2010; Olstad, Lieffers, Raine, & McCargar, 2011; Olstad, Poirier, Naylor, Shearer, & Kirk, 2015; Olstad, Raine, & McCargar, 2012).

The WHO called upon member states to measure the nature and extent of food and beverage marketing to children in their countries as a preliminary step to generating policy (World Health Organization, 2010b). However, current methods of measuring food marketing to children do not capture all marketing channels through which children may be exposed to food marketing (i.e. television, internet, product packaging, placement) (Kelly et al., 2013) and most were not designed to assess food marketing specifically in settings where children gather, such as recreation and sport facilities. In addition, no current methods collectively capture the impact of the four main marketing approaches: product, place, promotion and price (i.e. the 4Ps). The 4Ps represent marketing approaches that commercial and social marketers mix strategically to effectively persuade individuals to think or behave in a certain way (Lee & Kotler, 2011). Comprehensive measurement of the 4Ps across multiple marketing channels may reveal the intensity of food marketing that children may be exposed to in real life settings.

Without attention to the breadth and depth of potential food marketing channels and approaches in children's settings, existing food environment assessment tools used in schools (Craypo, Samuels, & Samuels and Associates, 2006; Velazquez et al., 2015), restaurants (Saelens, Glanz, Sallis, & Frank, 2007), and stores (Ghirardelli, Quinn, & Sugerman, 2011;

Hosler & Dharssi, 2011; Laska, Borradaile, Tester, Foster, & Gittelsohn, 2010) fall short of capturing a full picture of the food marketing environment. First, some tools only measure a single marketing approach: Velazquez et al. (2015) measured only promotions (one of the 4Ps) in schools; Hosler & Dharssi (2011) only measured one marketing channel (exterior window advertisements) in stores. On the other hand, other tools collect minimal details on multiple marketing approaches perhaps because measuring food marketing was not the primary purpose of these tools. For example, in restaurants, Saelens et al. (2007) used only a few questions to measure place, price, and promotion. In stores, Laska et al. (2010) measured place and promotion only. Furthermore, some tools dichotomize the presence or absence of food marketing without considering the intensity of marketing in an area (Craypo et al., 2006; Ghirardelli et al., 2011; Laska et al., 2010). Finally, only a few tools have been tested for reliability (Ghirardelli et al., 2011; Hosler & Dharssi, 2011; Saelens et al., 2007; Velazquez et al., 2015) and none have been tested for validity.

To better understand the nature and extent of food marketing within settings where children gather, we developed a theoretically grounded, evidence-informed observational Food and beverage Marketing Assessment Tool for Settings (FoodMATS). The FoodMATS provides a novel method to measure food marketing by gathering and scoring detailed information on numerous food marketing approaches and channels children may be exposed to. This study tested the inter-rater reliability of the FoodMATS indicators and evaluated validity of its scoring algorithm by evaluating convergence between FoodMATS scores and facility sponsorship dollars, and between FoodMATS scores and unhealthy food sales.

## Methods

### *Setting, Participants & Measures*

Data were collected as part of the Eat Play Live (EPL) study investigating food environments in public recreation facilities in four provinces in Canada. To be eligible to participate facilities must: (1) have provided food services through vending or concession (such as a canteen, snack bar, café, or restaurant), (2) had not made major changes to their food environment since 2010, (3) be able to make changes to their food environment (as the facility may be randomly assigned to a capacity-building intervention to improve food environments, not discussed here), and (4) had year-round sport programming. Recreation facilities were recruited between August 2015 and May 2016 by provincial partners through newsletters, email, and conference sessions; the EPL research team followed up with managers of facilities within proximity of universities only due to logistical constraints of the above mentioned planned intervention (not discussed here) by telephone and/or personal emails.

Forty-nine of the 286 facilities contacted by the EPL team agreed to participate. Of the remaining, 141 did not respond to the invitation; 70 were not eligible; 11 refused without reason; 15 refused with reason [insufficient staff capacity (n=11), uninterested in research (n=2), risk of being a control site (n=1), worried about competition (n=1)]. Food and beverage marketing was measured in 51 sites (two facilities operated two buildings each that were geographically separated; we treated each building as an individual site rather than combining the sites since a patron would usually only visit one site at a time, resulting in 51 sites from 49 facilities). The sample size was determined by a priori power calculations with G\*Power (v3.1), which determined that at least 43 sites were required to detect a medium-large effect in the availability of healthy and unhealthy foods and beverages in vending machines with 80% power.

## FoodMATS Development of Tool and Scoring Algorithm

The FoodMATS was developed to capture overall exposure to food marketing in recreation facilities, what products (tangible food or beverage item), brands (name or symbol that represents the maker of a product), and retailers (place where food can be purchased, such as a store or restaurant) were marketed, where food marketing was placed, and whether persuasive marketing techniques were used. The scope and content of the FoodMATS was informed by previous research measuring: (a) food marketing by marketing channel (Kelly et al., 2013); (b) food marketing within schools (Craypo et al., 2006; Velazquez et al., 2015), restaurants (Saelens et al., 2007), and stores (Ghirardelli et al., 2011; Hosler & Dharssi, 2011; Laska et al., 2010); (c) food marketing targeted to children (Cairns et al., 2013; Elliott, 2012b) and (d) sports-related food environments and marketing (Kelly, Baur, et al., 2010; Wolfenden et al., 2015).

Two conceptual models from business (Perreault Jr, McCarthy, & Cannon, 2006) and population health (World Health Organization, 2012) informed the content and scoring of the FoodMATS. First, the 4Ps marketing mix (Perreault Jr et al., 2006), was used to identify the breadth of marketing approaches to be assessed by the FoodMATS that may be present in a recreation facility (Table 1). Secondly, the WHO's *Exposure and Power of Marketing Messages* model (World Health Organization, 2012) informed the depth of information collected by the FoodMATS (Table 2). This model explains how the impact of food and beverage marketing to children on food preferences, purchases, and consumption depends on the exposure and power of marketing messages, where exposure is "the reach and frequency of the marketing message", and power is "the creative content, design and execution of the marketing message" (p.11). As the WHO model provides only broad definitions of exposure and power, we developed our own evidenced-based operational definitions for the FoodMATS.

We used the count and repetition of food marketing to represent ‘exposure’ of food marketing (Table 1). Based on previous research suggesting that certain marketing techniques have unique or strong impacts on food choice (described below), we used the healthfulness of the product, brand, retailer marketed, use of child-targeted and sports-related marketing techniques, and size of each marketing occasion as FoodMATS indicators to represent the ‘power’ of food marketing (Table 1).

Unhealthy food marketing is considered ‘powerful’ since children have an innate desire for nutrient poor foods and immediate gratification and are thus less able to resist unhealthy food marketing (Harris & Graff, 2012). Experimental research found that children preferred less healthy foods and beverages over more healthy options even when the more healthy option was marketed to them with licensed characters (Ogle, Graham, Lucas-Thompson, & Roberto, 2017).

Targeting of children in food marketing through characters, appeals of taste, humour, action-adventure, fantasy and fun, and incentives (giveaways) are common practices worldwide (Cairns et al., 2013) and should be monitored (Kelly et al., 2013). We considered marketing techniques that target children ‘powerful’ since children’s cognitive immaturity makes them vulnerable to the effects of marketing (Elliott, 2012a). Child-targeted marketing techniques, such as fun product packaging (Elliott, 2012b), toy premiums (Hobin et al., 2012), and games (Brady et al., 2008) have been shown to impact children’s and parents’ desire to consume and purchase advertised foods.

Sports-related food marketing techniques, such as using themes of physical activity or exercise, are also considered ‘powerful’ because they have shown to impact product perceptions in adults and children (Castonguay, 2015a; Folta et al., 2006; Van Kleef et al., 2011). For example, children who reviewed a commercial for sugary cereal that contained some aspect of

physical activity had more positive reactions to the cereal and believed the cereal to be healthier than the children who viewed the cereal commercial with no reference to physical activity (Castonguay, 2015a).

Finally, size is considered a ‘powerful’ feature since marketing eye tracking research found that the larger the advertisement, the more attention the viewer paid to it (Smit, Boerman, & van Meurs, 2015).

The final FoodMATS included 37 marketing items, including 26 locations and 11 pricing indicators (Table 5). A copy of the FoodMATS tool can be found in Additional File 1. For each marketing item, the rater recorded:

- (a) the presence of food or beverage marketing occasions by item;
- (b) the count of food and beverage marketing occasions by area;
- (c) the product, brand, retailer identified in the marketing occasion;
- (d) whether the marketing occasion was child-targeted;
- (e) whether the marketing occasion was sports-related; and
- (f) the size of the marketing occasion.

During data collection, raters used a priori definitions to classify each marketing occasion as child-targeted, and/or sports-related, as well as its physical size (Table 6). After data collection, we classified marketing occasions by healthfulness (described in Data Collection).

**Table 5 FoodMATS Operational Definitions of 4Ps Marketing Mix**


---

<b>Product</b>	<ul style="list-style-type: none"> <li>• Food or beverages available for purchase in concessions or vending machines or the food or beverage product, brand, or retailer marketed in the recreation facility (whether or not it was available within the recreation facility).</li> <li>• Classified as “Most Healthy”, “Less Healthy”, or “Least Healthy” foods or beverages (Table 6).</li> </ul>
<b>Price</b>	<ul style="list-style-type: none"> <li>• Monetary cost of food and beverages available in vending machines and concessions located within the recreation facility.</li> <li>• The FoodMATS includes 11 pricing indicators: four were related to overeating or rewards for repeat visits; seven compared prices of healthy and unhealthy food and beverage options.</li> <li>• Pricing indicators were classified as “Least Healthy” if pricing encouraged overeating, repeat visits, or unhealthy options (e.g. sugar sweetened drinks) were cheaper than healthy options (e.g. water).</li> </ul>
<b>Place</b>	<ul style="list-style-type: none"> <li>• Physical location of where food and beverages are placed or marketed.</li> <li>• The FoodMATS includes 26 locations (e.g. windows, scoreboards, checkouts) where food marketing may be found in the recreation facility.</li> <li>• All locations were grouped into three facility areas: food (concession), sports, and other (entrance, hallways, outside).</li> </ul>
<b>Promotion</b>	<ul style="list-style-type: none"> <li>• Advertising, messaging, or communication to persuade recreation facility users to purchase, use, or consume any food or beverage or to increase brand awareness.</li> <li>• Used by raters to identifying the presence and count of food marketing occasions.</li> </ul>

---



**Table 6 FoodMATS Operational Definitions of Exposure and Power of Marketing**

<b>Exposure</b>	<b>Frequency</b>	<b>Number of food or beverage marketing occasions.</b> A marketing occasion was defined as any commercial advertising, promotion, or messaging of food or beverage products, brands, retailers (i.e. restaurant) that is intended to increase the “recognition, appeal and/or consumption” of such products/ brands (World Health Organization, 2012, p.9). Excludes product packaging.		
	<b>Repetition</b>	<b>Number of products, brands, retailers that are recorded three or more times per facility during the observational audit.</b>		
<b>Power</b>	<b>Content</b>	<b>Healthfulness of product, brand, or retailer that is promoted.</b> Classified by ordered categories for products/brands, and retailers.  <u>Product/Brands:</u> “Most Healthy”= unprocessed food/beverages with no added fat, sugar or salt; “Less Healthy”= some added fat, sugar, or salt; “Least Healthy”= processed energy-dense, nutrient-poor items with high levels of fat, sugar, or salt.  <u>Retailers:</u> “Most Healthy”= grocery stores, farmers’ markets, salad bars, sandwich outlets, smoothie outlets; “Less Healthy”= sit-down restaurants, cafeterias, coffee outlets, prepared grocery stores, supplement stores; “Least Healthy”= pizza, burger, taco, fried chicken, Asian, and ice cream outlets, pubs/lounges/alcohol stores.		
	<b>Design</b>	<b>Use of child-targeted techniques and/or inclusion of sports-related theme in promotion.</b> <sup>1</sup> Recorded as present or absent. <u>Child-targeting techniques</u> were those that had evidence of animated or fictional characters, taste appeals, humour, action-adventure, fantasy, fun (shapes, colours), competitions, give-aways, (Cairns et al., 2013) cartoonish font (Elliott, 2012b), or that used a child actor <sup>2</sup> to advertise a food or beverage product/brand that would appeal to children. <u>Sports-related techniques</u> were those that had any reference to physical activity, exercise, sport, game, recreation, performance or competition <sup>3</sup> .		
	<b>Execution</b>	<b>Physical size of the promotion.</b> <sup>1</sup> Recorded as ordered categories, using different size requirements for outdoor and indoor marketing occasions.  <u>Outdoor (Ghirardelli et al., 2011):</u> Small < 1 letter sheet piece of paper (8.5 X 11 in); Medium 1-10 letter size sheets of paper together; Large >10 pieces of letter size sheets of paper together		
		<u>Indoor (Velazquez et al., 2015):</u> Small < 1 letter sheet piece of paper (8.5 X 11”); Medium 1-3 letter size sheets of paper together; Large >3 letter size sheets of paper together		

<sup>1</sup> Excluded for some pricing and place marketing occasions;<sup>2</sup> added post pilot after this technique was identified<sup>3</sup>a design feature relevant to sport settings

The exposure and power of food marketing recorded were used to derive a FoodMATS score for each site. Points were assigned for the frequency of observed food marketing occasions and the proportion of marketing occasions with ‘powerful’ characteristics in each area (food, sport, other). Site scores were generated by summing area scores and adding a repetition factor for the number of products, brands, or retailers marketed repeatedly in the entire site (see Additional File 2 for more information on scoring). Higher scores represent settings with greater exposure and more powerful food marketing which, according to the WHO’s *Exposure and Power of Marketing Messages* theory (World Health Organization, 2012), may identify environments that may be more harmful on children’s food preferences, purchases, and consumption.

### ***Data Collection***

#### *Inter-rater Reliability Testing*

Inter-rater reliability of the FoodMATS was tested by five raters. Five urban public recreation facilities that offered food through vending machines and/or concessions were selected for testing in October-November 2015. Facilities of different sizes and sport offerings were selected to investigate the use of the FoodMATS in different types of recreation and sport settings. Two independent trained raters completed the FoodMATS at the same facility on the same day and photographed each food marketing occasion.

#### *EPL Baseline – Validity Testing*

Following inter-rater reliability testing, the FoodMATS was completed in 51 EPL sites between December 2015 and April 2016 by a trained rater. Food and beverage marketing was photographed and recorded in food (concession) areas, sports areas, and other general areas (entrance, hallways, bathrooms, parking lot) of the site. Specialty areas (i.e. theatres, day cares,

meeting rooms, etc.) were not audited. All marketing occasions recorded were checked by the first author (RP) against photos taken to confirm marketing frequency, the product, brand, retailer marketed, use of child-targeting and sports-related marketing techniques, and size. Inconsistencies were resolved via a consensus process with the rater and the first author, including another investigator (KR) if necessary.

One registered dietitian (RP) independently classified the healthfulness of every food and beverage product, brand, and retailer recorded in the FoodMATS for all 51 sites, which was checked by a second registered dietitian (KR). We used ordered classes to rank food and beverage products, brands, and retailers (“Most Healthy”, “Less Healthy”, or “Least Healthy”) (Table 6) which paralleled provincial nutrition guideline categories (Alberta Health and Wellness, 2010; Government of Nova Scotia, 2015; British Columbia Ministry of Health, 2014) which assess food and beverage healthfulness according to nutrient and ingredient content per reference size (see Appendix D; we could not use exact provincial guideline categories due to lack of detailed nutrient information for many products marketed in recreation facilities. Given that it was not feasible to collect and analyze nutrient content of all products marketed, several simplifying assumptions were made for the purposes of classifying products as more or less healthy (see Appendix E). If needed, the Canadian Nutrient File (<https://food-nutrition.canada.ca/cnf-fce/index-eng.jsp>) or product company websites were used to obtain more information about foods and beverages. Brands were ranked as per the product rankings described above for the product the brand most closely represented (e.g. Coca-Cola is known for sweetened soft drinks; Aquafina is known for water). The healthfulness of food retailers was assessed according to rankings of healthfulness of food retailers by Minaker et al. (2009) which were ranked based on their relative availability of healthy food and preparation methods. When

retailers not evaluated by Minaker et al. (2009) were recorded on the FoodMATS, we placed retailers into the three categories as per their most prominent product sold based on the retailers' name and menu (e.g. fried chicken for a fast food retailer called Mary Brown's Chicken & Taters, ice cream for a fast food retailer called Dairy Queen). Each site was assigned a FoodMATS score based on the exposure and power of food marketing recorded.

Two weeks of food and beverage sales data that did not include an unusual day (e.g. tournament or site closure) were requested from all vending and concession operators from all 51 sites. Foods and beverages recorded on concession sales data were classified with the same ordinal classification scheme described for the FoodMATS products by two registered dietitians; any disagreements were resolved by a third dietitian. Since detailed product nutrient information was available for items in vending machines from a public database, Brand Name Food List (<https://bnfl.healthlinkbc.ca/>), provincial nutrition guidelines from each site's respective province was used to classify products (except for vending machines in the non-guideline province). Products in vending machines from the non-guideline province were classified according to British Columbia's provincial nutrition guidelines. Specifically, foods and beverages classified as "Do Not Sell" in British Columbia (Ministry of Health, 2014) and Ontario, "Choose Least Often" in Alberta (Alberta Health and Wellness, 2010), and "Minimum" in Nova Scotia (Government of Nova Scotia, 2015) represented "Least Healthy" vending sales. Total "Least Healthy" sales equaled the sum of "Least Healthy" sales from concession and vending for sites that had data for both available (when applicable). We adjusted all concession, vending, and total sales to represent one week of sales per site. Based on the *Exposure and Power of Marketing Messages* model, marketing is expected to impact food preferences, purchases, and consumption

(World Health Organization, 2012), therefore we hypothesized that FoodMATS scores should explain some variability in unhealthy food sales.

Total and food-related sponsorship dollars facilities that were received by facilities during the 2015/2016 fiscal year were requested from a subset of 27 volunteer sites in two provinces (BC, AB). We defined sponsorship dollars as dollars paid by outside companies to support facility operations and/or to advertise in and around a facility. Food-related sponsorship dollars were dollars provided by food retailers. Since sport sponsorship is usually combined with on site ads, signs, and displays (O'Reilly & Horning, 2013), we hypothesized that higher FoodMATS scores would be correlated with higher food-related sponsorship dollars.

### ***Data Analysis***

#### *Inter-rater Reliability*

Data were entered and cleaned in Microsoft Excel 2013. Statistical Package for the Social Sciences Version 23 (SPSS Inc., Chicago, IL, USA) was used for all statistical analyses with  $p < 0.05$  indicating statistical significance. Agreement between the two raters for each site was assessed based on whether raters agreed food marketing was present or absent per item and the count of marketing occasions per area (food, sport, other). For marketing occasions that were identified by both raters, we tested whether raters agreed on what product, brand, or retailer was marketed, and whether the marketing occasion was children-targeted and/or sports-related, and its physical size.

Percent agreement (McHugh, 2012) for these items was calculated by determining the proportion of occasions of perfect agreement out of all possible occasions. Cohen's kappa ( $\kappa$ ) was used to determine agreement between raters on categorical data (unweighted  $\kappa$  for nominal data; weighted  $\kappa_w$  for ordinal data). The interpretation of Cohen's kappa was as follows: 0.0-0.2

fair, 0.21-0.40 poor; 0.41-0.60 moderate; 0.61-0.80 good; 0.81-1.00 very good agreement (Altman, 1991). Intra class correlations (ICC) were used to determine consistency between raters for continuous data (Landers, 2015; Scholtes, Terwee, & Poolman, 2011). Continuous data were square root transformed to improve normality. Two-way random ICC (Landers, 2015) were completed on the transformed data. The ICC was interpreted as follows: <0.40 poor; 0.40-0.59 fair; 0.60-0.74 good; 0.75-1.00 excellent (Cicchetti, 1994). The ICC for using the measure with 1 rater are reported.

### *Validity*

FoodMATS scores, total and food-related sponsorship dollars, and weekly sales of “Least Healthy” foods and beverages for concessions, vending, and in total were entered into Statistical Package for the Social Sciences Version 24 (SPSS Inc., Chicago, IL, USA) for analysis with  $p < 0.05$  indicating statistical significance.

First, validity of FoodMATS scores was tested by using Pearson’s Product Moment correlations, which correlated the FoodMATS scores with total and food sponsorship dollars. To improve normality, FoodMATS scores and food sponsorship dollars were transformed by taking the square root of the data. One outlier was truncated for FoodMATS score and food sponsorship dollars to one point above the next closest value below 3 standard deviations in the data set to reduce its effect (Carson & Kuzik, 2017; Tabachnick, 2013). We ran partial Pearson’s Product Moment correlations controlling for site size, defined as the number of concessions and number of sports areas per site.

Next, validity of FoodMATS scores was tested using by sequential multiple linear regression to examine associations between the dependent variables (concession, vending, and total “Least Healthy” sales) and the explanatory variable (FoodMATS). Site size (as defined

above) was entered as Model 1 as a controlling variable, then FoodMATS scores were added to site size for Model 2. We square root transformed the “Least Healthy” sales which resulted in normal distributions of the residuals.

We used “Least Healthy” sales because the majority of marketing occasions were “Least Healthy” and FoodMATS scores increased with greater proportions of “Least Healthy” marketing occasions. Additionally, the availability of “Most Healthy” products for sale was very low relative to “Least Healthy” products in most sites, possibly obscuring relationships between marketing and sales of “Least Healthy” products due to limited availability.

To assess the impact of missing data, independent t-tests were used to assess if there were differences in the mean FoodMATS scores between sites that provided sponsorship and sales data and those that did not.

## **Results**

### ***Reliability***

Inter-rater reliability results can be found in Table 7. Percent agreements were high for all components evaluated except for identifying the same count of marketing occasions by area (61%). However, the ICC for identifying the same count of marketing occasions per area was excellent. Raters also had very good agreement on identifying the presence of marketing. For marketing occasions identified by both raters, there was very good agreement for identifying the product, brand, retailer marketed, the presence of child-targeted and sports-related features, and its size.

**Table 7 Inter-rater reliability statistics from pilot testing FoodMATS**

Reliability Component	n	Percent	
		Agreement	Inter-rater reliability coefficients
(a) Presence of food marketing by item	464	92.2%	$\kappa = 0.875$ (95% CI 0.847, 0.903)***
(b) Count of food marketing occasions by area	28	61.1%	ICC (2, 2) = 0.934 (95% CI (0.808, 0.978)***
(c) Product marketed <sup>a</sup>	218	100.0%	$\kappa = 1.00$ (95% CI 1.000,1.000)***
(d) Child-targeted marketing <sup>a</sup>	184	100.0%	$\kappa = 1.00$ (95% CI 1.000,1.000)***
(e) Sports-related marketing <sup>a</sup>	184	98.9%	$\kappa = 0.941$ (95% CI 0.883, 0.999)***
(f) Physical Size <sup>a</sup>	180	92.2%	$\kappa_w = 0.911$ (95% CI 0.846, 0.976)***

\*\*\* p&lt;0.001

<sup>a</sup> when both raters identified that food marketing was present**FoodMATS Score Validity**

Median and interquartile ranges of sponsorship, sales, facility size, and FoodMATS scores can be found in Table 8.

**Table 8 Descriptive statistics of “Least Healthy” food and beverage sales and FoodMATS scores**

Variable	N	Median	Interquartile Range <sup>a</sup>
<i>Facility Sponsorship Dollars</i>			
Total Sponsorship (\$)	16	15452.50	7630.50, 32825.00
Food Sponsorship (\$)	18	1350.00	0.00, 4120.50
<i>“Least Healthy” Food and Beverages</i>			
<i>Sales</i>			
Total Sales (\$)	21	1100.35	290.32, 2521.94
Concession Sales (\$)	30	1515.94	466.82, 2354.15
Vending Sales (\$)	23	280.53	121.00, 567.58
<i>Facility Size</i>			
Concessions (n)	51	1	1, 1
Sports Areas (n)	51	3	2, 5
<i>Marketing Scores</i>			
FoodMATS (points)	51	43.3	18.6, 71.0

<sup>a</sup>25<sup>th</sup> percentile, 75<sup>th</sup> percentile



### *Association with sponsorship dollars*

Sixteen facilities (64.0%) provided the total sponsorship dollars received annually. Eighteen facilities (72.0%) provided food sponsorship dollars received annually. FoodMATS scores were linearly correlated with food sponsorship dollars ( $r=0.900$ ,  $p < 0.001$ ) but not with total sponsorship dollars ( $r=0.390$ ,  $p = 0.136$ ) (using raw data), thus no further analysis with total sponsorship was completed. There was a strong positive correlation between FoodMATS and food sponsorship dollars ( $r=0.815$ ,  $p < 0.001$ ;  $\rho=0.842$ ,  $p < 0.001$ ). After controlling for facility size, the correlation between FoodMATS and food sponsorship dollars remained strong ( $r=0.863$ ,  $p < 0.001$ ). There were no differences in mean FoodMATS scores between sites that provided food sponsorship dollars and sites that did not ( $p=0.895$ ).

### *Predicting sales of less “healthful” food and beverage items*

Thirty-four concessions (70.8%) provided concession sales for 2 weeks. Four concessions were excluded due to poorly itemized sales data which inhibited classification of products sold by healthfulness, resulting in 30 sites for the final sample size for concession sales. Thirty-seven sites (75.5%) provided vending sales data. Data from 14 sites were excluded (seven had poorly itemized sales data which inhibited classification of products sold by health; seven provided incomplete sales data), resulting in a final sample size for analysis of vending sales from 23 sites. Twenty-one sites (41.2%) had complete sales data for vending and concessions. There were no differences in mean FoodMATS scores between sites that did and did not provide concession ( $p=0.881$ ), vending ( $p=0.563$ ), and total sales ( $p=0.726$ ).

In the initial regression analysis, FoodMATS scores and number of concessions were highly correlated ( $r > 0.7$ ) and the number of concessions was not predictive of “Least Healthy” sales in the concession ( $r=0.224$ ,  $p=0.097$ ) so we excluded number of concessions as a predictor

of FoodMATS scores (Pallant, 2013) and re-ran the regression models. Regression results can be found in Table 9. Model 1 (facility size defined as the number of sports areas) significantly predicted “Least Healthy” sales in concessions, vending, and in total. Model 2 (FoodMATS scores and facility size) did not significantly predict “Least Healthy” sales in vending, but significantly predicted “Least Healthy” sales in concessions and in total; explaining 45.1% and 42.8% of the variance of “Least Healthy” sales in concessions and in total, respectively. The FoodMATS score significantly explained an additional 13.8% of the variability in sales of “Least Healthy” items in concessions ( $F$  change (1, 27) = 7.300,  $p=0.012$ ) and 23.5% of the variability in total sales ( $F$  change (1, 18) = 8.485,  $p=0.003$ ).

We tested the robustness of the regression results by evaluating whether food marketing outside of the concession, FoodMATS scores from non-food areas (Sports, and Other), predict “Least Healthy” sales in the concession. Sport area FoodMATS scores significantly predicted “Least Healthy” sales in concessions ( $\beta=0.285$ , 95% CI 0.085-0.485,  $p=0.007$ ). Other area FoodMATS scores also significantly predicted “Least Healthy” sales in concessions ( $\beta=0.643$ , 95% CI 0.111-1.175,  $p=0.020$ ). On the other hand, Food area FoodMATS scores on their own were not associated with ( $r=0.294$ ,  $p=0.057$ ), suggesting that evaluating food marketing in the whole setting, not just food areas, is critical to understand how food marketing in recreation and sport facilities may impact food and beverage sales.

**Table 9 Sequential multiple regression analyses predicting square root transformed weekly sales of "Least Healthy" foods and beverages from FoodMATS scores and facility size**

Predictor	Beta <sup>a</sup> (95% confidence interval)	Beta <sup>b</sup> (95% confidence interval)	R <sup>2</sup> (adjusted)	R <sup>2</sup> change (adjusted)	F
Concession sales (n=30)					
Model 1: <i>Facility Size</i>			0.328**	0.351**	15.149**
Number of Sports Areas	0.593** (2.42-7.79)	0.517** (1.97-6.94)			
Model 2: <i>Marketing Scores</i>			0.451***	0.138*	12.929***
FoodMATS Score		0.379** (0.03-0.24)			
Vending sales (n=23)					
Model 1: <i>Facility Size</i>			0.184*	0.221*	5.960*
Number of Sports Areas	0.470* (0.37-4.66)	0.448* (0.17-4.63)			
Model 2: <i>Marketing Scores</i>			0.156	0.012	3.038
FoodMATS Score		0.111 (-0.07-0.12)			
Total (concession and vending sales) (n=21)					
Model 1: <i>Facility Size</i>			0.210*	0.250*	6.329*
Number of Sports Areas	0.500* (1.12-12.16)	0.505** (1.98-11.42)			
Model 2: <i>Marketing Scores</i>			0.428**	0.235*	8.485**
FoodMATS Score		0.485* (0.04-0.29)			

<sup>a</sup> Standardized regression coefficients without marketing scores entered into the regression

<sup>b</sup> Standardized regression coefficients with marketing scores entered into the regression

\*p<0.05. \*\*p<0.01. \*\*\*p<0.001.

## **Discussion**

The FoodMATS tool performed well in both reliability and validity analyses. These findings suggest that individual raters collected very similar data when completing the FoodMATS and the scores assigned to each site represent constructs of the food marketing environment related to exposure, power, and impact.

### ***Reliability***

Measures of inter-rater reliability were very good to excellent. The measures of reliability were chosen to reflect how the information would be interpreted for scoring which means that the consistency between raters identifying marketing frequency and characteristics should translate to consistency in FoodMATS scores. Providing specific operational definitions of marketing components and adequate training may have contributed to these positive results.

The percent perfect agreement may have been lower for the count of marketing occasions per area than for other reliability measures as raters may have different interpretations of what one occasion meant. For example, one rater may interpret three of the same beverage logos on a vending machine as three marketing occasions, whereas the other rater may record that as one. Despite the low percent perfect agreement, the ICC for the count of marketing occasions per area was excellent suggesting that even though raters did not always count the exact same number of marketing occasions their counts were close. For example, rater 1 may have counted 17 marketing occasions in one area and rater 2 counted 18.

The inter-rater reliability of the FoodMATS is comparable to other settings-based food environment tools, including the Nutrition Environment Measures Survey in Restaurants (NEMS-R) (Saelens et al., 2007), and in grab-and-go establishments (NEMS-GG) (Lo, Minaker, Chan, Hrgetic, & Mah, 2015). In a study documenting food and beverage promotions in schools,

Velazquez et al. (2015) had almost perfect inter-rater reliability for most items, similar to this study. The FoodMATS tool had better inter-rater reliability than a tool measuring number of healthy and less healthy outdoor store promotions ( $\kappa = 0.37-65$ ) and presence of healthy and less healthy advertisements or products at store checkouts (ICC=0.466-0.697) (Ghirardelli et al., 2011). The FoodMATS may have performed superiorly because each marketing feature was assessed individually, whereas Ghirardelli et al. (2011) combined multiple constructs (frequency, size, and healthfulness) into one item when documenting marketing and assessing inter-rater reliability.

### ***FoodMATS Scores Validity***

#### *Association with sponsorship dollars*

Total sponsorship and FoodMATS scores were not linearly related as there were some sites that received high amounts of sponsorship funding from third parties that had low FoodMATS scores (lower exposure to food marketing and/or less powerful marketing), and other sites had low amounts of sponsorship funding with high FoodMATS scores (greater exposure to food marketing and/or more powerful marketing). On the other hand, the sponsorship dollars that facilities received from food-related companies were significantly correlated with FoodMATS scores. The lack of correlation between total sponsorship and FoodMATS scores and strong correlation between food sponsorship and FoodMATS scores may indicate that the FoodMATS scores truly represent food marketing in the facility, and not marketing in general.

As the FoodMATS and its scoring algorithm is a novel tool to measure and classify food and beverage marketing in settings, there is little research to compare the results to. However, previous related research may help to explain results. In Australia, only 17% of all sports club

sponsors were food and beverage companies (Kelly, Baur, et al., 2010), which may explain why there was no linear relationship between FoodMATS scores and total sponsorship. In our study, food sponsorship dollars contributed a median of 12.0% (IQR: 3.9, 25.6%) of total sponsorship dollars for the 11 sites that provided both food and total sponsorship dollars (data not shown).

The high correlation between FoodMATS and sponsorship dollars may be surprising because the FoodMATS collects several marketing items that may or may not be part of a sponsorship agreement. However, Kelly et al. (2010) found food and beverage sponsors of sports clubs in Australia engaged in numerous marketing activities besides direct funding to show their support of the club or sport, including uniform branding, being official club sponsors, naming in newsletters, signage, offering sponsor's product, and providing rewards.

#### *Predicting sales of "Less Healthy" food and beverage items*

FoodMATS scores significantly explained almost half of "Least Healthy" food and beverage sales in concessions and in total. The large effect size of the FoodMATS score on total "Least Healthy" sales suggests that greater exposure and/or powerful food marketing in recreation facilities contributes to higher "Least Healthy" sales, in line with the theoretical underpinning of the scoring algorithm. The lack of prediction of vending sales by FoodMATS may be related to a small sample size or low sales since vending sales only contributed an average of less than one-third of total facility sales when both concession and vending are present (data not shown).

The prediction of "Least Healthy" food sales in concessions from FoodMATS is interesting, especially from marketing outside of concessions in sport and other areas, because it may represent that more food marketing throughout a facility results in more traffic to the concessions to purchase food. A recent meta-analysis found that there is an immediate modest

impact of unhealthy food marketing on children's food intake (Boyland et al., 2016). In the context of this setting, that may mean that children who see food marketing in a recreation facility may eat more and some of the food consumed may be purchased on site. Furthermore, findings from a systematic review suggest that food marketing impacts food purchases at the brand and category level (Cairns et al., 2013); thus, it is possible that unhealthy food marketing in recreation facilities could impact food sales in general regardless of whether the exact product or brand marketed was available for purchase on site. These findings provide support for settings-based measurement to fully understand the extent of children's food marketing environments.

Previous research has shown healthy food availability to be associated with greater purchases of the same (Olstad, Goonewardene, McCargar, & Raine, 2015; Wolfenden et al., 2015). Future research should investigate the interrelationship between food availability, marketing, and sales to best provide recommendations on how to generate a health promoting food environment within recreation facilities while maintaining profitability.

### ***Limitations***

The FoodMATS may not capture certain types of non-permanent food marketing, such as team sponsorship, giveaways, or fundraising; nor does it capture marketing on product packaging. As well, the analysis of the FoodMATS data did not include content analysis of the promotions, thus providing limited information on types of marketing techniques used. We excluded the placement height of marketing as an indicator child-targeted marketing since vending machine, concessions, or other areas may only have a certain amount of space causing them to place items or promotions at child height without intentionally marketing to them. This exclusion may underestimate child-targeted marketing.

Due to limited product nutrient information, we were unable to assess nutrient content of products by the WHO Regional Office for Europe Nutrient Profiling Model which was developed to inform marketing to children restrictions. This profiling model should be considered in future use of the FoodMATS when product nutrient information can be collected. Nevertheless, the provincial guidelines used in this study to assess healthfulness were highly relevant to our local context.

It is possible that two weeks of food and beverage sales data may not represent facilities' overall sales which could have impacted the regression results. Although a relative outcome variable, such as the ratio of "Most Healthy" to "Least Healthy" sales, rather than the absolute variable we used may be more fitting to test the validity of the FoodMATS score, we were unable to use the former because there was little variability in the proportion of sales that were "Least Healthy". Also, we were only able to evaluate the relationship between the food marketing environment and sales at the site level, which cannot be interpreted at the individual level. The results presented here should be interpreted with some caution, since the sites selected for EPL are not necessarily representative of all recreation and sport facilities in Canada and the small sample sizes limit the power of analyses.

### ***Strengths***

No other research tool measures marketing as comprehensively as the FoodMATS or include a scoring algorithm that quantifies the potential negative impact of a food marketing environment. Diverging from the previous self-report survey methods used to measure food and beverage marketing in recreation and sport settings (Carter et al., 2012), the FoodMATS collects detailed data grounded in theory relevant to public health and business practitioners. Investigating the relationship between food marketing environments and sales to validate the



FoodMATS scores in our unique study presents a new avenue to advance researchers' abilities to study the impact of food marketing environments on diet. To understand broader, whole setting-based influences on dietary habits future research could assess relationships between FoodMATS scores and healthy food sales, changes in FoodMATS and sales, individual level purchases, and purchases by different demographic groups.

Although the FoodMATS was designed for sport settings, it could be adapted for other settings, such as schools, enabling comparison across settings where children gather. The tool has only been used with trained research staff, but it is possible that it could be used with trained community members to conduct self-assessments. Additional supports may be necessary to enable community use such as an online system where marketing can be entered and automatically scored. Most importantly, the FoodMATS tool can be used to inform and evaluate regulatory interventions aimed at reducing children's exposure to powerful unhealthy food marketing.

### **Conclusions & Implications**

In 2010, the World Health Assembly (WHA) endorsed the WHO set of recommendations on the marketing of foods and non-alcoholic beverages to children but was met with insubstantial follow through by member states (WHA, 2010). Last year, the WHA recommitted to action by supporting the report of the Commission on Ending Childhood Obesity which includes implementing the WHO's food marketing recommendations (WHO, 2017). Understanding the landscape of food marketing to children within settings where children spend time is important in order to generate effective policy interventions that will reduce children's exposure to marketing and the power of that marketing (WHO, 2012). The FoodMATS is a novel audit tool that can be reliably used to analyze food marketing in children's recreation and sport settings. Its scoring

algorithm has good validity and can therefore be used to explore the unhealthfulness of food marketing environments. As the first validated and reliable marketing assessment tool, the FoodMATS represents a means to comprehensively track food marketing environments over time. With the forthcoming development of food marketing regulations in Canada or other countries, and the WHO's call to restrict unhealthy food marketing in children's settings (WHO, 2010b), the FoodMATS may prove to be a fundamental ingredient in designing and monitoring regulatory interventions.

## References

Alberta Health and Wellness. (2010). *The Alberta Nutrition Guidelines for Children and Youth*.

Retrieved from: <https://www.albertahealthservices.ca/nutrition/Page2929.aspx>

Altman, D. G. (1991). *Practical Statistics for Medical Research*. London: Champan and Hall.

Boelsen-Robinson, T., Chung, A., Khalil, M., Wong, E., Kurzeme, A., & Peeters, A. (2017).

Examining the nutritional quality of food and beverage consumed at Melbourne aquatic and recreation centres. *Australian and New Zealand Journal of Public Health*, 41(2), 184-186.

Boyland, E. J., Nolan, S., Kelly, B., Tudur-Smith, C., Jones, A., Halford, J. C., & Robinson, E.

(2016). Advertising as a cue to consume: A systematic review and meta-analysis of the effects of acute exposure to unhealthy food and nonalcoholic beverage advertising on intake in children and adults. *The American Journal of Clinical Nutrition*, 103(2), 519-533.

Brady, J., Farrell, A., Wong, S., & Mendelson, R. (2008). Beyond television: Children's

engagement with online food and beverage marketing. *Clinical Medicine: Pediatrics*, 2, 1-9.

Brownell, K. D., & Warner, K. E. (2009). The perils of ignoring history: Big Tobacco played

dirty and millions died. How similar is Big Food? *The Milbank Quarterly*, 87(1), 259-294.

Cairns, G., Angus, K., Hastings, G., & Caraher, M. (2013). Systematic reviews of the evidence

on the nature, extent and effects of food marketing to children. A retrospective summary. *Appetite*, 62, 209-215.

- Carson, V., & Kuzik, N. (2017). Demographic correlates of screen time and objectively measured sedentary time and physical activity among toddlers: a cross-sectional study. *BMC Public Health, 17*.
- Carter, M. A., Edwards, R., Signal, L., & Hoek, J. (2012). Availability and marketing of food and beverages to children through sports settings: A systematic review. *Public Health Nutrition, 15*(08), 1373-1379.
- Castonguay, J. (2015). Sugar and sports age differences in children's responses to a high sugar cereal advertisement portraying physical activities. *Communication Research*.
- Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological assessment, 6*(4), 284-290.
- Craypo, L., Samuels, S., & Samuels and Associates. (2006). *School Food and Beverage Marketing Assessment Tool*. Retrieved from Oakland, CA:  
<http://www.californiaprojectlean.org/doc.asp?id=174&parentid=20>
- Elliott, C. (2012a). Marketing foods to children: Are we asking the right questions? *Childhood Obesity, 8*(3), 191-194.
- Elliott, C. (2012c). Packaging fun: analyzing supermarket food messages targeted at children. *Canadian Journal of Communication, 37*(2).
- Folta, S. C., Goldberg, J. P., Economos, C., Bell, R., & Meltzer, R. (2006). Food advertising targeted at school-age children: A content analysis. *Journal of Nutrition Education And Behavior, 38*(4), 244-248.
- Ghirardelli, A., Quinn, V., & Sugerman, S. (2011). Reliability of a retail food store survey and development of an accompanying retail scoring system to communicate survey findings

- and identify vendors for healthful food and marketing initiatives. *Journal of Nutrition Education And Behavior*, 43(4), S104-S112.
- Government of Nova Scotia. (2015). *Healthy Eating in Recreation and Sport Settings Guidelines*. Retrieved from <http://www.recreationns.ns.ca/wp-content/uploads/2016/01/HERSS-Guidelines.pdf>.
- Harris, J. L., & Graff, S. K. (2012). Protecting young people from junk food advertising: implications of psychological research for First Amendment law. *American Journal of Public Health*, 102(2), 214-222.
- Hobin, E. P., Hammond, D. G., Daniel, S., Hanning, R. M., & Manske, S. (2012). The Happy Meal® effect: the impact of toy premiums on healthy eating among children in Ontario, Canada. *Canadian Journal of Public Health*, 103(4), e244-e248.
- Hosler, A. S., & Dharssi, A. (2011). Reliability of a survey tool for measuring consumer nutrition environment in urban food stores. *Journal of Public Health Management and Practice*, 17(5), e1-e8.
- Kelly, B., Bauman, A. E., & Baur, L. A. (2014). Population estimates of Australian children's exposure to food and beverage sponsorship of sports clubs. *Journal of Science and Medicine in Sport*, 17(4), 394-398.
- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2010). Food and drink sponsorship of children's sport in Australia: Who pays? *Health Promotion International*, 26(2), 188-195.
- Kelly, B., King, L., Baur, L., Rayner, M., Lobstein, T., Monteiro, C., . . . Friel, S. (2013). Monitoring food and non-alcoholic beverage promotions to children. *Obesity Reviews*, 14(S1), 59-69.

- Kirk, S. F. L., Penney, T. L., & Freedhoff, Y. (2010). Running away with the facts on food and fatness. *Public Health Nutrition, 13*(1), 147-148.
- Landers, R. (2015). Computing Intraclass Correlations (ICC) as Estimates of Interrater Reliability in SPSS. *The Winnower*.
- Laska, M. N., Borradaile, K. E., Tester, J., Foster, G. D., & Gittelsohn, J. (2010). Healthy food availability in small urban food stores: A comparison of four US cities. *Public Health Nutrition, 13*(7), 1031-1035.
- Lee, N. R., & Kotler, P. (2011). *Social marketing: Influencing behaviors for good*. Thousand Oaks, CA: Sage.
- Lo, B. K., Minaker, L., Chan, A. N., Hrgetic, J., & Mah, C. L. (2015). Adaptation and validation of a nutrition environment measures survey for university grab-and-go establishments. *Canadian Journal of Dietetic Practice and Research, 77*(1), 17-24.
- McHugh, M. L. (2012). Interrater reliability: The kappa statistic. *Biochemia Medica, 22*(3), 276-282.
- Minaker, L. M., Raine, K. D., & Cash, S. B. (2009). Measuring the food service environment: Development and implementation of assessment tools. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique, 421-425*.
- Ministry of Health. (2014). *Healthier Choices in Vending Machines in BC Public Buildings*. Victoria, BC: Province of British Columbia Retrieved from [www.healthlinkbc.ca/foodguidelines](http://www.healthlinkbc.ca/foodguidelines).
- Naylor, P. J., Wekken, S. V., Trill, D., & Kirbyson, A. (2010). Facilitating healthier food environments in public recreation facilities: Results of a pilot project in British Columbia, Canada. *Journal of Park & Recreation Administration, 28*(4), 37-58.

- O'Reilly, N., & Horning, D. L. (2013). Leveraging sponsorship: The activation ratio. *Sport Management Review, 16*(4), 424-437.
- Ogle, A. D., Graham, D. J., Lucas-Thompson, R. G., & Roberto, C. A. (2017). Influence of cartoon media characters on children's attention to and preference for food and beverage products. *Journal of the Academy of Nutrition and Dietetics, 117*(2), 265-270. e262.
- Olstad, D. L., Goonewardene, L. A., McCargar, L. J., & Raine, K. D. (2015). If we offer it, will children buy it? Sales of healthy foods mirrored their availability in a community sport, commercial setting in Alberta, Canada. *Childhood Obesity, 11*(2), 156-164.
- Olstad, D. L., Lieffers, J. R., Raine, K. D., & McCargar, L. J. (2011). Implementing the Alberta nutrition guidelines for children and youth in a recreational facility. *Canadian journal of dietetic practice and research/Revue canadienne de la pratique et de la recherche en dietetique, 72*(4), 177.
- Olstad, D. L., Poirier, K., Naylor, P. J., Shearer, C., & Kirk, S. F. L. (2015). Policy outcomes of applying different nutrient profiling systems in recreational sports settings: the case for national harmonization in Canada. *Public Health Nutrition, 18*(12), 2251-2262.
- Olstad, D. L., & Raine, K. D. (2013). Profit versus public health: The need to improve the food environment in recreational facilities. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique, 104*(2), e167-e169.
- Olstad, D. L., Raine, K. D., & McCargar, L. J. (2012). Adopting and implementing nutrition guidelines in recreational facilities: Public and private sector roles. A multiple case study. *BMC Public Health, 12*.
- Pallant, J. (2013). *SPSS survival manual*: McGraw-Hill Education (UK).

- Perreault Jr, W. D., McCarthy, E. J., & Cannon, J. P. (2006). *Basic marketing: A marketing strategy planning approach*: McGraw-Hill/Irwin.
- Saelens, B. E., Glanz, K., Sallis, J. F., & Frank, L. D. (2007). Nutrition Environment Measures Study in restaurants (NEMS-R): Development and evaluation. *American Journal of Preventive Medicine*, 32(4), 273-281.
- Scholtes, V. A., Terwee, C. B., & Poolman, R. W. (2011). What makes a measurement instrument valid and reliable? *Injury*, 42(3), 236-240.
- Smit, E. G., Boerman, S. C., & van Meurs, L. (2015). The power of direct context as revealed by eye tracking. *Journal of Advertising Research*, 55(2), 216-227.
- Tabachnick, B., & Fidell, L.S. (2013). *Using Multivariate Statistics*. Upper Saddle River, New Jersey: Pearson Education, Inc.
- Van Kleef, E., Shimizu, M., & Wansink, B. (2011). Food compensation: do exercise ads change food intake? *International Journal of Behavioral Nutrition and Physical Activity*, 8(6), 661-664.
- Velazquez, C. E., Black, J. L., & Ahmadi, N. (2015). Food and beverage promotions in Vancouver schools: A study of the prevalence and characteristics of in-school advertising, messaging, and signage. *Preventive Medicine Reports*, 2, 757-764.
- Wolfenden, L., Kingsland, M., Rowland, B. C., Dodds, P., Gillham, K., Yoong, S. L., . . . Wiggers, J. (2015). Improving availability, promotion and purchase of fruit and vegetable and non sugar-sweetened drink products at community sporting clubs: A randomised trial. *International Journal of Behavioral Nutrition and Physical Activity*, 12(1), 35.



- World Health Assembly. (2010). *Agenda item 11.9: Marketing of food and non-alcoholic beverages to children*. Retrieved from [http://apps.who.int/gb/ebwha/pdf\\_files/WHA63/A63\\_R14-en.pdf](http://apps.who.int/gb/ebwha/pdf_files/WHA63/A63_R14-en.pdf).
- World Health Organization. (2010). Set of recommendations on the marketing of foods and non-alcoholic beverages to children.
- World Health Organization. (2012). A framework for implementing the set of recommendations on the marketing of foods and non-alcoholic beverages to children.
- World Health Organization. (2016a). Consideration of the evidence on childhood obesity for the Commission on Ending Childhood Obesity: report of the ad hoc working group on science and evidence for ending childhood obesity, Geneva, Switzerland. Retrieved from: [http://apps.who.int/iris/bitstream/10665/206549/1/9789241565332\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/206549/1/9789241565332_eng.pdf)
- World Health Organization. (2016b). *Report of the commission on ending childhood obesity*:  
World Health Organization.
- World Health Organization. (2017). *Agenda item 15.5: Report of the Commission on Ending Childhood Obesity: implementation plan*. Retrieved from [http://apps.who.int/gb/ebwha/pdf\\_files/WHA70/A70\(19\)-en.pdf?ua=1](http://apps.who.int/gb/ebwha/pdf_files/WHA70/A70(19)-en.pdf?ua=1).

## CHAPTER 4 – RESULTS STUDY 2

### **Food marketing in recreational sport settings in Canada: a cross-sectional audit in different policy environments using the Food and beverage Marketing Assessment Tool for Settings (FoodMATS)**

*A version of this paper has been published as Prowse, R. J., Naylor, P. J., Olstad, D. L., Carson, V., Storey, K., Mâsse, L. C., Kirk, S. F. L., & Raine, K. D. (2018). Food marketing in recreational sport settings in Canada: a cross-sectional audit in different policy environments using the Food and beverage Marketing Assessment Tool for Settings FoodMATS). International Journal of Behavioral Nutrition and Physical Activity, 15(1), 39.*

#### **Background**

Increased prevalence of childhood obesity is believed to be the product of “small, cumulative environmental changes that have altered children’s physical activity and dietary patterns” (Brennan, Brownson, & Orleans, 2014, p.e1). By providing opportunities to be active, recreation and sport facilities may be ideal sites to support childhood obesity prevention. Recreation and sport facilities, defined as public or private community centres that offer opportunities for physical activity and programming for children and adults at a fee, have a mandate to promote health and wellbeing (Government of Alberta, 2011). However, this mandate may be undermined by the unhealthy foods they offer (Olstad et al., 2011) which are commonly deep fried foods, hot dogs, and sugary snacks and drinks (Naylor, Bridgewater, et al., 2010). In a systematic review by Nelson et al. (2011), no difference in children’s weights was found between those who participated in extracurricular physical activity and those who did not, in spite of the former being more physically active than the latter. Increased availability, marketing and consumption of fast foods and soft drinks in sport settings may have contributed to this weight discrepancy (Nelson et al., 2011).

Food and beverage marketing (henceforth food marketing) in recreation and sport facilities may influence food attitudes, preferences and behaviors. A scoping review of the relationship between watching sports and population health concluded that sport spectating may increase unhealthy eating behaviours from exposure to unhealthy food sponsorship (Inoue, Berg, & Chelladurai, 2015). Unhealthy food marketing that uses sport or physical activity appeals is concerning due to its associated impacts on product likeability and nutritional quality. In a cross-sectional study of 10-14 year olds who participated in sports at a local club in Australia, over two-thirds could recall at least one food and beverage company sponsor of their club and 59% “liked to return the favour to these sponsors by buying their products” (Kelly et al., 2011b, p.4). Furthermore, both adults and children may experience a ‘halo effect’ when food is marketed with physical activity themes, leading to more positive reactions and perceptions of product healthfulness (Castonguay, 2015a).

Restricting unhealthy food and beverage sport sponsorship and improving healthy food availability in recreation and sport facilities have been ranked as some of the most important and feasible interventions to promote children’s health (Kelly, King, et al., 2014). In this regard, several Canadian provinces [Alberta (AB), British Columbia (BC), Nova Scotia (NS)] have introduced voluntary nutrition guidelines to encourage healthier food provision in recreation facilities (Alberta Health and Wellness, 2010; Government of Nova Scotia, 2015; British Columbia Ministry of Health, 2014). Guidelines introduced in 2015 in NS, Canada discouraged unhealthy food promotion, sponsorship, and marketing (Government of Nova Scotia, 2015). Taking a different approach, guidelines in AB, Canada, revised in 2012, recommended marketing healthier foods through competitive pricing and placement (Alberta Health and Wellness, 2010). Guidelines in the Canadian province of BC, revised in 2014, did not mention

food marketing (British Columbia Ministry of Health, 2014). Even without specific food marketing recommendations, food marketing environments may improve in parallel with improved food provision as guidelines are implemented in recreation facilities. Once a new food product introduced into a recreation facility, marketing may be used to increase consumers' "recognition, appeal and/or consumption" (World Health Organization, 2012, p.9) of the product through pricing, placement, or promotion (Lee & Kotler, 2011). Thus, we aimed to investigate the difference in food marketing environments between provinces with and without provincial nutrition guidelines.

Describing the nature and extent of food marketing in sport settings is a current gap in the literature (Inoue et al., 2015). The limited available research focuses on the prevalence of sport sponsorship (Carter et al., 2012) or testing the impact of experimental food marketing techniques in recreation facilities on food choices (Olstad, Goonewardene, McCargar, & Raine, 2014; Wolfenden et al., 2015). It is necessary to understand the breadth, intensity, and characteristics of food marketing in recreation facilities to inform healthy food policy and reduce children's exposure to unhealthy food marketing. Marketing policies that reduce 'exposure' to and 'power' of food and beverage marketing are recommended by the WHO (2010b) and could reduce the impact of unhealthy food marketing on children's eating behaviors.

To fill the gap in the literature regarding food marketing in recreation facilities, this study aimed to document the food and beverage marketing in public recreation and sport facilities in Canada and assess differences in food marketing environments between facilities from provinces with voluntary nutrition guidelines and facilities from a province with no guidelines. This type of investigation is valuable as it may reveal how well current nutrition guidelines designed to enhance healthy food provision also protect (or do not protect) children from unhealthy food

marketing. We aimed to explore the ‘exposure’ (frequency, repetition) to and ‘power’ (healthfulness, child-targeting, sports-related, size) of food marketing in public recreation facilities. We hypothesized that recreation facilities in provinces with voluntary nutrition guidelines would have less unhealthy food marketing (related to a difference in food provision) but did not have any other a priori hypotheses for other outcomes assessed due to limited research that currently exists on this topic.

## **Methods**

### **Setting and Participants**

This study was part of a larger Eat Play Live (EPL) research project evaluating the impact of voluntary provincial nutrition guidelines on recreation and sport facility food environments including food availability, marketing, and policy in Canada. Public recreation facilities in three provinces with existing provincial nutrition guidelines for recreation facilities (BC (British Columbia Ministry of Health, 2014), AB (Alberta Health and Wellness, 2010), and NS (Government of Nova Scotia, 2015)) and one province without provincial nutrition guidelines [Ontario (ON)] were included in the current study. Eligible facilities were those that provided food services through vending or concession (such as a canteen, snack bar, café, or restaurant), had not made major changes to their food environment since 2010, were willing and able to make changes to their food environment, and had year-round sport programming.

Facilities were recruited for EPL between August 2015 and April 2016 by provincial parks and recreation organizations and the EPL team. A buffer of 150 km (adjusted by provinces if appropriate in regards to geography and budget) was used to identify a subsample of facilities near universities (n=286) that were followed-up by telephone. Only 216 facilities were eligible to participate and 49 facilities (22.7%) agreed to participate. Of the remaining, 141 did not respond

to the invitation; 11 refused without reason; 15 refused due to insufficient staff capacity (n=11), uninterested in research (n=2), risk of being a control site (n=1), worried about competition (n=1). Non-response greatly varied by province (ON 25%; BC 36%; AB 63%; NS 92%). Two facilities had two separate buildings which we treated as individual sites for a total of 51 sites where food and beverage marketing was measured. Thirty-four sites were from the three guideline provinces; 17 sites were from the one non-guideline province. A sample size of 43 was required for the EPL project to detect a medium to large effect ( $d=0.8$ ) in unhealthy food and beverage availability in vending machines between two groups with  $\alpha = 0.05$ . See methods for post hoc power analyses of the sample size to detect change in marketing scores.

### **Data Collection**

A trained EPL provincial coordinator or research assistant conducted observational audits using the Food Marketing Assessment Tool for Settings (FoodMATS) (Prowse, Naylor, Olstad, Carson, Mâsse, et al., 2018) between November 2015 and May 2016. The FoodMATS captures the presence of food marketing in recreation facilities, what food products, brands, and retailers were marketed, and whether persuasive (powerful) marketing techniques were used. At each site, a trained rater photographed and recorded the following on the FoodMATS:

- the frequency of food and beverage marketing in sports areas, food areas (concessions), and other areas (entrance, hallways, parking lot),
- the product, brand, or food retailer marketed,
- whether the marketing occasion targeted children,
- whether the marketing occasion was related to sports, and
- the physical size of the marketing occasion.

One marketing occasion was defined as one advertisement, promotion, or message (e.g. one sign), that is intended to increase the “recognition, appeal and/or consumption” of a food or beverage products, brands, or retailer (World Health Organization, 2012) (p.9). Marketing occasions that were not physical signage (e.g. product placement and pricing promotions) were counted but were not assessed for targeting children, being related to sports, or their size as that would usually require reviewing product packaging which was beyond the scope of this study.

After each site visit, one registered dietitian (RP) classified all marketing occasions according to their healthfulness using composite rankings (“Most Healthy”, “Less Healthy”, “Least Healthy”) (Table 10) informed by provincial nutrition guidelines (Alberta Health and Wellness, 2010; Government of Nova Scotia, 2015; British Columbia Ministry of Health, 2014). Classifications were checked by a second registered dietitian (KR). We calculated the repetition of food marketing in each site, defined as the number of products, brands, or retailers that were marketed at least three times per site. A FoodMATS score was derived for each site based on the ‘exposure’ to food and beverage marketing (defined as the frequency and repetition), and the ‘power’ of each marketing occasion (defined as the persuasiveness of marketing represented by its unhealthfulness, use of child-targeted and/or sports-related techniques, and size). Our definitions of exposure and power were operationalized from the WHO’s *Exposure and Power of Marketing Messages* model where exposure was explained as “the reach and frequency of the marketing message”, and power was “the creative content, design and execution of the marketing message” (World Health Organization, 2012, p.11). Scores could range from zero to infinity with higher scores representing sites with greater exposure to food marketing, along with more powerful food marketing.

The FoodMATS was previously validated by assessing correlations with recreation facility sponsorship and advertising dollars, and whether FoodMATS scores predict unhealthy food and beverage sales (Prowse et al., 2018). During pilot testing the FoodMATS demonstrated very good to excellent inter-rater reliability ( $\kappa=0.88-1.00$ ,  $p<0.001$ ; ICC=0.97,  $p<0.001$ ) (Prowse et al., 2018). Detailed methods on EPL and the FoodMATS have been previously reported (Prowse et al., 2018).

**Table 10 Classification of Marketing Occasions by Healthfulness (Prowse et al., 2018)**

Type	“Most Healthy”	“Less Healthy”	“Least Healthy”
Products <sup>a</sup> / Brands <sup>b</sup>	Unprocessed foods and beverages with no added fat, sugar or salt	Foods and beverages with some added fat, sugar, or salt	Processed energy-dense, nutrient-poor items with high levels of fat, sugar, or salt
Retailers <sup>c</sup>	Grocery stores, farmers’ markets Sandwich outlets, smoothie outlets, salad bars	Sit-down restaurants, cafeterias, coffee outlets, prepared grocery stores, supplement stores	Pizza, burger, taco, fried chicken, Asian, and ice cream outlets, pubs, lounges, alcohol stores
Other	All nutrition education or healthy eating promotion	None	None

<sup>a</sup>defined as a tangible food or beverage (Lee & Kotler, 2011),

<sup>b</sup>defined as a name or symbol that represents the maker of a product (Lee & Kotler, 2011),

<sup>c</sup>defined as a place where food can be purchased (store, restaurant, etc.)

We also assessed *post hoc* whether food marketing was related to the types of foods available for customers to purchase (as opposed to any alternative such as the food marketing was related to sponsorship or funding provided to the site by an outside organization) by identifying “in house” products, brands, and retailers. Products and brands were considered “in house” if they were sold in vending machines or concessions within the site the marketing was found. Food retailers were considered “in house” if they sold food or beverages within the site. Audits conducted at concessions and in vending machines and product sales reports collected for the EPL study were used to check whether a product or brand was sold onsite. Names of concessions recorded in the FoodMATS were used to determine if the marketed food retailer was onsite. The classification was completed by a trained graduate research assistant and checked by



RP. This type of classification may be important to understand how food marketing is influenced across different operational areas in the facility, which may require different interventions if an association is found. For example, if most marketing is for foods and beverages available onsite then food service operators may be the target of interventions. On the other hand, if there is marketing from outside retailers or for products/brands not sold within the facility, then an intervention may need to target management or financial departments that contract out advertising space.

### **Data Analysis**

FoodMATS data were entered, cleaned, and scored in Microsoft Excel 2013. Medians and interquartile ranges were used to describe the frequency and repetition of marketing, and FoodMATS scores. The prevalence of powerful features (healthfulness, child-targeted, sports-related, size) was described using proportions. Crosstabs were used to assess whether marketing occasions that used child-targeted and sports-related marketing techniques differed by healthfulness.

Differences between guideline and non-guideline provinces were assessed using Pearson's Chi squared tests of homogeneity. Ordinal variables were collapsed into dichotomous groups to improve stability. Healthfulness was grouped into "Most Healthy"/"Less Healthy" versus "Least Healthy" as the latter are recommended to be restricted or not available in recreation facilities (Alberta Health and Wellness, 2010; Government of Nova Scotia, 2015; British Columbia Ministry of Health, 2014). Size was grouped into small/medium versus large. Effect sizes are reported as Phi coefficients interpreted as 0.1 for small effects, 0.3 for medium effects, and 0.5 for large effects (Cohen, 1977).

Due to unequal variances and non-normality, Mann-Whitney U tests were used to test differences between guideline and non-guideline provinces for food marketing frequency, repetition, and FoodMATS scores. Post hoc power analyses with G\*Power (v3.1) revealed that our sample size would have 73% chance of detecting a large effect ( $D=0.80$ ,  $t=2.01$ ,  $\alpha = 0.05$ ) when using Mann-Whitney tests to compare mean ranks between two groups, and assuming two-tailed normal distribution with  $\alpha=0.05$ ; but would be insufficient to detect medium ( $D=0.50$ ,  $\alpha =0.36$ ) or small ( $D=0.2$ ,  $\alpha =0.099$ ) effect sizes.

## Results

### *Characteristics of Guideline and Non-Guideline Sites*

The majority of guideline ( $n=23$ , 67.6%) and non-guideline ( $n=15$ , 88.2%) sites had one concession. Eight sites in the guideline provinces had no concession(s) (23.5%). Zero sites in the non-guideline province had no concession(s). All other sites in guideline provinces ( $n=5$ , 14.7%) and the non-guideline province ( $n=2$ , 11.8%) had two or more concessions. Thirty-one guideline sites (91.2%) and all 17 non-guideline sites (100.0%) had snack and/or beverage vending machines. Almost two-thirds of sites in the guideline provinces ( $n=22$ , 64.7%) and non-guideline province ( $n=11$ , 64.7%) had between one and four sports areas (see Table 11 for types of sports areas). One site in the guideline provinces had spaces for community events such as dances but no dedicated sport area. All other sites in the guideline ( $n=11$ , 32.4%) and non-guideline provinces ( $n=6$ , 35.3%) had five or more sports areas.

Food marketing was present in all but one site ( $n=50$ , 98.0%), located in a guideline province. Most sites had food marketing in their food (concession) area(s) ( $n=41$  out of 43 sites with concessions, 95.3%), sports area(s) ( $n=35$  out of 50 sites with sports areas, 70.0%), and other area(s) ( $n=46$  out of 51 sites, 90.2%). Presence of food marketing differed between sport area types, ranging from 2.6% of gymnasiums to 81.3% of arenas having food marketing (Table

11). No single use courts, cycling studios, climbing areas, or other areas contained food marketing (Table 11).

**Table 11 Number and proportion of sports areas with food marketing present (n=188)**

Sports Area	All Sites		Guideline Sites		Non-guideline Sites	
	n	Proportion of sports areas with food marketing present (%)	n	Proportion of sports areas with food marketing present (%)	n	Proportion of sports areas with food marketing present (%)
All sports areas	188	36.2	119	34.5	69	41.2
Arenas	64	81.3	30	83.3	34	79.4
Fields	7	71.4	5	80.0	2	50.0
Tracks	4	25.0	3	66.7	1	0.0
Weight/Cardio Room	24	25.0	19	31.6	5	0.0
Pool	24	12.5	16	18.8	8	0.0
Gymnasiums	38	2.6	32	3.1	6	0.0
Single-use Courts	12	0.0	4	0.0	8	0.0
Cycle studios	6	0.0	5	0.0	1	0.0
Rock climbing walls	1	0.0	0	0.0	1	0.0
Other sport areas <sup>a</sup>	8	0.0	5	0.0	3	0.0

<sup>a</sup>Includes: indoor playground (n=2), gymnastics area (n=2), shuffle board (n=1), ballet studio (n=1), bowling alley (n=1), skateboarding area (n=1).

**Table 12 Number and proportion of food marketing occasions found in food, sports, and other area by type (n=1740)**

Food (concession) Areas	n	Proportion of all food marketing in Food Areas (%) <sup>e</sup>	Sports Areas	n	Proportion of all food marketing in Sports Areas (%) <sup>e</sup>	Other Areas	n	Proportion of all food marketing in Other Areas (%) <sup>e</sup>
Checkout	229	30.8	Playing area	200	39.3	Indoor walls/ floors	70	14.4
Price promotions <sup>a</sup>	159	21.3	Seating area	96	18.9	Facility TVs	24	4.9
Signs/ displays/ table tents	150	20.2	Other <sup>c</sup>	59	11.6	Other <sup>d</sup>	22	4.5
Menus	102	13.7	Scoreboard/clocks	44	8.6	Outdoor walls, windows, doors	14	2.9
Other <sup>b</sup>	101	13.6	Change/locker rooms	15	2.9	Welcome desk	14	2.9
						Outdoor signs, furniture	10	2.1
						Facility pamphlets	10	2.1
						Bathrooms	3	0.6
Vending machines	3	0.4	Vending machines in spectator area	61	12.0	Vending machines	320	65.7
			Vending machines in athlete area	34	6.7			
Total	744	100.0	Total	509	100.0	Total	487	100

<sup>a</sup>Includes multiple pricing promotion types: combos; small versus regular portions; and healthy entrees, salads, beverages, and snacks versus regular; and other pricing. No supersize, all-you-can-eat, free refills, loyalty programs were found.

<sup>b</sup>Includes marketing/branding on fridges, coolers, machines, garbage cans, recycling cans, menus, clocks etc.

<sup>c</sup>Includes marketing/branding on stairs, coolers, floors, bulletin boards, etc.

<sup>d</sup>Includes marketing on sandwich boards/posters.

<sup>e</sup>Percentages may not add up to 100.0 due to rounding.

## *Exposure*

### *Frequency*

A total of 1740 food marketing occasions were recorded across all sites. The frequency of promotions by location can be found in Table 12. Overall, the median number of food marketing occasions per site was 29 (IQR 13, 42) (Table 13). There was no statistical difference between the number of food marketing occasions between provinces with and without guidelines ( $p=0.576$ ) (Table 13).

Products or brands were most frequently marketed, comprising 75.3% of all marketing occasions. The remaining food marketing occasions promoted food retailers (22.5%) or were nutrition education or general healthy eating promotions (2.2%), such as government, industry, or site developed posters that provided nutrition information or highlighted healthy food choices. Most products (97.1%) and brands (85.8%) marketed were “in house”, but only 12.7% of marketing occasions for food retailers were “in house”. Food retailers that did not sell food within the facility were promoted almost eight times more often than “in house” food retailers.

### *Repetition*

Overall, sites marketed a median of two products, brands, or retailers three or more times. However, the top quartile of sites repeatedly marketed between three and 13 products, brands, and retailers at least three times within their site. There was no difference in the number of repeated products, brands, and retailers between guideline and non-guideline provinces ( $p=0.217$ ) (Table 13).

**Table 13 Exposure to food and beverage marketing occasions for facility areas for guideline and non-guideline provinces (n=1740)**

	All sites (n=51)		Guideline sites (n=34)		Non-guideline sites (n=17)		P value <sup>b</sup>
	Median	IQR <sup>a</sup>	Median	IQR <sup>a</sup>	Median	IQR <sup>a</sup>	
<b>Frequency of food marketing occasions (n)</b>							
Total Site	29.0	13.0, 42.0	28.5	5.5, 42.3	29.0	20.0, 42.5	p=0.576
Food Areas	13.0	7.3, 20.8	15.0	5.0, 25.0	12.0	7.5, 17.0	p=0.447
Sports Areas	5.5	0.0, 13.0	6.0	0.0, 15.0	5.0	2.0, 12.5	p=0.787
Other Areas	7.0	3.0, 13.0	7.0	3.0, 13.0	11.0	3.5, 15.5	p=0.389
<b>Repetition of food marketing occasions (n)</b>							
Total Site	2.0	1.0, 3.0	2.0	1.0, 3.0	2.0	1.0, 3.0	p=0.217

<sup>a</sup>Interquartile Range (IQR) = 25<sup>th</sup> percentile, 75<sup>th</sup> percentile

<sup>b</sup>asymptotic significance (2-tailed) from Mann-Whitney test difference of mean ranks between scores

### **Power**

There were statistically significant differences in the proportions of food marketing occasions that were “Least Healthy”, child-targeted, sports-related, and large size between sites in guideline and non-guideline provinces (Table 14).

**Table 14 Power of food and beverage marketing occasions for guideline and non-guideline provinces (n=1740)**

<b>Power Feature</b>	All sites (n=51)		Guideline sites (n=34)		Non-guideline sites (n=17)		P value <sup>a</sup>
	n (missing)	%	n (missing)	%	n (missing)	%	
<b>Healthfulness</b>	n=1740 (0)		n=1212 (0)		n=528 (0)		p<0.001
Most Healthy	420	24.1	358	29.5	62	11.7	
Less Healthy	352	20.2	274	22.6	78	14.8	
Least Healthy	968	55.6	580	47.9	388	73.5	
<b>Child-targeted<sup>b</sup></b>	n=1377 (5)		n=953 (4)		n=424 (1)		p<0.001
Targeted at children	99	7.2	91	9.5	8	1.9	
<b>Sports-related<sup>c</sup></b>	n=1377 (5)		n=953 (4)		n=424 (1)		p<0.001
Related to sports	123	8.9	104	10.9	19	4.5	
<b>Size total</b>	n=1375 (6)		n=952 (4)		n=423(2)		p=0.001
Small <sup>d</sup>	444	32.3	282	29.6	162	38.3	
Medium <sup>e</sup>	257	18.7	193	20.3	64	15.1	
Large <sup>f</sup>	674	49.0	477	50.1	197	46.6	

<sup>a</sup>asymptotic significance (2-sided) from Chi<sup>2</sup> tests for homogeneity

<sup>b</sup>evidence of animated or fictional characters, taste appeals, humour, action-adventure, fantasy, fun shapes or colours, competitions, give-aways, cartoonish font, or used a child actor to advertise a food or beverage product/brand that would appeal to children (Prowse et al., 2018)

<sup>c</sup>any reference to physical activity, exercise, sport, game, recreation, performance or competition, a design feature relevant to sport settings (Prowse et al., 2018)

<sup>d</sup>small: less than one 8.5 x 11 inch paper (Prowse, et al., 2018)

<sup>e</sup>outdoor medium: one to ten 8.5 x 11 inch paper(s); indoor medium :one to three 8.5 x 11 inch paper(s) (Prowse et al., 2018)

<sup>f</sup>outdoor large: more than ten 8.5 x 11 inch paper(s);indoor large: more than three- 8.5 x 11 inch paper(s) (Prowse et al., 2018)

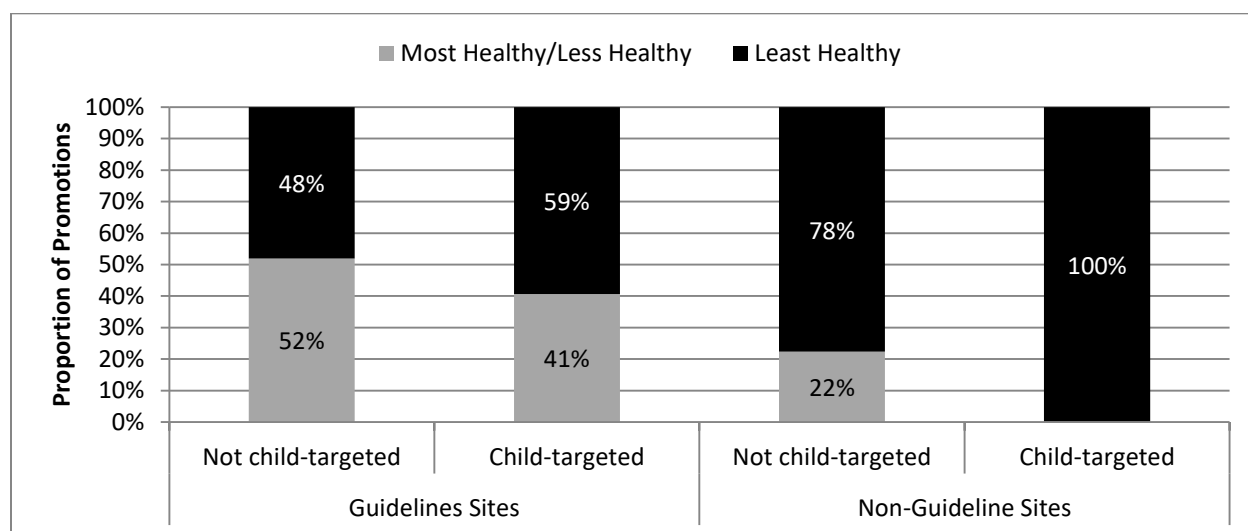
### *Healthfulness of Marketing*

Overall, more than half of all food marketing occasions were considered “Least Healthy” (55.6%) (Table 14). There was a significantly greater proportion of “Least Healthy” food marketing occasions in the non-guideline province compared to the guideline province ( $X^2(1, N=1740) = 63.604$ , Phi coefficient = -0.191,  $p < 0.001$ ) (Table 14).

### *Child-targeted Food Marketing*

Approximately, one in every 14 food marketing occasions (7.2%) was targeted at children (Table 14). There was a significantly greater proportion of child-targeted food marketing occasions in guideline provinces than in non-guideline provinces ( $X^2(1, N=1377) = 25.817$ , Phi coefficient = 0.137,  $p < 0.001$ ) (Table 14).

Across all sites, the healthfulness of food marketing occasions targeted at children and not targeted at children were similar, however, 100.0% of the food marketing occasions targeted at children in non-guideline provinces were “Least Healthy” ( $n=8$ ), compared to only 59.3% in guideline provinces ( $n=54$ ) (Figure 2).

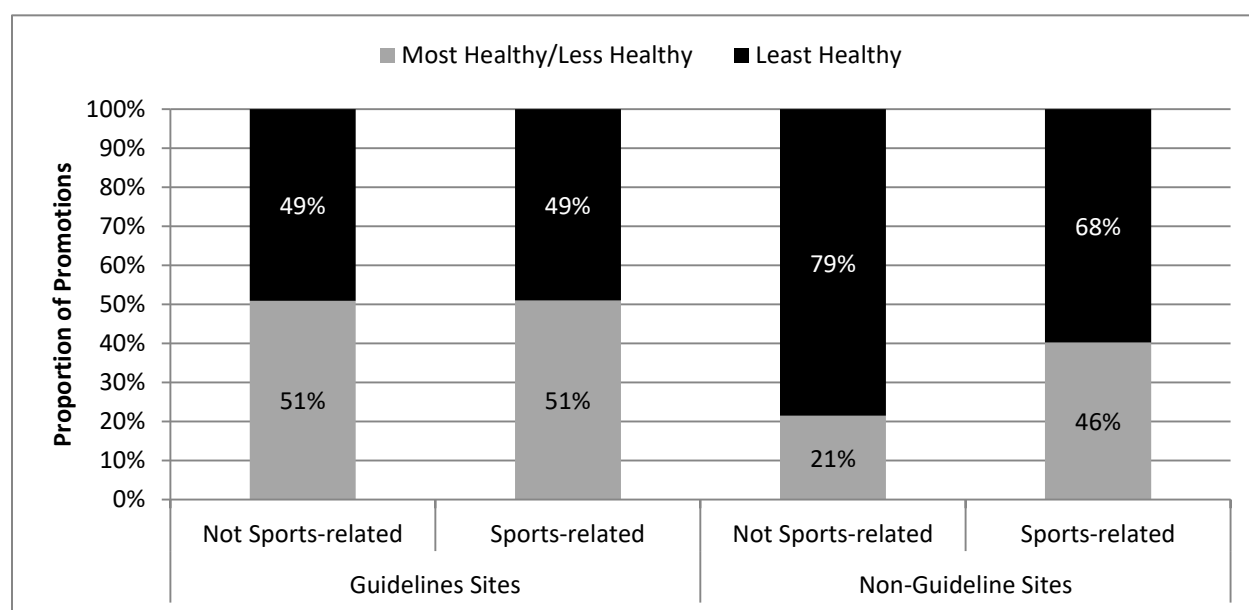


**Figure 2 Distribution by healthfulness for child-targeted and non-child-targeted marketing occasions comparing sites in guideline and non-guideline provinces (n=1377)**

### *Sports-related Food Marketing*

Approximately 1 in every 11 food marketing occasions (8.9%) were sports-related (Table 6). There was a significantly greater proportion of sports-related food marketing occasions in guideline provinces than in the non-guideline province ( $X^2(1, N=1377) = 14.923, p < 0.001$ , Phi coefficient = 0.086) (Table 14).

Overall, 52.0% of all sports-related food marketing occasions were “Least Healthy” (n=64); however, it was more common in non-guideline sites with 68.4% (n=51) to have sports-related food marketing occasions for “Least Healthy” products, brands, or retailers compared to 49.0% (n=53) in guideline sites (Figure 3).



**Figure 3 Distribution by healthfulness for sports-related and non-sports-related marketing occasions comparing sites in guideline and non-guideline provinces (n=1377)**

#### *Size of Marketing*

Almost half of all food marketing occasions were large and one-third were small (Table 5). There was a significantly greater proportion of large food marketing occasions in the guideline province than the non-guideline provinces ( $X^2(2, N=1375) = 11.718, \text{Phi coefficient} = 0.092, p = 0.003$ ) (Table 14).



### ***FoodMATS Scores***

Overall, the median score was 43.3 (IQR 18.6, 71.0) with higher scores indicating greater exposure to food marketing, along with more powerful food marketing. There was no statistically significant difference in FoodMATS scores between guideline (median=42.7, IQR 4.6, 70.1) and non-guideline provinces (median=43.3, IQR 29.5, 71.5).

### **Discussion**

Food marketing, such as signs, posters, branding, pricing promotions, and product placement, was found to be present in almost all recreation facility sites with unhealthy products, brands, or retailers marketed on more than half of the occasions. Our study found mixed results in differences between sites in guideline and non-guideline provinces, differing by ‘power’ (healthfulness of food marketing, targeting children, using appeals of physical activity, and having large signs) but not by ‘exposure’ (frequency, and repetition) nor FoodMATS scores (the composite of ‘power’ and ‘exposure’).

It may be surprising that the FoodMATS scores did not differ between guideline types despite differences in ‘power’. This null result may be related to the fact that we could only use a non-parametric test to compare mean ranks. If actual values were assessed, findings may have shown a difference since the 25<sup>th</sup> percentile of FoodMATS score is almost 25 points (84.4%) lower in the guideline provinces than in the non-guideline province. Secondly, FoodMATS scores were calculated by assessing each component of ‘power’ individually rather than cumulatively. If ‘power’ was scored based on the cumulative presence of marketing techniques, the FoodMATS scores in the non-guideline province may have been higher since more marketing occasions that used child-targeted and sports-related techniques were for “Least Healthy” products, making it easier to see differences between guideline types. However, our

approach of evaluating each component individually proposes the idea that the impact of food marketing on children's food preferences and behaviours may remain unchanged if one marketing technique is replaced by another (e.g. replace sports-related food marketing occasions with child-targeted food marketing occasions).

The lack of difference in FoodMATS scores may highlight that there are multiple components to food marketing that need to be considered in policy interventions. Current provincial nutrition guidelines incompletely address food marketing by merely recommending what product should or should not be marketed (i.e. healthy versus unhealthy food) which is only one component of marketing strategies. How foods and beverages are marketed (targeted to children, sports-related, and physical size, as well as potentially other characteristics not assessed in this study) should also be regulated in order to protect children from exposure to powerful food marketing. That being said, protecting children's environments from all unhealthy food marketing would reduce children's exposure to food marketing and thus make discussions regarding other powerful features redundant.

No previous research has evaluated food marketing in sports settings as comprehensively as this study. Carter et al. (2013) identified 131 food and beverage companies that advertised on sports clubs' websites in New Zealand. Although we did not measure the number of different marketers, we found that only a couple products, brands, and/or retailers were marketed repeatedly in a site. The findings from both Carter et al. (2013) and this study suggest that there are several food industry actors involved in food marketing in recreation and sport facilities. Kelly et al. (2010) found that sports club food sponsors in Australia most commonly provided jersey branding (53% of sponsors), official partnership (52%), recognition in club newsletters (29%), signs (28%), and onsite availability of sponsors' product (24%). This project also found

that signage was a common marketing channel and that most products marketed were available for purchase in the facility. However, the marketing techniques and channels captured by Kelly et al. (2010) only overlap to a limited extent with the FoodMATS since Kelly et al. (2010) only evaluated sponsorship and the FoodMATS broadly assessed food marketing within multiple areas of the facility including concessions and vending machines. The breadth of food marketing found in this study suggests that sponsorship may be only one of many strategies the food industry uses to market their product, brand, or retailer in sports settings.

The proportion of marketing occasions that were “Least Healthy” (55%) found in this study is similar to the proportion of food sponsors classified as unhealthy by Carter et al. (2013) (using the New Zealand Food and Beverage Classification System) and Kelly et al. (2010) (through expert consensus classification). These consistent findings suggest that food marketing environments in recreation and sport facilities are not health promoting.

The greater use of child-targeted marketing in the guideline province may reflect that the provincial guidelines tend to focus on improving children’s environments and may be related to efforts by sites from guideline provinces to move towards offering and promoting healthier options for children. It could also be explained by other factors that we did not assess including differences in the prevalence of onsite child programming or proximity of schools to the recreation facility.

The difference in sports-related marketing between guideline and non-guideline provinces is surprising because the prevalence of sports areas with food marketing was lower in the guideline provinces than in the non-guideline province, and the number of sports areas was similarly distributed in both groups. The study did find that food marketing was variable depending on the type of sport, consistent with previous research (Carter et al., 2013; Kelly,

Bauman, et al., 2014). Despite this, it is unclear whether differences in sport types between sites in guideline and non-guideline provinces explains the different prevalence of sports-related food marketing between guideline types.

### **Strengths and Limitations**

The results of this study must be interpreted cautiously due to its cross-sectional design and small, non-representative sample; yet, this is the largest known assessment of food marketing in recreation facilities in Canada. Unfortunately, our small sample size did not allow us to investigate whether differences in marketing environments existed in sites between guideline provinces in relation to their variable food marketing recommendations. Similarly, we had insufficient power to adjust for clustering effects within provinces resulting in confidence intervals narrower than if we could have adjusted for clustering. Despite its limitations, the FoodMATS is a theoretically grounded reliable validated tool that provides broad and detailed information on food marketing. Although it did not measure sponsorship specifically, it captured a breadth of marketing approaches the food industry uses in sport settings.

### **Implications & Recommendations**

To our knowledge, this is the first study to investigate the ‘exposure’ and ‘power’ of food marketing in sport settings, a place where children gather that should be free from unhealthy food marketing (World Health Organization, 2010b), and to examine differences in food marketing environments according to presence of regional voluntary nutrition guidelines. We found differences between what and how foods and beverages were marketed, but not in the frequency or repetition of marketing. Findings suggest that the presence of voluntary provincial nutrition guidelines that focus on what food provision rather than food marketing may be insufficient to impact the frequency of marketing but may influence the healthfulness of

marketing. It is possible that provincial nutrition guidelines improve the foods available for sale onsite which impacts their marketing. However, nutrition guidelines for food provision can only be expected to go so far; a study of food promotions in public schools in Vancouver, Canada found that almost one-quarter of promotions were for “Choose Least” and “Not Recommended” foods and beverages (Velazquez et al., 2015) even though provincial school nutrition guidelines there discouraged unhealthy food marketing (e.g. posters, coupons, and branded equipment) (Government of British Columbia, 2013).

The presence of unhealthy food marketing found in schools by Velazquez et al. (2015) and in recreation facilities presented here despite the presence of nutrition guidelines suggests that it should not be assumed that healthy food provision policies will translate to healthier food promotion. On the other hand, it may also be shortsighted to assume that food provision policies will have no impact on food marketing within its applicable setting.

Although child-targeted marketing techniques were used infrequently, recreation and sport facilities still offer multiple exposures to unhealthy food marketing. Regardless of their power, children will likely still see such marketing and be impacted by it. Sport sponsorship is not inherently child-targeted, but a study of 5-12 year olds in New Zealand found that 76% of children can correctly match sponsors to their respective sport (Pettigrew et al., 2013). Pettigrew et al. (2013) also found that even when children mismatched sponsors with sports, 83% of children selected an unhealthy food brand for that sport, suggesting that children have a strong association of unhealthy food with sport. A photo-based project in New Zealand revealed that 83% of beverages 10-12 year olds associate with sport were not consistent with dietary guidelines (Smith, Jenkin, Signal, & McLean, 2014).

The presence of unhealthy food marketing in almost all recreation facilities studied in Canada is worrisome from a population health perspective. Thousands of children, youth, and families use public recreation facilities in Canada (Naylor, Wekken, et al., 2010; Randall Conrad and Associates & Roma, 2006), thus the reach of food marketing is broad. Kelly et al. (2014) estimated that Australian children may be exposed up to 64,000 person-hours of food and beverage sponsorships per week depending on the sport. It is not reasonable to expect recreation facilities that sell food to be free of food marketing (although food sponsorship may be unnecessary), but marketing environments could be improved to be less pervasive across recreation and sport facilities and be used to promote healthy products only. Marketing policies that reduce ‘exposure’ to and ‘power’ of food and beverage marketing are recommended by the WHO (2010b) and could reduce the impact of unhealthy food marketing on children’s eating behaviors. Institutions, such as recreation facilities, may consider generating food marketing restrictions to complement food provision policies in order to more comprehensively promote healthy diets (Prowse, 2017).

Future research should explore the relationships of food marketing in children’s sport settings with other environmental factors (food availability, food sales) and the impact of food marketing in sport settings on individual and population diet and health outcomes. Investigating the impact of food marketing according to FoodMATS scores may help to understand how to reduce the impact of food marketing by identifying ideal food marketing scores and generating strong, specific recommendations for policymakers to restrict unhealthy food marketing and sponsorship in children’s sport settings. Researchers should consider assessing differences in food marketing between sport types (hockey versus soccer), facility type (public versus private funding; single versus multi-sport), competition levels, and communities in which these facilities

are located (high versus low income; urban versus rural). Such research may reveal whether certain populations are at greater risk of exposure to unhealthy food marketing environments. Understanding such differences could identify where to focus interventions to have the greatest population impact on diet, health, and childhood obesity.

### **Conclusions**

It is argued that the food industry often overemphasizes the importance of physical activity deliberately (Brownell & Warner, 2009b; Kirk et al., 2010) to “[deflect] attention from its possible role in the obesity epidemic” (Folta et al., 2006, p. 244). The overwhelming presence of food marketing in recreation facilities may be evidence of one method used by the food industry to do so. Over half of food products, brands, and retailers marketed in public recreation facilities were “Least Healthy”. Although not common, child-targeted and sports-related features were occasionally present. Having provincial nutrition guidelines did not appear to impact the frequency or repetition of food marketing in recreation facilities, but was associated with less unhealthy food promotion, including the products marketed with child-targeted or sports-related techniques. As researchers and practitioners work to improve food environments in sport settings, targeting food marketing as an environmental factor appears important for supporting healthy eating.

## References

Alberta Health and Wellness. (2010). *The Alberta Nutrition Guidelines for Children and Youth*.

Retrieved from: <https://www.albertahealthservices.ca/nutrition/Page2929.aspx>

Brennan, L. K., Brownson, R. C., & Orleans, C. T. (2014). Childhood obesity policy research and practice: evidence for policy and environmental strategies. *American Journal Of Preventive Medicine*, 46(1), e1-16.

British Columbia Ministry of Health. (2014). *Healthier Choices in Vending Machines in BC Public Buildings*. Victoria, BC: Province of British Columbia Retrieved from [www.healthlinkbc.ca/foodguidelines](http://www.healthlinkbc.ca/foodguidelines).

Brownell, K. D., & Warner, K. E. (2009). The perils of ignoring history: Big Tobacco played dirty and millions died. How similar is Big Food? *Milbank Quarterly*, 87(1), 259-294.

Carter, M. A., Edwards, R., Signal, L., & Hoek, J. (2012). Availability and marketing of food and beverages to children through sports settings: A systematic review. *Public Health Nutrition*, 15(08), 1373-1379.

Carter, M. A., Signal, L., Edwards, R., Hoek, J., & Maher, A. (2013). Food, fizzy, and football: promoting unhealthy food and beverages through sport - a New Zealand case study. *BMC Public Health*, 13.

Castonguay, J. (2015). Sugar and Sports Age Differences in Children's Responses to a High Sugar Cereal Advertisement Portraying Physical Activities. *Communication Research*..

Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (revised ed.): New York: Academic Press.



- Folta, S. C., Goldberg, J. P., Economos, C., Bell, R., & Meltzer, R. (2006). Food advertising targeted at school-age children: A content analysis. *Journal of Nutrition Education And Behavior, 38*(4), 244-248.
- Government of Alberta. (2011). Active Alberta 2011-2021. Retrieved from <http://culture.alberta.ca/recreation/active-alberta/pdf/Active-Alberta-Policy.pdf>
- Government of British Columbia. (2013). *Guidelines for Food and Beverage Sales in B.C. Schools*. Victoria, BC: Province of British Columbia Retrieved from [http://www2.gov.bc.ca/assets/gov/education/administration/kindergarten-to-grade-12/healthyschools/2015\\_food\\_guidelines.pdf](http://www2.gov.bc.ca/assets/gov/education/administration/kindergarten-to-grade-12/healthyschools/2015_food_guidelines.pdf).
- Government of Nova Scotia. (2015). *Healthy Eating in Recreation and Sport Settings Guidelines*. Retrieved from <http://www.recreationns.ns.ca/wp-content/uploads/2016/01/HERSS-Guidelines.pdf>.
- Inoue, Y., Berg, B. K., & Chelladurai, P. (2015). Spectator Sport and Population Health: A Scoping Study. *Journal of Sport Management, 29*(6), 705-725.
- Kelly, B., Bauman, A. E., & Baur, L. A. (2014). Population estimates of Australian children's exposure to food and beverage sponsorship of sports clubs. *Journal of Science and Medicine in Sport, 17*(4), 394-398.
- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2010). Food and drink sponsorship of children's sport in Australia: Who pays? *Health Promotion International, 26*(2), 188-195.
- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2011). Food company sponsors are kind, generous and cool?: (Mis)conceptions of junior sports players. *International Journal of Behavioural Nutrition and Physical Activity, 8*(95).

- Kelly, B., King, L., Bauman, A. E., Baur, L. A., Macniven, R., Chapman, K., & Smith, B. J. (2014). Identifying important and feasible policies and actions for health at community sports clubs: A consensus-generating approach. *Journal of Science and Medicine in Sport, 17*(1), 61-66.
- Kirk, S. F. L., Penney, T. L., & Freedhoff, Y. (2010). Running away with the facts on food and fatness. *Public Health Nutrition, 13*(1), 147-148.
- Lee, N. R., & Kotler, P. (2011). *Social marketing: Influencing behaviors for good*: Sage: Thousand Islands (CA).
- Naylor, P. J., Bridgewater, L., Purcell, M., Ostry, A., & Wekken, S. V. (2010). Publically funded recreation facilities: Obesogenic environments for children and families? *International Journal of Environmental Research and Public Health, 7*(5), 2208-2221.
- Naylor, P. J., Wekken, S. V., Trill, D., & Kirbyson, A. (2010). Facilitating healthier food environments in public recreation facilities: Results of a pilot project in British Columbia, Canada. *Journal of Park & Recreation Administration, 28*(4), 37-58.
- Nelson, T. F., Stovitz, S. D., Thomas, M., Lavoie, N. M., Bauer, K. W., & Neumark-Sztainer, D. (2011). Do youth sports prevent pediatric obesity? A systematic review and commentary. *Current Sports Medicine Reports, 10*(6), 360-370.
- Olstad, D. L., Downs, S. M., Raine, K. D., Berry, T. R., & McCargar, L. J. (2011). Improving children's nutrition environments: A survey of adoption and implementation of nutrition guidelines in recreational facilities. *BMC Public Health, 11*(1), 423.
- Olstad, D. L., Goonewardene, L. A., McCargar, L. J., & Raine, K. D. (2014). Choosing healthier foods in recreational sports settings: A mixed methods investigation of the impact of

- nudging and an economic incentive. *International Journal of Behavioral Nutrition and Physical Activity*, 11.
- Pettigrew, S., Rosenberg, M., Ferguson, R., Houghton, S., & Wood, L. (2013). Game on: do children absorb sports sponsorship messages? *Public health nutrition*, 16(12), 2197-2204.
- Prowse, R. (2017). Food marketing to children in Canada: a settings-based scoping review on exposure, power and impact. *Health Promotion & Chronic Disease Prevention in Canada: Research, Policy & Practice*, 37(9).
- Prowse, R. J., Naylor, P.-J., Olstad, D. L., Carson, V., Mâsse, L. C., Storey, K., . . . Raine, K. D. (2018). Reliability and validity of a novel tool to comprehensively assess food and beverage marketing in recreational sport settings. *International Journal of Behavioral Nutrition and Physical Activity*, 15(38).
- Randall Conrad and Associates, & Roma, M. (2006). *ARPA's infrastructure committee: Operations Survey Summary Report*. Retrieved from Edmonton, AB: <http://s3.arpaonline.ca/docs/IU-Infra-Comm-Operations-Survey.pdf>
- Smith, M., Jenkin, G., Signal, L., & McLean, R. (2014). Consuming calories and creating cavities: beverages NZ children associate with sport. *Appetite*, 81, 209-217.
- Velazquez, C. E., Black, J. L., & Ahmadi, N. (2015). Food and beverage promotions in Vancouver schools: A study of the prevalence and characteristics of in-school advertising, messaging, and signage. *Preventive Medicine Reports*, 2, 757-764.
- Wolfenden, L., Kingsland, M., Rowland, B. C., Dodds, P., Gillham, K., Yoong, S. L., . . . Wiggers, J. (2015). Improving availability, promotion and purchase of fruit and vegetable and non sugar-sweetened drink products at community sporting clubs: A randomised trial. *International Journal of Behavioral Nutrition and Physical Activity*, 12(1), 35.

World Health Organization. (2010). Set of recommendations on the marketing of foods and non-alcoholic beverages to children.

World Health Organization. (2012). A framework for implementing the set of recommendations on the marketing of foods and non-alcoholic beverages to children.

## CHAPTER 5 – RESULTS STUDY 3

### **Impact of building capacity to implement nutrition guidelines in recreation facilities on food marketing**

#### **Introduction**

The food industry has been involved in the sports industry for decades (Taylor & Gratton, 2002). Professional sport sponsorship and athlete endorsement of food products have been used by food companies to broadly reach and influence buyers (Bragg et al., 2017). Although much less researched, food marketing also exists locally in community recreation facilities. Recent research in municipally operated recreation facilities in Canada counted a median of 29 food marketing occasions per site, of which half were for unhealthy products (sugar-sweetened beverages, confectionary, deep-fried foods, etc.), or brands and retailers generally regarded as unhealthy (Prowse, Naylor, Olstad, Carson, Storey, et al., 2018). Research from Australia has found that unhealthy food and beverage companies often sponsor youth sports (Carter et al., 2012; Watson et al., 2016).

The presence of unhealthy food marketing in settings intended to promote health and wellbeing, such as recreation facilities, is contradictory to their aims and may contribute to health halos by associating unhealthy products with healthy activities (Bragg et al., 2017; Castonguay, 2015b). The potential for recreation facilities to regularly expose hundreds of thousands of users, including children (Kelly, Bauman, et al., 2014; Randall Conrad and Associates & Roma, 2006; Watson et al., 2016), to unhealthy food marketing should be an impetus for action as recommended by the World Health Organization (2010). Experts in health promotion, nutrition, physical activity and sport management from government, academia, and non-government agencies identified

restricting unhealthy food and beverage sport sponsorship as an important and feasible interventions to promote children's health in community sport centers (Kelly, King, et al., 2014).

In Canada, three provinces [British Columbia (BC), Alberta (AB), and Nova Scotia (NS)] have developed voluntary provincial nutrition guidelines for recreation facilities. However, evidence indicates that voluntary provincial nutrition guidelines may be poorly adopted and implemented, due to concerns over potential for reduced profitability, desires to maintain current cultural norms, and beliefs that patrons continue to purchase unhealthy foods even when healthy options are available (Olstad et al., 2011). Healthy food marketing could support the success (and profitability) of providing healthy food in recreation facilities by increasing consumer awareness of healthy options and nudging consumers to healthier choices (Olstad et al., 2014). To this end, our study aimed to assess the impact of a capacity-building intervention (CBI) to increase recreation facility managers' (and food service operators') ability to implement provincial nutrition guidelines in recreation facilities on food marketing.

## **Methods**

### ***Study Design***

The Eat Play Live (EPL) project was a randomized control trial embedded within a natural experiment. As a natural experiment, this project evaluated the impact of voluntary provincial nutrition guidelines on recreation facility food environments by comparing outcomes in facilities in three provinces with guidelines (BC, AB, NS) to one province without guidelines [(Ontario (ON))]. Facilities within guideline provinces were subsequently randomized to an intervention or guidelines-only comparison group to evaluate the added value of capacity building in enhancing recreation facility ability to implement provincial nutrition guidelines. Full methodologic details and primary study outcomes are reported elsewhere (Olstad et al., 2018).

The current study assessed the impact of the CBI on food marketing outcomes, comparing CBI facilities (Guidelines+CBI) to guidelines-only comparison facilities (Guidelines-Only) and no guidelines comparison facilities (Non-Guideline).

### ***Participants and Recruitment***

Local parks and recreation associations emailed study invitation letters to all of their members in each province. Researchers followed up with 286 facilities deemed within a day's travel of the host institution in each province. Approximately half of facilities (n=145) returned phone calls/emails, but only 75 of these were eligible to participate (provided food services, provided year-round sport programming, and had not made changes to their food environment since 2010 but were willing and able to do so). Of the eligible facilities, 49 facilities agreed to participate (65% of those who returned calls and were eligible). There were two facilities that each operated two geographically separate buildings resulting in a total of 51 measurement sites (34 in guideline provinces, and 17 in the Non-Guideline province). Only 26 eligible facilities declined the invitation, citing insufficient staff capacity in most cases (n=11). Ethics approval was obtained for the EPL project at all participating universities (blinded).

### ***Procedures***

A third party randomly assigned the facilities in guideline provinces to the CBI (Guidelines+CBI, n=18 sites) or guidelines only comparison (Guidelines-only, n=16 sites) group after baseline audits were completed. All ON facilities were automatically assigned to the no guidelines comparison (Non-Guideline) group (n=17 sites). Over the next 18 months, Guidelines+CBI facilities participated in the CBI, while Guidelines-Only and Non-Guideline facilities were asked to continue with their usual practices and refrain from making any food environment changes.

Details of the CBI have been previously reported (Olstad et al., 2018). Briefly, the CBI included a one-time training workshop, on demand provincial coordinator support, monthly check-ins, four teleconferences with all Guidelines+CBI facilities in each province, facilitated goal-setting and implementation-planning activities, electronic tools and resources, and a \$1000 CAD grant. A provincial coordinator provided tailored support to each facility depending on their self-identified needs and goals. The CBI did not explicitly address food marketing. However, the intervention sites could still elect to address food marketing within their facilities, and a majority did (16/18 sites).

All 51 sites were assessed at baseline (T1; November 2015 to May 2016) and follow-up (T2; August to December 2017). Due to permanent or temporary closing of concessions (n=5) and sports areas (n=1) in some sites, all areas in all sites could not be reassessed at T2. As a result, some sites were excluded from select analyses (see Table 16 and 17 for details).

### ***Instruments and Measures***

The FoodMATS (interrater reliability:  $\kappa=0.88-1.00$ ,  $p<0.001$ ; intraclass correlation= $0.97$ ,  $p<0.001$ ) was used to assess food marketing in all facilities (Prowse et al., 2018). The FoodMATS collects information on the frequency of food marketing occasions, repeated marketing of the same product, brand, or retailer, use of child-targeted and sports-related marketing techniques, and size of promotions. Raters participated in a training session before each data collection period (T1, T2) in order to ensure the tool was administered as intended. The training included reviews of what counted as food marketing and definitions of child-targeted, sports-related, and promotion sizes. The raters were walked through how the tool would be completed with food marketing examples. Frequently asked questions and common mistakes identified in T1 were reviewed during the training session in T2. Raters classified whether food



marketing occasions were child-targeted, sports-related, and how large it was based on a priori definitions. After data collection, every food and beverage product, brand, and retailer was classified as “Most Healthy”, “Less Healthy”, or “Least Healthy” by a registered dietitian (RP), confirmed by a second registered dietitian (KR). Products were ranked according to their classification in provincial nutrition guidelines (Alberta Health and Wellness, 2010; Government of Nova Scotia, 2015; British Columbia Ministry of Health, 2014) using several assumptions since it was not feasible to collect product nutrient information. Brands were ranked as per the product rankings for the product the brand most closely represented. Retailers were classified by rankings of relative food retailer healthfulness informed by Minaker et al. (2009). See Table 15 for definitions of “Least Healthy” products, brands, and retailers. Full analysis details are published elsewhere (Prowse et al., 2018).

Using the FoodMATS scoring scheme, composite scores were generated for facility areas (Food, Sport, Other) and for the total facility (All Areas). The FoodMATS scoring scheme has been validated by Prowse et al. (2018) where higher FoodMATS scores represented less favorable food marketing environments. Study outcomes included FoodMATS scores and components (frequency; repetition; unhealthfulness of food and beverage products brands, and retailers; child-targeted techniques; sports-related techniques; and size) (Table 15). These features are included in the FoodMATS score as they contribute to the exposure and power of food marketing and thus its impact on children’s dietary preferences and behaviors (World Health Organization, 2012).

### ***Data Analysis***

Statistical Package for the Social Sciences Version 23 (SPSS Inc., Chicago, IL, USA) was used for statistical analyses with  $p < 0.05$  indicating statistical significance. Due to unequal

covariances, we used Wilcoxon Signed Rank Tests to test within-group differences in changes in outcomes of interest between T1 and T2 (Table 15). Kruskal-Wallis Tests were used to test between-group differences (Guidelines+CBI versus Guidelines-Only versus Non-Guidelines) in changes in outcomes of interest between T1 and T2 with Mann-Whitney U post hoc tests. Kruskal-Wallis with post-hoc Mann-Whitney U tests were also used to test if there were significant differences in FoodMATS scores and marketing features (frequency, repetition, and proportion of “Least Healthy”, child-directed, sports-related, and large food marketing occasions) between treatment groups at T1. The treatment conditions (Guidelines+CBI; Guidelines-Only; and Non-guideline) were independent variables.

**Table 15 Measures Evaluated by the Food and beverage Marketing Assessment Tool for Settings (FoodMATS) between T1 and T2**

Measure	Outcome of Interest ( $\Delta^a$ )	Definition of Measure
FoodMATS score	Number of points	A composite score calculated from the exposure (frequency, repetition) and power (healthfulness, child-targeting, sports-related, size) of food marketing documented in a facility area, and in all areas (Prowse et al., 2018).
Frequency	Count of food or beverage marketing occasions	One marketing occasion was counted as any commercial advertising, promotion, or messaging of food or beverage products, brands, or retailers intended to increase the “recognition, appeal and/or consumption” (World Health Organization, 2012, p.9) of the products, brands, or retailers. Includes all food marketing regardless of healthfulness.
Repetition	Count of repeated products/ brands/ retailers	A product, brand, or retailer was counted as repeated if it was marketed three or more times across all areas.
Unhealthfulness	% of “Least Healthy” products, brands, retailers marketing occasions	“Least Healthy” products/brands were processed energy-dense, nutrient-poor items with high levels of fat, sugar, or salt. “Least Healthy” retailers were pizza, burger, taco, fried chicken, Asian, and ice cream outlets, and pubs/lounges/alcohol stores.
Child-targeted techniques	% child-targeted marketing occasions	A child-targeted technique included evidence of animated or fictional characters, taste appeals, humor, action-adventure, fantasy, fun (shapes, colors), competitions, giveaways, cartoonish font, or used a child actor to advertise a food or beverage product/brand that would appeal to children.
Sports-related techniques	% sports-related marketing occasions	A sports-related technique included any reference to physical activity, exercise, sport, game, recreation, performance or competition.
Size	% large marketing occasions	Large marketing occasions inside the facility were greater than three 8.5x11” pieces of paper. Large marketing occasions outside the facility were greater than 10 pieces of paper.

<sup>a</sup>Change calculated as T2 value minus T1 value.

## Results

Food marketing environment outcome measures at T1 and T2 are summarized in Table 16 for All Areas, Food Areas, and Sports Areas according to treatment condition. There were no statistically significant differences at T1 in food marketing in All Areas between the groups, except for Non-Guideline sites having more “Least Healthy” food marketing occasions than the Guideline-Only sites ( $p=0.008$ ) and a greater proportion of “Least Healthy” food marketing occasions than both other groups ( $p<0.001$ ).

### *Within group change in food marketing environments between T1 and T2*

For almost all food marketing outcomes in All Areas, there were no significant changes from T1 to T2 within any condition (Table 17). Median values for frequency, repetition, and proportions of “Least Healthy”, child-targeted, and sports-related food marketing occasions in All Areas were lower in Guidelines+CBI sites at T2 compared to T1 (Table 16), but were not significantly different (Table 17). There was a significant increase in the frequency of food marketing occasions ( $p=0.036$ ) and FoodMATS scores (indicating a poorer food marketing environment) for All Areas ( $p=0.039$ ) within Non-Guideline sites.

In Food Areas, FoodMATS subscores significantly decreased (indicating a better food marketing environment) in Guidelines-Only sites from T1 to T2 ( $p=0.047$ ) (Table 17). Contrary to expectations, there were trends towards increasing food marketing occasion frequency overall, proportion of “Least Healthy” marketing occasions, proportion of large marketing occasions, and FoodMATS subscores (indicating a poorer food marketing environment) in Food Areas for Guidelines+CBI sites (Table 16) but these were not statistically significant (Table 17).

***Between group change in food marketing environments***

There were no significant differences in the change in food marketing environments between T1 and T2 across groups (Table 17), except for a significant difference in the change in frequency of food marketing occasions in All Areas ( $p=0.045$ ). Post-hoc Mann Whitney tests revealed that the change in frequency in All Areas in Non-Guideline sites was significantly greater than the change in frequency in Guidelines+CBI sites ( $p=0.033$ ) and Guidelines-Only sites ( $p=0.049$ ); there was no difference in between Guidelines+CBI and Guidelines-Only sites ( $p=0.367$ ).

**Table 16 Food and Beverage Marketing Outcomes by Facility Condition and Facility Area**

	Guidelines+CBI sites				Guidelines-Only sites				Non-Guideline sites			
	T1		T2		T1		T2		T1		T2	
	Median	(IQR)	Median	(IQR)	Median	(IQR)	Median	(IQR)	Median	(IQR)	Median	(IQR)
<b>All Areas<sup>a,b</sup></b>	n=15				n=15				n=16			
Score (pts)	58.3	2.8, 73.7	53.9	8.1, 107.6	32.6	4.1, 68.8	30.3	4.4, 58.3	43.6	31.8, 71.3	50.5	34.8, 80.1
Frequency (n)	37.0	4.0, 47.0	32.0	8.0, 55.0	24.0	3.0, 40.0	24.0	3.0, 34.0	29.0	20.0, 42.8	31.5	23.0, 51.3
Repetition (n)	3	0, 5	2	0, 5	1	0, 2	1	0, 3	2	1, 3	2	1, 3, 75
Unhealthfulness [n (%)]	14 (42.9)	2, 19 (25.3, 51.4)	10 (33.3)	2, 23 (18.8, 50.0)	11 (41.8)	1, 17 (7.7, 57.5)	10 (38.3)	0.0, 20 (0.0, 55.6)	20 (75.4)	13.75, 33.75 (66.9, 81.4)	23 (77.3)	15.5, 35.75 (29.9, 85.2)
Child-targeted [n (%)]	2 (2.8)	0, 4 (0.0, 12.)	1 (2.8)	0, 2 (0.0, 57.7)	0 (0.0)	0, 3 (0.0, 22.7)	0 (0.0)	0, 3 (0.00, 23.1)	0 (0.0)	0, 1 (0.0, 2.3)	0 (0.0)	0, 2 (0.0, 5.3)
Sports-related [n (%)]	2 (5.7)	0, 11 (0.0, 18.8)	1 (6.1)	0, 4 (0.0, 12.5)	0 (0.0)	0, 3 (0.0, 7.7)	0 (0.0)	0, 3 (0.0, 6.5)	1 (4.3)	0, 1.75 (0.0, 7.3)	1 (1.9)	0, 1 (0.0, 5.4)
Large size [n (%)]	7 (33.3)	2, 32 (18.9, 62.4)	10 (53.3)	3, 38 (33.5, 66.7)	8 (50.0)	2, 15 (33.3, 66.7)	7 (53.8)	2, 17 (31.8, 77.8)	10.5 (50.0)	4.25, 20.25 (43.7, 61.6)	12 (51.0)	6, 20.75 (38.7, 68.1)
<b>Food Area<sup>c</sup></b>	n=10				n=11				n=16			
Score (pts)	14.2	9.3, 42.2	22.5	12.1, 72.7	20.7	14.1, 40.2	13.2	8.8, 30.6	13.4	8.8, 23.6	15.1	12.3, 22.8
Frequency (n)	14.0	8.8, 32.8	18.5	6.8, 32.0	17.0	13.0, 28.0	14.0	9.0, 23.0	12.0	7.3, 18.0	14.0	9.0, 17.8
Unhealthfulness [n (%)]	6.5 (34.5)	3.0, 12.75 (16.7, 54.5)	6.5 (39.58)	2.0, 11.5 (25.5, 57.0)	9 (46.7)	5, 11 (38.5, 69.0)	7 (40.0)	4, 7 (21.7, 53.8)	8.5 (38.3)	5.25, 12.75 (2.6, 55.9)	9 (42.8)	7.25, 14.0 (23.6, 62.0)
Child-targeted [n (%)]	0.0 (0.0)	0, 1.5 (0.0, 21.9)	0.0 (0.0)	0.75, 5.25 (0.0, 10.7)	0.0 (0.0)	0, 1 (0.0, 33.3)	0.0 (0.0)	0, 1 (0.0, 71.4)	0.0 (0.0)	0, 1 (0.0, 100.0)	0.0 (0.0)	0, 0 (0.0, 0.0)
Sports-related [n (%)]	0.0 (0.0)	0.0, 0.5 (0.0, 4.5)	0.0 (0.0)	0.0, 0.5 (0, 04.5)	0.0 (0.0)	0, 1 (0.0, 33.3)	0.0 (0.0)	0, 3 (0.0, 50.0)	0.0 (0.0)	0, 0.75 (0.0, 18.8)	0.0 (0.0)	0, 0 (0.0, 0.0)
Large size [n (%)]	1.0 (4.1)	0.0, 3.25 (0.0, 014.7)	2.5 (16.5)	0.75, 9.75 (2.0, 30.0)	0.0 (0.0)	0, 3 (0.0, 30.0)	0 (0.0)	0, 3 (0.0, 17.6)	0 (0.0)	0, 2 (0.0, 15.8)	1 (0.0)	0, 1.75 (0.0, 10.0)
<b>Sport Area<sup>c</sup></b>	n=16				n=15				n=17			
Score (pts)	13.2	0.0, 36.5	8.8	0.0, 34.8	0.4	0.0, 18.0	7.3	0.0, 19.1	9.5	4.15, 21.3	14.6	4.0, 23.9
Frequency (n)	6.0	0.0, 17.3	5.5	0.0, 8.5	2.0	0.0, 10.0	3.0	0.0, 13.0	5.0	2.0, 12.5	8.0	2.5, 12
Unhealthfulness [n (%)]	3 (16.5)	0.0, 8.5 (0.0, 33.6)	2.5 (27.6)	0.0, 9.25 (0.0, 35.6)	1 (3.4)	0, 4 (0.0, 26.7)	1.0 (5.0)	0, 6 (0.0, 34.8)	2.0 (12.5)	1, 8 (4.4, 33.3)	4.0 (14.3)	1, 7 (2.2, 0.32.7)
Child-targeted <sup>b</sup> [n (%)]	0.0 (0.0)	0.0, 1.0 (0.0, 43.8)	0.0 (0.0)	0.0, 0.0 (0.0, 0.0)	0.0 (0.0)	0, 1.0 (0.0, 20.0)	0.0 (0.0)	0.0, 0.0 (0.0, 0.0)	0.0 (0.0)	0.0, 0.0 (0.0, 0.0)	0.0 (0.0)	0.0, 0.0 (0.0, 0.0)
Sports-related <sup>c</sup> [n (%)]	0.0 (0.0)	0.0, 5.75 (0.0, 50.0)	0.0 (0.0)	0.0, 2.0 (0.0, 93.2)	0.0 (0.0)	0.0, 1.0 (0.0, 40.0)	0.0 (0.0)	0.0, 1.0 (0.0, 16.7)	0.0 (0.0)	0.0, 1.0 (0.0, 100.0)	0.0 (0.0)	0.0, 0.5 (0.0, 33.3)
Large size [n (%)]	3.5 (36.7)	0.0, 13.5 (0.0, 71.0)	2.0 (29.1)	0.0, 16.0 (0.0, 60.4)	0.0 (0.0)	0.0, 10 (0.0, 62.5)	3.0 (17.6)	0.0, 9.0 (0.0, 50.0)	5.0 (41.7)	2, 9 (21.6, 67.5)	7 (40.0)	1.5, 10.5 (20.0, 63.6)

IQR=Interquartile Range (25<sup>th</sup> percentile, 75<sup>th</sup> percentile). pts = points. <sup>a</sup>All areas=Food Area + Sport Area + Other Area. <sup>b</sup>For All Area analyses, five sites were excluded (3 due to missing Food Area audits; 1 due to missing Sports Area audit; 1 due to missing Food Area audit and an error in Sports Area audit at baseline). <sup>c</sup>For Food Area analyses, five sites were excluded due to missing Food Area audits data at follow-up and another nine sites were excluded as they did not have a concession at baseline or follow-up. <sup>d</sup>Three sites were excluded from Sports Area analyses (one due to missing Sports Area audit, one due to an error in Sports Area audit at baseline, and one did not have a Sports Area to audit (Prowse et al., 2018).

**Table 17 Change in FoodMATS Outcomes Between T1 and T2 Within and Between Guidelines+CBI, Guidelines-Only, and Non-Guideline Sites**

	All Areas <sup>a,b</sup>			p-value <sup>f</sup>	Food Area(s) <sup>c</sup>			p-value <sup>f</sup>	Sport Area(s) <sup>d</sup>			p-value <sup>f</sup>
	Guidelines +CBI	Guidelines-Only	Non-Guideline		Guidelines +CBI	Guidelines-Only	Non-Guideline		Guidelines +CBI	Guidelines-Only	Non-Guideline	
	n (missing)	n (missing)	n (missing)		n (missing)	n (missing)	n (missing)		n (missing)	n (missing)	n (missing)	
	15 (3)	15 (1)	16 (1)		10 (8)	11 (5)	16 (1)		16 (2)	15 (1)	17 (0)	
	Median <sup>e</sup> (IQR)	Median (IQR)	Median (IQR)		Median (IQR)	Median (IQR)	Median (IQR)		Median (IQR)	Median (IQR)	Median (IQR)	
FoodMATS Score (points)	-1.0 (-9.7, 8.95)	0.00 (-9.7, 6.9)	7.1 (-4.5, 16.6)*	.118	6.4 (-2.5, 30.1)	-5.0 (-9.6, 1.4)*	2.5 (-3.0, 8.4)	.050	0.0 (-8.4, 1.2)	0.0 (-3.0,0.0)	0.0 (-1.9.0, 7.6)	.313
Frequency (n)	0 (-10.0,4.0)	0 (-2.0, 3.0)	6.0 (-2.0, 8.5)*	.045	1.5 (4.50, 10.0)	-2.0 (-7.0, 2.0)	1.5 (-1.8, 5.0)	.187	0.0 (-5.3, 1.5)	0.0 (-1.0, 0.0)	0.0 (-0.5, 4.0)	.461
Repetition <sup>g</sup> (n)	0 (-2.0, 4.00)	0 (-1.0, 1.0)	0 (-0.8, 1.0)	.190	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Unhealthfulness (%)	-9.5 (-22.3, 4.8)	0.00 (-4.6, 4.0)	0.0 (-10.0, 6.5)	.370	3.0 (-16.1, 19.1)	-8.0 (-20.1, 1.7)	-2.1 (-12.6, 8.3)	.500	0.0 (-8.3, 6.7)	0.0 (0.0, 4.0)	0.0 (-9.7, 7.0)	.846
Child-targeted (%)	0.0 (-5.7, 3.0)	0.00 (0.0, 0.0)	0 (0.00, 3.7)	.374	0.0 (-12.5, 7.6)	0.00 (-20.0, 38.1)	0 (-75.0, 0.0)	.614	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0 (-0.0, 0.0)	.163
Sports-related (%)	-1.3 (-10.4, 2.3)	0.00 (-4.5, 0.0)	-0.9 (-4.4, 1.2)	.880	0.0 (0.0, 0.0)	0.00 (0.0, 6.7)	0.0 (0.0, 0.0)	.154	0.0 (0.0, 25.0)	0.0 (-6.7, 0.0)	0.0 (-66.7, 0.0)	.323
Large size (%)	0.0 (-0.0, 14.33)	0.00 (-3.6, 0.0)	0 (-1.2, 5.1)	.259	7.0 (0.0, 19.5)	0.0 (-7.0, 0.0)	0.00 (-1.0,5.0)	.060	0.0 (-17.8, 2.8)	0.0 (-6.7, 2.7)	0.0 (-15.0, 6.4)	.734

IQR=interquartile range (25<sup>th</sup> percentile, 75<sup>th</sup> percentile). n/a=not applicable. \*P<.05 from Wilcoxon signed rank test within group. <sup>a</sup>All areas=Food Area + Sport Area + Other Area. <sup>b</sup>For All Area analyses, five sites were excluded (3 due to missing Food Area audits; 1 due to missing Sports Area audit; 1 due to missing Food Area audit and an error in Sports Area audit at baseline). <sup>c</sup>For Food Area analyses, five sites were excluded due to missing Food Area audits data at follow-up and another nine sites were excluded as they did not have a concession at baseline or follow-up. <sup>d</sup>Three sites were excluded from Sports Area analyses (one due to missing Sports Area audit, one due to an error in Sports Area audit at baseline, and one did not have a Sports Area to audit (Prowse et al., 2018). <sup>e</sup> median difference post- intervention minus pre-intervention. <sup>f</sup>p-value from Kruskal wallis non-parametric test between groups <sup>g</sup>Repetition is only measured at the facility level (not by area).

## Discussion

Overall, this study did not find that capacity building improved food marketing environments in recreation facilities. These null findings are in contrast to findings that Guidelines+CBI facilities significantly reduced the proportionate availability of unhealthy snacks in vending machines and improved the overall quality of the food environment in concessions (Olstad et al., 2018). These findings suggest that Guidelines+CBI facilities may have prioritized changing other aspects of their food environments (e.g. food availability) rather than food marketing.

Results of the EPL process evaluation can help to understand the current findings (Moore et al., 2015; Oakley, Strange, Bonell, Allen, & Stephenson, 2006). After reviewing Guidelines+CBI facility change plans for the intervention, we found that although almost all Guidelines+CBI sites set food marketing goals, they were minor components of site's overall improvement plans. Marketing goals included: marketing healthy choices at concessions or vending machines, increasing general healthy food promotion, restricting sport sponsorship to healthier food or beverage retailers, and/or including food marketing in a healthy food policy. At the end of the intervention period, many Guidelines+CBI sites stated that they did not achieve their marketing goals. Less than one-third of sites succeeded in changing food marketing in concessions and vending machines as they had originally planned. All sites that aimed to increase general healthy food promotion and restrict unhealthy food sponsorship stated that they made progress towards their goal but had not fully achieved their goal at study end. Moreover, only two of the five sites that aimed to implement a food policy that addressed food marketing had made progress.



Notably, most food marketing goals were usually vague (e.g. “market healthy choices” without specific actions) and/or narrow (e.g. identified one or two marketing strategies to implement such as labelling healthy choices for consumers). Specificity and comprehensiveness are components often evaluated in school wellness policies (Lucarelli et al., 2015; Schwartz et al., 2009) and thus may be applicable in action planning, since ambiguity makes it difficult to implement policy requirements (Lucarelli et al., 2015). The ambiguous food marketing goals of Guidelines+CBI sites is consistent with the minimal detail provided on food marketing in provincial nutrition guidelines (Prowse et al., 2018). Lucarelli et al. (2015) recommend that policy direction for schools be supplemented with procedure manuals specifying practices-based recommendations to support policy implementation. Policy-makers should detail ideal food marketing practices within provincial nutrition guidelines for recreation facilities, and provide sufficient resources to support implementation of recommendations.

Further, the narrowness of food marketing goals may explain why Guidelines+CBI sites did not appear to improve their marketing food environments. As previously described, labelling products by healthfulness on menus or in vending machines was a common strategy sites identified to promote healthy options to consumers. Although such labelling systems can be effective (Littlewood, Lourenço, Iversen, & Hansen, 2016; Olstad, Vermeer, McCargar, Prowse, & Raine, 2015; Sinclair, Cooper, & Mansfield, 2014), the FoodMATS only counted menu labelling as one food marketing occasion, therefore having a small impact on FoodMATS scores and other marketing outcomes. Since the FoodMATS is designed to measure food marketing in whole settings, null to minor changes to the FoodMATS score after implementing a single change (e.g. labelling the menu) suggests that simply adding healthy food promotion and not removing unhealthy food marketing may be insufficient to change food marketing environments

for consumers overall. Previous research has suggested that having both healthy and unhealthy options available in recreation facilities (Olstad et al., 2011) and schools (Krølner et al., 2011; Story, Nanney, & Schwartz, 2009) may not support healthy eating in children. In the same vein, having healthy and unhealthy food marketing presented simultaneously may be contradictory. When competing with unhealthy food marketing, healthy food marketing may fail to positively influence dietary attitudes or behaviours as intended.

Action may be further complicated as food marketing may be decided by several parties including recreation facility managers, food service operators, sports leagues, municipalities, or others. Our findings may therefore reflect difficulty aligning preferred interventions across recreation facility areas and decision makers. Furthermore, recreation facilities are often profit-driven (Olstad & Raine, 2013) and food is seen as a source of revenue (Taylor, Canning, Brailsford, & Rokosz, 2003). Therefore, marketing decisions may be influenced by desired to maintain or increase profits. Finally, as some food marketing features, such as vending machine branding, may be dictated by lengthy contracts it is possible that some food marketing features in recreation facilities could not be changed until the contract renewal date arose (which may not have occurred during the 18 month intervention period for some sites).

### ***Limitations***

Study findings are limited by our sample size which may have limited our statistical power to detect an observable change in food marketing environments (Prowse et al., 2018). There is risk of self-selection bias (risk of higher participation amongst those more interested in creating healthy food environments) which may bias results towards the null than if facilities in all groups were in a variety of stages of readiness for change. As our sample is not representative, the findings are not generalizable across BC, AB, NS, ON, or Canada.

## **Implications for Research and Practice**

This study highlights challenges related to prioritizing and changing food marketing environments in recreation facilities. The prevalence of food marketing occasions in Canadian recreation facilities represents opportunities to align food messages in recreation facilities with their health-promoting nature. However, the vague and narrow food marketing goals set by Guidelines+CBI sites may suggest that improving food marketing is difficult. Change may be further challenged by the limited guidance on food marketing in provincial nutrition guidelines, the fact that there may be many parties involved in making decisions on food marketing, and the time require to plan and implement changes. Policy-makers and practitioners should consider including explicit strategies to improve food marketing environments in nutrition guidelines (with supports for implementation) and encourage recreation facility decision-makers to include specific food marketing stipulations in facility food policies or food service operator contracts. More research is needed to clarify how to address food marketing in recreation facilities and identify effective capacity-building strategies to improve food marketing environments. The profit-making side of food marketing cannot be ignored, but should be evaluated in the long-term context of the cost of perpetuating food marketing environments in recreation that are inconsistent with healthy eating.

## References

- Alberta Health and Wellness. (2010). *The Alberta Nutrition Guidelines for Children and Youth*. Retrieved from: <https://www.albertahealthservices.ca/nutrition/Page2929.aspx>
- British Columbia Ministry of Health. (2014). *Healthier Choices in Vending Machines in BC Public Buildings*. Victoria, BC: Province of British Columbia Retrieved from [www.healthlinkbc.ca/foodguidelines](http://www.healthlinkbc.ca/foodguidelines).
- Bragg, M. A., Roberto, C. A., Harris, J. L., Brownell, K. D., & Elbel, B. (2017). Marketing food and beverages to youth through sports. *Journal of Adolescent Health, 62*(1), 5-13.
- Carter, M. A., Edwards, R., Signal, L., & Hoek, J. (2012). Availability and marketing of food and beverages to children through sports settings: A systematic review. *Public Health Nutrition, 15*(08), 1373-1379.
- Castonguay, J. (2015). Sugar and sports: Age differences in children's responses to a high sugar cereal advertisement portraying physical activities. *Communication Research*.
- Government of Nova Scotia. (2015). *Healthy Eating in Recreation and Sport Settings Guidelines*. Retrieved from <http://www.recreationns.ns.ca/wp-content/uploads/2016/01/HERSS-Guidelines.pdf>.
- Kelly, B., Bauman, A. E., & Baur, L. A. (2014). Population estimates of Australian children's exposure to food and beverage sponsorship of sports clubs. *Journal of Science and Medicine in Sport, 17*(4), 394-398.
- Kelly, B., King, L., Bauman, A. E., Baur, L. A., Macniven, R., Chapman, K., & Smith, B. J. (2014). Identifying important and feasible policies and actions for health at community sports clubs: A consensus-generating approach. *Journal of Science and Medicine in Sport, 17*(1), 61-66.

- Krølner, R., Rasmussen, M., Brug, J., Klepp, K.-I., Wind, M., & Due, P. (2011). Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part II: qualitative studies. *International Journal of Behavioral Nutrition and Physical Activity*, *8*(1), 112.
- Littlewood, J. A., Lourenço, S., Iversen, C. L., & Hansen, G. L. (2016). Menu labelling is effective in reducing energy ordered and consumed: a systematic review and meta-analysis of recent studies. *Public Health Nutrition*, *19*(12), 2106-2121.
- Lucarelli, J. F., Alaimo, K., Belansky, E. S., Mang, E., Miles, R., Kelleher, D. K., . . . Liu, H. (2015). Little association between wellness policies and school-reported nutrition practices. *Health Promotion Practice*, *16*(2), 193-201.
- Minaker, L. M., Raine, K. D., & Cash, S. B. (2009). Measuring the food service environment: development and implementation of assessment tools. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, 421-425.
- Moore, G. F., Audrey, S., Barker, M., Bond, L., Bonell, C., Hardeman, W., . . . Wight, D. (2015). Process evaluation of complex interventions: Medical Research Council guidance. *BMJ*, 350.
- Oakley, A., Strange, V., Bonell, C., Allen, E., & Stephenson, J. (2006). Process evaluation in randomised controlled trials of complex interventions. *BMJ*, *332*(7538), 413-416.
- Olstad, D. L., Downs, S. M., Raine, K. D., Berry, T. R., & McCargar, L. J. (2011). Improving children's nutrition environments: A survey of adoption and implementation of nutrition guidelines in recreational facilities. *BMC Public Health*, *11*(1), 423.
- Olstad, D. L., Goonewardene, L. A., McCargar, L. J., & Raine, K. D. (2014). Choosing healthier foods in recreational sports settings: A mixed methods investigation of the impact of

nudging and an economic incentive. *International Journal of Behavioral Nutrition and Physical Activity*, 11.

Olstad, D. L., Lieffers, J. R., Raine, K. D., & McCargar, L. J. (2011). Implementing the Alberta nutrition guidelines for children and youth in a recreational facility. *Canadian Journal of Dietetic Practice and Research/Revue canadienne de la pratique et de la recherche en dietetique* 72(4), 177.

Olstad, D. L., Prowse, R.J.L, Raine, K.D., Tomlin, D., Kirk, S.F., McIsaac, J.D., . . . Naylor, P.J. (2018). *Eat, Play, Live: A randomized controlled trial of the impact of nutrition policy and capacity building on food environments in recreation and sport facilities* [unpublished].

Olstad, D. L., & Raine, K. D. (2013). Profit versus public health: The need to improve the food environment in recreational facilities. *Canadian Journal of Public Health/Revue Canadienne De Sante Publique*, 104(2), e167-e169.

Olstad, D. L., Vermeer, J., McCargar, L. J., Prowse, R. J. L., & Raine, K. D. (2015). Using traffic light labels to improve food selection in recreation and sport facility eating environments. *Appetite*, 91, 329-335.

Prowse, R. J., Naylor, P.J., Olstad, D. L., Carson, V., Mâsse, L. C., Storey, K., . . . Raine, K. D. (2018). Reliability and validity of a novel tool to comprehensively assess food and beverage marketing in recreational sport settings. *International Journal of Behavioral Nutrition and Physical Activity*, 15(38).

Prowse, R. J., Naylor, P.J., Olstad, D. L., Carson, V., Storey, K., Mâsse, L. C., . . . Raine, K. D. (2018). Food marketing in recreational sport settings in Canada: a cross-sectional audit in different policy environments using the Food and beverage Marketing Assessment Tool

- for Settings (FoodMATS). *International Journal of Behavioral Nutrition and Physical Activity*, 15(1), 39.
- Randall Conrad and Associates, & Roma, M. (2006). *ARPA's infrastructure committee: Operations Survey Summary Report*. Retrieved from Edmonton, AB: <http://s3.arpaonline.ca/docs/IU-Infra-Comm-Operations-Survey.pdf>
- Schwartz, M. B., Lund, A. E., Grow, H. M., McDonnell, E., Probart, C., Samuelson, A., & Lytle, L. (2009). A comprehensive coding system to measure the quality of school wellness policies. *Journal of the American Dietetic Association*, 109(7), 1256-1262.
- Sinclair, S. E., Cooper, M., & Mansfield, E. D. (2014). The influence of menu labeling on calories selected or consumed: a systematic review and meta-analysis. *Journal of the Academy of Nutrition and Dietetics*, 114(9), 1375-1388.
- Story, M., Nannery, M. S., & Schwartz, M. B. (2009). Schools and obesity prevention: creating school environments and policies to promote healthy eating and physical activity. *The Milbank Quarterly*, 87(1), 71-100.
- Taylor, H., Canning, W. F., Brailsford, P., & Rokosz, F. (2003). Financial issues in campus recreation. *New Directions for Student Services*, 103, 73-86.
- Taylor, P., & Gratton, C. (2002). *The economics of sport and recreation: an economic analysis*. New York, NY: Routledge.
- Watson, W. L., Brunner, R., Wellard, L., & Hughes, C. (2016). Sponsorship of junior sport development programs in Australia. *Australian and New Zealand Journal of Public Health*, 40(4), 326-328.
- World Health Organization. (2010). Set of recommendations on the marketing of foods and non-alcoholic beverages to children.

World Health Organization. (2012). A framework for implementing the set of recommendations on the marketing of foods and non-alcoholic beverages to children.



## CHAPTER 6 – RESULTS STUDY 4

### **Food messages in recreation facilities: A photo-based investigation of parents' awareness, reactions, and experiences of food and beverage marketing around children's sports**

#### **Introduction**

Children's exposure to unhealthy food and beverage marketing has a critical impact on their food-related beliefs, attitudes, preferences, and behaviours (Gootman et al., 2006). Since 2010, the World Health Organization (2010) has recommended limiting unhealthy food and beverage marketing in settings where children gather, such as recreation and sport facilities. Professionals in recreation, sports, and public health agree that restricting unhealthy food and beverage sponsorship in sport settings is an important and feasible intervention to create healthy sporting environments (Kelly, King, et al., 2014). Canada is currently considering restricting unhealthy food marketing to children, however, sport sponsorship may be exempt from proposed regulations (Government of Canada, 2018).

Research shows that parents with children engaged in organized sports struggle to provide healthy meals, often purchasing fast food and foregoing home cooked meals due to time constraints (Chircop et al., 2013). Unhealthy food and beverage marketing can also undermine parents' abilities to choose healthy food for their children (Mehta, Coveney, Ward, & Handsley, 2014; Newman & Oates, 2014; Oates, Newman, & Tziortzi, 2014). Many parents support restricting marketing but feel that the power of the food industry is overwhelming (Mehta et al., 2014; Ustjanauskas et al., 2010).

Recent Canadian research has found that food and beverage marketing is ubiquitous in recreation facilities and includes not only sport sponsorship but also a variety of direct product, brand, and food retailer marketing through posters, branding, and product placement (Prowse et

all., 2018). Recreation facilities also traditionally sell high calorie, low nutrient foods (Carter et al., 2012; Chaumette et al., 2008; Naylor, Bridgewater, et al., 2010; Olstad et al., 2014).

Comprehensive understanding of the issue is necessary to inform effective policy; thus, it is critical to measure both the existence of marketing (objective food environment) and the interpretation and experiences of marketing messages (perceived food environment) (Bowen et al., 2015; Penney et al., 2014). This study aims to investigate parents' perceptions of food and beverage marketing in their local municipal recreation facilities.

## **Methods**

### ***Study design***

We conducted a focused ethnography with parents of children who regularly participate in organized sport or physical activity at municipal recreation facilities. Guided by a specific research question (Mayan, 2009), this focused ethnography used reflexive photo interviewing to answer the question: what are parents' awareness, reactions, and experiences of food and beverage marketing in and around their children's sport and physical activity in municipal recreation facilities? Reflexive photo interviewing is a data generating strategy where participants take their own photographs which are subsequently used to guide conversations between the investigator and the participant (Warren, 2005). Interview dialogue does not focus on the content of the image necessarily, but includes reflexive thinking about the photo, its interpretations, and its implications (Warren, 2005). Photo-based research methods have been used to understand consumer experiences of retail stores (Petermans, Kent, & Van Cleempoel, 2014), advertising and marketing (Basil, 2011; Bibeau et al., 2012; Groeppel-Klein, 2010; Warren, 2005), and food and eating (Groeppel-Klein, 2010; Mareno, 2015; Sharma & Chapman,

2011; Venkatraman & Nelson, 2008). Ethics approval for this project was obtained from the University of Alberta Research Ethics Board 1.

### ***Participants & Recruitment***

Following a related project, called Eat Play Live (EPL), that objectively evaluated the food marketing environment in recreation facilities across Canada (Prowse et al., 2018), all EPL recreation facilities from Alberta were invited to participate in this study. Five facilities (45%) agreed to participate, however two facilities dropped out due to staff changes. The three participating sites were multi-sport recreation facilities. A food marketing audit completed in participating sites in November 2017 identified 42-88 food marketing occasions in each facility of which 25-50% were for foods and beverages high in calories, fat, sugar, and/or sodium, associated brands, or retailers selling the same. Two of the three facilities had participated in an intervention over the previous 18 months to improve the food environment; both facilities had chosen to work on improving the healthfulness of food availability in their facility and to increase healthy food promotion. The third facility did not participate in the intervention but had a slightly healthier concession that sold smoothies and sandwiches (as opposed to the more traditional burgers and deep fried foods).

Participants were recruited through posters and in person through an onsite booth (Caswell & Hanning, 2018) during busy times as determined by the facility. Inclusion criteria included parents with at least one child (17 years or younger) participating in an organized sport or physical activity at least once a week at an EPL recreation facility (which the parent also usually attended). We used purposive sampling (Palinkas et al., 2015; Schensul, Schensul, & LeCompte, 1999) to seek parents from varying age groups, ethnicities, gender, and socio-economic status. The sample size was driven by the aim of reaching theoretical saturation in

which sampling ceased when no new ideas or themes arose in the analysis (Mayan, 2009).

Participants were compensated with a \$30 gift card to a grocery store of their choice.

### ***Procedures***

Interested parents were given an information letter and signed an informed consent form before participating. Before taking photos, parents were briefed on the scope of food marketing, which we defined by the 4Ps commonly used by marketers (Lee & Kotler, 2011). Participants were told that food marketing is broader than just advertising and that marketing can include: (a) product - what types of foods and beverages are available to purchase; (b) pricing - the costs of certain foods and beverages (financial and non-financial); (c) placement - where foods and beverages are available to purchase, how easy access is, or where they are promoted; and (d) promotion - how foods and beverages are promoted through signs, messages, programs. It is important to note that the availability of *healthy* foods and beverages (as opposed to just the access to foods or beverages) is a component of the marketing mix: the product (a healthy food) serves as the basis for a marketing strategy (pricing, placement, promotion) to encourage consumers to buy that product. For example, some research on healthy food marketing for restaurant settings identifies that the nutritional profile of foods and whether they meet nutrition standards is one of multiple marketing strategies to influence consumers' behaviours (Kraak, Englund, Misyak, & Serrano, 2017). Participants were instructed to take any number of photos over two weeks (Belon, Nieuwendyk, Vallianatos, & Nykiforuk, 2014) in response to the question: What do you think your recreation facility is saying about food and eating?. Participants selected any number of photos that they deemed the most meaningful to them and emailed the photos to RP. RP printed the photographs, and each participant's photos were used during their photo-interview at their recreation facility the following week.

### ***Data Generation & Analysis***

Semi-structured photo-interviews were conducted in November and December 2017. The open interviewing process allowed the participant to lead the discussion using his/her printed photographs to foster an emic perspective. The interview started by asking the participants to show and describe the photos they took. The interviewer (RP) made sure that several topics were covered during the interview, including:

- parents' rationale for selecting photos,
- each of the "four Ps" of marketing, and
- how parents saw themselves, their children, and their family in the photos they took.

Interviews were audio-recorded, transcribed verbatim, de-identified and analyzed using thematic analysis (Braun & Clarke, 2006) in NVivo 11 (QSR International, 2017). The coding was guided by the research question. Holistic coding was initially used to identify high level topics in the transcripts, including but not limited to awareness, reactions, and experiences (Saldaña, 2015). Three coding methods (in vivo, versus, and value) designed to honour participants' perspectives and actions, suitable for ethnographic research, were used to recode the data within each holistic code (Saldaña, 2015). Codes and their data were combined into themes. Thematic maps (Braun & Clarke, 2006) were created to understand the relationships between codes within themes and the relationships between themes. Themes were also reviewed to ensure internal and external homogeneity (Braun & Clarke, 2006).

### ***Rigor***

Rigor was ensured by a series of verification strategies (Morse, 2015; Morse, Barrett, Mayan, Olson, & Spiers, 2002), including pre-study field engagement, ensuring methodological coherence, memoing, negative case analysis, and theoretical thinking and theory development.

Our research aim (to understand parents' awareness, reactions, and experiences of food marketing in and around their children's sport and physical activity in their municipal recreation facility) was continuously reflected on to ensure methodological coherence between the research question, data generation, and data analyses. In depth analysis of potential negative cases was used to investigate whether differences in between participants' responses were true variations in how parents' described their reactions to and experiences of food marketing in recreation facilities within and across themes.

## Results

Table 18 presents the sociodemographic characteristics of participants. Eleven parents participated in ten interviews (two parents from the same household participated in one interview together). Participants were between the ages of 33 and 52 years and had between two and five children. Children of participants engaged in a variety of sports; with hockey, swimming, and soccer being the most common. Most (90%) visited the facility 2-5 times per week with one or more of their children. All but one participant stated they usually or always stayed at the facility with their children. Participants took an average of 12 photographs. Interviews were an average of 50 minutes in length.

**Table 18 Sociodemographic Characteristics of Participants**

Sociodemographic Characteristic	n (%)
Parents' Sex	
Male	5 (45.5%)
Female	6 (54.5%)
Parents' Age	
30-39 years	4 (36.4%)
40-49 years	6 (54.5%)
50-59 years	1 (9.1%)
Children's Age	
<2 years	1 (3.8%)
2-5 years	3 (11.5%)
6-11 years	7 (27.9%)
12-15 years	12 (46.2%)

16-17 years	2 (7.7%)
18+ years	1 (3.8%)
Number of Children <sup>1</sup>	
2 children	7 (70.0%)
3 children	1 (10.0%)
4 children	1 (10.0%)
5 children	1 (10.0%)
Household Income <sup>2</sup>	
\$15,000-49,999 per year	1 (11.1%)
\$50,000-74,999 per year	1 (11.1%)
\$75,000-99,999 per year	3 (33.3%)
>\$100,000 per year	4 (44.4%)
Self-identified Ethnic Minority	2 (18.2%)

<sup>1</sup>n=1 missing response as 2 participants are from the same household (counted as 1)

<sup>2</sup>n=2 missing responses 2 participants are from the same household (counted as 1) and 1 participant declined to answer

Parents described their awareness, reactions, and experiences of the food marketing in and around their children’s sport and physical activity in their municipal recreation facility during the interviews with minimal prompting. Parents almost always immediately commented on their level of awareness of food marketing in the facility. As well, parents clearly expressed positive and negative reactions to food marketing in their descriptions of the photos they took. Parents’ experiences came through in the stories they told when describing their photos or explaining their reactions.

When describing food marketing in the facility, parents touched on all “four Ps”, however, the foods and beverages offered in the facility was the most common topic discussed. As a result, many of the findings below revolve around food and beverage availability which represents the “product” component of the “four Ps”. Other types of marketing, such as arena rink billboards, hockey jerseys, branded water bottles, food giveaways and vouchers, and posters on walls, were mentioned but did not appear to be major components of parents’ perceptions of food marketing.

Six major themes were identified by evaluating parents' awareness, reactions, and experiences of food marketing in and around their children's sport and physical activity in their municipal recreation facilities: (1) raising consciousness, (2) having choice of healthy foods and beverages, (3) marketers' motive, (4) mixed messages, (5) children request what they see, and (6) parents actively try to reduce their children's unhealthy food and beverage requests and choices. Some themes overlap due to the strong relationships between parents' reactions and experiences, and that food availability impacts other components of food marketing (in some cases). See Table 19 for definitions and exemplar quotes of themes. See Figure 4 for a visual representation of relationships between themes and sub-themes (described later).



**Table 19 Definitions of Themes and Exemplar Quotes**

Theme	Sub-themes	Exemplar quotes
<b>Parents' Awareness</b>		
<b>Raising Consciousness</b> Parents' level of awareness of food marketing in the facility before and after engaging in the photo-interview, including the type and amount of food marketing and their explanations for level of awareness.	none	<ul style="list-style-type: none"> <li>“...[taking photos] made me more aware of what was going on, or at least the marketing and advertising and uh all the stuff. Like I, when you brought it up about what, what the rec center says about eating and stuff, I had no idea. Like I knew there was a concession, but I didn't really – I didn't really having any clue as to what it said, even though I've been here....we get so blind to visual advertising that it's, especially like – especially fixed, I think. If it's not right in your way then you just ignore it.” (P2)</li> <li>It just becomes background noise, everything here, 'cause we are here so often. (P10)</li> </ul>
<b>Parents' Reactions</b>		
<b>Having Choice</b> Parents' reactions to the availability of foods and beverages for purchase at the recreation facilities, defining and comparing healthy and unhealthy items.	none	<ul style="list-style-type: none"> <li>“Here it's deep fried foods or popcorn, or slushes. Um, lots of Kit Kats, lots of chocolate bars, lots of pop. But not like a fruit basket, right, not a healthier choice for the children to go to...” (P4).</li> <li>“...you can see: one, two, three, four – four shelf or pops and only two shelves for milk. So then not much of the options to choose from.” (P6)</li> <li>“... the deep-fried list is this long, and the salad list is you know, there's two salads to choose from” (P9)</li> </ul>
<b>Marketers' motive</b> Parents' reactions to the primary motive they attributed to why food was marketed in the facility, differentiating between consumer-supportive and profit-driven motives.	For people  For profit	<ul style="list-style-type: none"> <li>“I thought it was kind of neat that [food service operators] have it colour coded...the reds – choose least; blue is choose sometimes; and the green is choose most often...I thought was nice, like sometimes kids, like they don't know what's a healthy choice, so that might help them.” (P7)</li> <li>“...when you come to our facility and it's like wow, you can – you don't have to have junk, you can have anything you want really at our concession...the message I get from our rec center is that they're trying to promote healthy eating. Um, and trying to make it easier for parents.” (P10)</li> <li>“...some [businesses] [provide sponsorship] very selflessly, they just want to contribute, especially local businesses, they're doing it to support local sports, to help kids get involved in something healthy for them...some of them are obviously doing it just for dollars and cents. Um. And I'm guessing the big corporations: Tim's, McDonald's they have got that worked out to a fine science...” (P3)</li> <li>“[food service operators] put all that fun kids' stuff right at eye level, just like the grocery store, which is smart for them. Right, smart for the people selling it, not so good for me. Because my kids want that stuff. Right?” (P5)</li> </ul>

<p><b>Mixed messages</b> Parents' reactions to inconsistent food-related messages within the facility itself (what the facility appeared to represent compared to its actions) and between their families and the facility.</p>	<p>Say vs Do</p>	<ul style="list-style-type: none"> <li>• “it says “do what I say not what I do”. It’s a very inconsistent message that I see. Um, that there’s this message of eat healthy, but then they don’t necessarily put that out there and give a lot of healthy options (P8A)</li> <li>• “we’re a healthy living facility, right, it’s mental health with the library and like keeping your brain strong; the pool; the skating; well it just to me is a hand-in-hand, right. Yeah why would you just serve poutine and burgers? [both laugh] At place where you’re trying to encourage active living.” (P10)</li> </ul>
	<p>Family vs Facility</p>	<ul style="list-style-type: none"> <li>• “We just don’t eat concession food....It’s dino buddies and junk food that she doesn’t eat at home. [laughs]...We eat real food, we don’t eat mac and cheese, and chicken fingers, she doesn’t know what those are...we try to support the food that we want and the food that we’d have at home...” (P8B).</li> <li>• “I think for our family culture, they would know that our family values would trump what the rink offers, and so we’ve enforced at home that it’s important to eat healthy, and that doesn’t include much at the rink.” (P3)</li> </ul>
<p><b>Parents’ Experiences</b></p>		
<p><b>Children request what they see</b> Parents’ experiences of children’s requests in the facility believed to be strongly driven by visual aspects of marketing (seeing products, colours, images).</p>	<p>None</p>	<ul style="list-style-type: none"> <li>• “...she’s going to want what she sees...she can only see what’s on the counter. So she sees slush and she see pizza um, she’s not seeing any healthy options...she’s going to pick the slush or the pizza...” (P8A)</li> <li>• “...just having things at the children’s height, right, a three year old is not going to be like oh mom I want – I want the bananas that are higher on the shelf, they’re going to just see all the pop and chips options and go for those” (P4)</li> </ul>
<p><b>Parents actively try to reduce their children’s unhealthy food and beverage requests and choices</b> Parents’ experiences of acting as gatekeepers in the facility to manage their child’s requests and diets, including avoiding (and planning to avoid) concessions and vending machines, monitoring and negotiating children’s choices, denying children’s requests, and teaching children about healthy eating.</p>	<p>Avoid</p>	<ul style="list-style-type: none"> <li>• “...it’s been a long time since we visited [a concession]...if there was vegetables or like sandwiches, or something other than chips and a slushy. I think we’d definitely consider it.... I don’t necessarily make the best choices either, so I would pick probably the same chips and I don’t want a slushy, but I’d probably get a pop... So I think, I try and avoid it so then I don’t eat that kind of stuff.”(P9)</li> </ul>
	<p>Plan</p>	<ul style="list-style-type: none"> <li>• “...if you plan ahead and you plan better, you can have food ready. ‘cause, I mean sometimes you’re working late and there’s not a lot of time, but you know then I usually just cook extra the night before and have stuff to grab on the way out, right..” (P2)</li> </ul>
	<p>Monitor/ Negotiate/ Deny</p>	<ul style="list-style-type: none"> <li>• “I feel like I have to monitor what they’re getting from the vending machines. Like once in a while it’s a good treat, but if they had their way they would have a \$3 treat every time we come. Right, we’re at this rink four times a week” (P4).</li> <li>• “...I’ll tell him okay don’t spend two dollars, you know, why would you spend two dollars buying those – the junk food...Or I, I gave you another two dollars and go and get a fresh juice .... I tell them the value right if you were spending two dollars, why didn’t you take another dollar or two from me and then buy something which is good for your health.” (P1)</li> </ul>
	<p>Teach</p>	<ul style="list-style-type: none"> <li>• “we try really hard at home – my husband’s a kinesiologist, like he’s – so sport and hydration and nutrition are always really forefront in our family, so has discussions about smart choices and eating well, are always occurring.” (P10)</li> </ul>

## ***Parents' Awareness of Food Marketing***

### *Raising Consciousness*

Parents stated that they had “no idea” about the food availability or marketing in the facility before taking photos. Parents described some marketing as “background noise” and attributed their lack of awareness to repeated exposure to and the fixed nature of food marketing in recreation facilities. Deliberately taking photos resulted in parents taking a step back, opening their eyes, to look read, think, and consider different points of views. Consequently, parents noticed new things, such as products for sale, promotional signs, product placement, and sponsor branding. However, even after photo-taking, parents reported that there was “not much” food marketing in the facility, including healthy food marketing. Only one participant reported that “*food is advertised everywhere. Everywhere!*” (P4) in the facility. Her reaction may have been influenced by uniquely comparing the facility of interest to another sports center her son visits with no food services: “*...there is no vending machine at the ski hill...there's no nothing, but for hockey it's everywhere.*” (P4).

## ***Parents Reactions to Food Marketing***

### *Having Choice of Healthy Foods and Beverages*

Most parents believed that, in general, food and beverage options at recreation facilities were not healthy and that fruit and vegetable options were non-existent or insufficient. Parents' descriptions of “*choice*” (synonymous with healthy food availability) varied from “*not a lot of choice*” to “*nice choices*”. Parents with the latter perspective identified that some healthier or different options were available in the facility: “*I think there are choices like more healthy stuff, although it's not 100 percent, but still it's not bad.*” (P1); “*They now have a butter chicken on rice. Like okay that might not be the healthiest choice, but it's a – it's something different.*” (P5).

Without prompting, parents distinguished healthy and unhealthy food by preparation method not by nutritional content: prepackaged, frozen foods and beverages that required little preparation were unhealthy; homemade foods prepared daily with thought and care, made from scratch with fresh real ingredients were healthy.

Parents believed the balance of choice favoured unhealthy options and were generally not optimistic that they or others would choose a healthy option if unhealthy options were also available or promoted alongside it: “...if there’s something that appeals to you, like some people have really good willpower and they will pick the salad nine times out of ten. But that, I think that’s pretty few and far between” (P9); “...if there is the burger option, are they ever going to take the good sandwich?” (P8B).

#### *Marketers’ Motive*

Parents had positive and negative reactions to food marketing depending whether they perceived marketers to be motivated primarily to support people or to generate revenue. respectively.

#### For People

Parents who had positive reactions to the food marketing environment believed that food marketing could help parents, their children, community business owners, or local sports in various ways. First, healthy food labelling and signage, described as “smart”, “neat”, “cool”, and “fantastic”, made it easier for parents and children to identify healthy choices and to remember to choose healthy options. Some parents thought they could use healthy food labelling and signs to guide their children’s food choices: “...[child] knows I can’t – she can’t anything that doesn’t have a checkmark on it for supper” (P10). However, not all parents had positive reactions to healthy food marketing; some believed it was inaccurate and an insincere token act to give the

appearance that the facility or the food service operator was committed to healthy eating (see *Mixed Messages*).

Secondly, parents believed that marketing by local businesses (e.g. through sport sponsorship) helped community business owners and local sports. In general, parents believed that local businesses who sponsored local sports were altruistic. Specifically, parents believed that the primary motive behind local businesses' decisions to provide sponsorship was to support local sports; parents did not believe that the primary motive of local businesses' sports sponsorship was to make money for their business even if they recognized that the sponsorship could also generate revenue for the business. For both local and big businesses, sport sponsorship by non-food companies was seen to be more selfless [*"...trying to help the community..."* (P2)] than sponsorship by food-companies [*"...trying to get more business...and get people to buy their products"* (P2)].

#### For Profit

Compared to local businesses, parents thought big businesses sponsors were self-serving: *"...I like supporting the little guy, they're just trying to put food on their table and pay their bills whereas big businesses, they're trying to buy like mansions and stuff."* (P5). One participant believed that while big business sport sponsorship was financially motivated, their investment still benefited community sports. His perspective may be unique due to his experience working with local franchisees of big businesses as tournament sponsors. Nevertheless, he recognized that he does not always distinguish between altruistic and profit motivated sponsors, and nor did his children know the difference.

Financial motive by food service operators was also mentioned. Concessions and vending operators were believed to be trying to maximize profits by selling unhealthy food (while

understanding that food operators may need to do so to survive) and by targeting children with the placement of unhealthy foods.

### *Mixed Messages*

#### Say versus Do

Participants described the purpose of recreation facilities as being to promote active living and wellbeing. Two parents emphasized that recreation facilities also promote mental health. Parents strongly felt that it did not make sense to be serving fast foods and junk food in these settings. Some parents perceived the efforts to improve the food environment as insufficient or insincere: “...*there’s the healthy eating initiative which I see that more as just lip service of okay we have to do this and put that out there, and make sure we have one option, so we can sell junk food.*” (P8A).

Parents were particularly concerned about mixed messages between food promotion and food availability. For example, participants saw messages saying “eat healthy” or “make better choices” but believed there were no healthy choices to purchase. In other cases, healthy messages were placed next to an unhealthy choice. For example, there was a sign saying “choose healthy drinks” placed next to a machine for slushies (frozen sugar-sweetened beverages). They found these inconsistencies ironic and disappointing. Furthermore, some parents were distrustful of items labelled or promoted as healthy.

On the other hand, there were parents who thought that their facility food environment was more consistent with promoting wellbeing but they recognized that other facilities with “less progressive” food environments (i.e. facilities that have not made progress towards offering and promoting healthier foods and beverages) presented mixed messages. The difference in perceived fit between the facility messages and actions align with variations in the other themes

of *choice* and *marketer's motive*. A better fit in messages was perceived by parents who thought there were healthy choices and that marketing within their facility was primarily people-motivated. Parents who believed there were no healthy choices and that marketing was primarily profit-motivated believed there were more mixed messages.

### Facility versus Family

Participants highlighted concerns over mixed messages that their child might receive at home and at the recreation facility. For example, healthy, fresh food availability at home, preparing your own food, and eating as a family were values in some families. Participants explained that the food available at concessions did not align with what they served at home. Parents did not necessarily support messages the recreation facility sent to their kids about eating frequently, eating fast convenient food, and not having meal time. When the facility offered foods that aligned with the types of foods participants had at home, these parents were more supportive of the foods available.

### ***Parents Experiences of Food Marketing***

#### *Children Request What They See*

All parents noted that children requested “junk” in recreation facilities and not fruits, vegetables or water. Parents explained that children chose what they wanted out of the products they could see since “*what they see is what their world is*” (P8A). In particular, the enticing slushie machines located on the front counter were mentioned by many parents: “*you can see [slushies] as soon as you walk through the door...you can see the machine twirling [laughs], calling to children from afar.*” (P9). Other participants also discussed that visual availability of vending machines influenced the frequency of requests from their child. Specifically, when the vending machines were more visible (e.g. right outside the change rooms) children requested

foods or beverages more often than when the vending machines were in a more discrete location (e.g. around the corner)

Parents compared visual food marketing features, such as colours, images, fun packaging, to other visual aspects, such as text on menus or signs. They said their children were drawn to colourful products: *“Interviewer: Why do you think she asked for a slushie? P10: ...she notices when the colour changes, ‘cause sometimes it does change here...she notices immediately as soon as there’s a new flavor”*. Parents did not believe that children noticed or cared about signs and suggested pictures impacted their children’s requests than words. In some cases, parents emphasized that many children cannot read menus: *“...it’s all at the eye level there for them...slushie machines right there. They’re going to ask for that more, right, especially little kids that don’t read or maybe don’t understand what they’re reading.”* (P7).

On the other hand, two parents also mentioned that their children would request candy and chocolate even if it was not visible because their children know that the concession or vending machines usually sell these snacks.

*Parents actively try to reduce their children’s unhealthy food and beverage requests and choices*

All participants discussed activities to reduce their children’s unhealthy food and beverage requests and choices in recreation facilities. Parents focused on intervening on the impact of food availability on their children’s food requests and choices rather than intervening on the impact from other forms of marketing. For example, parents were especially apathetic about the presence and impact of sport sponsorship. Some parents argued that their parenting was as or more impactful than promotional advertising: *“...it’s not the advertisement that should be allowed to dictate what’s going on in my kids life. It’s like it should be me, and if I’m*



*choosing a more healthy lifestyle for them, then I'm hoping my influence is more than a big red billboard on the side of arena" (P7).*

Parents described how they actively tried to avoid (or planned to avoid) concessions or vending machines, that they monitored, negotiated, and denied their children's requests and choices of foods and beverages in the facility, and taught their children about healthier choices. There were some differences in the type and number of activities parents engaged in to reduce children's unhealthy food and beverage requests and choices based on whether they had positive or negative reactions to *choice*, *marketers' motive*, and *mixed messages* (described below; see Figure 4).

#### Avoid

Many participants stated that they rarely or never used (purchased foods or beverages from) the concession and/or vending machines in recreation facilities due to perceived low availability of healthy choices, the expense of purchasing out-of-home snacks and meals, and the desire to avoid establishing a pattern of purchasing unhealthy items at the facility. Three participants were less likely to avoid the concession in their facilities related to their positive perspectives of *choice*, *marketers' motive*, and *mixed messages*. However, they said if they were visiting other facilities they would choose not to eat in the facility as the food would not be healthy.

#### Plan

Planning was seen as necessary to ensure children were adequately fueled for their sports and to avoid using the concession and vending machines in the facility. They planned around visiting the recreation facility by having meals at home, packing snacks from home, and visiting

nearby outside retailers. Parents explained if they did not plan properly, they may end up using food services within the facility.

### Monitor/Negotiate/Deny

Strategies of monitoring, negotiating, and denying were used by parents who believed there was *choice* in the recreation facility. Parents felt it was necessary to monitor children's choices believing that if left alone, children would select unhealthy options. Parents negotiated with their child to help them identify and choose healthier options. They suggested an alternative healthier option when their child was making a decision. In one case, a parent would give his son an extra couple dollars to supplement his son's pocket change and suggest that he go purchase a healthier item (e.g. fresh juice instead of a pop). A few parents said they denied children's requests which they explained as an effective strategy to curb future requests: "*they very rarely ask me anymore...they know better... 'cause the answer's no.*" (P5)

### Teach

Some parents explained how they engaged in more formal teaching with their children about healthy eating in an effort to support their children's ability to choose healthy options. Teaching was more common with parents who had very positive or very negative reactions to *choice*, *marketers' motive*, and *mixed messages*. Parents used food choices in the recreation facility, and healthy food labelling to talk to their children about healthier food options. One participant saw an opportunity to reinforce his family values by avoiding facility food services: "*... it's the opposite of what I teach them, but the fact that we don't get anything from them is ... it reinforces...what I'm teaching....*" (P2).

## Discussion

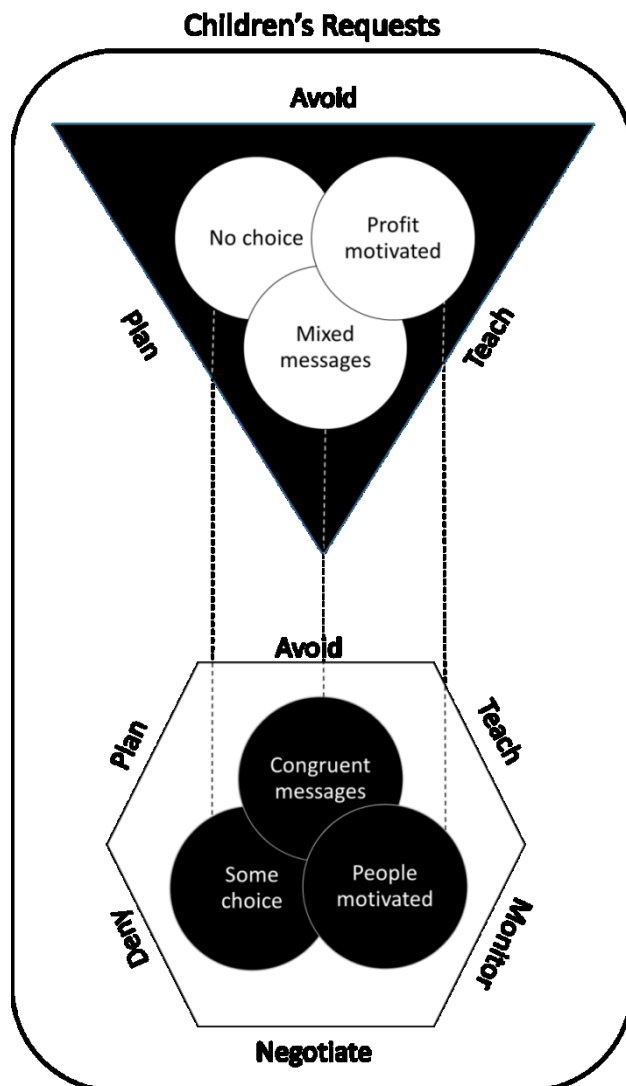
The photo-taking and interviewing process served as a mechanism to *raise parents' consciousness* of food marketing in recreation facilities. However, even after photo-taking, parents reported a low level of food marketing and focused mostly on food marketing from concessions and vending machines. Consequently, all parents focused on the food and beverage *choices* in the facility, assessing whether healthy options were available. All parents believed that, in general, the *choices* were not healthy. Parents' concerns with the lack of healthy food availability and dominance of unhealthy food in recreation has been previously documented (Caswell & Hanning, 2018; Smith, Signal, Edwards, & Hoek, 2017; Thomas, Nelson, Harwood, & Neumark-Sztainer, 2012). We found that there was a gradient of parents' perceptions of *choice* from less to more acceptable, which adds a new dimension to understand parents' perceptions of food availability.

Parents' reactions to *choice* were related to their perspectives of *marketers' motives*, where if parents believed that the primary *motive* of marketers' (including food service operators and outside companies) was to support people rather than generate revenue they had more positive reactions to food availability, and vice versa. Parents' reactions to *choice* were also related to their perspectives of *mixed messages*, where if parents had more negative reactions to *choice* they perceived greater *mixed messages* between the facility food environment and the perceived purpose of the facility to promote wellbeing, and as well as with their family values related to food and eating.

Regardless of parents' reactions to *choice*, *marketers' motives*, and *mixed messages*, almost all parents' experienced their *children requesting foods and beverages they saw*. However, parents' activities to intervene on the influence of food availability in the recreation

facility to *reduce their children's unhealthy food and beverage requests and choices* differed slightly across parents' perceptions of *choice* and *mixed messages*. Parents who perceived low *choice*, for profit *marketers' motives*, and more *mixed messages* outright avoided the concession, whereas others with more favourable opinions of *choice*, people-supportive *marketers' motives*, and congruent *messages* used the concession on occasion when necessary. Strategies of monitoring, denying, and negotiating were used more often with parents who reported more *choice*. Teaching was more common with parents with extreme positive or negative reactions to *choice*, *marketers' motives*, and *mixed messages*.

Figure 4 provides a visual representation of the relationships between the themes and sub-themes related to parents' reactions and experiences to food marketing in and around their children's sport and physical activity in their municipal recreation facility that arose through thematic mapping and investigating potential negative cases. Venn diagrams were chosen to represent parents' reactions to *choice*, *motive*, and *mixed messages* which appeared to be inter-related and aligned as positive or negative by parents. Thus, negative reactions (no choice, profit motivated, and mixed messages) are combined and juxtaposed with positive reactions (some choice, people motivated, and congruent messages). These reactions are placed within the sub-themes of *parents actively try to reduce children's unhealthy food and beverage requests and choices* (avoid, plan, monitor, negotiate, deny, and teach) in shapes that represent the number of strategies parents used according to their collective perceptions of *choice*, *motive*, and *messages*. Finally, these sub-themes and themes are placed within the theme of *children request what they see* as all participants experienced their children requesting unhealthy food regardless of their reactions to *choice*, *motive*, and *messages*, and of their active strategies to *reduce children's unhealthy food and beverage requests and choices*.



**Figure 4 Relationship between Themes and Sub-themes in Parents' Reactions and Experiences to food marketing in and around children's sport and physical activity in their municipal recreation facility**

Parents' low awareness of food marketing in recreation facilities is consistent with previous research that suggests parents are usually more aware of traditional marketing techniques, such as television advertising or in-store product promotion (Newman & Oates, 2014). Parents' focus on marketing in concessions and vending may be associated with the fact that the experiences of food marketing parents described in this study revolved around *children's*

*requests* for foods or beverages in the facility and *actions to reduced their children's unhealthy food and beverage requests and choices* in the facility. Our results suggest that parents may not consider all types of marketing as having equally important impacts in their life or their children's lives. For example, parents clearly explained how food availability and presentation contributed to their child's requests but were less aware of and unsure how other food marketing exposures, such as sponsor branding, could influence requests. Parents were apathetic about sponsorship despite the fact that research has demonstrated that food marketing in sports significantly impacts children's recall of sponsors (Bestman et al., 2015; Pettigrew et al., 2013) and attitudes towards sponsors (Kelly et al., 2011b).

As food marketers turn to broad, integrated marketing or "surround selling" where children are exposed to marketing almost constantly in their lives (McNeal, 2007, p. 371), more may need to be done to ensure parents do not underappreciate the exposure, power and impact of unhealthy food marketing that their children may be exposed to in settings that are intended to promote health and well-being, such as recreation facilities. Our research showed that parents can be made more aware of food marketing by actively reflecting on their environments; however future research may want to consider using other methods, such as photo elicitation where parents reflect on a wide range of food marketing tactics they may or may not be familiar with. By using photos to demonstrate existence of less noticed food marketing types or techniques, researchers may be able to explore reactions and experiences to the food marketing that parents considered "background noise". As a result, researchers may gain a deeper understanding of the phenomenon of parents' reactions and experiences of food marketing in recreation facilities.

Anrould and Thomspson (2005) call consumers “interpretive agents” who evaluate their environments (p.874). Consumers make inferences by using a known attribute to infer judgements on an unknown attribute (Peloza, Ye, & Montford, 2015). Folse et al. (2010) explains that “consumers, because of their frequent exposure to various persuasion attempts, accumulate knowledge about the persuasive motives and tactics used by marketers...Persuasion knowledge is activated when consumers try to interpret a marketer’s persuasive attempt. Consumers then use this knowledge to “cope” with these attempts, and responses include making inferences of firm motives.” (p.297). Our research showed that the perceived fit between marketers’ motives and food marketing actions (e.g. food availability, product promotion) were at the forefront of parents’ minds when evaluating the food marketing environment.

By exploring perceptions of food availability (*choice*) within the context of the food marketing environment, we were able to gain a unique understanding that parents’ reactions to the foods or beverages available (*choice*) in the facility were associated with variations in their perceptions of *motives* and *messages* (Figure 4). The varied reactions to *choice*, *motive*, and *messages* align with previous research where skepticism about corporate social responsibility (CSR) motives is known to lead to distrust of firm’s actions (Garst, Blok, Jansen, & Omta, 2017), mixed messages threaten relationships between firms and customers (Ye, Cronin, & Peloza, 2015), but a strong perceived fit between commitment to healthy eating and providing healthy options leads to positive consumer reactions (Ye et al., 2015). Research has found that CSR actions (such as providing or promoting healthy food) needs to be part of a complete strategy, otherwise consumers may view the action as a “hollow symbolic gesture” (Garst et al., 2017, p. 6). For example, research has found that consumers are more supportive and trusting of

menu labelling initiatives when the number of healthy options is sufficient or increased as evidence of demonstrated commitment to the initiative (Ye et al., 2015).

Parents' reactions to *choice, motives, and messages* in the context of consumer support for healthy food initiatives is important to consider because two of the three intervention sites had actively worked on increasing healthier food availability and promotion prior to this study. Our findings suggest that not all parents simply, nor quickly, bought into the small improvements to food availability and promotion made by these facilities. Previous research found that approximately one-third of recreation facility patrons who responded to a survey said they brought food from home rather than purchasing food at the recreation facility (Thomas & Irwin, 2010). A third of respondents also cited that a lack of healthy choices contributed to their decision not to purchase from the recreation facility concession (Thomas & Irwin, 2010). These customers may represent an untapped market that can be reached by offering healthier choices. However, our research suggests that the decision to purchase food is more complex than healthy food availability; the perceived fit between *choice, motive, and messages* appeared to be important in determining the degree to which parents chose to avoid purchasing foods or beverages at concessions or vending machines in the facility. This is consistent with CSR literature which explains that more positive reactions to CSR are associated with greater behavioural intention (e.g. buying food) (Ye et al., 2015). Achieving consumer support for healthy eating initiatives in recreation may be more complex than anticipated.

It was interesting that parents identified both moral (for the good of society) and instrumental (for profit) marketing motives (Garst et al., 2017) and that some parents believed marketers may be simultaneously motivated by both influences. In an evaluation of food companies' motives for voluntarily reformulating products to be able to add a government-



sanctioned healthy symbol to their package, researchers found that companies were often driven by both moral and instrumental motives (Garst et al., 2017). Garst et al. (2017) explained that both motives are important: moral motives will generate social change when consumers are not demanding it, but responsible innovation is only useful to society if it generates something that consumers will buy, thus instrumental motives are needed to ensure that the product created is a profitable one.

There is a risk of trade-off when trying to align instrumental and moral motives (e.g. creating a less healthy product that will sell or vice versa) (Garst et al., 2017). Furthermore, if change is strongly driven by instrumental motives and the resulting product does not match societal need, consumers are more likely to distrust the company's actions (Garst et al., 2017). Garst et al. (2017) found that companies could reduce distrust and bridge moral and instrumental motives by developing their own nutritional standards based on voluntary government nutrient criteria, thereby creating both profit and health goals. Similarly, recreation facilities could implement voluntary provincial nutrition guidelines into their own institutional policy or food service contracts to promote a morally-sound and profitable food environment (assuming the facility adopts the guidelines as intended to create a strong, evidence-based policy). Such innovation could be crucial to the success of healthy food environments in recreation, since parents' acceptance of healthy food marketing and their willingness to purchase foods and beverages from concessions and vending machines in recreation facilities appeared to be centered on their perceived balance of *motives*.

Finally, research has found that food marketing can generate family conflict by challenging parental messages and supporting pester power (Oates et al., 2014; Smith et al., 2017). The consistency of experiences by parents of *children's requests* for unhealthy food

suggests there may be underlying influences independent of parental perceptions of situations or environments. Parents are gatekeepers for their children and it is not unusual for parents to actively try to mediate food marketing for their children (Newman & Oates, 2014). Parents in our study attributed children's requests for unhealthy food to visual stimuli most often, but a couple parents stated that requests for confectionary occur even without being visually available. Previous research has established that food service managers believe there is a persisting food culture where recreation facility patrons expect unhealthy foods and beverages to be available in the facility (Olstad et al., 2011). Thus, in addition to reducing visibility of unhealthy foods, the food marketing environment should be improved via a comprehensive strategy that demonstrates commitment to changing the food culture in general.

### ***Limitations***

The participation of recreation facilities from EPL in this study may reduce the generalizability of the study. Two of the three recreation facilities that participated had actively worked on improving their food environment before this study was completed. Any recent changes in these recreation facilities may have increased parents' awareness or generated initial reactions, which may or may not persist over time. The parents who participated may have had more extreme positive or negative reactions to the food marketing environment than other parents in general or than other parents from different recreation facilities. Due to time constraints the data were not collected and analyzed concurrently which may have impeded the interviewer's ability to follow-up on emerging ideas.

The sample of parents was highly diverse which may have helped to provide a broad understanding of the phenomenon but inadequate in size to explore differences in perceptions of food marketing based different participant characteristics, such as children's ages. Researchers

may also want to consider exploring parents' and children's perspectives of food marketing in a wide variety of facilities or sports. This study provides valuable information about how parents perceive food marketing in recreation facilities that may have healthier food environments, and/or have made efforts to improve their food environments, including food marketing.

However, a case study research design with more recreation facilities that vary in their extent and approach to changing food environments may be needed to better understand parents' perceptions of improvements to food environments in recreation settings. More participants from each facility would also likely be needed to gain a rich descriptions and evaluate differences between facility types.

### ***Conclusions***

Parents have a limited awareness of food marketing that exists in recreation facilities. Reactions to food marketing are complex in nature and appear to be impacted by perceptions of healthy food *choices*, *marketers' motive*, and facility *messages*. *Requests* from children for unhealthy food was experienced by all parents, which resulted in parents needing to *actively try to reduce their children's unhealthy food and beverage requests and choices*. More research is needed on food marketing sponsorship, including its extent, impact on children, and its relative costs and benefits to sport and local communities. Future research should also explore what CSR looks like in public and private recreation facilities and their food service operators. When planning food marketing changes in recreation facilities, decision-makers for recreation facilities may want to reflect on their motives for change and communicate a genuine broad commitment to change to their patrons, including parents. Parents with more positive reactions to food availability (*choice*), *motive*, and *messages* in the facility may more readily support the food service operations in the facility.

## References

- Arnould, E. J., & Thompson, C. J. (2005). Consumer culture theory (CCT): Twenty years of research. *Journal of Consumer Research*, *31*(4), 868-882.
- Basil, M. (2011). Use of photography and video in observational research. *Qualitative Market Research: An International Journal*, *14*(3), 246-257.
- Belon, A. P., Nieuwendyk, L. M., Vallianatos, H., & Nykiforuk, C. I. (2014). How community environment shapes physical activity: Perceptions revealed through the PhotoVoice method. *Social Science & Medicine*, *116*, 10-21.
- Bestman, A., Thomas, S. L., Randle, M., & Thomas, S. D. (2015). Children's implicit recall of junk food, alcohol and gambling sponsorship in Australian sport. *BMC Public Health*, *15*(1), 1022.
- Bibeau, W. S., Saksvig, B. I., Gittelsohn, J., Williams, S., Jones, L., & Young, D. R. (2012). Perceptions of the food marketing environment among African American teen girls and adults. *Appetite*, *58*(1), 396-399.
- Bowen, D. J., Barrington, W. E., & Beresford, S. A. (2015). Identifying the effects of environmental and policy change interventions on healthy eating. *Annual Review of Public Health*, *36*, 289-306.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77-101.
- Carter, M. A., Edwards, R., Signal, L., & Hoek, J. (2012). Availability and marketing of food and beverages to children through sports settings: A systematic review. *Public Health Nutrition*, *15*(08), 1373-1379.

- Caswell, M. S., & Hanning, R. M. (2018). Adolescent perspectives of the recreational ice hockey food environment and influences on eating behaviour revealed through photovoice. *Public Health Nutrition, 21*(7), 1255-1265.
- Chaumette, P., Morency, S., Royer, A., Lemieux, S., & Tremblay, A. (2008). [Food environment in the sports, recreational and cultural facilities of Quebec City: a look at the situation]. *Canadian Journal of Public Health/Revue canadienne de sante publique, 100*(4), 310-314.
- Chircop, A., Shearer, C., Pitter, R., Sim, M., Rehman, L., Flannery, M., & Kirk, S. (2013). Privileging physical activity over healthy eating: 'Time' to Choose? *Health Promotion International.*
- Folse, J. A. G., Niedrich, R. W., & Grau, S. L. (2010). Cause-relating marketing: The effects of purchase quantity and firm donation amount on consumer inferences and participation intentions. *Journal of Retailing, 86*(4), 295-309.
- Garst, J., Blok, V., Jansen, L., & Omta, O. S. (2017). Responsibility versus profit: The motives of food firms for healthy product innovation. *Sustainability, 9*(12), 2286.
- Gootman, J. A., McGinnis, J. M., & Kraak, V. I. (2006). *Food Marketing to Children and Youth: Threat or Opportunity?* National Academies Press.
- Government of Canada. (2018). Restricting marketing of unhealthy food and beverages to children: An update on proposed regulations.
- Groepel-Klein, J., & Groepel-Klein, A. (2010). Examining the use of nutrition labelling with photoelicitation. *Qualitative Market: An International Journal, 13*(4), 389-413.

- Kraak, V., Englund, T., Misyak, S., & Serrano, E. (2017). A novel marketing mix and choice architecture framework to nudge restaurant customers toward healthy food environments to reduce obesity in the United States. *Obesity Reviews*, 18(8), 852-868.
- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2011). Food company sponsors are kind, generous and cool?: (Mis)conceptions of junior sports players. *International Journal of Behavioural Nutrition and Physical Activity*, 8(95).
- Kelly, B., King, L., Bauman, A. E., Baur, L. A., Macniven, R., Chapman, K., & Smith, B. J. (2014). Identifying important and feasible policies and actions for health at community sports clubs: A consensus-generating approach. *Journal of Science and Medicine in Sport*, 17(1), 61-66.
- Lee, N. R., & Kotler, P. (2011). *Social marketing: Influencing behaviors for good*: Sage: Thousand Oaks (CA).
- Mareno, N. (2015). Parental perception of healthy eating and physical activity: results from a preliminary Photovoice study. *Journal of Clinical Nursing*, 24(9-10), 1440-1443.
- Mayan, M. J. (2009). *Essentials of qualitative inquiry*. Walnut Creek, CA: Left Coast Press.
- McNeal, J. (2007). *On becoming a consumer*. London: Routledge.
- Mehta, K., Coveney, J., Ward, P., & Handsley, E. (2014). Parents' and Children's Perceptions of the Ethics of Marketing Energy-Dense Nutrient-Poor Foods on the Internet: Implications for Policy to Restrict Children's Exposure. *Public Health Ethics*.
- Morse, J. M. (2015). Critical analysis of strategies for determining rigor in qualitative inquiry. *Qualitative Health Research*, 25(9), 1212-1222.

- Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International Journal Of Qualitative Methods*, 1(2), 13-22.
- Naylor, P. J., Bridgewater, L., Purcell, M., Ostry, A., & Wekken, S. V. (2010). Publically funded recreation facilities: Obesogenic environments for children and families? *International Journal of Environmental Research and Public Health*, 7(5), 2208-2221.
- Newman, N., & Oates, C. J. (2014). Parental mediation of food marketing communications aimed at children. *International Journal of Advertising*, 33(3), 579-598.
- Oates, C., Newman, N., & Tziortzi, A. (2014). Parents' beliefs about, and attitudes towards, marketing to children. In *Advertising to Children* (pp. 115-136). Palgrave Macmillan, London.
- Olstad, D. L., Downs, S. M., Raine, K. D., Berry, T. R., & McCargar, L. J. (2011). Improving children's nutrition environments: A survey of adoption and implementation of nutrition guidelines in recreational facilities. *BMC Public Health*, 11(1), 423.
- Olstad, D. L., Poirier, K., Naylor, P.-J., Shearer, C., & Kirk, S. F. (2014). Policy outcomes of applying different nutrient profiling systems in recreational sports settings: The case for national harmonization in Canada. *Public Health Nutrition*, 1-12.
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533-544.

- Peloza, J., Ye, C., & Montford, W. J. (2015). When companies do good, are their products good for you? How corporate social responsibility creates a health halo. *Journal of Public Policy & Marketing, 34*(1), 19-31.
- Penney, T. L., Almiron-Roig, E., Shearer, C., McIsaac, J.-L., & Kirk, S. F. (2014). Modifying the food environment for childhood obesity prevention: challenges and opportunities. *Proceedings of the Nutrition Society, 73*(02), 226-236.
- Petermans, A., Kent, A., & Van Cleempoel, K. (2014). Photo-elicitation: Using photographs to read retail interiors through consumers' eyes. *Journal of Business Research, 67*(11), 2243-2249.
- Pettigrew, S., Rosenberg, M., Ferguson, R., Houghton, S., & Wood, L. (2013). Game on: do children absorb sports sponsorship messages? *Public Health Nutrition, 16*(12), 2197-2204.
- Prowse, R. J., Naylor, P.-J., Olstad, D. L., Carson, V., Storey, K., Mâsse, L. C., . . . Raine, K. D. (2018). Food marketing in recreational sport settings in Canada: A cross-sectional audit in different policy environments using the Food and beverage Marketing Assessment Tool for Settings (FoodMATS). *International Journal of Behavioral Nutrition and Physical Activity, 15*(1), 39.
- Saldaña, J. (2015). *The coding manual for qualitative researchers*: Sage: Thousand Oaks (CA).
- Schensul, S. L., Schensul, J. J., & LeCompte, M. D. (1999). *Essential ethnographic methods: Observations, interviews, and questionnaires* (Vol. 2). Walnut Creek, CA: Rowman Altamira.
- Sharma, S., & Chapman, G. (2011). Food, photographs, and frames: Photo elicitation in a Canadian qualitative food study. *The Journal of Canadian Food Cultures, 3*(1).



- Smith, M., Signal, L., Edwards, R., & Hoek, J. (2017). Children's and parents' opinions on the sport-related food environment: a systematic review. *Obesity Reviews, 18*(9), 1018-1039.
- Thomas, H. M., & Irwin, J. D. (2010). Food Choices in Recreation Facilities: Operators' and Patrons' Perspectives. *Canadian Journal of Dietetic Practice and Research, 71*(4), 180-185.
- Thomas, M., Nelson, T. F., Harwood, E., & Neumark-Sztainer, D. (2012). Exploring parent perceptions of the food environment in youth sport. *Journal of Nutrition Education And Behavior, 44*(4), 365-371.
- Ustjanauskas, A., Eckman, B., Harris, J., Goren, A., Schwartz, M., & Brownell, K. (2010). Focus Groups with Parents: What do they think about food marketing to their kids. *Rudd Center for Food Policy and Obesity. New Haven, CT.*
- Venkatraman, M., & Nelson, T. (2008). From servicescape to consumptionscape: A photo-elicitation study of Starbucks in the New China. *Journal of International Business Studies, 39*(6), 1010-1026.
- Warren, S. (2005). Photography and voice in critical qualitative management research. *Accounting, Auditing & Accountability Journal, 18*(6), 861-882.
- World Health Organization. (2010). Set of recommendations on the marketing of foods and non-alcoholic beverages to children.
- Ye, C., Cronin, J. J., & Peloza, J. (2015). The role of corporate social responsibility in consumer evaluation of nutrition information disclosure by retail restaurants. *Journal of Business Ethics, 130*(2), 313-326.

## CHAPTER 7 - DISCUSSION

### **Redefining Food Marketing in Recreation Facilities for Change**

Each study in this dissertation contributed unique findings to the understanding of food marketing in recreation facilities. Because results are discussed in detail in each chapter, this chapter aims to triangulate the findings across studies to generate a more complete picture of the phenomenon and explore mechanisms and structures that underlie it through tenets of critical realism. First, components of critical realism will be briefly reviewed before findings from all studies are summarized. Then, I will attempt to explore possible explanations and implications of my understanding of the phenomenon of interest, food marketing in recreation facilities, in order to generate recommendations for researchers, practitioners, and policy-makers.

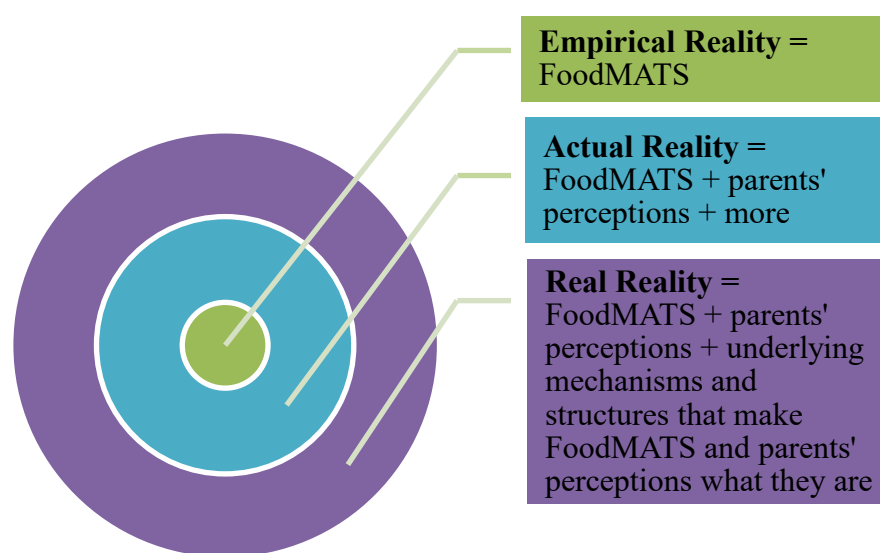
#### **Critical Realism in Food Marketing in Recreation Facilities**

Critical realism approaches science with ontological realism and epistemological relativism, supporting that “there is a real world that exists independently of our perceptions, theories, and constructions” but “our *understanding* of this world is inevitably a construction from our own perspectives and standpoint” (emphasis in the original) (Maxwell & Mittapalli, 2010). Critical realists believe that knowledge cannot be value-free, rather, knowledge is always theory-laden (Danermark et al., 2002). This epistemological standpoint gives way to multiple true realities. Based in the writings of Bhaskar (1989), critical realism suggests that reality is stratified and the purpose of science is to investigate the “deep” reality, not immediately observable, to understand underlying mechanisms of observable reality (Danermark et al., 2002). Bhaskar (1989) presents three levels of reality, each of which is a subset of a higher level:

1. Empirical reality – includes observable experiences
2. Actual reality – includes empirical reality and events that may or may not be observable

3. Real reality – includes actual reality and structures and mechanisms that are not directly observable but give way to the events and experiences

The empirical and actual levels of reality are assumed to represent features of the objective and perceived food environments. The levels of reality of food marketing in recreation are represented in Figure 5. The goal of this discussion is to explore the structures and mechanisms that may be contributing to the empirical reality observed through all studies.



**Figure 5 Levels of Food Marketing Realities adapted from Bhaskar (1989)**

Critical realism has four modes of inference (methods of reasoning) to explore the nature of realities: deduction, induction, abduction, and retrodution (Danermark et al., 2002).

Deductive, inductive, and abductive inference have been used across Studies 1-3 to explore the empirical and actual realities of food marketing in recreation (see Table 23 in Appendix A).

Therefore, this discussion will use retrodution thought processes to triangulate and collectively interpret qualitative and quantitative findings and seek to understand the phenomenon at a “deeper” level of reality. Retrodution is a way of thinking about a phenomenon in order to drill

down to the underlying mechanisms and structures of a phenomenon (Danermark et al., 2002) identifying possible answers to the query, what makes the phenomenon what it is or what it is not (Table 23 in Appendix A).

### **Summary of research**

The exploration of food marketing in recreation facility settings (S1-3) was informed by a scoping review on the exposure, power, and impact of food marketing to children in Canada. As stated in Chapter 2, “place” is a factor marketers consider in their marketing strategies to effectively reach consumers (Lee & Kotler, 2011). Places where children spend time are also critical spaces for health promotion and are recommended to be free from unhealthy food marketing (World Health Organization, 2013). Nonetheless, most of the marketing research in Canada has focused on single marketing channels, such as television, online, and product packaging, and rarely (if ever) attempted to understand exposure to and power of food marketing through a settings perspective. The review found that multiple exposures of unhealthy food marketing to children exist across settings and that powerful promotional techniques used to market to children overlap between settings. The scoping review identified that settings-based assessment of food marketing to children is a gap in the current literature. As such, we investigated food marketing in recreation facilities to start to fill this gap.

Studies 1 to 3 were developed to investigate the nature and extent of food and beverage marketing in the recreation setting. In Study 1, I led the development of a reliable, validated comprehensive instrument that measured the exposure to and power of food and beverage marketing within municipally owned recreation facilities, informed by the 4Ps marketing mix. It was necessary to develop a new tool as there was no existing tool to measure food marketing comprehensively across a setting. We found that the FoodMATS score was significantly and

strongly correlated with food sponsorship dollars and that the FoodMATS score explained up to almost one-quarter of total “Least Healthy” food and beverage sales. One interesting finding of the validation analyses was that FoodMATS scores for the whole facility, and the Sport Area and Other Area FoodMATS subscores, individually and significantly predicted concession “Least Healthy” food and beverage sales. This suggests food marketing environments may be quite broad in recreation facilities and food marketing outside of the concession area may encourage recreation facility users to visit concessions and purchase unhealthy foods and beverages. This may highlight the importance of evaluating food marketing in whole settings, beyond the food service areas.

Two types of interventions on food marketing environments were evaluated using the FoodMATS: (a) having voluntary provincial nutrition guidelines for recreation (S2), and (b) a capacity-building intervention (CBI) randomly assigned to half of recreation facilities in provinces with voluntary nutrition guidelines (S3). In S2, we found that there were significant differences in what and how foods and beverages were marketed but no significant differences in food marketing exposure between recreation facility sites in guideline provinces and the non-guideline province. We were correct in our hypothesis that sites in the guideline provinces would have a lower proportion of “Least Healthy” food marketing occasions compared to the sites in the non-guideline province. Our findings suggest that voluntary provincial nutrition guidelines that recommend foods and beverages to provide and to limit may somewhat influence what types of foods are marketed but may provide sufficient information on other food marketing features.

Findings from S3 suggest that the CBI did not appear effective in changing food marketing environments in Guidelines+CBI sites compared to the Guidelines-Only and Non-Guidelines sites. There were some positive trends in changes over the intervention period in the

Guidelines+CBI but none were statistically significantly different from baseline or different from change in other treatment groups. It also should be noted that this study was likely underpowered to detect changes. Nevertheless, the lack of change in FoodMATS scores may further highlight the breadth (and complexity) of food marketing environments in recreation settings.

Finally, we explored the culture of food and beverage marketing in and around children's sport and physical activity in municipal recreation facilities from parents' perceptions through a focused ethnography study. Parents said they became more aware of food marketing in their recreation facility after taking photos, but believed there was not a lot of food marketing present in the facility besides at the concessions and vending machines. Parents had various reactions to availability of healthy food and beverage choices, marketers' motives, and perceptions of mixed messages between what the facility says (or represents) and what it does, and between facility and family food cultures. The perceived fit between choice, motive, and messages appeared important in influencing parents' support of food services in the facility and their likelihood to purchase foods or beverages in the facility. Regardless of variable reactions, all parents experienced their children requesting junk food in the recreation facility and believed that visual features (e.g. product placement, images, colours) usually stimulated their requests.

### **What this dissertation adds**

Through retroduction, results from all studies were triangulated and interpreted together for the purpose of creating a greater picture of the whole. Collectively, this research provides significant contribution to the scientific literature on food marketing to children in Canada:

1. Food and beverage marketing in settings where children gather is under researched in Canada. The FoodMATS presents the first reliable, validated method worldwide to comprehensively assess multiple marketing channels and techniques used within a single

setting where children spend time.

2. Food and beverage marketing is ubiquitous in municipal recreation facilities and includes a complex mixture of commercial marketing and health promotion messages. Parents may perceive that recreation facilities are presenting contradictory messages.
3. A comprehensive assessment of food marketing in a whole setting requires evaluation of multiple constructs (e.g. exposure, power, product, price, place, promotion) simultaneously. To this end, actions to improve food environments in a setting may have to correspond accordingly to make observable and impactful change.
4. The food marketing environment in recreation facilities did not protect children who visit those facilities from unhealthy food marketing. Although objective baseline assessments found that only 7% of food marketing occasions were child-targeted, parents emphasized that their children's request for unhealthy food are influenced by visual factors that may or may not be considered child-targeted.
5. The food marketing environment in recreation facilities is not health-promoting as identified by objective and perceived assessments. Even those parents with the most positive perceptions of the environment engaged in multiple strategies to reduce the impact of the environment on their children's unhealthy requests and choices.

## **Possible Underlying Structures, Mechanisms and Implications**

This section will critically explore underlying structures or mechanisms in an effort to understand the aspects of the real reality of the phenomenon before providing recommendations for researchers, practitioners, and policy-makers. As critical realism explains, our knowledge is theory-laden (Danermark et al., 2002). How we define or conceptualize marketing may influence how we evaluate related phenomenon, define problems, confirm existing or generate new understandings of a phenomenon, and approach solutions. Here I will discuss the underlying influences of defining marketing in various ways. Specifically, I critically assess the implications of the findings of this dissertation by exploring conventional definitions or conceptualizations of:

- Marketing to children (general versus targeted)
- Types of marketing approaches (commercial versus social)
- Components of marketing strategies (the 4Ps versus alternatives)

I argue that using existing definitions of marketing may risk only re-creating existing knowledge of food marketing rather than generating better understandings of the situation and may limit generating novel, effective solutions that comprehensively address marketing and protect children. I propose alternative ways to define these aspects of marketing that may create specific evidence for strong policy recommendations and actions to improve food marketing environments in recreation facilities.

### ***Defining marketing to children***

The discourse around protecting children from unhealthy food marketing focuses on restricting unhealthy food marketing to children rather than protecting children from any exposures to unhealthy food marketing. This nuance is valuable to explore as it may underpin why regulations exclude settings. It begs the question, what is the problem? Unhealthy food



marketing to children? Or unhealthy food marketing in general (regardless of whether it is targeted to children)? Or both? Or all marketing to children (food and non-food)? The persuasive power of food marketing (i.e. targeting children) is an obvious concern but potential unintended consequences that could arise by defining the problem solely as “marketing to children” cannot be ignored. For example, will the food industry shift from targeting children to targeting other populations such as youth, or parents? An explicit focus on “marketing to children” may exclude important populations, such as youth, from protective interventions (Freeman, Kelly, Vandevijvere, & Baur, 2015). Additionally, will the food industry move to integrating themselves into events, spaces, or products that would not meet the definition of “marketing to children”? On the other hand, if unhealthy food marketing were less prominent overall, would we have to be as concerned about the persuasive power of child-targeted marketing techniques?<sup>3</sup> It is necessary to raise these concerns since current definitions bound by a criterion of targeting children would suggest that unhealthy food marketing in recreation facilities (not usually child-targeted) is an insignificant problem when in reality, food marketing in recreation facilities may repeatedly and frequently expose thousands of children to unhealthy food products, brands, and retailers.

Furthermore, our understanding of food marketing in Canada is limited by existing evidence. The nature of the evidence presented in the scoping review reflects how the scientific community has defined measurement of food marketing. Since there has been no tool to assess food marketing through a settings-based perspective, our knowledge is limited on the food marketing environments in places where children spend time (which may include marketing

---

<sup>3</sup> Even further, if no products are marketed to children, we would not have to define what we mean by unhealthy food marketing (Raine et al., 2013) Debating policy solutions for unhealthy food marketing to children versus all marketing to children is beyond the scope of this chapter and will not be discussed here.

targeted to children and/or general marketing). Of course, monitoring food marketing to children is extremely complex and can range from minimal to extended approaches with various inclusions of marketing channels, techniques, and populations (Kelly et al., 2013). However, monitoring systems are likely to be recommended based on existing evidence which ends up being a self-limiting cycle.

The broad view of marketing described in the scoping review lends itself to future queries that explore the cumulative impact of ubiquitous unhealthy food and beverage marketing in children's lives. Continuing to focus on individual promotional techniques or marketing channels and ignoring the settings where children are exposed to marketing risk attributing the impact of marketing to children to those features rather than the potential cumulative exposures over time and place. To this end, I recommend that researchers, practitioners, and policy-makers resist defaulting to common definitions of "food marketing to children" and seek to define the problem in a way that captures a wider net of food marketing exposures that may impact children's dietary attitudes, preferences, or patterns.

*Recommendation #1a (for researchers):* Broadly investigate exposure to unhealthy food marketing including that to which children are exposed, not just marketing occasions that are targeted to child audiences, with a particular emphasis on places where a high proportion of children may be exposed to marketing frequently and/or repeatedly.

*Recommendation #1b (for researchers):* Evaluate the impact of food marketing regulations on food marketing exposures that may be out of scope of proposed or enacted policies (e.g. targeting other populations, new marketing channels or techniques, or not included marketing

channels/settings).

*Recommendation #1c (for practitioners):* Conduct an environmental assessment of food marketing in local communities to understand local places where children may be exposed to unhealthy food marketing (in general, and targeted) and identify potential opportunities for intervention.

*Recommendation #1e (for policy-makers):* Critically assess the risk of unintended consequences of only restricting unhealthy food marketing targeted to children, which may allow continued or increased general exposure to unhealthy food marketing, and consequently, create food marketing regulations that attempt to reduce the risks of specific unintended consequences.

### ***Defining marketing in recreation facilities***

Through reductive inference to try to identify what makes food marketing in recreation facilities what it is, I realized that S1 to S4 conflated two systems of marketing. Marketing in recreation facilities may include a mix of (i) commercial marketing and (ii) social marketing. First, commercial marketing may be present from food service establishments that sell foods or beverages in the facility or from external food-related organizations that do not sell products in the facility. Examples of commercial marketing in recreation facilities may be:

- The placements of bags of candy at checkouts in concessions or of chocolate and candy at eye level in vending machines
- Price promotions that encourage overeating (e.g. combos) at concessions
- Branding from food retailers in a hockey arena

These commercial marketing practices may be influenced by municipal or facility policies or agreements with commercial organizations.

Secondly, recreation facilities may include an element of social marketing whereby the facility (or a government body or non-government organization) markets socially responsible behaviours such as being physically active or eating healthy. Some examples of social marketing promotions in recreation facilities may include:

- Posters that say “choose healthy drinks”
- Access to free water

Commercial and social marketing are different systems with different goals (Lee & Kotler, 2011). As Lee & Kotler (2011) explain, the goal of commercial marketing is to sell goods and services to “produce a *financial gain* for the corporation” (p.14, emphasis in the original). The goal of social marketing is to “influence behaviors that will contribute to *societal gain*” (Lee & Kotler, 2011, p.14, emphasis in the original). Although commercial marketing aims to generate profit, commercial marketing activities can also be evaluated based on how they impact society, such as how they impact the environment or public health (Bhattacharya, 2016). This may be referred to as socially responsible marketing or corporate social responsibility. For example, a food service establishment that chooses to use biodegradable take out containers may be more environmentally responsible than a food service establishment that uses styrofoam containers. Commercial and social marketing can sometimes overlap as well; for example, when a food service establishment makes the default side dish of an entrée a salad instead of fries to reduce the caloric content of their meals. Changing to a healthier side dish influences behaviours for societal gain but is done by a commercial company with goals to still profit from selling combination meals.

The research presented in this dissertation did not clearly delineate commercial marketing from social marketing. The quantitative assessment with FoodMATS included promotions from both commercial organizations and social marketing campaign promotions, although the latter contributed very little to all food marketing occasions overall. The qualitative assessment included parents' perceptions of commercial marketing and their descriptions of what marketing practices they saw as acceptable (i.e. socially responsible) or unacceptable (i.e. socially irresponsible). Parents appeared to reflect on the corporate social responsibility of commercial marketers and the presence of mixed messages between commercial marketing and social marketing (e.g. placing sugar sweetened beverages next to a sign that says "choose healthy drinks").

Without identifying and defining what types of marketing were included in the scope of S1 to S4 a priori, I experienced challenges in interpreting the results across all studies. Specifically, it was difficult to deeply understand what is contributing to the food marketing environment, who is marketing what, what should be expected of the interventions in terms of generating actual change, and to what type of marketing parents were referring to. Ambiguity could make it difficult to identify parties responsible for the situation who can be mobilized for change. Thus, it may be useful to differential between commercial and social marketing strategies in recreation facilities.

The multi-dimensional nature of food marketing in recreation facilities can be linked to larger "wicked" food problems (Fauvel & Lake, 2015). Wicked problems are defined as "illusive or difficult to pin down and influenced by a constellation of complex social and political factors, some of which change during the process of solving the problem...likely to be viewed differently depending on the perspectives and biases of those with a stake in the problem" (Kreuter, De

Rosa, Howze, & Baldwin, 2004, p.442). Reinecke and Ansari (2016) describe that responsibility for wicked problems needs to be reframed so that corporations or others acknowledge and accept their responsibility in the problem. I propose that an alternative marketing strategy, called critical social marketing, can be useful to encourage reframing of responsibility for food marketing environments in recreation facilities.

Critical social marketing is defined as “critical research from a marketing perspective on the impact commercial marketing has on society, to build the evidence base, inform upstream efforts such as advocacy, policy and regulation, and inform the development of downstream social marketing interventions” (Gordon, 2011, p.89). The critical social marketing approach uses upstream (i.e. environmental and policy change) and downstream (i.e. change individual knowledge and skills) interventions synergistically to create environments where individuals can perform healthy behaviours (Hoek & Jones, 2011). These attributes align with principles of the Ottawa Charter for Health Promotion to build healthy public policy, create supportive environments, strengthen community actions, and develop personal skills. Critical social marketing includes upstream and downstream social marketing activities where separate marketing campaigns are implemented to change attitudes and behaviours of two target audiences, policy-makers and the public, respectively (Gordon, 2011; Hoek & Jones, 2011).

I argue that critical social marketing may be a useful approach to understand problems and solutions that are relevant to business and public health, in this case – food marketing in recreation facilities. Experiences from tobacco and alcohol marketing suggest that an approach that limits commercial marketing to more socially responsible practices (e.g. no marketing to youth) along with downstream social marketing strategies to encourage people to quit or abstain from smoking has been effective (Gordon, 2011). To come full circle, upstream social marketing

targeted at policy-makers was instrumental in creating mandated regulations that required socially responsible commercial marketing (Hastings & Saren, 2003) and creating other supportive environments (e.g. smoking bans).

It would have been useful to scope and plan my research based on a critical social marketing approach. Defining my research objectives through critical social marketing may have enhanced the critical analysis of commercial marketing in recreation facilities. A critical social marketing approach may have stimulated more specific recommendations for alternative commercial marketing approaches and facility or municipal policies to improve food marketing environments, and generate complementary social marketing behaviour change campaigns. Without understanding and influencing marketing environments by aligning commercial and social marketing approaches, incongruence between messages may arise (as seen in S4) which may potentially threaten the success or sustainability of healthy food initiatives. Hoek & Jones (2011) suggests that “in an environment that is fundamentally imbalanced, where the funds spent on promoting risk behaviours far exceeds those available to support healthy behaviours, it is not surprising individuals often take rather than eschew risks” (p.37).

To such end, I recommend that researchers, practitioners, and policy-makers adopt critical social marketing approach to first differentiate, and then blend, socially responsible commercial marketing and effective upstream and downstream social marketing within the recreation setting. I argue that by differentiating the parties engaged in commercial and social marketing, responsibility for the situation and for change may be more appropriately placed. Further, by critically assessing commercial marketing, it may be more clear what attributes of food marketing in settings where children spend time should be changed to protect healthy diets in children. As such, advocacy efforts, such as Heart & Stroke Foundation of Canada’s Stop

Marketing to Kids campaign (Heart & Stroke Foundation of Canada, n.d.), could be strengthened. Finally, creating mutually synergistic commercial and social marketing strategies may improve the impact food marketing environment in recreation facilities on consumers' healthy food attitudes and behaviours (compared to if commercial and social marketing approaches continue to operate separately or in opposition). The blend may also harness the capacity of existing marketing infrastructure that can be leveraged to promote health, which may be important for the resource-constrained public health sector.

*Recommendation #2b (for researchers):* Use a critical social marketing approach to research in order to understand the impacts of commercial marketing on society while informing evidence-based specific recommendations for policy advocacy and traditional social marketing campaigns.

*Recommendation #2c (for researchers):* Explore the competition of messages within recreation facilities, and evaluate the impact of adding healthy food marketing in a setting compared to removing unhealthy food marketing, compared to a combination of both

*Recommendation #2d (for researchers):* Develop indicators of socially responsible commercial marketing practices for settings where children spend time, and evaluate how responsible (or irresponsible) current practices are.

*Recommendation #2e (for practitioners):* Explore situations where commercial and social marketing may overlap and identify opportunities for change and practical solutions to create mutually reinforcing strategies.



*Recommendation #2f (for practitioners):* Create a parents' jury (Watson, Sims, Syrett, Chapman, & Martin, 2010), perhaps as part of Heart & Stroke Foundation of Canada's Stop Marketing to Kids campaign (Heart & Stroke Foundation of Canada, n.d.), to stimulate upstream social marketing for policy and environmental change related to creating supporting healthy food marketing environments in settings where children spend time.

*Recommendation #2g (for practitioners):* Create a social marketing tool kit for recreation facilities or municipalities to use that supports implementing evidence-based downstream social marketing campaigns in recreation facilities.

*Recommendation #2h (for practitioners):* Explore situations where commercial and social marketing may overlap and identify opportunities or practical solutions to create mutually reinforcing strategies.

*Recommendation #2i (for policy-makers):* Use research conducted to develop provincial, municipal, or institutional regulations that require food marketers present in recreation facilities to adopt socially responsible marketing practices (in relation to promoting healthy eating in children).

### ***Defining (and addressing) marketing comprehensively***

The final "definition" reviewed here focuses on how marketing mixes (e.g. the 4Ps) are conceptualized. As discussed in Chapter 5, policy documents that only provide guidance on one

aspect of food marketing (i.e. product - healthfulness of food availability) may be insufficient to enact change across all components of marketing. Similarly, local action plans that only select a single promotional marketing channel may also be insufficient to generate widespread change. The limited changes in food marketing environments may have to be associated with a continued emphasis on single Ps [a common downfall in social marketing strategies (Lefebvre, 2011)] rather than creating a strategic plan.

Improving healthy food availability appeared to be prioritized by intervention recreation facilities (Guidelines+CBI) over changing other components of food marketing environments during the EPL CBI. Regardless of one's perspective on whether food availability is truly a component of food marketing, I believe that the point is that a comprehensive approach is needed to improve environmental influences on diet and that a comprehensive approach may be achieved by conceptualizing marketing strategies to be a collection of several components (including product). I argue that food availability is a critical component of food marketing as the product (i.e. the food or beverage) serves as the basis for the entire food marketing strategy. We found that even when recreation facilities had made progress towards offering healthier foods and beverages, parents still actively engaged in strategies to reduce their children's unhealthy food requests and choices in recreation facilities. It may be necessary to offer healthy foods and beverages to create more health-promoting recreation facilities, but it alone may not be sufficient to change parents' attitudes and behaviours.

The 4Ps is a commonly used marketing mix to generate effective marketing strategies (Lee & Kotler, 2011) and was used consistently through this dissertation. Some researchers and marketers suggest commercial marketing techniques, such as the 4Ps can be simply applied to social marketing strategies but others argue that the model is not directly applicable (Hoek &

Jones, 2011). Since the components of social marketing are less tangible than in commercial marketing it is difficult to apply the 4Ps directly (Wood, 2008); social products, prices, places, and promotion are naturally different than commercial products and their prices, places, and promotion (Wood, 2008). For example, the core product of social marketing is not a good or service, as it would be in commercial marketing, but the benefits accrued from engaging in the target behaviour (which are usually more societal than individual) (Wood, 2008). A social marketing strategy may strive to effectively mix the product (what are the benefits of the behaviour?), place (where can people learn about or engage in the behaviour?), price (what are the monetary and non-monetary costs and benefits?; e.g. is it worth the cost of losing family meal time?), and promotion (how do you get the message out?) (Lee & Kotler, 2011).

On the other hand, social marketing also includes “actual products” and “augmented products” which are more tangible goods and services that facilitate the target audience performing the socially desirable behaviour (Lee & Kotler, 2011). These more tangible products, such as fruits or vegetables (actual product) or refillable water bottles and hydration stations (augmented product) could overlap with commercial enterprises and their marketing strategies (e.g. concessions selling and promoting fruit cups). I argue that both commercial and social marketing each require the right marketing mix (which may not be exactly the same between the two approaches), and that they also may need to be blended within a setting like recreation facilities where products may overlap to be mutually reinforcing.

There is some research on marketing mixes that extend or adapt the traditional 4Ps. As Khan explains, more “Ps” are continuously added or changed to the marketing mix, such as People or Process (Khan, 2014). Kraak et al. (2017) created an 8P marketing mix for healthy food restaurants that includes the following components and interpretations:

1. Place – visually emphasize healthy choices
2. Profile – ensure half of menu meals meet healthful nutrient cut-offs
3. Portion – reduce portion sizes
4. Pricing – use pricing to encourage healthy food purchases
5. Promotion – responsibly market healthy foods and beverages
6. Picks – use healthy side dishes and beverages as defaults in combination meals
7. Priming – add menu labelling or information to encourage healthy choices
8. Proximity – put healthy options at eye level and near point-of-purchase

The eight suggested by Kraak et al. (2017) may be useful tangible strategies concessions could adopt in recreation facilities, however it may not be applicable to other types of commercial marketing (e.g. sponsorship) or social marketing.

Branding has been mentioned as an important component of commercial (Kraak, Kumanyika, & Story, 2009) marketing and could also be used in social marketing, as the “4Ps and a B” (Wood, 2008). Other researchers have introduced “4Cs” as a comparable alternative to the 4Ps (Khan, 2014).

This is far from a complete list or analysis of marketing mixes (which is beyond the scope of this chapter). Clearly, there are multiple components that can be defined and combined in multiple ways. More research may be needed to identify, review, and critique marketing mixes to suggest ideal marketing strategies. This task may be made more useful (and further daunting) by evaluating marketing mixes according to their potential usefulness for commercial and/or social marketing that occur simultaneously within a single setting, their fit with critical social marketing objectives, and their potential impact to generate public health impact. To this end, I recommend that researchers, practitioners, and policy-makers should consciously assess the need

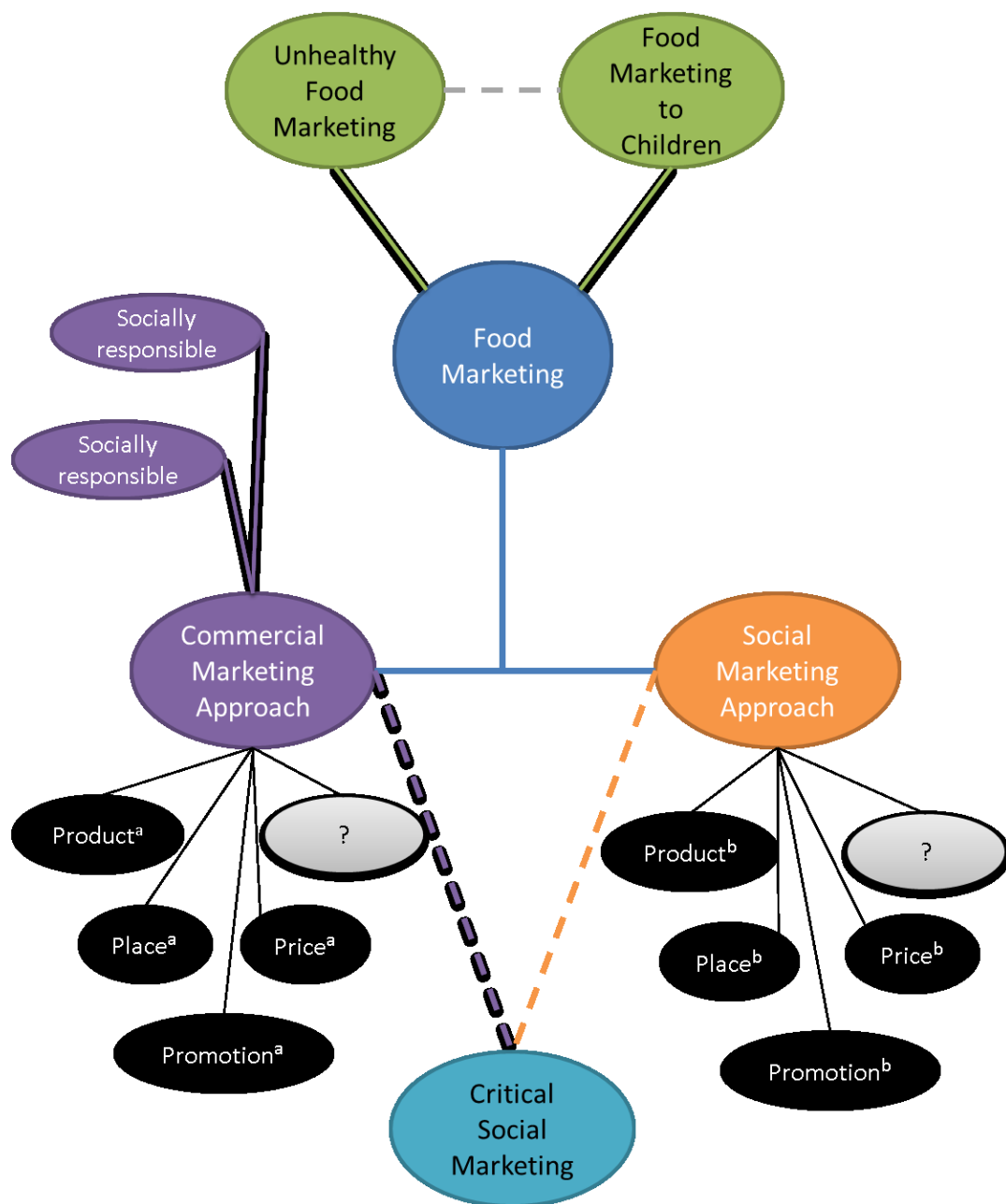
to include several marketing components and strategically mix the components when scoping and designing studies, actions, and policies related to food marketing in recreation settings.

*Recommendation #3b (for researchers):* Evaluate the impact of various strategic marketing mixes on consumer behaviour to identify ideal and successful social or commercial marketing plans that truly make the healthy choice the easy choice.

*Recommendation #3c (for researchers and practitioners):* Within each possible marketing component deemed relevant or importance, explore the process, feasibility, and impact of implementing various marketing practices on consumer attitudes and behaviours.

*Recommendation #3d (for policy-makers):* Create detailed policies that address unhealthy food marketing broadly with specific guidance on practical strategies that can be implemented by local recreation facilities or municipalities. Ensure resources are available to support practitioners and recreation facility staff or decision-makers implementing the policy requirements.

Figure 6 presents the complexity of food marketing in recreation facilities, reviewed in this discussion, including aspects of defining the problem of food marketing (general versus targeted), types of marketing approaches in recreation facilities (commercial marketing versus social marketing; critical social marketing), and the components of marketing strategies (the 4Ps versus alternatives).



**Figure 6 Food Marketing Definitions and Components**

Note: The superscripts on the components of marketing strategies (product, price, place, promotion) represent that, although they are named the same, these components differ between commercial marketing and social marketing.

### Strengths & Limitations

Many strengths and limitations of individual studies have been discussed in each chapter.

This section will briefly review some strengths and limitations of the overall dissertation. First,

this is the first investigation into food marketing in recreation facilities in Canada. The FoodMATS tool is the only reliable, validated tool to assess food marketing in a whole setting. The use of new and multiple methods has yielded unique contributions to the literature. The research questions and approach were grounded in evidence and theories from marketing and population health which facilitated the creation of knowledge relevant to these sectors. However, in light of the discussion presented here on the complexity of food marketing in recreation facilities, there may have been alternative conceptualizations of marketing that could have informed the study (e.g. critical social marketing; expanded or adapted versions of the 4Ps).

By exploring the phenomenon with a critical realism lens, multiple thought processes were used to generate a more complete picture of food marketing in recreation and suggest possible underlying mechanisms and structures. If it were possible to have explored the process evaluation of the EPL CBI in detail, we may have been able to gather more perceptions of reality from people engaged in marketing activities in the facilities (recreation managers, food service operators). Increasing our knowledge of diverse realities may have improved retroductive inferences to better understand the underlying structures and mechanisms of the phenomenon.

Although this research did include a large number of sites for this type of real world research, small sample sizes limited the power of our analyses. Furthermore, we initially aimed to conduct a mediation analyses of how the relationship between food availability and food sales was mediated by food marketing environments (i.e. FoodMATS scores); however, due to low availability and quality of sales data such an analysis was impossible. The mediation analysis would have been valuable to compare to parents' descriptions of their reactions to and experiences of food marketing. It could also have provided useful information for practitioners when the profit side of food services and marketing are emphasized. In the end, this research

included less investigation into how people behave in the context of food marketing environments than was initially planned.

The Eat Play Live study was an excellent opportunity to explore food marketing in recreation facilities; however food marketing was one of several outcomes evaluated, and thus was only one of many possible areas for action. Furthermore, the framework of food environments in municipal recreation environments did not explicitly identify food marketing as a target or strategy to change food environments. The results of this study could have been deepened if it had been possible to tailor the interventions to focus on food marketing. Nonetheless, the real world investigation of the topic strengthens its generalizability and usefulness to practitioners and policy-makers.

## **Conclusions**

Consistent with other research on marketing to children, the food marketing environment in recreation facilities is not health promoting. The findings presented in this dissertation reveals that food marketing in recreation facilities is complex with multiple actors involved and is widely interpreted by parents. Food marketing environments in recreation facilities were not significantly different when voluntary provincial nutrition guidelines for recreation facilities were available (versus no guidelines) and did not significantly improve after participating in a capacity-building intervention to implement the guidelines. Parents believe children are impacted by certain visual food marketing influences present in recreation facilities, but are less sure whether or how other types of marketing (e.g. sport sponsorship) have impacts. Parents end up using a variety of strategies to reduce their children's unhealthy food requests and choices in recreation facilities.

This research is extremely timely with the spotlight on food marketing to children in



Canada. In order to effectively protect children from unhealthy food marketing, the field should reflect on how to define the problem and generate policies that will change the exposure to and power of unhealthy food marketing in children's lives. Current approaches may fail to shift food marketing environments in recreation facilities as most food marketing occasions are not explicitly targeted to children. Critical social marketing may be a suitable approach for public health researchers, practitioners, and policy-makers to bridge commercial and social marketing through upstream and downstream actions that will generate health promoting environments that enable people to engage in healthy behaviours.

## References

- Bhaskar, R. (1989). *Reclaiming reality: A critical introduction to contemporary philosophy*. New York, NY: Verso.
- Bhattacharya, C. (2016). Responsible marketing: Doing well by doing good. *GfK Marketing Intelligence Review*, 8(1), 8-17.
- Danermark, B., Eskstrom, M., Jakobsen, L., & Karlsson, J. C. (2002). *Explaining society: Critical realism in the social sciences*. New York, NY: Talyor & Francis Books Ltd.
- Fauvel, A. M., & Lake, D. L. (2015). Tackling wicked food issues: applying the wicked problems approach in higher education to promote healthy eating habits in American school children. Retrieved from: [https://scholarworks.gvsu.edu/lib\\_articles/6/](https://scholarworks.gvsu.edu/lib_articles/6/)
- Freeman, B., Kelly, B., Vandevijvere, S., & Baur, L. (2015). Young adults: beloved by food and drink marketers and forgotten by public health? *Health Promotion International*, 31(4), 954-961.
- Gordon, R. (2011). Critical social marketing: definition, application and domain. *Journal of Social Marketing*, 1(2), 82-99.

- Hastings, G., & Saren, M. (2003). The critical contribution of social marketing: theory and application. *Marketing Theory*, 3(3), 305-322.
- Heart & Stroke Foundation of Canada. (n.d.) Stop Marketing to Kids Coalition. Retrieved from <http://stopmarketingtokids.ca/>
- Hoek, J., & Jones, S. C. (2011). Regulation, public health and social marketing: A behaviour change trinity. *Journal of Social Marketing*, 1(1), 32-44.
- Kelly, B., King, L., Baur, L., Rayner, M., Lobstein, T., Monteiro, C., . . . Friel, S. (2013). Monitoring food and non-alcoholic beverage promotions to children. *Obesity Reviews*, 14(S1), 59-69.
- Khan, M. T. (2014). The concept of 'marketing mix' and its elements (a conceptual review paper). *International Journal Of Information, Business And Management*, 6(2), 95.
- Kraak, V., Englund, T., Misyak, S., & Serrano, E. (2017). A novel marketing mix and choice architecture framework to nudge restaurant customers toward healthy food environments to reduce obesity in the United States. *Obesity Reviews*, 18(8), 852-868.
- Kraak, V. I., Kumanyika, S. K., & Story, M. (2009). The commercial marketing of healthy lifestyles to address the global child and adolescent obesity pandemic: prospects, pitfalls and priorities. *Public Health Nutrition*, 12(11), 2027-2036.
- Kreuter, M. W., De Rosa, C., Howze, E. H., & Baldwin, G. T. (2004). Understanding wicked problems: a key to advancing environmental health promotion. *Health Education & Behavior*, 31(4), 441-454.
- Lee, N. R., & Kotler, P. (2011). *Social marketing: Influencing behaviors for good*: Thousand Oaks (CA): Sage.

- Lefebvre, R. C. (2011). An integrative model for social marketing. *Journal of Social Marketing*, *1*(1), 54-72.
- Maxwell J, & Mittapalli K. *Realism as a Stance for Mixed Methods Research*. Handbook of mixed methods in social & behavioral research. 2010:145-68.
- Raine, K. D., Lobstein, T., Landon, J., Kent, M. P., Pellerin, S., Caulfield, T., . . . Spence, J. C. (2013). Restricting marketing to children: Consensus on policy interventions to address obesity. *Journal of Public Health Policy*, *34*(2), 239-253.
- Reinecke, J., & Ansari, S. (2016). Taming wicked problems: The role of framing in the construction of corporate social responsibility. *Journal of Management Studies*, *53*(3), 299-329.
- Watson, W., Sims, K., Syrett, C., Chapman, K., & Martin, J. (2010). The parents jury—An advocacy program to reduce obesogenic environments. *Obesity Research & Clinical Practice*, *4*, S58.
- Wood, M. (2008). Applying commercial marketing theory to social marketing: A tale of 4Ps (and a B). *Social Marketing Quarterly*, *14*(1), 76-85.
- World Health Organization. (2013). Marketing of foods high in fat, salt and sugar to children: update 2012-2013. *Copenhagen, Denmark: WHO Regional Office for Europe*.

## BIBLIOGRAPHY

Alberta Health and Wellness. (2010). The Alberta Nutrition Guidelines for Children and Youth.

Retrieved from: <https://www.albertahealthservices.ca/nutrition/Page2929.aspx>

Adams, J., Hennessy-Priest, K., Ingimarsdóttir, S., Sheeshka, J., Østbye, T., & White, M. (2009).

Changes in food advertisements during ‘prime-time’ television from 1991 to 2006 in the UK and Canada. *British Journal of Nutrition*, 102(4), 584-593.

Adams, J., Hennessy-Priest, K., Ingimarsdóttir, S., Sheeshka, J., Østbye, T., & White, M.

(2009b). Food advertising during children’s television in Canada and the UK. *Archives of Disease in Childhood*, 94(9), 658-662.

Advertising Standards Canada. (2014). Canadian Children's Food and Beverage Advertising

Initiative: Uniform Nutrition Criteria White Paper (pp. 19). Toronto, Ontario.

Advertising Standards Canada. (2015a). Broadcast Code for Advertising to Children - The Code.

Retrieved from:

<http://www.adstandards.com/en/clearance/childrens/broadcastCodeForAdvertisingToChildren-TheCode.aspx#social>

Advertising Standards Canada. (2015b). The Canadian Children's Food and Beverage

Advertising Initiative: 2014 Compliance Report. Retrieved from:

<http://www.adstandards.com/en/childrensinitiative/2014ComplianceReport.pdf>

Advertising Standards Canada. (2015c). The Canadian Code of Advertising Standards.

Retrieved from: <http://www.adstandards.com/en/standards/theCode.aspx>

Advertising Standards Canada. (n.d.). Children's Food and Beverage Advertising Initiative.

Retrieved from: <http://www.adstandards.com/en/childrensinitiative/default.htm>

Alberta Health and Wellness. (2010). The Alberta Nutrition Guidelines for Children and Youth.

Retrieved from: <https://www.albertahealthservices.ca/nutrition/Page2929.aspx>

Altman, D. G. (1991). *Practical Statistics for Medical Research*. London: Champan and Hall.

An Act to amend the Food and Drugs Act (prohibiting food and beverage marketing directed at children), S-228, Senate of Canada (2017).

Arnould, E. J., & Thompson, C. J. (2005). Consumer culture theory (CCT): Twenty years of research. *Journal of Consumer Research*, 31(4), 868-882.

Ball, K., Timperio, A. F., & Crawford, D. A. (2006). Understanding environmental influences on nutrition and physical activity behaviors: Where should we look and what should we count? *International Journal of Behavioral Nutrition and Physical Activity*, 3, 33.

Basil, M. (2011). Use of photography and video in observational research. *Qualitative Market Research: An International Journal*, 14(3), 246-257.

Batty, R. J., & Gee, S. (2018). Fast food, fizz, and funding: Balancing the scales of regional sport organisation sponsorship. *Sport Management Review*.

Belon, A. P., Nieuwendyk, L. M., Vallianatos, H., & Nykiforuk, C. I. (2014). How community environment shapes physical activity: Perceptions revealed through the PhotoVoice method. *Social Science & Medicine*, 116, 10-21.

Berry, B., & McMullen, T. (2008). Visual communication to children in the supermarket context: Health protective or exploitive? *Agriculture and Human Values*, 25(3), 333-348.

Bestman, A., Thomas, S. L., Randle, M., & Thomas, S. D. (2015). Children's implicit recall of junk food, alcohol and gambling sponsorship in Australian sport. *BMC Public Health*, 15(1), 1022.

- Bhaskar, R. (1989). *Reclaiming reality: A critical introduction to contemporary philosophy*. New York, NY: Verso.
- Bhattacharya, C. (2016). Responsible marketing: Doing well by doing good. *GfK Marketing Intelligence Review*, 8(1), 8-17.
- Bibeau, W. S., Saksvig, B. I., Gittelsohn, J., Williams, S., Jones, L., & Young, D. R. (2012). Perceptions of the food marketing environment among African American teen girls and adults. *Appetite*, 58(1), 396-399.
- Boelsen-Robinson, T., Chung, A., Khalil, M., Wong, E., Kurzeme, A., & Peeters, A. (2017). Examining the nutritional quality of food and beverage consumed at Melbourne aquatic and recreation centres. *Australian and New Zealand Journal of Public Health*, 41(2), 184-186.
- Bowen, D. J., Barrington, W. E., & Beresford, S. A. (2015). Identifying the effects of environmental and policy change interventions on healthy eating. *Annual Review of Public Health*, 36, 289-306.
- Boylard, E. J., Nolan, S., Kelly, B., Tudur-Smith, C., Jones, A., Halford, J. C., & Robinson, E. (2016). Advertising as a cue to consume: A systematic review and meta-analysis of the effects of acute exposure to unhealthy food and nonalcoholic beverage advertising on intake in children and adults. *The American Journal of Clinical Nutrition*, 103(2), 519-533.
- Brady, J., Farrell, A., Wong, S., & Mendelson, R. (2008). Beyond television: Children's engagement with online food and beverage marketing. *Clinical Medicine: Pediatrics*, 2, 1-9.

- Brady, J., Mendelson, R., Farrell, A., & Wong, S. (2010). Online marketing of food and beverages to children: a content analysis. *Canadian Journal of Dietetic Practice and Research, 71*(4), 166-171.
- Bragg, M. A., Liu, P. J., Roberto, C. A., Sarda, V., Harris, J. L., & Brownell, K. D. (2013). The use of sports references in marketing of food and beverage products in supermarkets. *Public Health Nutrition, 16*(4), 738-742.
- Bragg, M. A., Miller, A. N., Roberto, C. A., Sam, R., Sarda, V., Harris, J. L., & Brownell, K. D. (2018). Sports sponsorships of food and nonalcoholic beverages. *Pediatrics, 141*(4).
- Bragg, M. A., Roberto, C. A., Harris, J. L., Brownell, K. D., & Elbel, B. (2017). Marketing food and beverages to youth through sports. *Journal of Adolescent Health, 62*(1), 5-13.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101.
- Brennan, L. K., Brownson, R. C., & Orleans, C. T. (2014). Childhood obesity policy research and practice: evidence for policy and environmental strategies. *American Journal of Preventive Medicine, 46*(1), e1-16.
- Brierley, M., & Elliott, C. (2015). Boys' Healthy Packaged Food Choices. *International Journal of Men's Health, 14*(1), 21.
- British Columbia Ministry of Health. (2014). Healthier Choices in Vending Machines in BC Public Buildings. Victoria, BC: Province of British Columbia. Retrieved from [www.healthlinkbc.ca/foodguidelines](http://www.healthlinkbc.ca/foodguidelines).
- Brownell, K. D., & Warner, K. E. (2009). The perils of ignoring history: Big Tobacco played dirty and millions died. How similar is Big Food? *Milbank Quarterly, 87*(1), 259-294.

- Brug, J., Kremers, S. P., Lenthe, F., Ball, K., & Crawford, D. (2008). Environmental determinants of healthy eating: In need of theory and evidence. *Proceedings of the Nutrition Society, 67*(3), 307-316.
- Cairns, G., Angus, K., Hastings, G., & Caraher, M. (2013). Systematic reviews of the evidence on the nature, extent and effects of food marketing to children. A retrospective summary. *Appetite, 62*, 209-215.
- Canadian Education Association. (2013). The 2012/2013 School Calendar (pp. 18). Toronto, Ontario: Canadian Education Association.
- Canadian Grocer Staff. (2013). Grocers should look at 'fresh' opportunities in 2013: Nielsen. Retrieved from <http://www.canadiangrocer.com/top-stories/grocers-should-look-at-fresh-opportunities-in-2013-nielsen-20506>
- Carson, V., & Kuzik, N. (2017). Demographic correlates of screen time and objectively measured sedentary time and physical activity among toddlers: a cross-sectional study. *BMC Public Health, 17*.
- Carter, M. A., Edwards, R., Signal, L., & Hoek, J. (2012). Availability and marketing of food and beverages to children through sports settings: A systematic review. *Public Health Nutrition, 15*(08), 1373-1379.
- Carter, M. A., Signal, L. N., Edwards, R., & Hoek, J. (2018). Competing teammates: Food in New Zealand sports settings. *Health Promotion International*.
- Carter, M. A., Signal, L., Edwards, R., Hoek, J., & Maher, A. (2013). Food, fizzy, and football: promoting unhealthy food and beverages through sport - a New Zealand case study. *BMC Public Health, 13*.



- Carter, O. B., Patterson, L. J., Donovan, R. J., Ewing, M. T., & Roberts, C. M. (2011). Children's understanding of the selling versus persuasive intent of junk food advertising: Implications for regulation. *Social Science & Medicine*, 72(6), 962-968.
- Castonguay, J. (2015). Sugar and sports: Age differences in children's responses to a high sugar cereal advertisement portraying physical activities. *Communication Research*.
- Caswell, M. S., & Hanning, R. M. (2018). Adolescent perspectives of the recreational ice hockey food environment and influences on eating behaviour revealed through photovoice. *Public Health Nutrition*, 21(7), 1255-1265.
- Chaumette, P., Morency, S., Royer, A., Lemieux, S., & Tremblay, A. (2008). [Food environment in the sports, recreational and cultural facilities of Quebec City: a look at the situation]. *Canadian Journal of Public Health/Revue canadienne de sante publique*, 100(4), 310-314.
- Chircop, A., Shearer, C., Pitter, R., Sim, M., Rehman, L., Flannery, M., & Kirk, S. (2013). Privileging physical activity over healthy eating: 'Time' to Choose? *Health Promotion International*.
- Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological assessment*, 6(4), 284-290.
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (revised ed.): New York: Academic Press.
- Colman, R., & Hayward, K. (2010). Childhood overweight and obesity: Summary of evidence from the cost of obesity in Alberta report. Retrieved from

<http://www.albertahealthservices.ca/poph/hi-poph-surv-phids-childhood-overweight-obesity-2010.pdf>

- Craigie, A. M., Lake, A. A., Kelly, S. A., Adamson, A. J., & Mathers, J. C. (2011). Tracking of obesity-related behaviours from childhood to adulthood: A systematic review. *Maturitas*, *70*(3), 266-284.
- Craypo, L., Samuels, S., & Samuels and Associates. (2006). School Food and Beverage Marketing Assessment Tool. Retrieved from:  
<http://www.californiaprojectlean.org/doc.asp?id=174&parentid=20>
- Creswell, J., & Plano Clark, V. (2011). Designing and conducting mixed methods research (2nd ed.). Thousand Oaks, CA: SAGE Publications.
- Danermark, B., Eskstrom, M., Jakobsen, L., & Karlsson, J. C. (2002). *Explaining society: Critical realism in the social sciences*. New York, NY: Talyor & Francis Books Ltd.
- Dhar, T., & Baylis, K. (2011). Fast-food consumption and the ban on advertising targeting children: The Quebec experience. *Journal of Marketing Research*, *48*(5), 799-813.
- Dooris, M. (2009). Holistic and sustainable health improvement: The contribution of the settings-based approach to health promotion. *Perspectives in Public Health*, *129*(1), 29-36.
- Edgar, T., Huhman, M., & Miller, G. A. (2015). Understanding “Place” in social marketing: A systematic review. *Social Marketing Quarterly*, *21*(4), 230-248.
- Elliott, C. (2008). Assessing ‘fun foods’: nutritional content and analysis of supermarket foods targeted at children. *Obesity Reviews*, *9*(4), 368-377.
- Elliott, C. (2009). Healthy food looks serious: How children interpret packaged food products. *Canadian Journal of Communication*, *34*(3).

- Elliott, C. (2011). "It's junk food and chicken nuggets": Children's perspectives on 'kids' food' and the question of food classification. *Journal of Consumer Behaviour*, 10(3), 133-140.
- Elliott, C. (2012). Marketing foods to children: Are we asking the right questions? *Childhood Obesity*, 8(3), 191-194.
- Elliott, C. (2012a). Packaging fun: analyzing supermarket food messages targeted at children. *Canadian Journal of Communication*, 37(2).
- Elliott, C. (2012b). Packaging fun: analyzing supermarket food messages targeted at children. *Canadian Journal of Communication*, 37(2).
- Elliott, C. (2012c). Packaging health: Examining "better-for-you" foods targeted at children. *Canadian Public Policy*, 38(2), 265-281.
- Elliott, C. (2014). Food as people: Teenagers' perspectives on food personalities and implications for healthy eating. *Social Science & Medicine*, 121, 85-90.
- Elliott, C., & Brierley, M. (2012). Healthy choice?: Exploring how children evaluate the healthfulness of packaged foods. *Canadian Journal of Public Health*, 103(6), e453-e458.
- Elliott, C., & Cook, B. (2013). Not so grreat: Ten important myths about food advertising targeted to children in Canada. *Childhood Obesity*, 9(4), 286-291.
- Elliott, C., Den Hoed, R., & Conlon, M. (2013). Food branding and young children's taste preferences: A reassessment. *Canadian Journal of Public Health*, 104(5), e364-e368.
- Fauvel, A. M., & Lake, D. L. (2015). Tackling wicked food issues: applying the wicked problems approach in higher education to promote healthy eating habits in American school children. Retrieved from: [https://scholarworks.gvsu.edu/lib\\_articles/6/](https://scholarworks.gvsu.edu/lib_articles/6/)

- Folse, J. A. G., Niedrich, R. W., & Grau, S. L. (2010). Cause-relating marketing: The effects of purchase quantity and firm donation amount on consumer inferences and participation intentions. *Journal of Retailing*, *86*(4), 295-309.
- Folta, S. C., Goldberg, J. P., Economos, C., Bell, R., & Meltzer, R. (2006). Food advertising targeted at school-age children: A content analysis. *Journal of Nutrition Education and Behavior*, *38*(4), 244-248.
- Freeman, B., Kelly, B., Vandevijvere, S., & Baur, L. (2015). Young adults: beloved by food and drink marketers and forgotten by public health? *Health Promotion International*, *31*(4), 954-961.
- Froese-Germain, B., Hawkey, C., Larose, A., McAdie, P., Shaker, E. (2006). *Commercialism in Canadian schools: Who's calling the shots?*
- Galbraith-Emami, S., & Lobstein, T. (2013). The impact of initiatives to limit the advertising of food and beverage products to children: A systematic review. *Obesity Reviews*, *14*(12), 960-974.
- Garriguet, D. (2004). Nutrition: Findings from the Canadian Community Health Survey. Overview of Canadians' eating habits 2004. Retrieved from <http://publications.gc.ca/Collection/Statcan/82-620-M/82-620-MIE2006002.pdf>
- Garst, J., Blok, V., Jansen, L., & Omta, O. S. (2017). Responsibility versus profit: The motives of food firms for healthy product innovation. *Sustainability*, *9*(12), 2286.
- Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: a guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, *10*(2), 486.
- Ghirardelli, A., Quinn, V., & Sugerman, S. (2011). Reliability of a retail food store survey and development of an accompanying retail scoring system to communicate survey findings

- and identify vendors for healthful food and marketing initiatives. *Journal of Nutrition Education and Behavior*, 43(4), S104-S112.
- Giskes, K., van Lenthe, F., Avendano-Pabon, M., & Brug, J. (2010). A systematic review of environmental factors and obesogenic dietary intakes among adults: Are we getting closer to understanding obesogenic environments? *Obesity Reviews*, 12(5), e95-e106.
- Gluckman, P., Nishtar, S., & Armstrong, T. (2015). Ending childhood obesity: A multidimensional challenge. *The Lancet*, 385(9973), 1048-1050.
- Gootman, J. A., McGinnis, J. M., & Kraak, V. I. (2006). *Food Marketing to Children and Youth: Threat or Opportunity?* National Academies Press.
- Gordon, R. (2011). Critical social marketing: definition, application and domain. *Journal of Social Marketing*, 1(2), 82-99.
- Government of Alberta. (2011). Active Alberta 2011-2021. Retrieved from <http://culture.alberta.ca/recreation/active-alberta/pdf/Active-Alberta-Policy.pdf>
- Government of British Columbia (2005). The Guidelines for Food and Beverage Sales in B.C. Schools. Victoria, BC: Province of British Columbia.
- Government of British Columbia. (2013). Guidelines for Food and Beverage Sales in B.C. Schools. Victoria, BC: Province of British Columbia Retrieved from [http://www2.gov.bc.ca/assets/gov/education/administration/kindergarten-to-grade-12/healthyschools/2015\\_food\\_guidelines.pdf](http://www2.gov.bc.ca/assets/gov/education/administration/kindergarten-to-grade-12/healthyschools/2015_food_guidelines.pdf).
- Government of Canada. (2018). Restricting marketing of unhealthy food and beverages to children: An update on proposed regulations. Retrieved from <https://www.canada.ca/en/health-canada/programs/consultation-restricting-unhealthy-food-and-beverage-marketing-to-children/update-proposed-regulations.html>

- Government of Manitoba. (2014). Moving forward with school nutrition guidelines. Retrieved from <http://www.gov.mb.ca/healthyschools/foodinschools/documents/mfsng/mfsng.pdf>.
- Government of Manitoba. (2017). The Education Administration Act: C.C.S.M. c. E10.
- Government of New Brunswick. (2008a). *Healthier Eating and Nutrition in Public Schools: A Handbook for Policy 711*.
- Government of Newfoundland and Labrador. (2009). *School food guidelines for school food providers*. Retrieved from [http://www.ed.gov.nl.ca/edu/publications/k12/SFG\\_2009.pdf](http://www.ed.gov.nl.ca/edu/publications/k12/SFG_2009.pdf).
- Government of Nova Scotia. (2015). Healthy Eating in Recreation and Sport Settings Guidelines. Retrieved from <http://www.recreationns.ns.ca/wp-content/uploads/2016/01/HERSS-Guidelines.pdf>.
- Government of Quebec. (2007). *Going the healthy route at school: Framework policy on health eating and active living*. Government of Quebec. Retrieved from [http://www.education.gouv.qc.ca/fileadmin/site\\_web/documents/dpse/adaptation\\_serv\\_comp/Goingtothehealthyrouteatschool\\_policyframework\\_AN.pdf](http://www.education.gouv.qc.ca/fileadmin/site_web/documents/dpse/adaptation_serv_comp/Goingtothehealthyrouteatschool_policyframework_AN.pdf)
- Government of Prince Edward Island. (2011) Eastern School District administrative regulation. Charlottetown (PE). School nutrition (for all grade levels- K-12). Retrieved from: [https://www.princeedwardisland.ca/sites/default/files/publications/english\\_schools\\_nutrition\\_policy.pdf](https://www.princeedwardisland.ca/sites/default/files/publications/english_schools_nutrition_policy.pdf).
- Government of Saskatchewan. (2009). Nourishing minds. Towards comprehensive school community health: Nutrition policy development in Saskatchewan schools. Retrieved from [https://www.lcsd.ca/uploads/images/student\\_and\\_parents/nourishing\\_minds.pdf](https://www.lcsd.ca/uploads/images/student_and_parents/nourishing_minds.pdf).
- Government of Saskatchewan. (2014). *Healthy Foods for my School: Nutrition Standards for Saskatchewan Schools*.

- Government of Yukon. Whitehorse (2008). School nutrition policy no. 1025. Retrieved from:  
[http://www.education.gov.yk.ca/pdf/policies/school\\_nutrition\\_policy.pdf](http://www.education.gov.yk.ca/pdf/policies/school_nutrition_policy.pdf).
- Graff, S., Kunkel, D., & Mermin, S. E. (2012). Government can regulate food advertising to children because cognitive research shows that it is inherently misleading. *Health Affairs*, *31*(2), 392-398.
- Groeppel-Klein, J., & Groppel-Klein, A. (2010). Examining the use of nutrition labelling with photoelicitation. *Qualitative Market: An International Journal*, *13*(4), 389-413.
- Halfon, N., Larson, K., Lu, M., Tullis, E., & Russ, S. (2014). Lifecourse health development: Past, present and future. *Maternal and Child Health Journal*, *18*(2), 344-365.
- Harper, D. (2002). Talking about pictures: A case for photo elicitation. *Visual studies*, *17*(1), 13-26.
- Harris, J. L. (2014, June 26). Protecting children from unhealthy food marketing [Webinar]. In Childhood Obesity Foundation and the Heart and Stoke Foundation of BC and Yukon Marketing 2 Kids. Retrieved from: <http://childhoodobesityfoundation.ca/videos/>
- Harris, J. L., & Graff, S. K. (2012). Protecting young people from junk food advertising: implications of psychological research for First Amendment law. *American Journal of Public Health*, *102*(2), 214-222.
- Hastings, G., & Saren, M. (2003). The critical contribution of social marketing: theory and application. *Marketing Theory*, *3*(3), 305-322.
- Health Canada. (2016). Healthy Eating Strategy. Retrieved from <http://news.gc.ca/web/article-en.do?mthd=tp&crtr.page=1&nid=1142029>
- Health Canada. (2017, February 28). Health Canada's marketing to children [webinar].

- Heart & Stroke Foundation of Canada. Stop Marketing to Kids Coalition. Retrieved from <http://stopmarketingtokids.ca/>
- Hobin, E. P., Hammond, D. G., Daniel, S., Hanning, R. M., & Manske, S. (2012). The Happy Meal® effect: the impact of toy premiums on healthy eating among children in Ontario, Canada. *Canadian Journal of Public Health, 103*(4), e244-e248.
- Hoek, J., & Jones, S. C. (2011). Regulation, public health and social marketing: A behaviour change trinity. *Journal of Social Marketing, 1*(1), 32-44.
- Hosler, A. S., & Dharssi, A. (2011). Reliability of a survey tool for measuring consumer nutrition environment in urban food stores. *Journal of Public Health Management and Practice, 17*(5), e1-e8.
- Hudson, S., & Elliott, C. (2013). Measuring the impact of product placement on children using digital brand integration. *Journal of Food Products Marketing, 19*(3), 176-200.
- Inoue, Y., Berg, B. K., & Chelladurai, P. (2015). Spectator Sport and Population Health: A Scoping Study. *Journal of Sport Management, 29*(6), 705-725.
- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33*(7), 14-26.
- Kelly, B., Bauman, A. E., & Baur, L. A. (2014). Population estimates of Australian children's exposure to food and beverage sponsorship of sports clubs. *Journal of Science and Medicine in Sport, 17*(4), 394-398.
- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2010). Food and drink sponsorship of children's sport in Australia: Who pays? *Health Promotion International, 26*(2), 188-195.



- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2011). Food company sponsors are kind, generous and cool”: (Mis)conceptions of junior sports players. *International Journal of Behavioural Nutrition and Physical Activity*, 8(95).
- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2012). Restricting unhealthy food sponsorship: Attitudes of the sporting community. *Health Policy*, 104(3), 288-295.
- Kelly, B., Baur, L. A., Bauman, A. E., King, L., Chapman, K., & Smith, B. J. (2013). Views of children and parents on limiting unhealthy food, drink and alcohol sponsorship of elite and children's sports. *Public Health Nutrition*, 16(1), 130-135.
- Kelly, B., Cretikos, M., Rogers, K., & King, L. (2008). The commercial food landscape: Outdoor food advertising around primary schools in Australia. *Australian and New Zealand Journal of Public Health*, 32(6), 522-528.
- Kelly, B., Halford, J. C., Boyland, E. J., Chapman, K., Bautista-Castaño, I., Berg, C., . . . Summerbell, C. (2010). Television food advertising to children: A global perspective. *American Journal of Public Health*, 100(9), 1730-1736.
- Kelly, B., King, L., Bauman, A. E., Baur, L. A., Macniven, R., Chapman, K., & Smith, B. J. (2014). Identifying important and feasible policies and actions for health at community sports clubs: A consensus-generating approach. *Journal of Science and Medicine in Sport*, 17(1), 61-66.
- Kelly, B., King, L., Baur, L., Rayner, M., Lobstein, T., Monteiro, C., . . . Friel, S. (2013). Monitoring food and non-alcoholic beverage promotions to children. *Obesity Reviews*, 14(S1), 59-69.

- Khan, M. T. (2014). The concept of marketing mix and its elements (a conceptual review paper). *International Journal of Information, Business And Management*, 6(2), 95.
- Kirk, S. F. L., Penney, T. L., & Freedhoff, Y. (2010). Running away with the facts on food and fatness. *Public Health Nutrition*, 13(1), 147-148.
- Koenigstorfer, J., & Groeppel-Klein, A. (2010). Examining the use of nutrition labelling with photoelicitation. *Qualitative Market Research: An International Journal*, 13(4), 389-413.
- Kraak, V. I., Kumanyika, S. K., & Story, M. (2009). The commercial marketing of healthy lifestyles to address the global child and adolescent obesity pandemic: prospects, pitfalls and priorities. *Public Health Nutrition*, 12(11), 2027-2036.
- Kraak, V., Englund, T., Misyak, S., & Serrano, E. (2017). A novel marketing mix and choice architecture framework to nudge restaurant customers toward healthy food environments to reduce obesity in the United States. *Obesity Reviews*, 18(8), 852-868.
- Kreuter, M. W., De Rosa, C., Howze, E. H., & Baldwin, G. T. (2004). Understanding wicked problems: a key to advancing environmental health promotion. *Health Education & Behavior*, 31(4), 441-454.
- Krølner, R., Rasmussen, M., Brug, J., Klepp, K.-I., Wind, M., & Due, P. (2011). Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part II: qualitative studies. *International Journal of Behavioral Nutrition and Physical Activity*, 8(1), 112.
- Landers, R. (2015). Computing Intraclass Correlations (ICC) as Estimates of Interrater Reliability in SPSS. *The Winnower*.
- Laperrière, J.-P. (2009). Analyse comparative de la forme des messages publicitaires pouvant s'adresser aux enfants. (Maîtrise en Sociologie) Université du Québec à Montréal.

- Laska, M. N., Borradaile, K. E., Tester, J., Foster, G. D., & Gittelsohn, J. (2010). Healthy food availability in small urban food stores: A comparison of four US cities. *Public Health Nutrition, 13*(7), 1031-1035.
- Lebel, E., Hamelin, A.-M., Lavallée, M., Bédard, A., & Dubé, A. (2005). Publicité télévisée sur les aliments visant les enfants québécois. *Communication. Information médias théories pratiques, 24*(1), 65-85.
- Lee, N. R., & Kotler, P. (2011). *Social marketing: Influencing behaviors for good*: Thousand Oaks, CA: Sage.
- Leeman, J., Calancie, L., Kegler, M. C., Escoffery, C. T., Herrmann, A. K., Thatcher, E., . . . Fernandez, M. E. (2017). Developing theory to guide building practitioners' capacity to implement evidence-based interventions. *Health Education & Behavior, 44*(1), 59-69.
- Lefebvre, R. C. (2011). An integrative model for social marketing. *Journal of Social Marketing, 1*(1), 54-72.
- Leibowitz, J., Rosch, J., Ramirez, E., Brill, J., & Ohlhausen, M. (2012). A review of food marketing to children and adolescents: Follow-up report. *Washington (DC): US Federal Trade Commission*.
- Littlewood, J. A., Lourenço, S., Iversen, C. L., & Hansen, G. L. (2016). Menu labelling is effective in reducing energy ordered and consumed: a systematic review and meta-analysis of recent studies. *Public Health Nutrition, 19*(12), 2106-2121.
- Lo, B. K., Minaker, L., Chan, A. N., Hrgetic, J., & Mah, C. L. (2015). Adaptation and validation of a nutrition environment measures survey for university grab-and-go establishments. *Canadian Journal of Dietetic Practice and Research, 77*(1), 17-24.

- Lobstein, T., Baur, L., & Uauy, R. (2004). Obesity in children and young people: A crisis in public health. *Obesity Reviews*, 5(s1), 4-85.
- Lucarelli, J. F., Alaimo, K., Belansky, E. S., Mang, E., Miles, R., Kelleher, D. K., . . . Liu, H. (2015). Little association between wellness policies and school-reported nutrition practices. *Health Promotion Practice*, 16(2), 193-201.
- Lytle, L. A. (2009). Measuring the food environment: state of the science. *Am J Prev Med*, 36(4 Suppl), S134-144.
- Marcus, G. E. (1994). What comes (just) after “post”? The case of ethnography. *Handbook of Qualitative Research*, 563-574.
- Mareno, N. (2015). Parental perception of healthy eating and physical activity: Results from a preliminary Photovoice study. *Journal of Clinical Nursing*, 24(9-10), 1440-1443.
- Masters, C., Carlson, D. S., & Pfadt, E. (2006). Winging it through research: an innovative approach to a basic understanding of research methodology. *Journal of Emergency Nursing*, 32(5), 382-384.
- Maxwell, J., & Mittapalli, K. (2010). Realism as a stance for mixed methods research. *Handbook of mixed methods in social & behavioral research*, 145-168.
- Mayan, M. J. (2009). *Essentials of qualitative inquiry*. Walnut Creek, CA: Left Coast Press.
- McEvoy, P., & Richards, D. (2006). A critical realist rationale for using a combination of quantitative and qualitative methods. *Journal of Research in Nursing*, 11(1), 66-78.
- McHugh, M. L. (2012). Interrater reliability: The kappa statistic. *Biochemia Medica*, 22(3), 276-282.
- McNeal, J. (2007). *On becoming a consumer*. London: Routledge.

- Mehta, K., Coveney, J., Ward, P., & Handsley, E. (2014). Parents' and Children's Perceptions of the Ethics of Marketing Energy-Dense Nutrient-Poor Foods on the Internet: Implications for Policy to Restrict Children's Exposure. *Public Health Ethics*.
- Minaker, L. M., Raine, K. D., & Cash, S. B. (2009). Measuring the food service environment: Development and implementation of assessment tools. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, 421-425.
- Moore, G. F., Audrey, S., Barker, M., Bond, L., Bonell, C., Hardeman, W., . . . Wight, D. (2015). Process evaluation of complex interventions: Medical Research Council guidance. *BMJ*, 350.
- Morse, J. M. (2015). Critical analysis of strategies for determining rigor in qualitative inquiry. *Qualitative Health Research*, 25(9), 1212-1222.
- Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International Journal Of Qualitative Methods*, 1(2), 13-22.
- Morse, J. M., Niehaus, L., Wolfe, R. R., & Wilkins, S. (2006). The role of the theoretical drive in maintaining validity in mixed-method research. *Qualitative Research in Psychology*, 3(4), 279-291.
- Murray, C. (2014). *Examining the Nutritional Content of Prepackaged Foods and Beverages Marketed to Children in Canada*. (Master of Science), University of Toronto.
- Naylor, P. J., Bridgewater, L., Purcell, M., Ostry, A., & Wekken, S. V. (2010). Publically funded recreation facilities: Obesogenic environments for children and families? *International Journal of Environmental Research and Public Health*, 7(5), 2208-2221.

- Naylor, P. J., Wekken, S. V., Trill, D., & Kirbyson, A. (2010). Facilitating healthier food environments in public recreation facilities: Results of a pilot project in British Columbia, Canada. *Journal of Park & Recreation Administration, 28*(4), 37-58.
- Nelson, T. F., Stovitz, S. D., Thomas, M., Lavoie, N. M., Bauer, K. W., & Neumark-Sztainer, D. (2011). Do youth sports prevent pediatric obesity? A systematic review and commentary. *Current Sports Medicine Reports, 10*(6), 360-370.
- New Brunswick Department of Education. Department of Education; Fredericton (NB): 2008. Healthier eating and nutrition in public schools: A handbook for Policy 711
- Newman, N., & Oates, C. J. (2014). Parental mediation of food marketing communications aimed at children. *International Journal of Advertising, 33*(3), 579-598.
- Norman, J., Kelly, B., Boyland, E., & McMahon, A.-T. (2016). The impact of marketing and advertising on food behaviours: Evaluating the evidence for a causal relationship. *Current Nutrition Reports, 5*(3), 139-149.
- Nova Scotia Department of Education. (2006). Food and nutrition policy for Nova Scotia public schools: Policy directives and guidelines.
- Oakley, A., Strange, V., Bonell, C., Allen, E., & Stephenson, J. (2006). Process evaluation in randomised controlled trials of complex interventions. *BMJ, 332*(7538), 413-416.
- Oates, C., Newman, N., & Tziortzi, A. (2014). Parents' beliefs about, and attitudes towards, marketing to children. In *Advertising to Children* (pp. 115-136). Palgrave Macmillan, London.
- Office de la protection du consommateur. (2012). *Advertising Directed at Children under 13 Years of Age: Guide to the Application of Sections 248 and 249 Consumer Protection Act*. Quebec City, Quebec: Gouvernement du Quebec.

- Ogle, A. D., Graham, D. J., Lucas-Thompson, R. G., & Roberto, C. A. (2017). Influence of cartoon media characters on children's attention to and preference for food and beverage products. *Journal of the Academy of Nutrition and Dietetics, 117*(2), 265-270. e262.
- Ohri-Vachaspati, P., Isgor, Z., Rimkus, L., Powell, L. M., Barker, D. C., & Chaloupka, F. J. (2015). Child-Directed Marketing Inside and on the Exterior of Fast Food Restaurants. *American Journal of Preventive Medicine, 48*(1), 22-30.
- Olstad, D. L., & Raine, K. D. (2013). Profit versus public health: The need to improve the food environment in recreational facilities. *Canadian Journal of Public Health/Revue Canadienne De Sante Publique, 104*(2), e167-e169.
- Olstad, D. L., Downs, S. M., Raine, K. D., Berry, T. R., & McCargar, L. J. (2011). Improving children's nutrition environments: A survey of adoption and implementation of nutrition guidelines in recreational facilities. *BMC Public Health, 11*(1), 423.
- Olstad, D. L., Goonewardene, L. A., McCargar, L. J., & Raine, K. D. (2014). Choosing healthier foods in recreational sports settings: A mixed methods investigation of the impact of nudging and an economic incentive. *International Journal of Behavioral Nutrition and Physical Activity, 11*.
- Olstad, D. L., Goonewardene, L. A., McCargar, L. J., & Raine, K. D. (2015). If we offer it, will children buy it? Sales of healthy foods mirrored their availability in a community sport, commercial setting in Alberta, Canada. *Childhood Obesity, 11*(2), 156-164.
- Olstad, D. L., Lieffers, J. R., Raine, K. D., & McCargar, L. J. (2011). Implementing the Alberta nutrition guidelines for children and youth in a recreational facility. *Canadian journal of dietetic practice and research/Revue canadienne de la pratique et de la recherche en dietetique, 72*(4), 177.

- Olstad, D. L., Poirier, K., Naylor, P. J., Shearer, C., & Kirk, S. F. L. (2015). Policy outcomes of applying different nutrient profiling systems in recreational sports settings: The case for national harmonization in Canada. *Public Health Nutrition, 18*(12), 2251-2262.
- Olstad, D. L., Prowse, R.J.L, Raine, K.D., Tomlin, D., Kirk, S.F., McIsaac, J.D., . . . Naylor, P.J. (2018). *Eat, Play, Live: A randomized controlled trial of the impact of nutrition policy and capacity building on food environments in recreation and sport facilities* [unpublished].
- Olstad, D. L., Raine, K. D., & McCargar, L. J. (2012). Adopting and implementing nutrition guidelines in recreational facilities: Public and private sector roles. A multiple case study. *BMC Public Health, 12*.
- Olstad, D. L., Vermeer, J., McCargar, L. J., Prowse, R. J. L., & Raine, K. D. (2015). Using traffic light labels to improve food selection in recreation and sport facility eating environments. *Appetite, 91*, 329-335.
- Ontario Ministry of Education. Toronto (ON): [2010 Oct 4; cited 2017 Apr 11]. Policy/program memorandum No. 150: school food and beverage policy. Available from: <http://www.edu.gov.on.ca/extra/eng/ppm/150.html>.
- O'Reilly, N., & Horning, D. L. (2013). Leveraging sponsorship: The activation ratio. *Sport Management Review, 16*(4), 424-437.
- Palakshappa, D., Fiks, A. G., Faerber, J. A., & Feudtner, C. (2016). Association between state school nutrition laws and subsequent child obesity. *Preventive Medicine, 90*, 107-113.
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method



- implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533-544.
- Pallant, J. (2013). *SPSS survival manual*: McGraw-Hill Education (UK).
- Partington, S. N., Menzies, T. J., Colburn, T. A., Saelens, B. E., & Glanz, K. (2015). Reduced-item food audits based on the nutrition environment measures surveys. *American Journal of Preventive Medicine*, 49(4), e23-e33.
- Peloza, J., Ye, C., & Montford, W. J. (2015). When companies do good, are their products good for you? How corporate social responsibility creates a health halo. *Journal of Public Policy & Marketing*, 34(1), 19-31.
- Penney, T. L., Almiron-Roig, E., Shearer, C., McIsaac, J.-L., & Kirk, S. F. (2014). Modifying the food environment for childhood obesity prevention: Challenges and opportunities. *Proceedings of the Nutrition Society*, 73(2), 226-236.
- Peres-Neto, P. R. (1999). How many statistical tests are too many? The problem of conducting multiple ecological inferences revisited. *Marine Ecology Progress Series*, 176, 303-306.
- Perreault Jr, W. D., McCarthy, E. J., & Cannon, J. P. (2006). *Basic marketing: A marketing strategy planning approach*. McGraw-Hill/Irwin.
- Petermans, A., Kent, A., & Van Cleempoel, K. (2014). Photo-elicitation: Using photographs to read retail interiors through consumers' eyes. *Journal of Business Research*, 67(11), 2243-2249.
- Pettigrew, S., Rosenberg, M., Ferguson, R., Houghton, S., & Wood, L. (2013). Game on: Do children absorb sports sponsorship messages? *Public Health Nutrition*, 16(12), 2197-2204.

- Pluye, P., & Hong, Q. N. (2014). Combining the power of stories and the power of numbers: mixed methods research and mixed studies reviews. *Public Health, 35*(1), 29.
- Potvin Kent, M., & Wanless, A. (2014). The influence of the Children's Food and Beverage Advertising Initiative: Change in children's exposure to food advertising on television in Canada between 2006-2009. *International Journal of Obesity, 38*(4), 558-562.
- Potvin Kent, M., Dubois, L., & Wanless, A. (2011a). Food marketing on children's television in two different policy environments. *International Journal of Pediatric Obesity, 6*(2Part2), e433-e441.
- Potvin Kent, M., Dubois, L., & Wanless, A. (2011b). Self-regulation by industry of food marketing is having little impact during children's preferred television. *International Journal of Pediatric Obesity, 6*(5-6), 401-408.
- Potvin Kent, M., Dubois, L., & Wanless, A. (2012). A nutritional comparison of foods and beverages marketed to children in two advertising policy environments. *Obesity, 20*(9), 1829-1837.
- Potvin Kent, M., Dubois, L., Kent, E., & Wanless, A. (2013). Internet marketing directed at children on food and restaurant websites in two policy environments. *Obesity, 21*(4), 800-807.
- Potvin Kent, M., Martin, C. L., & Kent, E. A. (2014). Changes in the volume, power and nutritional quality of foods marketed to children on television in Canada. *Obesity, 22*(9), 2053-2060.
- Prowse, R. (2017). Food marketing to children in Canada: a settings-based scoping review on exposure, power and impact. *Health Promotion & Chronic Disease Prevention in Canada: Research, Policy & Practice, 37*(9).

- Prowse, R. J., Naylor, P.J., Olstad, D. L., Carson, V., Mâsse, L. C., Storey, K., . . . Raine, K. D. (2018). Reliability and validity of a novel tool to comprehensively assess food and beverage marketing in recreational sport settings. *International Journal of Behavioral Nutrition and Physical Activity*, 15(38).
- Prowse, R. J., Naylor, P.J., Olstad, D. L., Carson, V., Storey, K., Mâsse, L. C., . . . Raine, K. D. (2018). Food marketing in recreational sport settings in Canada: a cross-sectional audit in different policy environments using the Food and beverage Marketing Assessment Tool for Settings (FoodMATS). *International Journal of Behavioral Nutrition and Physical Activity*, 15(1), 39.
- Public Health Agency of Canada. (2011). Overview: Curbing childhood obesity. A federal, provincial and territorial framework for action to promote healthy weights.
- Raine, K. D., Lobstein, T., Landon, J., Kent, M. P., Pellerin, S., Caulfield, T., . . . Spence, J. C. (2013). Restricting marketing to children: Consensus on policy interventions to address obesity. *Journal of Public Health Policy*, 34(2), 239-253.
- Randall Conrad and Associates, & Roma, M. (2006). ARPA's infrastructure committee: Operations Survey Summary Report. Retrieved from Edmonton, AB:  
<http://s3.arpaonline.ca/docs/IU-Infra-Comm-Operations-Survey.pdf>
- Randall Conrad and Associates, & Roma, M. (2006). ARPA's infrastructure committee: Operations Survey Summary Report. Retrieved from Edmonton, AB:  
<http://s3.arpaonline.ca/docs/IU-Infra-Comm-Operations-Survey.pdf>
- Reinecke, J., & Ansari, S. (2016). Taming wicked problems: The role of framing in the construction of corporate social responsibility. *Journal of Management Studies*, 53(3), 299-329.

- Riazi, A. M., & Candlin, C. N. (2014). Mixed-methods research in language teaching and learning: Opportunities, issues and challenges. *Language Teaching*, 47(02), 135-173.
- Ritson, M., & Elliott, R. (1999). The social uses of advertising: an ethnographic study of adolescent advertising audiences. *Journal of Consumer Research*, 26(3), 260-277.
- Roberts, K. C., Shields, M., de Groh, M., Aziz, A., & Gilbert, J.-A. (2012). Overweight and obesity in children and adolescents: Results from the 2009 to 2011 Canadian Health Measures Survey. *Health Reports*, 23(3), 37-41.
- Robinson, K., Elliott, S. J., Driedger, S. M., Eyles, J., O'loughlin, J., Riley, B., . . . Harvey, D. (2004). Using linking systems to build capacity and enhance dissemination in heart health promotion: a Canadian multiple-case study. *Health Education Research*, 20(5), 499-513.
- Rowe, W. J., Moore, M. E., & Zemanek Jr, J. E. Three-tiered sponsorship: a study of decision heuristics across multiple levels of sport sponsorship. *Innovative Marketing*, 9(2).
- Sadeghirad, B., Duhaney, T., Motaghipisheh, S., Campbell, N., & Johnston, B. (2016). Influence of unhealthy food and beverage marketing on children's dietary intake and preference: A systematic review and meta-analysis of randomized trials. *Obesity Reviews*, 17(10), 945-959.
- Saelens, B. E., Glanz, K., Sallis, J. F., & Frank, L. D. (2007). Nutrition Environment Measures Study in restaurants (NEMS-R): Development and evaluation. *American Journal of Preventive Medicine*, 32(4), 273-281.
- Saldaña, J. (2015). *The coding manual for qualitative researchers*: Thousand Oaks, CA: Sage.
- Schensul, S. L., Schensul, J. J., & LeCompte, M. D. (1999). *Essential ethnographic methods: Observations, interviews, and questionnaires* (Vol. 2). Walnut Creek, CA: Rowman Altamira.

- Scholtes, V. A., Terwee, C. B., & Poolman, R. W. (2011). What makes a measurement instrument valid and reliable? *Injury, 42*(3), 236-240.
- Schwartz, M. B., Lund, A. E., Grow, H. M., McDonnell, E., Probart, C., Samuelson, A., & Lytle, L. (2009). A comprehensive coding system to measure the quality of school wellness policies. *Journal of the American Dietetic Association, 109*(7), 1256-1262.
- Sharma, S., & Chapman, G. (2011). Food, photographs, and frames: Photo elicitation in a Canadian qualitative food study. *The Journal of Canadian Food Cultures, 3*(1).
- Signal, L., Stanley, J., Smith, M., Barr, M., Chambers, T., Zhou, J., J. Zhou, A. Duane, C. Gurrin, A. F. Smeaton, C. McKerchar, A. L. Pearson, J. Hoek, G. L. S. Jenkin, & McKerchar, C. (2017). Children's everyday exposure to food marketing: An objective analysis using wearable cameras. *International Journal of Behavioral Nutrition and Physical Activity, 14*(1), 137.
- Sinclair, S. E., Cooper, M., & Mansfield, E. D. (2014). The influence of menu labeling on calories selected or consumed: a systematic review and meta-analysis. *Journal of the Academy of Nutrition and Dietetics, 114*(9), 1375-1388.
- Singh, A. S., Mulder, C., Twisk, J. W., Van Mechelen, W., & Chinapaw, M. J. (2008). Tracking of childhood overweight into adulthood: A systematic review of the literature. *Obesity Reviews, 9*(5), 474-488.
- Smit, E. G., Boerman, S. C., & van Meurs, L. (2015). The power of direct context as revealed by eye tracking. *Journal of Advertising Research, 55*(2), 216-227.
- Smith, M., Jenkin, G., Signal, L., & McLean, R. (2014). Consuming calories and creating cavities: beverages NZ children associate with sport. *Appetite, 81*, 209-217.

- Smith, M., Signal, L., Edwards, R., & Hoek, J. (2017). Children's and parents' opinions on the sport-related food environment: a systematic review. *Obesity Reviews*, *18*(9), 1018-1039.
- Statistics Canada. (2004). Table 3. Percentage of calories, fat, protein and carbohydrates from “other foods,” by selected characteristics, household population aged 4 or older, Canada excluding territories, 2004. In *Canadian Community Health Survey, Nutrition (2004)*. Government of Canada,
- Statistics Canada. (2011, July 12). General Social Survey - 2010 Overview of the Time Use of Canadians: Highlights. Retrieved from <http://www.statcan.gc.ca/pub/89-647-x/2011001/hl-fs-eng.htm>
- Statistics Canada. (2015a). Live births, by sex and geography. In CANSIM Table102-4512 (Ed.): Canadian Vital Statistics, Government of Canada.
- Statistics Canada. (2015b). Population by sex and age group. In CANSIM Table051-0001 (Ed.): Canadian Vital Statistics, Government of Canada.
- Statistics Canada. *Table 13-10-0797-01 Measured children and youth body mass index (BMI) (Cole classification), by age group and sex, Canada and provinces, Canadian Community Health Survey - Nutrition.*
- Story, M., Nannery, M. S., & Schwartz, M. B. (2009). Schools and obesity prevention: creating school environments and policies to promote healthy eating and physical activity. *Milbank Quarterly*, *87*(1), 71-100.
- Streiner, D. L., Norman, G. R., & Cairney, J. (2015). *Health Measurement Scales: A Practical Guide To Their Development and Use*: Oxford University Press, USA.
- Tabachnick, B., & Fidell, LS. (2013). *Using Multivariate Statistics*. Upper Saddle River, NJ: Pearson Education, Inc.

- Taylor, H., Canning, W. F., Brailsford, P., & Rokosz, F. (2003). Financial issues in campus recreation. *New Directions for Student Services, 103*, 73-86.
- Taylor, P., & Gratton, C. (2002). *The economics of sport and recreation: An economic analysis*. New York, NY: Routledge.
- Thomas, H. M., & Irwin, J. D. (2010). Food Choices in Recreation Facilities: Operators' and Patrons' Perspectives. *Canadian Journal of Dietetic Practice and Research, 71*(4), 180-185.
- Thomas, M., Nelson, T. F., Harwood, E., & Neumark-Sztainer, D. (2012). Exploring parent perceptions of the food environment in youth sport. *Journal of Nutrition Education and Behavior, 44*(4), 365-371.
- Ustjanauskas, A., Eckman, B., Harris, J., Goren, A., Schwartz, M., & Brownell, K. (2010). Focus Groups with Parents: What do they think about food marketing to their kids. *Rudd Center for Food Policy and Obesity. New Haven, CT*.
- Van Kleef, E., Shimizu, M., & Wansink, B. (2011). Food compensation: Do exercise ads change food intake? *International Journal of Behavioral Nutrition and Physical Activity, 8*(6), 661-664.
- Velazquez, C. E., Black, J. L., & Ahmadi, N. (2015). Food and beverage promotions in Vancouver schools: A study of the prevalence and characteristics of in-school advertising, messaging, and signage. *Preventive Medicine Reports, 2*, 757-764.
- Venkatraman, M., & Nelson, T. (2008). From servicescape to consumptionscape: A photo-elicitation study of Starbucks in the New China. *Journal of International Business Studies, 39*(6), 1010-1026.

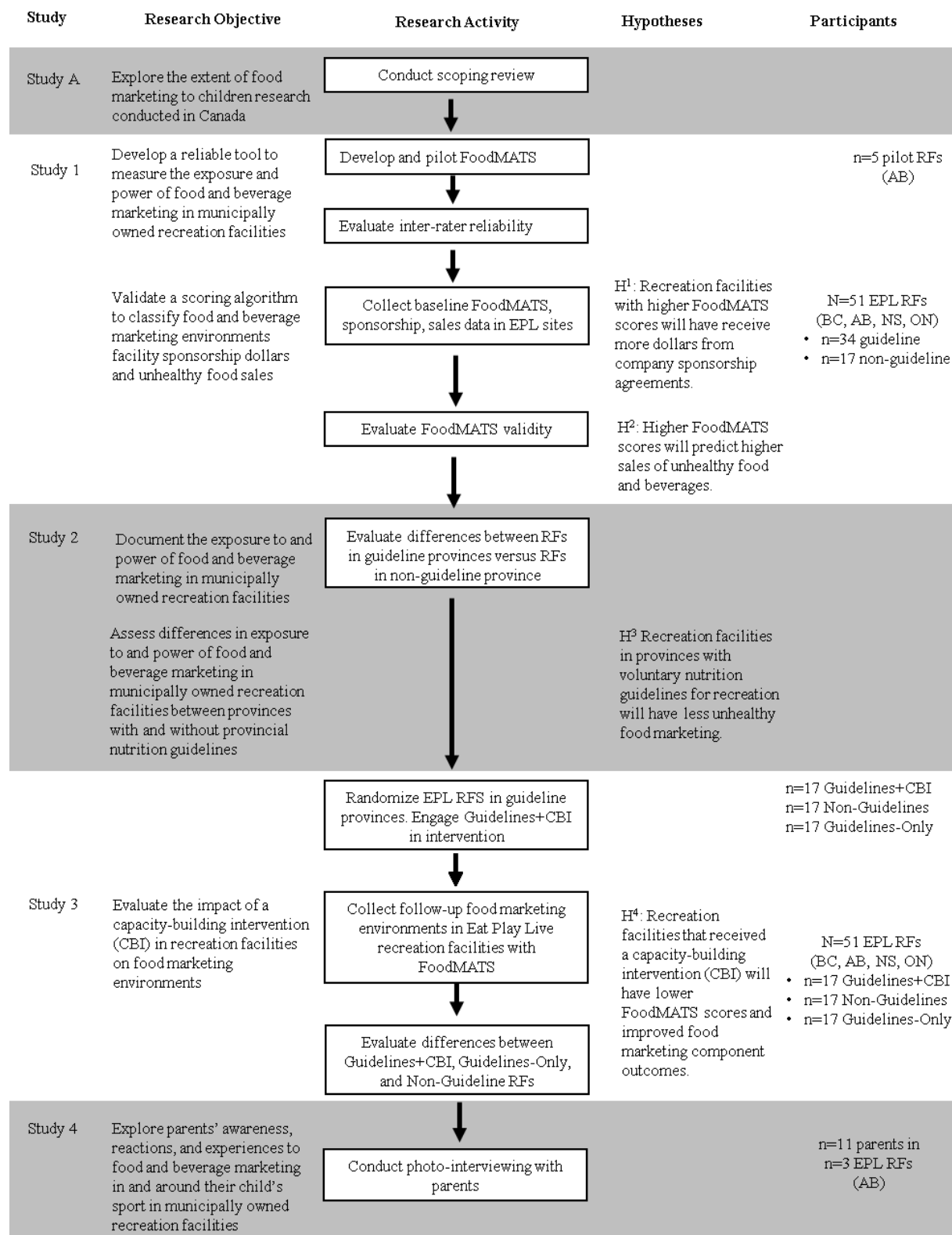
- Warren, S. (2005). Photography and voice in critical qualitative management research. *Accounting, Auditing & Accountability Journal*, 18(6), 861-882.
- Watson, W. L., Brunner, R., Wellard, L., & Hughes, C. (2016). Sponsorship of junior sport development programs in Australia. *Australian and New Zealand Journal of Public Health*, 40(4), 326-328.
- Watson, W., Sims, K., Syrett, C., Chapman, K., & Martin, J. (2010). The parents jury—An advocacy program to reduce obesogenic environments. *Obesity Research & Clinical Practice*, 4, S58.
- Whitelaw, S., Baxendale, A., Bryce, C., MacHardy, L., Young, I., & Witney, E. (2001). ‘Settings’ based health promotion: A review. *Health Promotion International*, 16(4), 339-353.
- Wolfenden, L., Kingsland, M., Rowland, B. C., Dodds, P., Gillham, K., Yoong, S. L., . . . Wiggers, J. (2015). Improving availability, promotion and purchase of fruit and vegetable and non sugar-sweetened drink products at community sporting clubs: A randomised trial. *International Journal of Behavioral Nutrition and Physical Activity*, 12(1), 35.
- Wood, M. (2008). Applying commercial marketing theory to social marketing: A tale of 4Ps (and a B). *Social Marketing Quarterly*, 14(1), 76-85.
- World Health Assembly. (2010). Agenda item 11.9: Marketing of food and non-alcoholic beverages to children. Retrieved from [http://apps.who.int/gb/ebwha/pdf\\_files/WHA63/A63\\_R14-en.pdf](http://apps.who.int/gb/ebwha/pdf_files/WHA63/A63_R14-en.pdf).
- World Health Organization. (1986). *The Ottawa Charter for Health Promotion: First international conference on health promotion, Ottawa, 21 November 1986*.



- World Health Organization. (2010). Set of recommendations on the marketing of foods and non-alcoholic beverages to children.
- World Health Organization. (2012). A framework for implementing the set of recommendations on the marketing of foods and non-alcoholic beverages to children.
- World Health Organization. (2013). Marketing of foods high in fat, salt and sugar to children: update 2012-2013. *Copenhagen, Denmark: WHO Regional Office for Europe.*
- World Health Organization. (2016a). Consideration of the evidence on childhood obesity for the Commission on Ending Childhood Obesity: report of the ad hoc working group on science and evidence for ending childhood obesity, Geneva, Switzerland. Retrieved from [http://apps.who.int/iris/bitstream/10665/206549/1/9789241565332\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/206549/1/9789241565332_eng.pdf)
- World Health Organization. (2016b). *Report of the commission on ending childhood obesity:* World Health Organization.
- World Health Organization. (2017). Agenda item 15.5: Report of the Commission on Ending Childhood Obesity: implementation plan. Retrieved from [http://apps.who.int/gb/ebwha/pdf\\_files/WHA70/A70\(19\)-en.pdf?ua=1](http://apps.who.int/gb/ebwha/pdf_files/WHA70/A70(19)-en.pdf?ua=1).
- Ye, C., Cronin, J. J., & Peloza, J. (2015). The role of corporate social responsibility in consumer evaluation of nutrition information disclosure by retail restaurants. *Journal of Business Ethics, 130*(2), 313-326.
- Zachariadis, M., Scott, S., & Barrett, M. (2013). Methodological implications of critical realism for mixed-methods research. *MIS Quarterly, 37*(3), 855-879.

## **Appendix A**

Appendix A provides an overview of methods of all studies and details on methods that were not included in the chapter manuscripts. Figure 7 describes the process of research activities and identifies relevant research objectives, hypotheses, and participants. The Eat Play Live (EPL) study design, procedures, and capacity-building intervention is reviewed first. Data collection methods and data analyses procedures (including nutrient analysis and statistical analyses) of the quantitative studies (S1-3) are reviewed next. Researcher positioning, study design, procedures, rigor, and limitations are reviewed for the qualitative study (S4). Finally, the inference processes of critical realism are described.



**Figure 7 Study flow chart**

### *Eat Play Live (EPL) Study*

This research is embedded in a larger research study called Eat Play Live (EPL). EPL was a natural experiment studying food environments in public recreation facilities in Canada. This study evaluated the impact of voluntary provincial nutrition guidelines on food availability, sales, marketing, and facility capacity to support healthy eating, and policy development in three provinces with nutrition guidelines compared to one province without nutrition guidelines. In the three guideline provinces, there was an additional randomized control trial component: facilities located in provinces with provincial nutrition guidelines were randomly assigned to an intervention group to receive 18 months of capacity building (CBI) to improve their food environments or to a control group to receive no capacity building.

This dissertation includes pilot data collected for EPL to assess the inter-rater reliability of the new marketing audit tool (objective #1); and baseline FoodMATS data to assess the validity of the FoodMATS scoring algorithm (objective #2), the state of food and beverage marketing in publicly owned and operated recreation facilities (objective #3), and differences in the food and beverage marketing between facilities located in provinces with and without provincial nutrition guidelines for recreation facilities (objective #4). Both baseline and follow-up FoodMATS data collected for EPL was used to assess the impact of the CBI on food marketing environments (objective #5). Qualitative data was collected in a subset of EPL facilities in Alberta to assess parents' perceptions of food and beverage marketing in and around their children's sports (objective #6).

### *Setting & Participants*

Public recreation facilities in three provinces with existing provincial nutrition guidelines for recreation facilities (British Columbia, Alberta, and Nova Scotia) and one province without

provincial nutrition guidelines (Ontario) were included in this study. To be eligible to participate in a guideline province, facilities must: (1) provide food services through vending or concession, (2) have not made major changes to their food environment since 2010, (3) be able to make changes to their food environment, and (4) have year round sport programming to be eligible. Facilities in Ontario, which were the comparison facilities for the intervention and control sites in the guideline provinces, were eligible if they did not plan to make any changes to their food or beverage services during the 18-month CBI period (rather than being willing and able to make changes).

### *Recruitment*

Facilities were recruited by invitation letters sent through provincial recreation associations or other sport and recreation partners through organizational websites, electronic newsletters, and direct e-mail. Eligible facilities (n=286) within 150 kilometers of the host university in each province were followed up by a telephone call. A radius of 150 kilometers was chosen as it was deemed to be drivable within a day's work of the host institution. Some exceptions were made for interested and eligible facilities that fell beyond 150km of the host university if recruitment of facilities was difficult in that province. For example, in Alberta, two participating sites were from another urban centre approximately 300 kilometers of the host institution.

Approximately half of facilities (n=145) returned phone calls/emails, but only 75 of these were eligible to participate. Of the eligible facilities that returned calls/emails, 49 facilities agreed to participate (65%). Of the remaining eligible facilities, 15 declined to participate citing insufficient staff capacity (n=11), uninterested in research (n=2), risk of being a control site (n=1), worried about competition (n=1). Eleven facilities declined to participate without

providing a reason. Possible reasons for recruitment difficulty may be related to the small size of the eligible population, low willingness to engage in a long intensive project, and perceived or actual inability of facilities to make changes to their food environment. A previous study was attempted in Alberta, but had to be cancelled due to low enrollment of participating facilities (Olstad & Raine, 2013).

The 49 recreation facilities made up 51 separate facilities (two facilities operated two buildings each that were geographically separated) (See Table 20). For the purposes of this dissertation we treated each building as an individual site rather than combining the sites since a patron would usually only visit one site at a time.

Each participating facility completed a facility agreement form, giving consent to the researchers to collect data in their site(s).

**Table 20 Sample Size of Recreation Facilities per Province**

Province	Voluntary Provincial Nutrition Guidelines?	Number of Total Participating Recreation Facilities	Number of Total Participating Recreation Facility Measurement Sites	Number of Guidelines+CBI sites
British Columbia	Yes	14	16	8
Alberta	Yes	11	11	6
Ontario	No	17	17	0
Nova Scotia	Yes	7	7	4
Total		49	51	18

Guidelines+CBI = recreation facilities in provinces with nutrition guidelines randomly assigned to receive the capacity-building intervention

### *Study Timeline*

The Eat Play Live project recruited participants between September 2015 and April 2016. As facilities were recruited, baseline data collection was conducted between November 2015 and May 2016 and follow-up data collection was conducted between August 2017 and December 2017.

### *Randomization*

After all baseline visits were completed in a province, a third party randomized facilities in guideline provinces to an intervention (Guidelines+CBI, n=16 facilities which is equivalent to 18 sites) or guideline-only (Guidelines-Only, n=16 equivalent to 16 sites) group. All Non-Guideline facilities were automatically assigned to a Non-Guideline comparison group (n=17). Once randomization for that province was completed, facilities were notified by email of their interventions status. Once randomized, the 18 month CBI was initiated. Over this time, the Guidelines-Only and Non-Guideline facilities were asked to refrain from making any changes to their food environment.

Note: After the completion of the CBI, all participating facilities (Guidelines+CBI and Guidelines-Only) in Alberta were invited to participate in a qualitative study about parent's awareness, reactions, and experiences of food and beverage marketing in and around their child's sport (objective #6) (See Methods of S4)

### *Capacity-building intervention (CBI)*

The CBI began with a training session for all Guidelines+CBI facilities in each guideline province with their respective provincial project coordinator. At this in-person or online session, facilities received an evaluation report on baseline data collection for food provision in concessions and vending machines, food marketing throughout the facility, and facility capacity, policies and programs to support healthy eating. Guidelines+CBI facilities were educated on the food environment framework for recreation facilities (Naylor, Bridgewater, et al., 2010) and provided ideas for change and resources to support change. Guidelines+CBI facilities then self-identified priority areas for change and developed goals to achieve over the 18 month intervention period. The provincial project coordinators followed up with all Guidelines+CBI

facilities by phone or email monthly, or more frequently based on the needs of the site. Four regional teleconferences were held per guideline province with Guidelines+CBI facilities where they shared their goals, progress, challenges, and successes with each other at month 3, 6, 12, and 15. Additional support in terms of human resources, knowledge, training, and resources were available to Guidelines+CBI facilities through the government nutrition and parks and recreation departments. All Guidelines+CBI facilities also received \$1000 CAD to support their intervention plans at their discretion. In AB, I (RP) led the CBI in assigned recreation facilities meaning I provided training, ongoing support, organized regional teleconferences, and facilitated connection with Alberta Health Services public health dietitians locally based in each community of the Guidelines+CBI facilities. In BC, a practitioner from British Columbia Recreation and Parks Association led the CBI with help from BC provincial study coordinator. In NS, the provincial study coordinator led the intervention.

The CBI is based on a linking system that connects knowledge users to researchers through an intermediary (Robinson et al., 2004). In this case, a provincial coordinator engaged with the research team to lead data collection and analysis in their provinces and lead the Guidelines+CBI facilities through their intervention. The provincial coordinator was reactive to the needs of the Guidelines+CBI facilities and the arising needs of the researchers. The provincial coordinator ended up providing different types of support to the Guidelines+CBI facilities based on their goals and needs. A tailored approach to capacity-building to inform the implementation of evidence-based interventions is necessary when the context in which change agents are acting vary (Leeman et al., 2017). However, using tailored approaches makes standardization of the CBI impossible and lead to significant differences in the degree of engagement in the CBI between facilities and across provinces. Process data was collected to



help understand this variation, which has yet to be analyzed. The analysis of process data is beyond the scope of this dissertation.

It must be noted that the CBI was based on a model for food environments in municipal recreation facilities (Naylor, Bridgewater, et al., 2010) and did not explicitly include food marketing. However, the intervention sites could elect to work on food marketing.

### ***Food Marketing Assessment Tool for Settings (FoodMATS)***

The FoodMATS was developed specifically for EPL. Several iterative periods of drafting, testing, and revision were undertaken to create an instrument that was informed by evidence and theory, comprehensive, and easy to use. After initial development and testing, the tool was shared with a group of food environment research experts as part of the EPL study who provided feedback on its content and design.

Two conceptual models from population health (World Health Organization, 2012) and business (Perreault et al., 2006) informed the content and scoring of the FoodMATS. The WHO's *Exposure and Power of Marketing Messages* model (see adapted Figure 8 in Data Collection Procedures) (World Health Organization, 2012) explains that impact of food and beverage marketing to children on food preferences, purchases, and consumption depends on the exposure and power of marketing messages, where exposure is "the reach and frequency of the marketing message", and power is "the creative content, design and execution of the marketing message" (p.11). This model is one monitoring framework for food marketing to children (Kelly et al., 2013) and thus it makes sense for it to inform the information to be collected on the FoodMATS. This model also informed the development of a scoring scheme which aimed to differentiate between less healthy and healthier food marketing environments, where less healthy

food marketing environments would have higher exposure and higher power (resulting in a higher FoodMATS score).

Secondly, the *4Ps Marketing Mix* (product, price, promotion, placement) (Perreault Jr et al., 2006) was used to identify the marketing approaches to be assessed by the FoodMATS. The *4Ps* is a marketing model used by commercial and social marketers to create effective comprehensive marketing strategies to persuade individuals to think or behave in a certain way (Lee & Kotler, 2011). Marketing mixes are often based on a strategic combination of four components (or 4Ps): Product, Price, Place, and Promotion (Perreault Jr et al., 2006) thus it was important to use in order to ensure that a broad range of approaches marketers may use across areas of the recreation facility to market foods or beverages.

The FoodMATS was designed to capture overall exposure to food marketing in recreation facilities, what food products, brands, and retailers were marketed, where food marketing was placed, and whether persuasive (powerful) marketing techniques were used. We created operational definitions of exposure, and power components to inform FoodMATS indicators which were presented in Chapter 3 so will not be reviewed here. By using both models to inform the content and scoring of the FoodMATS we are more confident that it will collect practical and policy-relevant information and can be used to easily monitor change in food marketing in settings over time.

See Appendix B for a copy of the FoodMATS tool.

### *Scoring*

The exposure and power of food marketing recorded were used to derive a FoodMATS score for each site. Points were assigned for the number of food marketing instances observed and evidence of "powerful" characteristics (healthfulness, child-targeted, sports-related, and

physical size) ranked as present/absent or on a 3 point scale based on evidence-based a priori definitions (see Appendix C). For each area, a FoodMATS score was calculated by multiplying the “power” points and the “frequency” points, and then adding the result to the “frequency” points:

$$\text{FoodMATS}_{\text{Area}} = \text{FREQ} + (\text{EXP} * \text{POW})$$

If there was more than one sports area or food area within one facility, each area was scored individually. For the entire facility, a total FoodMATS Score was calculated by summing all area scores and adding a repetition factor:

$$\text{Total FoodMATS}_{\text{Facility}} = \text{FoodMATS}_{\text{Sports}} + \text{FoodMATS}_{\text{Food}} + \text{FoodMATS}_{\text{Other}} + \text{REP}$$

Microsoft Excel 2010 was used to calculate marketing scores. The components of the scoring scheme can be found in Appendix C, which explain how area scores were developed. Scores can range from zero to infinity, depending on the intensity and type of food marketing. Lower scores represent more favourable food marketing environments. Higher scores represent settings with greater exposure and more powerful food marketing.

#### *Practicality of the FoodMATS*

The FoodMATS tool measures food marketing in four areas: (1) outdoors, (2) entrance, hallways, bathrooms, (3) concessions, and (4) sports. Therefore, the time to complete the FoodMATS tool depends on the size of the facility. In a small single sport facility (i.e. 1-2 hockey rink arena) with one vending machine and one concession, the FoodMATS may take an estimated 30-60 minutes to complete. In a large multi-sport facility with multiple vending machines and one or more, it is possible that the FoodMATS could take more than two hours to complete. Since we completed the FoodMATS alongside other food environment audits of the vending machines and the concessions, we can only approximate how long it takes to complete.

After filling out the forms, there is additional time needed in order to verify the data with photos taken, electronically enter the data, check the data, classify the healthfulness of products, brands, and retailers marketed, and generate FoodMATS scores. In its current form, requires sufficient training to understand how to fill out the form with what information to ensure accuracy, although the rater may not need previous research skills or nutrition knowledge if they are well trained (meaning a community member or recreation facility employee could complete it). The data entry, cleaning, checking, healthfulness assessment, and scoring may require stronger technical skills and knowledge of research and nutrition. Community members could be supported by universities or other organizations with the capacity to do the latter activities. In the future, an online application could be developed that would ease the entry, classification, and scoring through an automatic process.

### *Limitations*

The FoodMATS tool is limited by its observational audit design as it captures mainly permanent (or semi-permanent) food marketing. It may not capture the extent of food marketing, namely sponsorship that might include free food, coupons, giveaways, jersey or equipment branding, online, fundraising, or special events. This may underestimate the exposure to food marketing, as well as the power because these missing types may be types of marketing that which consumers may actively (versus passively) engage with.

The exclusion of children's eye level from the definition of child-targeted food marketing may also underestimate the power of food marketing occasions. As we found in Chapter 6, parents reflected often on children's requests being impacted by the products and signs at their eye-level or that they could see clearly.

Another limitation is related to its scoring algorithm. Although the scores were theory-driven and validated with unhealthy food and beverage sales, since this is the first study to develop food marketing scores (and that the scores were developed in recreation facilities with unhealthy food marketing and availability dominating), we were unable to identify a specific ideal score which hinder interpretation of the score until more research is done with the FoodMATS.

Finally, our definition of exposure does not take into account the number of visitors, children or adults, to the recreation facility, the length of time they spend at the facility, the areas in the facility visited, nor the actual viewing of recorded food marketing occasions. Thus, our measure of exposure assumes equal exposure to all food marketing occasions (adjusted by persuasive features present in each) across all areas. This is a crude assessment of exposure, but can be used to calculate population exposures in the future if visitor information is captured as well.

### ***Data Collection Procedures***

The data for this dissertation includes baseline and follow-up data collected with the FoodMATS, and baseline patron purchasing data in all participating facilities. We also collected data at baseline on sponsorship and advertising dollars from a subset of facilities in Alberta and British Columbia to use in validating the marketing scoring scheme. Multiple outcomes were used across the three quantitative studies associated with EPL. Refer to Table 21 at the end of this section for a summary of all outcomes and measurement tools used in EPL and clarification on what data was used in this dissertation.

### *Pilot Testing*

The FoodMATS was assessed for inter-rater reliability with data collected during pilot testing to determine consistency between raters (Kelly et al., 2013). Prior to piloting the tool, training was provided for all raters by RP via written instructions and an in-person or teleconference meeting. Two independent raters (an EPL provincial coordinator and a research assistant) completed the FoodMATS at the same facility on the same occasion. As per the instructions for the tool, each food or beverage marketing occasion was photographed which allowed assessments between raters to be easily compared. Five urban public recreation facilities (four in Alberta, one in British Columbia) that offered food through vending machines and/or concessions were selected for pilot testing and reliability testing. The pilot facilities were selected based on size, sport offering, and proximity to the universities of the raters, in order to investigate the applicability and use of the FoodMATS in different types of recreation and sport settings. All data was provided to RP with photos for review. The FoodMATS was assessed for inter-rater reliability with data collected during pilot testing to determine consistency between raters (Kelly et al., 2013).

### *Baseline EPL*

An EPL provincial coordinator and a research assistant conducted observational audits at 51 measurement sites. Food and beverage marketing was documented using the FoodMATS in all 51 sites. (All other observational audits for EPL were also collected at this time; see Table 21.) Food and beverage marketing was recorded in sports areas, food service areas, and other indoor and outdoor general areas (entrance, hallways, parking lot). Specialty areas (i.e. theatres, day cares, meeting rooms, etc.) were not audited. Each marketing occasions was recorded on the FoodMATS and photographed. RP checked all FoodMATS audits and photos to ensure

consistency. Any discrepancies were solved through consensus with the original rater and a third investigator if necessary.

We used unhealthy food and beverage sales to test construct validity of FoodMATS scores (Figure 8). Two weeks of food and beverage sales data was requested from all vending and concession operators from all 51 sites that did not include an unusual day (e.g. tournament or site closure) and that included the audit date. Thirty-four concessions (70.8%) provided concession sales for 2 weeks. Four concessions with poorly itemized sales data which inhibited classification of products sold by healthfulness were excluded, resulting in 30 sites as the final sample size for concession sales. Thirty-seven sites (75.5%) provided vending sales data. Data from 14 sites were excluded (seven had poorly itemized sales data which inhibited classification of products sold by health; seven did not provide complete sales data for snacks and beverage machines). The final sample size for vending sales data was 23 sites. Twenty-one sites (41.2%) had complete sales for vending and the concession.

We also had requested 12 months of food and beverage sales data from concessions and vending from a sub-group of facilities (n=11) in AB but we were unable to obtain complete facility sales data from any site. Thus, we only included the two week sales data period and were unable to conduct sensitivity analysis on the sales data to assess the impact of sales seasonality on the results.

The nutritional quality of products purchased was classified as per respective provincial nutrition guidelines (see Nutrient Analysis – Patron Purchasing) to determine the number of weekly dollars received from “Least Healthy” foods and beverages. Unfortunately, the food and beverage sales data received was challenging to work with as all food service providers used different sales tracking methods (with many sites having more than one set of sales data as they

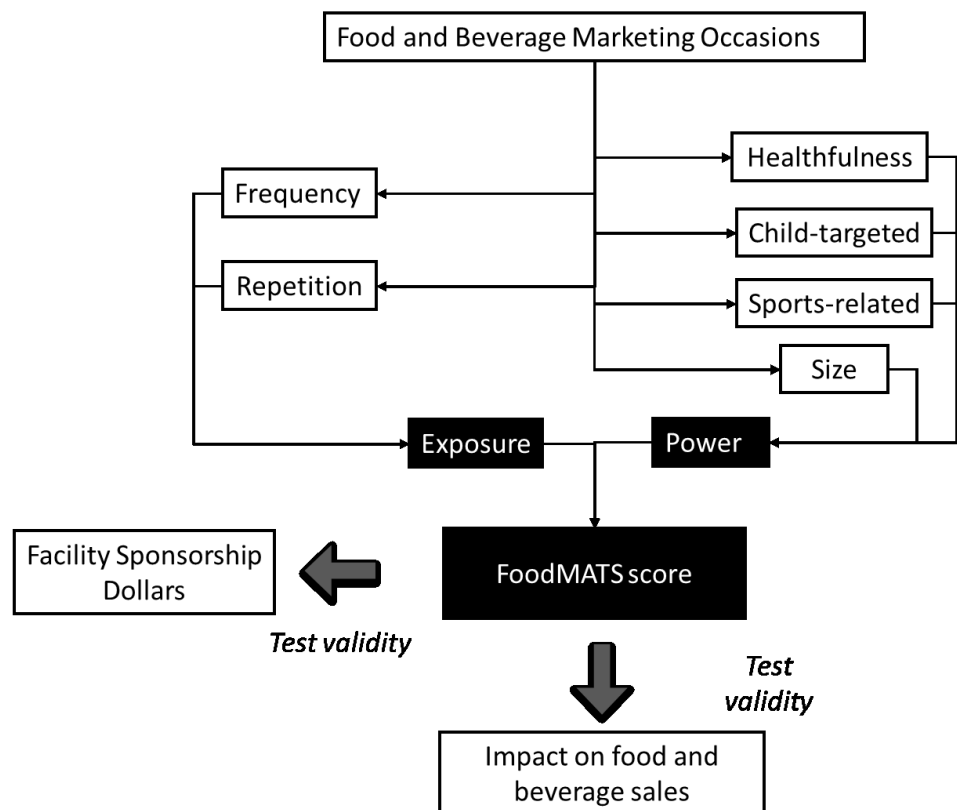
had more than one food service provider). It was not always possible to identify the items in the sales data even after cross-referencing it with our audit information, requiring excluding some items and following multiple assumptions to make the data usable (see Appendix E).

Furthermore, although we requested two weeks of data we were provided with various lengths of sales reports depending on what made sense for the facility. The stark differences in data completeness and quality between sites challenges any conclusions made comparing one site to another. This data may be more appropriate to evaluate changes in food sales within a facility. Finally, it would have been preferable to obtain sales data for much longer than two weeks due to the seasonality of food sales data.

Another way we assessed construct validity of the FoodMATS score was with facility sponsorship dollars (Figure 8). We defined sponsorship dollars as dollars outside companies paid to support facility operations and/or to advertise in and around a facility. Food-related sponsorship dollars were dollars provided by food retailers. Total and food-related dollars facilities received during the 2015-2016 fiscal year for funding or advertising were requested from a subset of 27 sites in two guideline provinces (BC, AB). All provinces were invited to request the same from their participating EPL sites, but ON and NS declined due to resource limitations. Sixteen facilities (64.0%) provided the total sponsorship dollars received annually. Eighteen facilities (72.0%) provided food-related sponsorship dollars received annually. Expenditures for food marketing has been used previously to assess the extent of marketing in the United States (Leibowitz et al., 2012). Sport sponsorship is usually combined with other marketing strategies, such as on-site ads, signs, and displays (O'Reilly & Horning, 2013), thus we hypothesized that higher FoodMATS scores would be correlated with higher food-related sponsorship dollars.



We assumed that the sponsorship and advertising dollars received in the fiscal year when our baseline data was collected would align with the visual presentation of sponsorship and advertising in the facility. However, anecdotally we know that some sponsor products remain in a facility long after the sponsorship agreement has ended so the dollars received in that year may not have converged as well as we anticipated. We also do not know the nature of the sponsorship agreements in terms of whether they are philanthropic driven (i.e. providing dollars to the facility without much advertising) or advertising driven (i.e. providing dollars to the facility to display their name). Furthermore, there are several limitations with using expenditures to measure food marketing, including that some marketing channels or techniques can be very inexpensive but be far reaching (Leibowitz et al., 2012) which may impact the degree to which the FoodMATS and sponsorship dollars are related.



**Figure 8** Logic model of FoodMATS scoring and validation analyses adapted from the World Health Organization (2012)

*Follow-up EPL*

All measurements from baseline (with the exception of the food sponsorship and advertising dollars) were repeated in all 51 sites at follow-up. Due to permanent or temporary closing of concessions and sports areas, all areas in all sites could not be reassessed at follow-up. As a result, some sites were excluded from select analyses. Overall, five sites were excluded due to incomplete FoodMATS [missing food area audit (n=4), missing sports area (n=1)]. FoodMATS changes in food areas could not be assessed in 14 sites due to missing food area audits (n=5) and lack of a concession to audit at baseline and/or follow-up (n=9). Three sites were excluded from analyses of FoodMATS changes in sports areas due to missing sports area audit (n=1), error in baseline sports area audit (n=1), and a lack of a sports area to audit at baseline and/or follow-up (n=1).

All food and beverage marketing occasions recorded at baseline were checked at follow-up to improve accuracy in assessing change between baseline and follow-up. All new food marketing occasions were recorded. Pictures were taken to compare baseline and follow-up and to use for verification purposes for data checking and entry.

**Table 21 Eat Play Live Outcome Constructs and Measurement Tools**

<b>Construct</b>	<b>Measurement Tool</b>	<b>Outcome*</b>	<b>Timing of Collection</b>	<b>Source of Data</b>	<b>Data used for dissertation</b>
Food Environment Quality – Food Marketing	Food and Beverage Marketing Assessment for Settings (Prowse, Naylor, Olstad, Carson, Mâsse, et al., 2018)	Exposure outcomes (frequency, repetition); Power outcomes (healthfulness, child-targeted, sports-related, size); FoodMATS scores by area and total site	T1, T2	All EPL sites	All
Food Environment Quality – Concession (overall)	Adapted reduced Nutrition Environment Measures Survey for Restaurants (Partington, Menzies, Colburn, Saelens, & Glanz, 2015)	Numerical score representing the healthfulness of food services establishments based on food availability and marketing	T1, T2	All EPL sites	Reference only to assess healthfulness of products marketed; and to identify “in house” marketing
Food Environment Quality – Concessions (packaged food)	Packaged Food Audit	Proportion of packaged foods and beverages available in concession classified by provincial nutrition guideline categories	T1, T2	All EPL sites	Reference only to identify products placed at checkout for FoodMATS section 4c; and to identify “in house” marketing
Food Environment Quality – Vending	Vending Audit (Naylor, Bridgewater, et al., 2010)	Proportion of foods and beverages available in a random selection of vending machines classified by provincial nutrition guideline categories	T1, T2	All EPL sites	Reference only to identify “in house” marketing
Facility Capacity	Online survey self-assessment (Naylor, Bridgewater, et al., 2010)	Numerical score representing existing ability of facility to offer healthy food and support healthy eating initiatives	T1, T2	All EPL sites	None
Facility Nutrition Policy	Policy Assessment	Numerical score representing the presence and strength of current nutrition-based policies	T1, T2	All EPL sites	None
Food and beverage Sales – Vending Machines	Itemized sales report provided by food operator	Weekly dollars of “Least Healthy” food and beverages sold in vending machines on site	T1, T2	All EPL sites	T1 only
Food and beverage Sales – Concessions	Itemized sales report provided by food operator	Weekly dollars of “Least Healthy” food and beverages sold in concessions on site	T1, T2	All EPL sites	T1 only
Facility Sponsorship Dollars - Total	Self-reported	Dollars facility received from outside companies to support facility operations and/or to advertise in and around a facility.	T1	BC and AB EPL sites	All
Facility Sponsorship Dollars - Food	Self-reported	Dollars facility received from food retailer companies to support facility operations and/or to advertise in and around a facility.	T1	BC and AB EPL sites	All

## ***Data Analysis Procedures***

### *Nutrient Analysis*

#### Marketing

The healthfulness of promoted items recorded on the FoodMATS was assessed differed by whether the item was a product, brand, food retailer, or other.

#### Products

A harmonized classification scheme to rate the healthfulness of foods and beverages was created by combining common elements from the BC, AB and NS provincial classification schemes. Across all provinces, foods and beverages are categorized into one of three ordinal categories according to their ingredient and nutrient content. Consistent across all provincial classification schemes is a major distinction between the categories according to the fat, sugar, and sodium content of foods and beverages. Each classification scheme has specific nutrient cut-offs per portion or reference sizes which, although similar, are not consistent across the provinces for all products in all categories (Olstad et al., 2015). Since nutrient analysis of all menu items was not feasible in this study, we could not assess foods and beverages listed on patron purchasing reports using the provincial classification schemes' exact nutrient criteria.

Thus, we developed a harmonized classification scheme by applying high level recommendations from the provincial classification schemes (e.g. choose whole grain products, choose products with low levels of fat, sugar, salt, avoid artificial sweeteners, etc.). We classified foods and beverages as “Most Healthy”, “Less Healthy”, or “Least Healthy” which paralleled ordinal provincial nutrition guideline categories:

- “Most Healthy” products represented unprocessed foods and beverages with no added fat, sugar or salt

- “Less Healthy” products represented foods and beverages with some added fat, sugar, or salt
- “Least Healthy” items were processed energy-dense, nutrient-poor items with high levels of fat, sugar, or salt.

In some cases, the provincial classification schemes clearly placed product types into a single category. For other products where products were placed in different categories between the provincial guidelines, we compared the provincial classifications against one another and used the majority ranking of the three provinces for the harmonized classification of that product. For example, unsweetened dried fruit is classified as most healthy in BC (Sell Most) and AB (Choose Most Often), and less healthy in NS (Moderate), thus the harmonized classification of unsweetened dried fruit was “Most Healthy”. Face validity of the classification system was determined by review among registered dietitians and the EPL investigative team.

Given that product and nutrient information was not available for many products marketed in recreation facilities and that it not logistically feasible to collect and analyze nutrient content of products, several simplifying assumptions were required for the purposes of classifying items as more or less healthy (e.g. all grains were assumed to be white unless otherwise indicated, milk was assumed to be 0-2% milk fat and unsweetened unless otherwise indicated) (see Appendix D). While these assumptions eased classification, they may have biased evaluations of change between baseline (T1) and follow-up (T2) towards the null as we applied the assumptions consistently across the board at T1 and T2 unless it was made explicitly clear that a product had changed. We anticipate that this approach may have underestimated changes in product nutrient content and believe that since EPL is a healthy food intervention, it may

disproportionately affect interpretations of changes that occurred to improve nutritional content of foods and beverages than the opposite.

One registered dietitian (RP) independently classified every food and beverage product recorded in the FoodMATS. A second registered dietitian (KR) checked the classifications. If needed, the Canadian Nutrient File (<https://food-nutrition.canada.ca/cnf-fce/index-eng.jsp>) or product company websites was used to obtain more information about foods and beverages to help classify.

### Brands

When a brand was recorded on the FoodMATS (e.g. Coca-Cola, Powerade, Dasani), we used the ranking of the product believe it most closely represented (e.g. Coca-Cola is most known for sugar-sweetened beverages and Dasani is most known for plain unsweetened water). This is consistent with recommendations from the WHO (2012) recommendations to consider what food product is the “dominant feature of the marketing communication” when restricting marketing of food brands (p.28).

### Retailers

When a food retailer was recorded on the FoodMATS, (i.e. Boston Pizza, Tim Horton’s) its healthfulness was assessed according to rankings of healthfulness of food retailers by Minaker et al. (2009): food retailer types were assigned a rank of 1-8 based on their relative availability of healthy food and preparation methods (see Table 22). We separated the ranked retailers into three ordinal categories: “Most Healthy”, “Less Healthy”, and “Least Healthy”. When retailers that were not evaluated by Minaker et al. (2009) were recorded, we classified the retailers into the three categories as per their most prominent food (e.g. taco, ice cream).

**Table 22 Ranking of Food Retailers Healthfulness**

Type of Food Outlet	Ranking by Minaker et al. (2009)	Healthfulness Rank for FoodMATS
Sandwich outlet	1	“Most Healthy”
Smoothies outlet	2	
Grocery stores	-	
Farmer’s markets	-	
Salad bars	-	
Sit-down restaurant	3	“Less Healthy”
Cafeteria	4	
Coffee outlet	5	
Prepared Food Grocery (e.g. M&M meat shops)	-	
Supplement Stores	-	
Pizza place	6	“Least Healthy”
Asian outlet	7	
Burger outlet	8	
Taco outlet	-	
Ice cream outlet	-	
Fried chicken outlet	-	
Alcohol outlet	-	

“-“ = not ranked by Minaker et al (2009), identified in baseline marketing data

#### Other

Other food-related promotions that did not fit into product, brand, or retailer category, such as general nutrition education, or promotion of agriculture, were classified as “other” and were always ranked as “Most Healthy”.

#### Classification of Food Marketing by “in house” or “off-site”

We also assessed post hoc whether food marketing was related to the types of foods available for customers to purchase (as opposed to any alternative such as the food marketing was related to sponsorship or funding provided to the site by an outside organization) by identifying “in house” products, brands, and retailers. Products and brands were considered “in house” if they were sold in vending machines or concessions within the site the marketing was found, referring the Vending Audit, Concession Audit, and Packaged Food Audit to identify which products were available at the recreation facility. Food retailers were considered “in

house” if they sold food or beverages within the site. Names of concessions recorded in the FoodMATS were used to determine if the marketed food retailer was onsite. All non-“in house” food marketing were classified as “off-site” food marketing

The classification was completed by a trained graduate research assistant and checked by RP. Classifying food marketing occasions according to whether the product can be purchased at the facility (or the food retailer could be visited within the facility) may be important to understand how food marketing is influenced across different operational areas in the facility. Different interventions may be required for onsite or offsite products, brands, retailers. For example, if most marketing is for foods and beverages available onsite then food service operators may be the target of interventions. On the other hand, if there is marketing from outside retailers or for products/brands not sold within the facility, then an intervention may need to target management or financial departments that contract out advertising space.

### *Food and Beverage Sales*

#### Concession Sales

Foods and beverages recorded on concession sales data were classified with the same harmonized classification scheme for products described above. Two registered dietitians independently classified every food and beverage listed on the concession data; any disagreements were solved by a third dietitian. Raters identified the food type and assessed whether the product should rank as “Most Healthy”, “Less Healthy”, “Least Healthy” (Appendix E). Raters used the Canadian Nutrient File (<https://food-nutrition.canada.ca/cnf-fce/index-eng.jsp>) or product company websites to obtain more information about foods and beverages to help classify.



There were 4 sites that housed more than one concession. To be consistent with other experimental measures of EPL where only one concession is randomly targeted to track intervention impacts, we randomly selected one concession from each site with more than one concession using the random sequence generator on random.org and only included the sales data from the selected concession in the analysis.

Out of 1626 concession product sales lines, 42 (2.58%) were excluded because the nature of the item sold was unclear (e.g. “lunch special”) and 26 (1.60%) were excluded because the product line listed items from two or more healthfulness categories of which one would only have been purchased (e.g. “soft drinks and juice”). Product lines of items with no nutritional value (e.g. tea, coffee, gum, throat lozenges) and supplements were also excluded (n=228, 14.0%).

Inter-rater reliability was calculated between a random sample 130 food and beverage sales lines (approximately 10%) that were ranked by both raters (i.e. not excluded due to clarity, mixed content, or non-nutritive items). Results showed very good agreement between raters with  $\kappa=0.84$  ( $p<0.001$ ) as interpreted by Altman (1991).

### Vending Sales

Unlike foods and beverages sold in concessions, products sold in vending machines typically have nutrient facts and ingredient lists. Detailed product nutrient information was obtained for items in vending machines from a public database, Brand Name Food List (<https://bnfl.healthlinkbc.ca/>). Provincial nutrition guidelines from each site’s respective province were used to classify products with the exception of vending machines in the non-guideline province. Products in vending machines from the non-guideline province were classified according to British Columbia’s provincial nutrition guidelines since the Brand Name

Food List automatically classify products by those guidelines. Foods and beverages classified as “Do Not Sell” in British Columbia and Ontario, ”Choose Least Often” in Alberta, and “Minimum” in Nova Scotia represented “Least Healthy” vending sales.

In cases where quantities sold were provided rather than dollars, we calculated the dollars sold from each product using prices provided by the vendor or recorded on the vending audit forms. Out of 1107 vending product sales lines, 91 lines (8.2%) were excluded due to missing product information (n=20; 1.8%), mixed products (e.g. from more than one category of healthfulness) in one line (n=6; 0.5%), missing price information (n=62; 5.6%). Three lines with non-food products were excluded (0.3%).

#### Total Sales

Total “Least Healthy” sales equaled the sum of “Least Healthy” sales from concession and vending. We adjusted all concession, vending, and total sales to represent one week of sales per site.

#### *Statistical Analysis*

The following provides the details of statistical analysis procedures used to achieve our objectives. Please refer back to Figure 7 for the research objectives and hypotheses. All data was entered into Microsoft Excel 2013 for cleaning and checking. Statistical Package for the Social Sciences Version 23 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis, with  $p < 0.05$  indicating statistical significance.

#### Inter-rater Reliability Testing

Inter-rater reliability of the FoodMATS was tested using pilot data. Inter-rater reliability was tested as the degree of agreement between the pilot tests by two raters per site. The features of the FoodMATS that were tested for agreement include identifying:

- a) the presence food or beverage marketing for each indicator in the FoodMATS,
- b) the product/brand/retailer identified in the marketing occasion,
- c) whether the marketing occasion was child-directed,
- d) whether the marketing occasion was sports-related,
- e) the size of the marketing occasion, and
- f) the count of marketing occasions identified for each area.

Agreement between the two raters for each site was assessed based on whether raters agreed food marketing was present or absent per item and the count of marketing occasions per area (food, sport, other). We elected to assess interrater reliability this way as these were the factors that would impact the FoodMATS score for facility areas and total areas. Therefore, we wanted to ensure that there was good consistency between raters on these items which we assume would translate to consistency in FoodMATS scores.

Percent agreement (McHugh, 2012) was calculated by determining the proportion of instances of perfect agreement out of all possible instances between the two raters. Cohen's kappa ( $\kappa$ ) was used to determine agreement between raters on categorical data (unweighted  $\kappa$  for nominal data; weighted  $\kappa$  for ordinal data) which considers the role of chance in rater agreement (Scholtes et al., 2011). The data met the assumptions for this statistical test: nominal or ordinal data, paired data, equal number of categories, independent data, and fixed raters. The comparison of rater 1 to rater 2 was run individually for each item a to e. The interpretation of Cohen's kappa was as follows: 0.0-0.2 fair, 0.21-0.40 poor; 0.41-0.60 moderate; 0.61-0.80 good; 0.81-1.00 very good (Altman, 1991).

Intraclass correlations was used to determine consistency between raters for continuous data (item f) between the two raters (Landers, 2015; Scholtes et al., 2011). Two out of three required

assumptions were met to complete intraclass correlations: interval data, and equal variances (Levene's Test for Equality of Variances revealed a p-value of 0.706 which fails to reject the null hypothesis that the variances in Rater 1 and Rater 2 are equal). The third assumption, normality, was not met: histograms revealed that the number of promotions per section was positively skewed. Further, Shapiro-Wilk test of normality, appropriate for small sample sizes (Ghasemi & Zahediasl, 2012), gave significant p-values at  $p=0.001$ . Thus, the null hypothesis that the number of promotions per section is normally distributed is rejected. To improve normality, we completed a square root transformation of the data. Once transformed, the histogram was less skewed and the Shapiro-Wilk tests of normality were insignificant ( $p>0.05$ ). Two-way random intra-class correlations were completed on the transformed data. Two-way random model was selected because there were fixed raters and we used a sample of raters (Landers, 2015). The value of the average measures of the intraclass correlation were used as this is more useful for understanding the inter-rater reliability overall rather than the reliability of a single rater (Landers, 2015). The intraclass correlation was interpreted as follows:  $<0.40$  poor;  $0.40-0.59$  fair;  $0.60-0.74$  good;  $0.75-1.00$  excellent (Cicchetti, 1994). The intraclass correlation for using the measure with one rater was reported which indicates whether the FoodMATS tool can be reliably used by one rater.

### Validity Testing

Because there are no existing tools to assess food marketing in sport settings, there is not a gold standard to compare it to in order to assess criterion validity (Streiner, Norman, & Cairney, 2015). Construct validity was tested as the FoodMATS is a new tool generating new constructs (FoodMATS scores and outcomes). Construct validity is the "degree to which the scores of the measurement instrument are consistent with hypotheses based on the assumption

that the measurement instrument validly measures the construct to be measured” (Scholtes et al., 2011, p. 239). The FoodMATS scores were tested for validity to determine whether the scores generated from the observational assessment are consistent with the theoretical underpinning *Exposure and Power of Marketing Messages* model (World Health Organization, 2012) of which it is expected to represent. Specifically, it is important to assess whether the FoodMATS is able to rank marketing environments on a continuum of a health-related feature (Lytle, 2009). It should be noted that construct validity is not established by conducting a single study (Streiner et al., 2015); it requires an ongoing process of generating and testing new hypotheses (Streiner et al., 2015). Using FoodMATS data collected at baseline, this is the first study to explore the construct validity of a settings-based food marketing score.

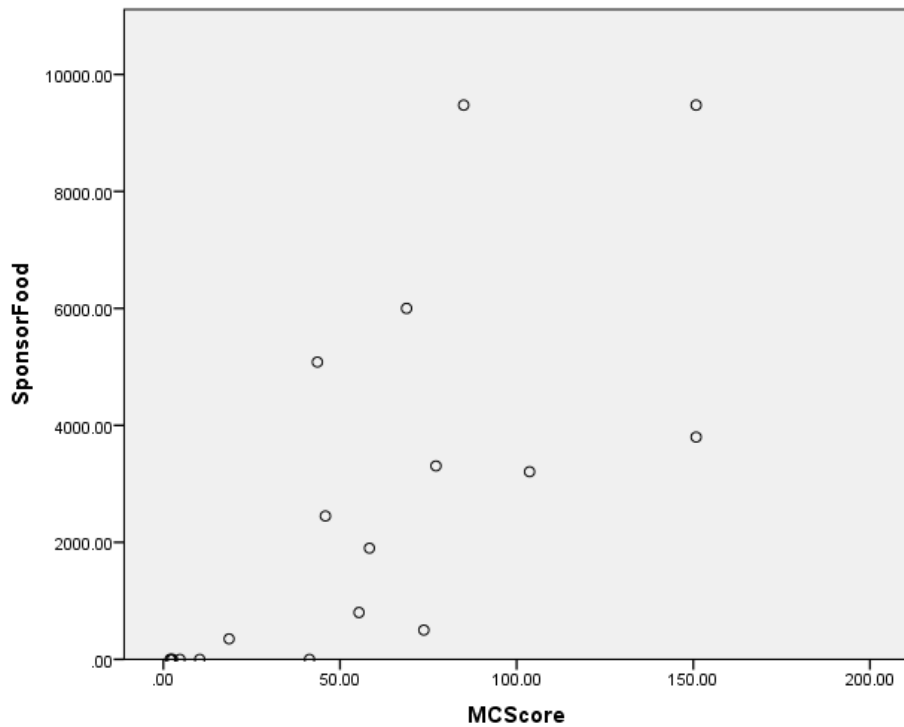
#### *Validating with Sponsorship Dollars*

Validity was first tested by simple correlations between FoodMATS scores and sponsorship dollars using Pearson’s Product Moment correlations. Scatter plots were used to test whether the relationships between FoodMATS scores and total sponsorship dollars and food sponsorship dollars were linearly related. The relationship between FoodMATS scores and total sponsorship dollars were not linearly related (Figure 9), but the relationship between FoodMATS and food sponsorship dollars was linearly related (Figure 10). Other assumptions were met to complete Pearson’s correlations between FoodMATS and food-related sponsorship dollars including continuous data, paired data, and homoscedasticity. The assumption of normality was not met: histograms revealed that FoodMATS scores and food-related sponsorship dollars were positively skewed and the Shapiro-Wilk test of normality gave significant p-values at  $p < 0.001$ . To improve normality, FoodMATS scores and food-related sponsorship dollars were transformed by taking the square root of the data which resulted in a normal distribution for

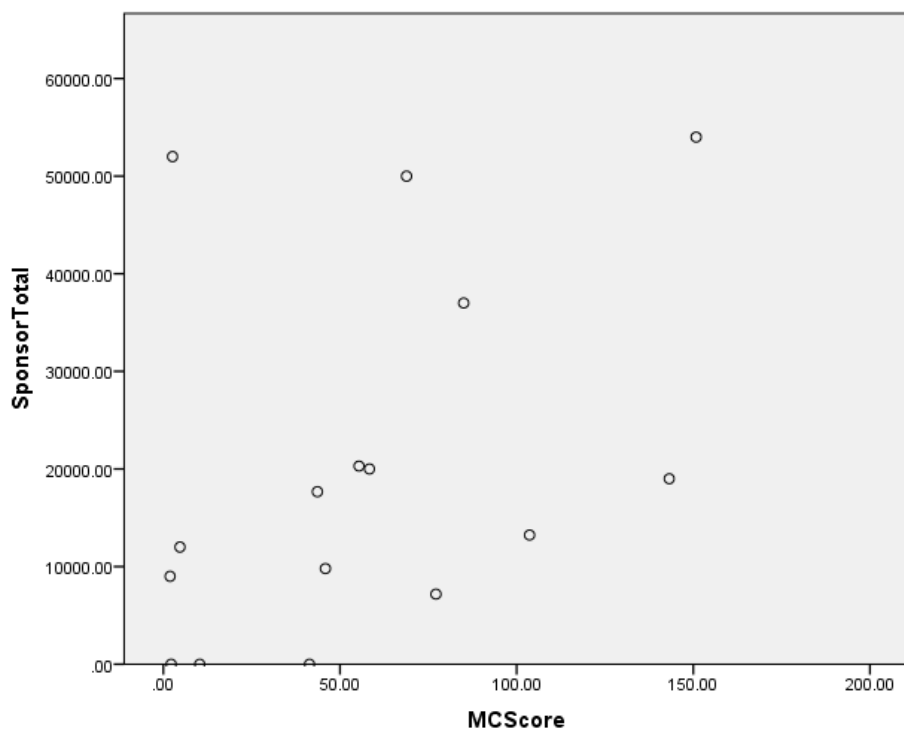
FoodMATS (Shapiro-Wilk  $p=0.161$ ), and improved normality for food-related sponsorship dollars (Shapiro-Wilk  $p=0.033$ ).

One outlier was truncated for FoodMATS score and food sponsorship dollars to the next value+1 below 3sd (Carson & Kuzik, 2017) as it affected the linear relationship between FoodMATS scores and site size covariates [non-significant correlations between FoodMATS and number of sports areas with raw data ( $r=0.199$ ,  $p=0.179$ ), but significant correlations between FoodMATS and number of sports areas ( $r=0.401$ ,  $p=0.005$ ) with truncated outlier; the relationship between FoodMATS scores and number of concessions did not change substantially after outlier truncation ( $r=0.836$ ,  $p<0.001$  versus  $r=0.723$ ,  $p<0.001$ )].

Since the normality assumption for food-related sponsorship dollars may not be met, both Pearson's Product Moment correlations and Spearman's correlations were ran without controlling for facility size. We also ran Pearson's correlation controlling for site size after the results demonstrated that Pearson's and Spearman's did not differ greatly.



**Figure 9 Scatterplot of FoodMATS scores compared to annual dollars received by facilities from food-related organizations for sponsorship or advertising.**



**Figure 10 Scatterplot of FoodMATS scores compared to total annual dollars received by facilities for sponsorship or advertising from food and non-food related organizations with truncated outlier.**

Validating with sales of less “healthful” food and beverage items

Validity of the FoodMATS scores was tested by stepwise multiple linear regression between FoodMATS scores and sales of “Least Healthy” food and beverage from vending machines and concessions. According to the *Exposure and Power of Marketing Messages* model, marketing is expected to impact eating behaviours (World Health Organization, 2012). Thus, it is hypothesized that FoodMATS scores will be associated with greater purchases of “Least Healthy” products.

Assumptions that x values are measured without error, y values are independent, and x and y values are linearly related were met. The data were not normally distributed for any sales outcomes (concession, vending, or total sales). We square root transformed the “Least Healthy” concession, vending, and total data sets to improve normal distribution of the residuals. Other transformations were attempted, but square root transformations most improved normality.

Since FoodMATS scores and number of concessions were highly correlated ( $r > 0.7$ ) and the number of concessions was not predictive of “Least Healthy” sales in the concession ( $r = 0.224$ ,  $p = 0.097$ ), we excluded number of concessions as a predictor of FoodMATS scores (Tabachnick & Fidell, 2013). For the stepwise multiple linear regression, we defined facility size as the number of sports areas. The number of sports areas was the only proxy available to represent how large a facility was, however, this may not be the best controlling variable. When considering the influence of facility size on food sales, a better measure would have been the foot traffic or number of visitors to recreation facilities as this is more likely to be tied to food sale dollars. Unfortunately, this type of data was not available, partly because many users are monthly or annual pass holders meaning that their visits are not necessarily captured in admission data. Furthermore, community members can visit public recreation facilities. It would



be difficult to track visitors who come to the facility but do not participate in an organized activity at the facility.

A relative outcome (e.g. proportion of Least Healthy sales; ratio of Least Healthy sales to Most Healthy sales; ratio of vegetable and fruit sales to unhealthy snacks; ration of water sales to sugar-sweetened beverage sales) might be a more appropriate as this would negate the need to control for facility size. Unfortunately, this was not possible to do as there were too few sites at baseline that offered and sold healthier options. There was very little variation in the proportion of sales that were Least Healthy across sites. There were too few sites that sold both healthy and unhealthy to be able to do any relative analyses.

We ran stepwise multiple linear regression for facility size as Model 1 and facility size plus FoodMATS scores for Model 2 on concession, vending, and total sales for “Least Healthy” sales. We used independent t-tests to assess if there were differences in mean FoodMATS scores between sites that provided sponsorship and sales data and those that were missing the data.

#### Evaluating Impact of Voluntary Provincial Nutrition Guidelines

Features of food and beverage marketing that contribute to the FoodMATS score (Appendix C) were explored overall, by facility area (food, sport, other), and by intervention type (guideline versus non-guideline) using descriptive statistics. Due to outliers, median and interquartile ranges were used to explore the frequency and repetition of marketing, and FoodMATS scores. The prevalence of powerful features (healthfulness, child-targeted, sports-related, size) was explored using proportions. Crosstabs were used to assess whether promotions that used child-targeted and sports-related marketing techniques differed by healthfulness.

Differences between guideline and non-guideline provinces were assessed using Pearson’s Chi<sup>2</sup> tests of homogeneity. Ordinal variables were collapsed into dichotomous groups

to improve stability. Healthfulness was grouped into “Most Healthy”/”Less Healthy” versus “Least Healthy” as the latter are recommended to be restricted or not available in recreation facilities (Alberta Health and Wellness, 2010; Government of Nova Scotia, 2015; British Columbia Ministry of Health, 2014) . Size was grouped into small/medium versus large. Effect sizes are reported as Phi coefficients interpreted as 0.1 for small effects, 0.3 for medium effects, and 0.5 for large effects (Cohen, 1977).

Some assumptions required for linear regression were met including a linear relationship between independent and dependent variables, that dependent variables are measured without error (assumed), and that independent variable values are independent. Unfortunately, assumptions of equal variances and normality of residuals were not met. All outcomes (frequency, repetition, or FoodMATS) violated the equal variance assumption as evidence by Levene’s test for equality of variances  $p$ -values $<0.05$ . Non-normality that was not improved by transformation nor outlier truncation. Therefore, Mann-Whitney U tests were used to test differences between guideline types for continuous variables.

Post hoc power analyses with G\*Power (v3.1) revealed that our sample size would have 73% chance of detecting a large effect ( $D=0.80$ ,  $t=2.01$ ,  $\alpha = 0.05$ ) when using Mann-Whitney tests to comparing mean ranks between two groups, and assuming two-tailed normal distribution with  $\alpha=0.05$ ; but would be insufficient to detect medium ( $D=0.50$ ,  $\alpha =0.36$ ) or small ( $D=0.2$ ,  $\alpha =0.099$ ) effect sizes.

#### Evaluating impact of capacity-building intervention

We intended to use General Linear Model ANOVA Repeated Measures to assess within and between group differences, however due to unequal variances and covariances, and unequal  $n$  in groups these tests were no longer appropriate. We tested to see if randomly removing sites to

create equally sized groups as recommended by Tabachnick & Fidell (2013) improved the data meeting the assumptions, but this did not fix the unequal variance issue. We also assessed the appropriateness of using a Linear Mixed Model but assumptions for normality of residuals and homogeneity were not met with raw or transformed data.

In the end, we used Wilcoxon Signed Rank Tests to test changes in FoodMATS score and outcomes within groups (T1 vs T2). Kruskal-Wallis Tests were used to test changes in FoodMATS score and outcomes between groups (Guidelines+CBI versus Guidelines-Only versus Non-Guidelines) with Mann-Whitney U post hoc tests. Kruskal-Wallis with post-hoc Mann-Whitney U tests were also used to test if there were significant differences between treatment groups at T1 which helps confirm whether randomization was successful in creating balanced treatment groups. Running multiple non-parametric tests rather than a few statistical models increases the risk of Type I error where significant results are found by chance, thus, the results of the statistical analyses for this study must be interpreted with caution (Peres-Neto, 1999).

Post hoc power analyses with G\*Power (v3.1) revealed that our sample size has an 80% change of detecting a large effect ( $D=0.80$ ,  $t=2.15$ ,  $\alpha = 0.05$ ) when using Wilcoxon signed rank test for matched pairs (assuming a two-tailed distribution with  $\alpha=0.05$ ), but would be insufficient to detect a medium ( $D=0.5$ ,  $\beta=0.42$ ) or small change ( $D=0.2$ ;  $\beta=0.11$ ). Our sample size is underpowered when using Mann-Whitney tests to comparing mean ranks between two groups, and assuming two-tailed normal distribution with  $\alpha=0.05$  with only a 54% chance of detecting a large effect ( $D=0.80$ ,  $t=2.05$ ,  $\alpha = 0.05$ ).

## ***Methods of S4***

### *Researcher Positioning*

In qualitative research, the researcher is the tool (Masters, Carlson, & Pfadt, 2006), thus it is important to explicitly state the researcher's positioning to understand underlying worldviews, potential sources of biases, and personal values. I situate my worldview within critical realism where reality is understood to be stratified: there are levels of realities which include what we can (and cannot) observe or experience with hidden underlying mechanisms producing realities (Danermark et al., 2002). Critical realism takes the stance that there is a reality that exists regardless of our knowledge or experience of it, and our knowledge of reality (what we know to be true) is always grounded in our knowledge, experiences, beliefs, and context (Danermark et al., 2002).

As a registered dietitian, I, RP, come to this project with a keen interest in understanding environmental influences on diet. I focus on environmental influences as I believe individuals are challenged to engage in healthy eating behaviours by socially, environmentally, and politically determined factors. These broad contexts are shared by individuals in a population and thus I believe by understanding and improving these factors, we can have a greater impact on the diets, and ultimately, health of populations.

I have extensive understanding of the food marketing environment in the participating facilities as I led data collection and intervention in the EPL project; however this knowledge is structured by evidence, and theories and frameworks from commercial marketing, psychology, and population health. Nevertheless, I am an outsider in this project in the sense that I am not a parent, and I do not experience the food marketing environment in recreation facilities on a regular basis (or at all). I have had experiences with sport and food as a life-long recreational

athlete being rewarded with treats after a soccer game and tempted by popsicles at the local pool from a young age. I am now an aunt to nieces and nephews who play food-company-sponsored sports and who sometimes tell me they enjoy the halftime snack more than the activity. For the sake of the health of the children in my life, I seek to understand the spaces they spend time in and yearn for them to be health promoting. I do not believe many children's environments (or general spaces where children spend time) are health promoting, seeing excessive access to unhealthy foods at the corner store, zoo, farmers market, beach, and community centre, to name a few, coupled with never-ending requests for treats. I worry about the weight of children pestering on their parents' ability to feed their child a healthy diet - parents have so many other things to worry about, why wouldn't they give in?

In line with critical realism, I believe that there is an objective reality of food marketing environment that exists regardless of whether it is consciously acknowledged by parents. I also believe that parents' experiences of food marketing is a crucial point of knowledge that can highlight the subjective, but perhaps somewhat socially consistent, nature of parents' and children's world. The food marketing world as understood and experienced by parents is as relevant a truth as the objective measures even if objective and perceived truths differ.

### *Study design*

We conducted a focused ethnography with parents of children who regularly participate in organized sport or activity at a municipal recreation facility. Guided by a specific research question (Mayan, 2009), this focused ethnography used reflexive photo interviewing to understand the culture of food and beverage marketing surrounding children's sport in recreation facilities and parents' experiences of the same. Photo-based research methods and its use within focused ethnography will be described below.

### Photo-based research methods

Recent research that has used photo research methods to study consumer culture has been situated within interpretivism (Petermans et al., 2014). Studies have been designed to understand consumer experience within sociocultural situations (Ritson & Elliott, 1999; Venkatraman & Nelson, 2008) and within designed settings, such as retail environments (Petermans et al., 2014). Older research in marketing, advertising and consumer experience has been based a positivist epistemology focused on characteristics on individuals and resulted in “context-free theories (Peter and Olson, 1983, p.123)” (as cited in Ritson & Elliot 1999, p.261). The shift to an interpretive epistemology offers a new interpretation of consumers’ experience of advertising and marketing within a natural setting (Ritson & Elliott, 1999) and highlights multiple meanings of reality (Venkatraman & Nelson, 2008).

Warren (2005) states that the move away from positivist paradigms to “reflexive practice, subjectivity, and immersion in the worlds [investigators’] research” has supported the development of photo research methods in which participants are actively involved in photo taking or interpretation. Photo research methods can be a powerful qualitative method as “in the act of viewing, we are not just seeing, but experiencing with all our sensory faculties and we bring a whole host of cultural, social and psychological knowledge to bear in making sense of what we see – understanding what we experience” (p. 863). Such research methods can be empowering for participants and enable them to raise their voices greater than what may be possible solely through language (Petermans et al., 2014; Warren, 2005). Photo-based research methods may allow deeper investigation into the culture and influencing factors on the phenomenon of food marketing in recreation facilities.

There are four primary approaches to photo research (Warren, 2005):

1. using images as a data source,
2. using images to “document social, cultural and physical processes as they are happening (as cited in Petersman et al. (2014, p.2244),
3. as stimuli to draw out information in participant interviews (photos are often provided by the researcher); often called “photo-elicitation” (Wagner, 1979, Collier and Collier, 1986 as cited in Warren, 2005), and
4. as a participatory data collection strategy where the participant takes the photo and interprets it for the researcher.

The latter approach (having participants take photographs) can be called “native image-making” (Wagner, 1979 as cited in Warren, 2005, p. 864). With roots in anthropology, the participant is able to present their culture in through their own eyes by selecting what and how to photograph and describing its meaning. This photo data generating strategy may also be called photo interviewing. Here, photos produced are not used as data themselves, instead the photos are communication tools used to gather participants’ meaning and interpretation of their photos (Warren, 2005). The discussions between researchers and participants serve as the data for analysis.

There are three common types of photo interviewing: (1) autodiving, (2) reflexive photography, and (3) photovoice (Warren, 2005). Autodiving is a participant led discussion surrounding the photos taken by the participant and focuses on the features within the photograph. As an extension of autodiving, reflexive photography, is where the conversations between the investigator and the participant do not focus on the content of the photos necessarily, but includes reflexive thinking by the researcher and participant about the photo, its interpretations and its implications. Finally, photovoice is a participatory research approach

where participants take photographs of their lives to tell a story and is traditionally used with disempowered populations (Warren, 2005).

Photo-based research methods have been used to understand consumer experiences of retail stores (Petermans et al., 2014), advertising and marketing (Basil, 2011; Bibeau et al., 2012; Groeppel-Klein, 2010; Warren, 2005), and food culture and consumption (Groeppel-Klein, 2010; Mareno, 2015; Sharma & Chapman, 2011; Venkatraman & Nelson, 2008). One research project reported to use photovoice to understand parents' perceptions of physical activity and healthy eating (Mareno, 2015). Another project has also used photovoice to understand perceptions of food marketing in African American females. Other studies have used autodiving to investigate how consumers experience food retail stores and restaurants and select food purchases (Koenigstorfer & Groeppel-Klein, 2010; Petermans et al., 2014; Sharma & Chapman, 2011; Venkatraman & Nelson, 2008). No photo methods have been conducted on food marketing in sport settings [but Thomas et al. (2012) assessed parents' perceptions of this topic in youth sport through qualitative focus groups].

Photo interviewing is expected to provide a deeper understanding of the culture of food and beverage marketing in children's sport. When participants took photos of their experience in a food store before discussing their experience, participants "paid attention to and photographed aspects which they had never noticed before...[indicating] that photography can deliver insights which are unattainable by text or observation alone" (Petermans et al., 2014, p.2247). In a study of consumer food choice and understanding of nutrition labelling, Koenigstorfer & Groeppel-Klein (2010) found that photo interviewing enables participants to "interview themselves", projecting their beliefs, thoughts and motivations onto the photographs" (p.394), generating an emic perspective. Such techniques may help to situate the participant as the expert, decreasing



emphasis on the traditional researcher and participant division (Koenigstorfer & Groeppel-Klein, 2010). Furthermore, Koengstorfer and Groeppel-Klein (2010) suggest that participants may feel less pressure to provide socially desirable answers in a photo interview.

### Focused Ethnography

This project used focused ethnographic research methods to understanding the culture of food and beverage marketing surrounding children's sport in recreation facilities and parents' experiences of the same. Because focused ethnography is guided by a specific research question (Mayan, 2009), this project used reflexive photo interviewing (as opposed to photovoice which is often guided more strongly by participants). Reflexive photo interviewing may ensure that the generation and analysis of the data remain within the investigator's control to a greater extent than in photovoice. Therefore, it is more likely that what is gathered and analyzed remains directly related to the research questions. As well, data analysis by the investigator rather than the participants may allow for higher abstraction of the data beyond sematic levels into latent themes (Braun & Clarke, 2006).

Reflexivity is a central construct of ethnographic research, requiring ongoing critique of oneself, methods, representation, and positioning (Marcus, 1994). I used memoing and field notes to practice reflexivity (see Rigor). For participants, the act of taking and interpreting photos was naturally reflexive as Harper (2002) states that photographs enable participants to "deconstruct their own phenomenological assumptions" (p.21).

Although ethnographies traditionally include participant observation, a focused ethnography may not include such observation (Mayan, 2009). This study did not include participant observation as a data generating strategy.

### *Participants & Recruitment*

All EPL recreation facilities in Alberta were invited to participate in the current study (see Appendix F for invitation letter and Appendix G for Facility Agreement). Five facilities (45%) agreed to participate, however two facilities dropped out due to staff changes. The three participating sites were multi-sport recreation facilities. The initial recruitment plan was to invite eligible parents to participate in the study through email invitations (Appendix H) via facility list serves and by recruitment posters (Appendix H) in the facilities. Potential participants would self-identify after receiving a recruitment flyer by email or seeing one in the facility and contact the researcher by email or phone if interested. However, this approach yielded no interested participants so we tried an active recruiting strategy used by Caswell & Hanning (2018) in a previous photo-based research study in recreation facilities.

Participants must have been parents or guardians with at least one child (17 years or younger) participating in an organized sport or activity at least once a week at a participating recreation facility (which they, the parent, also usually attended). We used purposively sampling (Palinkas et al., 2015; Schensul, Schensul, & LeCompte, 1999) to seek parents from varying age groups, ethnicities, gender, and socio-economic status. The sample size was driven with the aim of theoretical saturation in which sampling was ceased when no new ideas or themes arose in analysis (Mayan, 2009). Participants were compensated with a gift card of \$30 to a grocery store of their choice (Belon et al., 2014).

### *Procedures*

Interested participants signed an informed consent form before participating in the study (Appendix J). We planned to have an initial meeting with all participants to explain the study and establish rapport (Sharma & Chapman, 2011); however, due to the location of the participating

recreation facilities, this was not possible. Instead, since most participants were recruited in person, RP made an effort to build rapport during recruitment. We adjusted our methods to communicate more study details and instructions with participants via email and telephone which was effective during the pilot. Refer to Appendix K for a summary of the content reviewed via email and telephone to prepare participants.

Before taking photos, parents were briefed on the scope of food marketing, which we defined by the 4Ps commonly used by marketers (Lee & Kotler, 2011). Participants were told that food marketing is broader than just advertising and that marketing can include: (a) product - what types of foods and beverages are available to purchase; (b) pricing - the costs of certain foods and beverages (financial and non-financial); (c) placement - where foods and beverages are available to purchase, how easy access is, or where they are promoted; and (d) promotion - how foods and beverages are promoted through signs, messages, programs.

Participants were instructed to take photographs over two weeks (Belon et al., 2014) in response to the question: What do you think your recreation facility is saying about food and eating?. Instructions were kept to a minimum in an effort to minimize researcher bias (Petermans et al., 2014). Situating participant photography within their local recreation facility supported naturalistic investigation (Ritson & Elliott, 1999) where by the photos stimulate an understanding of the experiences of parents of food and beverage marketing within recreation facilities, as opposed to an account of their experiences seemingly extracted from the setting in which it takes place. Participants emailed the photos most meaningful to them to RP which were used in their photo-interview at their recreation facility the next week. No limits were provided for the minimum or maximum number of photos participants should take or choose to email to RP.

### Pilot Test

The photo-taking and interview process was pilot tested with two female parents and demonstrated that the interviewer could generate relevant data through the process. We communicated with participants through email and telephone to describe the study and instructions to the parents, and schedule their interview. Parents took several relevant photos. The interview questions with the semi-structured format and use of the photos to guide the interview was effective in generating responses that reflected on their awareness, reactions, and experiences of food marketing. Following the pilot, interview questions and procedures were only adjusted slightly.

It should be noted that the pilot tests were conducted with two educated Caucasian women from high income households. Additional pilot testing with a different demographic should have been completed since I was seeking a variety in ethnicities and incomes. It became obvious in interviews that the process and questioning may be less familiar with other demographic groups.

### *Data Collection & Analysis*

Semi-structured interviews were conducted in January and February 2018. Please see Appendix M for the interview guide. The open interviewing process allowed the participant to lead the discussion using his/her printed photographs and foster an emic perspective. The interview started by asking the participants to show and describe the photos they took. The interviewer (RP) made sure that several topics were covered during the interview, including:

- parents' rationale for selecting photos,
- each of the "four Ps" of marketing, and
- how parents saw themselves, their children, and their family in the photos they took.

Interviews were audio-recorded, transcribed verbatim, de-identified and analyzed by thematic analysis (Braun & Clarke, 2006) using NVivo 11 (QSR International, 2017).

Traditional “sticky-note” methods were used to group codes and identify themes.

Several rounds of coding was used to analyze the data. Holistic coding was initially used to identify high level topics in the transcripts (Saldaña, 2015). Then, three simultaneous methods were used to code the data within each holistic codes:

1. *In Vivo* (“emic”) coding - uses participants’ words as codes to reveal folk terms;
2. *Versus* coding - identifies components of the phenomenon participants compared;
3. *Value* coding - reflects participants’ beliefs, attitudes, values, and worldviews

These coding methods are designed to honour participants’ perspectives and actions and thus are suitable for ethnographic research (Saldaña, 2015). Codes and their data were combined into themes. Thematic maps (Braun & Clarke, 2006) were created to understand the relationships between codes within themes and the relationships between themes. Themes generated from the data were reviewed to ensure that each theme is relevant to the all data said to be associated with it (“internal homogeneity”) and that there is no overlap between themes (“external heterogeneity”) (Braun & Clarke, 2006, p. 91).

### *Rigor*

Research rigor was ensured by a series of verification strategies (Morse, 2015; Morse et al., 2002). RP was engaged in the field for over a year before beginning the qualitative research study which supported methodological coherence between research questions, data generation, and data analysis. RP was highly familiar with the participating facilities which supported skilled interviewing to obtain rich data.

Unfortunately, interviews were conducted over a short time period which made it impossible to analyze the data concurrently. Our research aim to understand parents' awareness, reactions, and experiences of food marketing in and around their children's sport and physical activity in their municipal recreation facility was continuously reflected on to ensure methodological coherence between the research question, data generation, and data analyses.

Peer debriefing was used during data collection and analysis with RP's supervisor. The interviewer (RP) memoed common topics and emerging ideas after every interview to follow-up on in later interviews. These strategies helped RP identify emerging items to follow-up on. When new ideas emerged in later interviews and through data analysis, RP verified them in earlier data. Field notes were completed after each interview.

Theoretical trajectories that arose from potential negative cases were investigated to understand true differences that exist within the phenomenon. RP built new theories of the phenomenon within the boundaries of the research question using an inductive and iterative process that included understanding single components of the phenomenon, linking components across themes, and situating the findings in the literature.

### *Strengths and Limitations*

This research was conducted with appropriate research methods to deeply and soundly answer the research question. The data generated in this study may be more relevant as it was informed by previous quantitative work in the recreation facilities the parents attended. Nevertheless, this study has some important limitations to note. First, the integration with the field prior to this study may have also limited my ability to suspend knowledge about aspects of the phenomenon and hear participants' descriptions without being clouded by my previous knowledge and experiences. I found it difficult to not react to comments made by participants

criticizing initiatives I had supported during EPL. I also found it difficult not to react when participants stated there was no marketing in the facility as I had documented multiple food marketing occasions in the facilities just weeks before. I believe it was a useful strategy to have the participants take photos and use those photos to discuss as it helped me take a step back and focus on their perspectives rather than my reactions.

During data collection, there were several challenges to work through. First, I was unable to analyze the data concurrently with interviewing. I believe if I had been able to analyze in between data collection periods I would have been able to ask some focused questions that may have increased clarity of the phenomenon. For example, the data provided some insight on sport sponsorship; however it was difficult to work through as usually it was only a few minutes of interviews. I believe there are important nuances of sport sponsorships that could have been followed-up on.

Finally, there were challenges in the type of data generated in the photo-interviewing. Because participants believed there was almost no marketing in the facility, and because many participants actively avoided using food services in the facility, one has to question whether these were the best participants to interview. Different responses may be expected of participants that noticed more marketing and/or used food services more often. Their focus on food availability was a disappointment to me as a researcher, but I attempted to follow the direction led by the participants while also trying to cover all planned topics in order to support data true to the participant but that also would help to answer our research question.

### *Critical Realism's Inference Processes*

Critical realism claims that “all science should have generalizing claims” (Danermark et al., 2002, p.73). However, a realist approach to generalization differs from the traditional empiricist definition of generalization (where findings from n observations are generalized to N population (Danermark et al., 2002). A realism approach to generalization uses retroductive thought processes to understand “the more or less universal preconditions for an object to be what it is” (Danermark et al., 2002, p.77). Danermark et al. (2002) explain that critical realism uses four different complementary thought processes that provide structure for logical inference (ways of reasoning) that can be applied to move from specific research findings to higher level general understanding of a phenomenon: deduction, induction, abduction, and retroduction. These four thought processes are defined in Table 23 with examples of how they were used in this dissertation. Deduction and induction are interpreted here as formal logical inferences whereas abduction and retroduction are thought processes that enable the researcher to move from one way of thinking to another (Danermark et al., 2002). [It must be recognized that inductive logic presented here is different than an inductive approach to research where researchers explore phenomenon without a priori hypotheses (Danermark et al., 2002).]

Retroduction is a valuable approach to combine findings from different methods to work from the specific to the general in order to gain a better understanding of what the phenomenon is and what gives rise to it (Zachariadis, Scott, & Barrett, 2013). The triangulation of findings through retroductive thought processes can be found in Chapter 7.



**Table 23 Description and Application of Critical Realism Thought Processes**

Mode of Inference	Process (Danermark et al., 2002)	Use	Study
Deductive	<p>Make logical conclusions about phenomenon based on rules</p> <p>Example of thought process: <i>Rule: If A then B.</i></p> <p><i>Finding: A</i></p> <p><i>Inference: Thus, B</i></p>	<p>Conclusions of food marketing are based on theories informing the development and scoring of the FoodMATS.</p> <p>Example: <i>Rule: If greater exposure and power of food marketing (e.g. higher FoodMATS score) (A), then greater unhealthy food purchases (B), based on WHO model World Health Organization, 2012).</i></p> <p><i>Finding: Higher FoodMATS</i></p> <p><i>Inference: Thus, higher “Least Healthy” food and beverage purchases</i></p> <p>Confirmed through validation.</p>	S1, S2, S3
Inductive	<p>Draw general conclusions from a larger number of individual observations (obs).</p> <p>Example of thought process: <i>Obs 1: x happens when y</i> <i>Obs 2: x happens when y</i> <i>Obs 3: x happens when y</i></p> <p><i>Inference: Always, when y happens, x happens</i></p>	<p>Conclusions regarding impact of voluntary provincial nutrition guidelines and a capacity-building intervention were drawn from a collection of individual observations.</p> <p>Example: <i>Obs 1: proportion of “least healthy” food marketing occasions (x) is 48% when have nutrition guidelines (y<sub>1</sub>)</i> <i>Obs 2: proportion of “least healthy” food marketing occasions (x) is 74% when have no nutrition guidelines (y<sub>2</sub>)</i> <i>Obs 3: frequency of food marketing occasions (z) is 29 per facility when have nutrition guidelines (y<sub>2</sub>)</i> <i>Obs 4: frequency of food marketing occasions (z) is 29 per facility when have no nutrition guidelines (y<sub>2</sub>)</i></p> <p><i>Inference: When have nutrition guidelines (y<sub>1</sub>), the proportion of “Least Healthy” food marketing occasions (x) is lower, but the frequency of food marketing occasions (z) does not change than when there are no nutrition guidelines (y<sub>2</sub>)</i></p>	S1, S2, S3
Abductive	<p>Redesign and reconceptualize a phenomenon to give new meaning</p> <p>Example of thought process; <i>Explain an empirical event (x<sub>1</sub>) by relating it to a theory or framework (y) to generate a new understanding (x<sub>2</sub>)</i></p>	<p>Parents’ perceptions of food environments in sports have been briefly evaluated in previous research. Collected new information on parents’ perceptions of food marketing environment (x<sub>1</sub>) and situated those findings within literature from corporate social responsibility (y) to generate a new understanding of the complexity of parents’ perceptions of food marketing environments in recreation facilities (x<sub>2</sub>).</p>	S4

Retrodutive	Identifying the basic items that makes a phenomenon what it is.	Exploration of the properties, structures, and underlying mechanisms of food marketing in recreation facilities.	Ch.7
	Example of thought process: “What properties (y) must exist for X to exist and for X to be what it is?” (Danermark et al., 2002, p.97)	Example: For food marketing in recreation facilities (x) to exist, factors such as how we define food marketing to children (y <sub>1</sub> ) or the appreciation of food marketing in recreation facilities (y <sub>2</sub> ) influence what the phenomenon is.	

## References

Alberta Health and Wellness. (2010). *The Alberta Nutrition Guidelines for Children and Youth*.

Retrieved from: <https://www.albertahealthservices.ca/nutrition/Page2929.aspx>

Altman, D. G. (1991). *Practical Statistics for Medical Research*. London: Champan and Hall.

Basil, M. (2011). Use of photography and video in observational research. *Qualitative Market Research: An International Journal*, 14(3), 246-257.

Belon, A. P., Nieuwendyk, L. M., Vallianatos, H., & Nykiforuk, C. I. (2014). How community environment shapes physical activity: Perceptions revealed through the PhotoVoice method. *Social Science & Medicine*, 116, 10-21.

Bibeau, W. S., Saksvig, B. I., Gittelsohn, J., Williams, S., Jones, L., & Young, D. R. (2012). Perceptions of the food marketing environment among African American teen girls and adults. *Appetite*, 58(1), 396-399.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.

Carson, V., & Kuzik, N. (2017). Demographic correlates of screen time and objectively measured sedentary time and physical activity among toddlers: a cross-sectional study. *BMC Public Health*, 17.

- Caswell, M. S., & Hanning, R. M. (2018). Adolescent perspectives of the recreational ice hockey food environment and influences on eating behaviour revealed through photovoice. *Public Health Nutrition, 21*(7), 1255-1265.
- Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological assessment, 6*(4), 284-290.
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (revised ed.): New York: Academic Press.
- Danermark, B., Eskstrom, M., Jakobsen, L., & Karlsson, J. C. (2002). *Explaining society: Critical realism in the social sciences*. New York, NY: Talyor & Francis Books Ltd.
- Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: a guide for non-statisticians. *International Journal of Endocrinology and Metabolism, 10*(2), 486.
- Government of Nova Scotia. (2015). *Healthy Eating in Recreation and Sport Settings Guidelines*. Retrieved from <http://www.recreationns.ns.ca/wp-content/uploads/2016/01/HERSS-Guidelines.pdf>.
- Harper, D. (2002). Talking about pictures: A case for photo elicitation. *Visual studies, 17*(1), 13-26.
- Kelly, B., King, L., Baur, L., Rayner, M., Lobstein, T., Monteiro, C., . . . Friel, S. (2013). Monitoring food and non-alcoholic beverage promotions to children. *Obesity Reviews, 14*(S1), 59-69.
- Koenigstorfer, J., & Groeppel-Klein, A. (2010). Examining the use of nutrition labelling with photoelicitation. *Qualitative Market Research: An International Journal, 13*(4), 389-413.

- Landers, R. (2015). Computing Intraclass Correlations (ICC) as Estimates of Interrater Reliability in SPSS. *The Winnower*. doi:10.15200/winn.143518.81744
- Lee, N. R., & Kotler, P. (2011). *Social marketing: Influencing behaviors for good*: Sage: Thousand Oaks (CA).
- Leeman, J., Calancie, L., Kegler, M. C., Escoffery, C. T., Herrmann, A. K., Thatcher, E., . . . Fernandez, M. E. (2017). Developing theory to guide building practitioners' capacity to implement evidence-based interventions. *Health Education & Behavior*, 44(1), 59-69.
- Leibowitz, J., Rosch, J., Ramirez, E., Brill, J., & Ohlhausen, M. (2012). A review of food marketing to children and adolescents: follow-up report. *Washington (DC): US Federal Trade Commission*.
- Lytle, L. A. (2009). Measuring the food environment: state of the science. *Am J Prev Med*, 36(4 Suppl), S134-144.
- Marcus, G. E. (1994). What comes (just) after "post"? The case of ethnography. *Handbook of Qualitative Research*, 563-574.
- Mareno, N. (2015). Parental perception of healthy eating and physical activity: Results from a preliminary Photovoice study. *Journal of Clinical Nursing*, 24(9-10), 1440-1443.
- Masters, C., Carlson, D. S., & Pfadt, E. (2006). Winging it through research: an innovative approach to a basic understanding of research methodology. *Journal of Emergency Nursing*, 32(5), 382-384.
- Mayan, M. J. (2009). *Essentials of qualitative inquiry*. Walnut Creek, CA: Left Coast Press.
- McHugh, M. L. (2012). Interrater reliability: the kappa statistic. *Biochemia Medica*, 22(3), 276-282.

- Minaker, L. M., Raine, K. D., & Cash, S. B. (2009). Measuring the food service environment: development and implementation of assessment tools. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, 421-425.
- Ministry of Health. (2014). *Healthier Choices in Vending Machines in BC Public Buildings*. Victoria, BC: Province of British Columbia Retrieved from [www.healthlinkbc.ca/foodguidelines](http://www.healthlinkbc.ca/foodguidelines).
- Morse, J. M. (2015). Critical analysis of strategies for determining rigor in qualitative inquiry. *Qualitative Health Research*, 25(9), 1212-1222.
- Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International Journal of Qualitative Methods*, 1(2), 13-22.
- Naylor, P. J., Bridgewater, L., Purcell, M., Ostry, A., & Wekken, S. V. (2010). Publically funded recreation facilities: Obesogenic environments for children and families? *International Journal of Environmental Research and Public Health*, 7(5), 2208-2221.
- O'Reilly, N., & Horning, D. L. (2013). Leveraging sponsorship: The activation ratio. *Sport Management Review*, 16(4), 424-437.
- Olstad, D. L., Poirier, K., Naylor, P. J., Shearer, C., & Kirk, S. F. L. (2015). Policy outcomes of applying different nutrient profiling systems in recreational sports settings: the case for national harmonization in Canada. *Public Health Nutrition*, 18(12), 2251-2262.
- Olstad, D. L., & Raine, K. D. (2013). Profit Versus Public Health: The Need to Improve the Food Environment in Recreational Facilities. *Canadian Journal of Public Health/Revue Canadienne De Sante Publique*, 104(2), e167-e169.

- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research, 42*(5), 533-544.
- Partington, S. N., Menzies, T. J., Colburn, T. A., Saelens, B. E., & Glanz, K. (2015). Reduced-item food audits based on the nutrition environment measures surveys. *American Journal of Preventive Medicine, 49*(4), e23-e33.
- Peres-Neto, P. R. (1999). How many statistical tests are too many? The problem of conducting multiple ecological inferences revisited. *Marine Ecology Progress Series, 176*, 303-306.
- Perreault Jr, W. D., McCarthy, E. J., & Cannon, J. P. (2006). *Basic marketing: A marketing strategy planning approach*: McGraw-Hill/Irwin.
- Petermans, A., Kent, A., & Van Cleempoel, K. (2014). Photo-elicitation: Using photographs to read retail interiors through consumers' eyes. *Journal of Business Research, 67*(11), 2243-2249.
- Prowse, R. J., Naylor, P.-J., Olstad, D. L., Carson, V., Mâsse, L. C., Storey, K., . . . Raine, K. D. (2018). Reliability and validity of a novel tool to comprehensively assess food and beverage marketing in recreational sport settings. *International Journal of Behavioral Nutrition and Physical Activity, 15*(38).
- Ritson, M., & Elliott, R. (1999). The social uses of advertising: an ethnographic study of adolescent advertising audiences. *Journal of Consumer Research, 26*(3), 260-277.
- Robinson, K., Elliott, S. J., Driedger, S. M., Eyles, J., O'loughlin, J., Riley, B., . . . Harvey, D. (2004). Using linking systems to build capacity and enhance dissemination in heart health promotion: a Canadian multiple-case study. *Health Education Research, 20*(5), 499-513.

- Saldaña, J. (2015). *The coding manual for qualitative researchers*: Sage: Thousand Oaks (CA).
- Schensul, S. L., Schensul, J. J., & LeCompte, M. D. (1999). *Essential ethnographic methods: Observations, interviews, and questionnaires* (Vol. 2). Walnut Creek, CA: Rowman Altamira.
- Scholtes, V. A., Terwee, C. B., & Poolman, R. W. (2011). What makes a measurement instrument valid and reliable? *Injury*, 42(3), 236-240.
- Sharma, S., & Chapman, G. (2011). Food, photographs, and frames: Photo elicitation in a Canadian qualitative food study. *The Journal of Canadian Food Cultures*, 3(1).
- Streiner, D. L., Norman, G. R., & Cairney, J. (2015). *Health Measurement Scales: A Practical Guide To Their Development And Use*: Oxford University Press, USA.
- Tabachnick, B., & Fidell, LS. (2013). *Using Multivariate Statistics*. Upper Saddle River, New Jersey: Pearson Education, Inc.
- Thomas, M., Nelson, T. F., Harwood, E., & Neumark-Sztainer, D. (2012). Exploring parent perceptions of the food environment in youth sport. *Journal of Nutrition Education and Behavior*, 44(4), 365-371.
- Venkatraman, M., & Nelson, T. (2008). From servicescape to consumptionscape: A photo-elicitation study of Starbucks in the New China. *Journal of International Business Studies*, 39(6), 1010-1026.
- Warren, S. (2005). Photography and voice in critical qualitative management research. *Accounting, Auditing & Accountability Journal*, 18(6), 861-882.
- World Health Organization. (2012). A framework for implementing the set of recommendations on the marketing of foods and non-alcoholic beverages to children.

Zachariadis, M., Scott, S. V., & Barrett, M. I. (2013). Methodological Implications of Critical Realism for Mixed-Methods Research. *MIS quarterly*, 37(3), 855-879.



## Appendix B – Food and beverage Marketing Assessment Tool for Settings (FoodMATS)

<p><b>Community:</b> _____</p> <p><b>Facility audited:</b> _____</p> <p><input type="checkbox"/> <b>Baseline:</b> Date _____ (mmm / dd / yyyy)</p> <p><input type="checkbox"/> <b>Follow-up:</b> Date _____ (mmm / dd / yyyy)</p> <p>This Assessment was completed by the following (check all that apply and fill in name):</p> <p><input type="checkbox"/> <b>Provincial coordinator:</b> _____</p> <p><input type="checkbox"/> <b>Research assistant:</b> _____</p> <p><input type="checkbox"/> <b>Other (please specify):</b> _____</p>
---

### Instructions

The checklist is organized into the following sections:

**1. Parking Lot & Facility Grounds**

**2. Entrance, Reception & Hallways**

**3. Sport Areas**

- There are 2 parts to Section 3:
  - A. All Sport Areas
  - B. Sport Areas with Food or Beverage Marketing
- Assess all sport areas in the facility.
- Each sport area with marketing will be filled out on individually with one page per Sport Area. If there are more than 5 sport areas with marketing, attach additional pages of Section 3. Remember to fill out the type of athletic area (and name if applicable) on the top of each page in Section 3B.

**4. Concession or Food Service Area**

- This area includes commercial franchises.
- There are 3 parts to Section 4:
  - C. Product Promotions
  - D. Pricing Promotions
  - E. Placement Promotions
- Assess all concessions, food service areas, and commercial franchises in the facility.
- There is space for two Concessions or Food Service Area in the checklist. Record marketing in all concessions. If there are more than 2 concessions, attach additional pages of Section 4A to 4C. If there is only 1, select “not applicable” beside “Concession 2” for all parts of Section 4.

You may want to consult a map of the facility (if available) to ensure you cover the entire facility.

**Step 1.** Systematically walk through the facility documenting food and beverage marketing. Complete one area at a time, using the page designated for that section. For this checklist, **marketing** is defined as any commercial advertising, promotion, or messaging of food or beverage products/ brands/ food retailers (i.e. restaurant) that is intended to increase the “recognition, appeal and/or consumption” of such products/ brands/ retailer.

**Step 2.** Within each section, review the suggested sites (i.e. outdoor facility sign) or marketing type (i.e. menu combos) and record the product/brand of all food or beverage products/ brands promoted. For example if a promotion says “Boston Pizza -visit us after the game”, record “Boston Pizza” as the **product/brand advertised**.

- Record each promotion separately. For example, if a vending machine has two promotions, one for Dasani Water and one for Vitamin Water, enter each promotion separately.
  - For each product promoted, record the product size and other product details (if possible).
- If no food or beverage marketing exists for that site or type, check the box indicating “No food/bev ads”.
- If that marketing site or type is does not exist at a facility, check the box indicating “Not applicable”.
- Add any additional promotions observed under “Other” and specify the location or type of marketing.

**Step 3.** For each promotion you record, take a photo for verification and other purposes.

**Step 4.** Where indicated, circle whether each promotion is child-directed or not. For example if a promotion says “Boston Pizza -visit us after the game” and has an image of a cartoon character, this would be considered child-directed.

Child-directed means that the promotion has evidence of animated or fictional characters, taste appeals, humour, action-adventure, fantasy, fun (shapes, colours), competitions, give-aways, cartoonish font, or uses a child actor to advertise a food or beverage product/brand that would appeal to children.

**Step 5.** Where indicated, circle whether each promotion is sports-related or not. For example if a promotion says “Boston Pizza -visit us after the game”, because it refers to the “game” it would be considered sport-related.

Sports-related includes any reference to physical activity, exercise, sport, game, recreation, performance or competition.

**Step 6.** Where indicated, circle the size of each promotion. Please note: the size of advertisements and promotions, defined as small, medium, and large, are different for indoor and outdoor promotions:

<p><u>Outdoor promotions:</u>  <b>small</b> &lt; one letter size piece of paper (8.5 X 11 in)  <b>medium</b> 1-10 letter size sheets of paper together  <b>large</b> &gt;10 pieces of paper together</p>	<p><u>Indoor promotions:</u>  <b>small</b> &lt; one letter size piece of paper (8.5 X 11”)  <b>medium</b> 1-3 pieces of paper together  <b>large</b> &gt;3 pieces of paper together</p>
--	---

- Please note: sizing for promotions on vending machines will always use indoor promotion sizing even if the machine is located outside.

- Step 7.** If a promotion is entered into “Other”, add appropriate descriptive information (child-directed, size, etc.).
- Step 8.** Once finished, review the entire tool before you leave the facility to ensure that everything is fully completed.
- Step 9.** Enter data into provided spreadsheets. Number each promotion identified (site number\_promotion number) in the spreadsheet and attach that number to the photo taken of that promotion.
- Step 10.** Submit completed assessment form and photos (by email or downloaded into the data server) to Rachel Prowse for data checking.

## Section 1 - Parking Lot &amp; Facility Grounds

ID	Location	Product(s) or brand(s) advertised Record serving size of products	Child-directed?	Sports-related?	Size of advertising <sup>1</sup>
1.1.1	<b>1. Outdoor facility sign</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
1.1.2		2.	Yes No	Yes No	S M L
1.2.1	<b>2. Billboards</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
1.2.2		2.	Yes No	Yes No	S M L
1.3.1	<b>3. Temporary signs (i.e. sandwich boards)</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
1.3.2		2.	Yes No	Yes No	S M L
1.3.3		3.	Yes No	Yes No	S M L
1.4.1	<b>4. Sides of building</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads	1.	Yes No	Yes No	S M L
1.4.2		2.	Yes No	Yes No	S M L
1.4.3		3.	Yes No	Yes No	S M L
1.5.1	<b>5. Windows</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
1.5.2		2.	Yes No	Yes No	S M L
1.5.3		3.	Yes No	Yes No	S M L
1.6.1	<b>6. Doors</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads	1.	Yes No	Yes No	S M L
1.6.2		2.	Yes No	Yes No	S M L
1.6.3		3.	Yes No	Yes No	S M L
1.7.1	<b>7. Outdoor furniture (i.e benches, tables, umbrellas)</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1. <input type="checkbox"/> Seasonal	Yes No	Yes No	S M L
1.7.2		2. <input type="checkbox"/> Seasonal	Yes No	Yes No	S M L
1.7.3		3. <input type="checkbox"/> Seasonal	Yes No	Yes No	S M L
1.8.1	<b>8. Vending machines<sup>2</sup></b> Total # of VM _____	1. (VM#____)	Yes No	Yes No	S M L
1.8.2		2. (VM#____)	Yes No	Yes No	S M L
1.8.3		3. (VM#____)	Yes No	Yes No	S M L
1.9.1	<b>9. Other (specify)</b> <input type="checkbox"/> Not applicable		Yes No	Yes No	S M L

<sup>1</sup>Size definitions: small < one letter size piece of paper (8.5 X 11 in); medium 1-10 letter size sheets of paper together; large >10 pieces of paper together

<sup>2</sup>Size definitions: small < one letter size piece of paper (8.5 X 11"); medium 1-3 pieces of paper together; large >3 pieces of paper together

## Section 2 - Entrance, Reception Area &amp; Hallways

ID	Location	Product(s) or brand(s) advertised Record serving size of products	Child-directed?	Sports-related?	Size of advertising <sup>2</sup>
2.1.1	<b>1. Facility pamphlets or brochures</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
2.1.2		2.	Yes No	Yes No	S M L
2.2.1	<b>2. Facility televisions</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
2.2.2		2.	Yes No	Yes No	S M L
2.3.1	<b>3. Welcome desk</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
2.3.2		2.	Yes No	Yes No	S M L
2.3.3		3.	Yes No	Yes No	S M L
2.4.1	<b>4. Walls/ floors</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads	1.	Yes No	Yes No	S M L
2.4.2		2.	Yes No	Yes No	S M L
2.4.3		3.	Yes No	Yes No	S M L
2.5.1	<b>5. Bathrooms</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads	1.	Yes No	Yes No	S M L
2.5.2		2.	Yes No	Yes No	S M L
2.6.1	<b>6. Vending machines</b> Total # of VM _____ <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1. (VM#___)	Yes No	Yes No	S M L
2.6.2		2. (VM#___)	Yes No	Yes No	S M L
2.6.3		3. (VM#___)	Yes No	Yes No	S M L
2.6.4		4. (VM#___)	Yes No	Yes No	S M L
2.6.5		5. (VM#___)	Yes No	Yes No	S M L
2.6.6		6. (VM#___)	Yes No	Yes No	S M L
2.6.7		7. (VM#___)	Yes No	Yes No	S M L
2.6.8		8. (VM#___)	Yes No	Yes No	S M L
2.6.9		9. (VM#___)	Yes No	Yes No	S M L
2.6.10		10. (VM#___)	Yes No	Yes No	S M L
2.6.11		11. (VM#___)	Yes No	Yes No	S M L
2.6.12		12. (VM#___)	Yes No	Yes No	S M L
2.7.1	<b>7. Other (specify)</b> <input type="checkbox"/> Not applicable		Yes No	Yes No	S M L

<sup>2</sup>Size definitions are as follows: small < one letter size piece of paper (8.5 X 11"); medium 1-3 pieces of paper together; large >3 pieces of paper together

### Section 3A - SPORT AREAS

In the following table, record the type and number of sport areas present in the facility. Indicate the number of sport areas that have **no marketing**, the **number with non-food marketing ONLY**, and the number of sport areas **with food or beverage marketing**. The **Total number** should equal Number with **NO marketing** plus the number with **WITH non-food marketing ONLY** plus the number **WITH FOOD marketing**. For sport areas with marketing, proceed to Section 3B.

Type of Indoor Sport Area	Total number of number of sport areas	Number of sport areas with <b>NO marketing</b>	Number of sport areas <b>WITH non-food marketing ONLY</b>	Number of sport areas <b>WITH FOOD marketing</b> (Go to 3B)
<b>Pool area</b>				
<b>Playing field area</b> (indoor soccer field, etc.)				
<b>Rink area</b> (including ice rinks that have been melted and used for another sport)				
<b>Weight/cardio room area</b>				
<b>Indoor track area</b>				
<b>Cycling room area</b>				
<b>Rock climbing space area</b>				
<b>Single-use court (i.e. racket sports) area</b>				
<b>Large multi-use gym (i.e. basketball) area</b>				
<b>Small multi-use gym (i.e. yoga) area</b>				
<b>Other area (specify)</b>				

#### Notes:

- Include indoor sports areas only.
- Record the number of “spaces” for these sports (not necessarily the number of fields or courts). For example, if there is one rink area for curling and the rink includes 5 sheets for 5 separate games, mark this as 1 area not 5. Similarly, if there is a collection of 6 tennis courts in 2 separate buildings, record this as 2 single use court areas, not 12 courts.

- For the areas WITH FOOD or beverage marketing, please fill out one page for each area and specify the type of athletic area in Section 3B. Attach more sport area pages if there are more than 5 athletic areas.

**Section 3B - SPORT AREA 1** (specify type of athletic area):

Type of athletic area (see Section 3A): \_\_\_\_\_

Name of athletic area (i.e. Ice Rink North or CIBC field) (if applicable): \_\_\_\_\_

ID	Location	Product(s) or brand(s) advertised Record serving size of products	Child-directed?	Sports-related?	Size of advertising <sup>2</sup>
3-1.1.1	<b>1. Change/Locker rooms<sup>3</sup></b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
3-1.1.2		2.	Yes No	Yes No	S M L
3-1.2.1	<b>2. In playing area</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
3-1.2.2		2.	Yes No	Yes No	S M L
3-1.2.3		3.	Yes No	Yes No	S M L
3-1.2.4		4.	Yes No	Yes No	S M L
3-1.2.5		5.	Yes No	Yes No	S M L
3-1.3.1	<b>3. On scoreboards</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
3-1.3.2		2.	Yes No	Yes No	S M L
3-1.4.1	<b>4. On clocks</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
3-1.4.2		2.	Yes No	Yes No	S M L
3-1.5.1	<b>5. In seating area</b> <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
3-1.5.2		2.	Yes No	Yes No	S M L
3-1.5.3		3.	Yes No	Yes No	S M L
3-1.6.1	<b>6. Vending machines in spectator area</b> Total # of VM _____ <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1. (VM#____)	Yes No	Yes No	S M L
3-1.6.2		2. (VM#____)	Yes No	Yes No	S M L
3-1.6.3		3. (VM#____)	Yes No	Yes No	S M L
3-1.7.1	<b>7. Vending machines in athlete area</b> Total # of VM _____ <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1. (VM#____)	Yes No	Yes No	S M L
3-1.7.2		2. (VM#____)	Yes No	Yes No	S M L
3-1.7.3		3. (VM#____)	Yes No	Yes No	S M L
3-1.8.1	<b>8. Other (specify)</b> <input type="checkbox"/> Not applicable		Yes No	Yes No	S M L

<sup>2</sup>Sizes: small < one letter size piece of paper (8.5 X 11"); medium 1-3 pieces of paper together; large >3 pieces of paper together

<sup>3</sup>If there are multiple locker rooms, assess only the first three rooms encountered. If the change/locker rooms have already been accounted for, do not record the marketing here to prevent duplication.



## Section 4 - Concession or Food Service Areas

## A. Menu Item Promotions

Name of Concession/Franchise: \_\_\_\_\_

4-1 CONCESSION 1					
ID	Marketing Type	Product(s) or brand(s) advertised Record serving size of products	Child-directed?	Sports-related?	Size of advertising <sup>2</sup>
4-1a .1.1	<b>1. Menu signs/ messages/ etc. that promote specific menu items<sup>4</sup></b> <input type="checkbox"/> Not applicable  <i>Example: Menu says: "Try our new hearty tomato soup"</i>  Does <u>not</u> include listing of menu items in general	1.	Yes No	Yes No	S M L
4-1a .1.2		2.	Yes No	Yes No	S M L
4-1a .1.3		3.	Yes No	Yes No	S M L
4-1a .1.4		4.	Yes No	Yes No	S M L
4-1a .1.5		5.	Yes No	Yes No	S M L
4-1a .1.6		6.	Yes No	Yes No	S M L
4-1a .1.7		7.	Yes No	Yes No	S M L
4-1a .2.1	<b>2. Menu signs/ messages/ etc. that promote children's menu items</b> <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No	Yes No	S M L
4-1a .2.2		2.	Yes No	Yes No	S M L
4-1a .2.3		3.	Yes No	Yes No	S M L
4-1a .2.4		4.	Yes No	Yes No	S M L
4-1a .3.1	<b>3. Healthy items identified on menu</b> <input type="checkbox"/> Not applicable	Describe how items are identified and what items are identified as healthy:			
4-1a .4.1	<b>4. Other signs/ table tents/ displays<sup>5</sup> that promote specific menu items</b>  <input type="checkbox"/> Not applicable  <i>Example: Sign at entrance of concession says: "Cold and refreshing fruit smoothies"</i>	1.	Yes No	Yes No	S M L
4-1a .4.2		2.	Yes No	Yes No	S M L
4-1a .4.3		3.	Yes No	Yes No	S M L
4-1a .4.4		4.	Yes No	Yes No	S M L
4-1a .4.5		5.	Yes No	Yes No	S M L
4-1a .7.1	<b>5. Vending machines</b> Total # of VM _____  <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1. (VM#____)	Yes No	Yes No	S M L
4-1a .7.2		2. (VM#____)	Yes No	Yes No	S M L
4-1a .7.3		3. (VM#____)	Yes No	Yes No	S M L
4-1a .8.1	<b>8. Other (specify)</b> <input type="checkbox"/> Not applicable		Yes No	Yes No	S M L

<sup>3</sup>Sizes: small < one letter size piece of paper (8.5 X 11"); medium 1-3 pieces of paper together; large >3 pieces of paper together ;<sup>4</sup>"Menu signs/messages that promote specific menu items" includes any signs on or around the menu board that highlights a particular menu item or brand. It does not include menus in general. Other signage (i.e. on walls) for particular products should be captured under "Other signs/table tents/displays that promote specific menu items". <sup>5</sup> "Other signs/ table tents/ displays that promote specific menu items" includes other signage or displays in the concession that promotes a particular menu item or brand.

## Section 4 - Concession or Food Service Areas

## B. Pricing Promotions

4-1		CONCESSION 1							
ID	Marketing Type	Product(s) or brand(s) advertised Record serving size of products	Child-directed?		Sports-related?		Size of advertising <sup>2</sup>		
4-1b .1.1	<b>1. Supersize</b> <input type="checkbox"/> Not applicable		Yes	No	Yes	No	S	M	L
4-1a .2.1	<b>2. All-you-can-eat or "unlimited trips"</b> <input type="checkbox"/> Not applicable	1.	Yes	No	Yes	No	S	M	L
4-1a .2.2		2.	Yes	No	Yes	No	S	M	L
4-1a .3.1	<b>3. Free refills</b> <input type="checkbox"/> Not applicable	1.	Yes	No	Yes	No	S	M	L
4-1a .3.1		2.	Yes	No	Yes	No	S	M	L
4-1a .4.1	<b>4. Loyalty programs/ cards</b> <input type="checkbox"/> Not applicable		Yes	No	Yes	No	S	M	L
	Marketing Type	Product(s) or brand(s) advertised Record serving size of products							
4-1a .5.1	<b>5. Sum of individual items compared to combo meals</b> <input type="checkbox"/> Not applicable	Individual items:				Combo:			
		\$				\$			
4-1a .6.1	<b>6. Smaller portion compared to regular portion<sup>6</sup></b> <input type="checkbox"/> Not applicable	Small portion:				Regular portion:			
		\$				\$			
4-1a .7.1	<b>7. Healthy entrees<sup>7</sup> compared to regular ones in the concession</b> <input type="checkbox"/> Not applicable	Healthy entrée:				Regular entrée:			
		\$				\$			
4-1a .8.1	<b>8. Healthy main dish salads<sup>8</sup> compared to regular ones in the concession</b> <input type="checkbox"/> Not applicable	Healthy salad:				Regular salad:			
		\$				\$			
4-1a .9.1	<b>9. Healthy beverages<sup>9</sup> compared to regular ones in the concession</b> <input type="checkbox"/> Not applicable	Water/milk/juice:				Sweetened water: (pop, vitamin water, Gatorade)			
		\$				\$			
4-1a .10.1	<b>10. Healthy beverages<sup>9</sup> compared to regular ones in a vending machine</b> (closest to concession) <input type="checkbox"/> Not applicable VM#___	Water:				Sweetened water: (pop, vitamin water, Gatorade)			
		\$				\$			
4-1a .11.1	<b>11. Healthy snacks<sup>10</sup> compared to regular ones in the concession</b> <input type="checkbox"/> Not applicable	Healthy snack: (fruit/vegetable)				Regular snack: (cookie/chips/choco)			
		\$				\$			
4-1a .12.1	<b>12. Other (specify)</b> <input type="checkbox"/> Not applicable								

<sup>2</sup>Sizes: small < one letter size piece of paper (8.5 X 11"); medium 1-3 pieces of paper together; large >3 pieces of paper together

<sup>6</sup>The price should be relative (i.e. a half portion should cost half as much as the full portion)

<sup>7</sup>A healthy main dish/ entrée is defined as per our NEMS plus definition.

<sup>8</sup>A healthy main dish salad is defined as per our NEMS plus definition.

<sup>9</sup>Choose beverages comparable in size. Use water (or milk, or juice) for the healthy beverage, and pick a sugar beverage made from water (or milk) as the regular beverage, such as pop, Vitamin Water, or Gatorade (or chocolate milk).

<sup>10</sup> Choose and specify one healthy compare and one regular snack to compare using the examples provided, provided adequate details.

## Section 4 - Concession or Food Service Areas

## C. Placement Promotions

4-1		CONCESSION 1			
ID	Location	Product(s) or brand(s) advertised Record serving size of products	Child-directed?	Sports-related?	Size of advertising <sup>2</sup>
4-1c .1.1	<b>1. At checkout</b>  Include non-packaged products and advertisements located at the checkout <sup>11</sup>  <b>Record any packaged products (that would be sold in vending machines) in the concession audit.</b>  <input type="checkbox"/> No ads <input type="checkbox"/> No food/bev ads <input type="checkbox"/> Not applicable	1.	Yes No N/A	Yes No N/A	S M L N/A
4-1c .1.2		2.	Yes No N/A	Yes No N/A	S M L N/A
4-1c .1.3		3.	Yes No N/A	Yes No N/A	S M L N/A
4-1c .1.4		4.	Yes No N/A	Yes No N/A	S M L N/A
4-1c .1.5		5.	Yes No N/A	Yes No N/A	S M L N/A
4-1c .1.6		6.	Yes No N/A	Yes No N/A	S M L N/A
4-1c .1.7		7.	Yes No N/A	Yes No N/A	S M L N/A
4-1c .1.8		8.	Yes No N/A	Yes No N/A	S M L N/A
4-1c .1.9		9.	Yes No N/A	Yes No N/A	S M L N/A
4-1c .1.10		10.	Yes No N/A	Yes No N/A	S M L N/A
4-1c .2.1	<b>2. Other (specify)</b>  <input type="checkbox"/> Not applicable		Yes No N/A	Yes No N/A	S M L N/A

<sup>2</sup>Size: small < one letter size piece of paper (8.5 X 11"); medium 1-3 pieces of paper together; large >3 pieces of paper together

<sup>11</sup>Checkout is defined as the space close to you (within reach) when paying for your order (what you see when you are buying your food or beverage).

**Review entire assessment form prior to leaving the facility to ensure it is fully completed.**

**Appendix C - Components, definitions, and process of scoring data collected by the FoodMATS**

Component	Exposure		Power					
Indicator	Frequency	Repetition	Content		Design	Execution		
Definition	Any commercial advertising, promotion, or messaging of food or beverage products/ brands/ food retailers (i.e. restaurant) that is intended to increase the “recognition, appeal and/or consumption” of such products/ brands [26] (p.9) Excludes product packaging.	A product, brand, or food retailer that is marketing $\geq$ 3 times within 1 facility.	<u>Product/Brands:</u> “Most Healthy”= unprocessed food/beverages with no added fat, sugar or salt; “Less Healthy”= some added fat, sugar, or salt; “Least Healthy”= processed energy-dense, nutrient-poor items with high levels of fat, sugar, or salt.	<u>Retailers:</u> “Most Healthy”= sandwich outlets, smoothie outlets, grocery stores, farmers’ markets, and salad bars; “Less Healthy”=sit-down restaurants, cafeterias, coffee outlets, prepared grocery stores, and supplement stores; “Least Healthy”= pizza, burger, taco, fried chicken, Asian, and ice cream outlets, and pubs/lounges/alcohol stores.	Evidence of animated or fictional characters, taste appeals, humour, action-adventure, fantasy, fun (shapes, colours), competitions, giveaways, cartoonish font, or uses a child actor <sup>1</sup> to advertise a food or beverage product/brand that would appeal to children.	Any reference to physical activity, exercise, sport, game, recreation, performance or competition. (A design feature relevant to sport settings)	<u>Outdoor :</u> small < one letter size piece of paper (8.5 X 11 in) medium 1-10 letter size sheets of paper together large >10 pieces of paper together	<u>Indoor:</u> small < one letter size piece of paper (8.5 X 11”) medium 1-3 pieces of paper together large >3 pieces of paper together
Every marketing instance identified was ranked on each indicator using the definitions:								
Rankings	One <i>instance</i> =1	One <i>repeated</i> product, brand or retailer=1	Ranked as “Least Healthy”=1; “Less Healthy”=0.5; “Most Healthy”=0		Ranked as present=1; or absent=0	Ranked as present=1; or absent=0	Ranked as large=1; medium=0.5; small=0	
Rankings for each marketing instance were scored within each food, sport, other area:								
Indicator Scores	FREQ = $\sum instances * 0.2$ pts	REP = $\sum repeated * 1$ pt	UNHE = $\sum rankings / FREQ * 5$ pts		CHIL = $\sum rankings / FREQ * 5$ pts	SPOR = $\sum rankings / FREQ * 5$ pts	SIZE = $\sum rankings / FREQ * 5$ pts	
For each area (food, sport, other), a FoodMATS score was calculated. If there was more than one sports area or food area within one facility, each area was scored individually and then summed for the complete Sport or Food Area score.								
Area Scores	FOODMATS <sub>Area</sub> = FREQ + (FREQ*POW) where POW = UNHE + CHIL + SPOR + SIZE							
For the entire site, a total FoodMATS score was calculated by summing all Area scores and adding a repetition factor to reflect the number of repeated products, brands, retailers marketed per site.								
Facility Scores	FOODMATS <sub>Facility</sub> = FOODMATS <sub>Sports</sub> + FOODMATS <sub>Food</sub> + FOODMATS <sub>Other</sub> + REP							

<sup>1</sup>added post pilot after this technique was identified; <sup>2</sup>excludes pricing and select place marketing instance

**Appendix D - Nutrient and ingredients assessed in Canadian provincial nutrition guidelines for the recreation sector**

Province	Guidelines	Year	Raking Categories	Reference amount	Nutrients Assessed											Ingredients assessed
					Energy (kcal)	Fat (g)	SF <sup>1</sup> (g)	TF <sup>2</sup> (g)	Na <sup>3</sup> (mg)	Sugar (g)	Fibre (g)	Protein (g)	Ca <sup>4</sup> (%DV)	Fe <sup>5</sup> (%DV)	Vit D <sup>6</sup> (%DV)	
Alberta	Alberta Nutrition Guidelines for Children and Youth for childcare, school, and recreation/ community centres	Introduced: 2008 Updated: 2010	2008-present: (1) "Choose Most Often" (2) "Choose Sometimes" (3) "Choose Least Often"	Serving size based on product type	✓ <sup>7</sup>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Added fibre Added fat Added sugar Artificial sweeteners Caffeine
British Columbia	Healthier Choices in Vending Machines in B.C. Public Buildings	Introduced: 2006 Updated 2014	2006-2014: (1) "Choose Most Often" (2) "Choose Sometimes" (3) "Choose Least Often" (4) "Not Recommended"  2014-present: (1) "Sell Most" (2) "Sell Sometimes" (3) "Do Not Sell"	Package size	✓	✓	✓	✓	✓	✓	x <sup>8</sup>	✓	✓	x	✓	Whole grain Added sugar Artificial sweeteners Caffeine Other botanical ingredients

Nova Scotia	Guidelines for Healthy Eating in Recreation and Sport Settings	Introduced: 2016	2016-present: (1) "Maximum" (2) "Moderate" (3) "Minimum"	Serving size based on product type	✓	✓	✓	✓	✓	✓	×	✓	×	×	×	Added fibre Added fat Added sugar Added sodium Artificial sweeteners Caffeine
-------------	--	------------------	---	------------------------------------	---	---	---	---	---	---	---	---	---	---	---	--

<sup>1</sup>SF=saturated fat <sup>2</sup>TF= trans fat <sup>3</sup>Na=sodium <sup>4</sup>Ca=calcium <sup>5</sup>Fe=iron <sup>6</sup>Vit D=vitamin D <sup>7</sup>✓=included nutrient in profiling system <sup>8</sup>×=excluded nutrient in profiling system

**Appendix E - Categorization of food and beverage products recorded on FoodMATS and in concession sales data by harmonized criteria**

Food Type	Harmonized Categories		
	Most Healthy <i>With no added fat, sugar, or salt</i>	Less Healthy <i>With 1 added fat, sugar, or salt; OR low levels of 2 added fat, sugar, or salt</i>	Least Healthy <i>With 2 added fat, sugar, or salt; OR high levels of 1 added fat, sugar, or salt</i>
Vegetables & Fruit	Fresh, frozen, canned fruit/vegetables Fruit/vegetables with dip/dressing Dried fruit Fruit sauce	Smoothies 100% fruit or vegetable juice Baked vegetable chips	Regular vegetable chips Deep fried vegetables Pickled vegetables
Grain Products	<i>Must be whole grain.</i> Whole grain rice, pasta, bread, pitas, wraps Hot cereal	<i>May be whole grain or refined grain.</i> Granola bars Non-whole grain rice, pasta, bread, pitas, wraps Baked goods (e.g. muffins) Rice cakes Pretzels (hard)	<i>Refined grain products.</i> Cold cereal Pancakes Cookies Dessert-like baked goods (e.g. brownie) Crackers Pretzels (soft)
Milk & Alternatives	Plain skim, 1%, 2% milk Plain skim, 1%, 2% yogurt, kefir, soygurt Low-fat (<20% M.F.) cheese	Flavoured skim, 1%, 2% or higher fat yogurt, kefir, soygurt Regular fat cheese (>20% M.F.)	Sweetened milk Processed cheese products
Meat & Alternatives	Fresh, frozen lean meat, poultry, fish that was baked, broiled, grilled Eggs Legumes Nut/seeds, nut butters	Hummus Mayonnaise-based egg, tuna salads Salted/sugared nut, seeds, nut butters	Breaded and/or deep-fried meat, poultry, fish Processed meat (deli, bacon, sausage, jerky)
Mixed dish with no protein source <sup>4</sup>	<ul style="list-style-type: none"> <li>Each major ingredient of the dish assessed according to their food type. Closest ranking to the average of all ingredients is selected as the rank for that mixed product. If the average was exactly in the middle of “Most Healthy” and “Less Healthy” it was increased to “Most Healthy”. If the average was exactly in the middle of “Least Healthy” and “Less Healthy” it was lowered to “Least Healthy”.</li> <li>If the mixed dish included an undefined beverage (i.e. “drink”), the ranking of the mixed dish alone served as the ranking of the combo (mixed dish + drink). If the mixed dish included a defined beverage (i.e. “juice”), the beverage was included as a major ingredient of the mixed dish and was included in the calculation of the average ranking.</li> </ul>		

<sup>4</sup> Protein source is any meat or alternative product. It does not include milk and alternative products.

Mixed dish with a protein source <sup>3</sup> (entrees)	<ul style="list-style-type: none"> <li>Entire dish assessed on evidence of 4 qualities: (1) whole grain<sup>5</sup> (if applicable), (2) quality protein<sup>6</sup>, (3) vegetable serving<sup>7</sup>, (4) no added fat<sup>8</sup>.</li> <li>A priori simplifying assumptions were necessary to classify mixed dishes with protein (see below). Additional information was obtained from menu analyses for concession audits when available to inform ranking.</li> <li>Rankings for combos of mixed dishes with protein and beverages were calculated by averaging the ranking of the mixed dish with protein and the ranking of the beverage. If the mixed dish with protein included an undefined beverage (i.e. “drink”), the ranking of the mixed dish with protein alone served as the ranking of the combo.</li> <li>Averages that fall exactly between two categories were treated the same as above (see “Mixed dish with no protein”).</li> </ul>		
	Evidence of all 4/4 qualities	Evidence of all 2-3/4 qualities	Evidence of all 0-1/4 qualities
Kids’ Meals	<ul style="list-style-type: none"> <li>Assessed on evidence of 3 qualities: (1) whole grain<sup>5</sup> (if applicable), (2) quality protein<sup>6</sup>, (3) healthy side<sup>9</sup>. Kids’ meals were automatically ranked as “Least Healthy” if they contained red meat or had cheese as a major ingredient.</li> </ul>		
	Evidence of all 3/3 qualities	Evidence of 2/3 qualities	Evidence of 0-1/3 qualities, OR contains red meat or cheese as their major ingredient <sup>10</sup> .
Condiments	None.	Sauces that provide some nutritional value and/or have low levels of fat, sugar, or salt: Salsa (homemade) Low-fat salad dressing	Sauces that provide no nutritional value and/or have high levels of fat, sugar, or salt: Sour cream Cream cheese Gravy
Other foods	None.	None.	Energy-dense, nutrient poor foods: Chocolate Candy Ice cream/frozen desserts Baked desserts (e.g. pie)

<sup>5</sup> Assume all breads, buns, wraps, etc. are not whole grain unless specified in the sales data or the concession audit. “Brown bread” is counted as whole-grain.

<sup>6</sup> Quality proteins include baked, broiled, boiled, grilled, or roasted fresh or frozen meats; or legumes, eggs, nut butters. It does not include milk and alternatives (milk, cheese, yogurt, etc.). Quality proteins cannot be deep-fried or breaded at any point and cannot be high fat/salt meats (ham, pastrami, salami, pepperoni, corned beef).

<sup>7</sup> Vegetable serving equals ½ cup (125ml) of fresh, frozen, canned non-leafy vegetables or 1 cup (250ml) of leafy vegetables.

<sup>8</sup> Added fat for entrees include any presence of high fat sauce (cheese sauce), ingredients (cheese, bacon, avocado, mayonnaise based salad), or sides (French fries, onion rings); it does not include butter, margarine, or mayonnaise spread on sandwiches. Added fat for vegetable-based entrée sized salads represent having more than 2 of the following: full fat dressing not on side, avocado, bacon, cheese, croutons, egg, fried noodles, crushed tortilla chips, nuts, olives, pesto, sausage, pepperoni, salami, bologna, pastrami, high fat lunch meat, or sour cream (meats are counted if they are in addition to the main protein).

<sup>9</sup> Healthy side includes vegetables, fruit, or other “Most Healthy” foods.

<sup>10</sup> Always includes: pizza, hamburgers, hot dogs, beef tabos, pasta and cheese, grilled cheese



Other beverages	Beverages with no added sugar: Plain water	Beverages with artificial sweeteners (no caffeine), or low levels of added sugar: Diet soft drinks Diet sports drinks Diet vitamin enhanced-water Coconut water	Beverages with high levels or added sugar; OR with caffeine: Soft drinks Sports drinks Vitamin enhanced water Energy drinks Fruit drinks Slushies Hot Chocolate Frappuccino/ Iced Cappuccino Alcohol
-----------------	---	---	---

**General assumptions made to rank products on FoodMATS and foods and beverages on concession sales**

- Dip/dressing is on the side of fruits and vegetables unless otherwise specified.
- Dried fruit and fruit sauces are unsweetened unless otherwise specified.
- Smoothies are fruit and milk based but contain some added sugar and are always “Less Healthy” unless otherwise specified.
- 100% juice is always “Less Healthy” due to its high sugar concentration, even though it contains no added sugar
- Rice, pasta, bread, pitas, and wraps are non-whole grain and always “Less Healthy” unless otherwise specified.
- Oatmeal is without added fat and sugar unless otherwise specified and is always “Most Healthy”.
- Granola bars had lower levels of added sugar and is always “Less Healthy” unless otherwise specified.
- Cold cereal (no added milk) has high added sugar and is always “Least Healthy” unless otherwise specified. Cold cereal with milk is assessed as a mixed dish.
- Pancakes always have high added sugar and fat and are always “Least Healthy” unless otherwise specified.
- Cookies and dessert-like baked goods had high fat and sugar and were always “Least Healthy” unless otherwise specified.
- Crackers are high in fat and sodium and are always “Least Healthy” unless otherwise specified.
- All milk is plain low-fat and always “Most Healthy” unless otherwise specified. Assume all soy and almond milks are sweetened and always “Least Healthy” unless otherwise specified.
- Yogurt is flavoured and always “Less Healthy” unless otherwise specified.
- Cheese is processed and always “Least Healthy” unless otherwise specified.
- Eggs are always “Most Healthy” unless they are in a mayonnaise-based salad.
- Nuts and nut butters have low levels of added sugar and salt and are always “Less Healthy” unless otherwise specified.

- No condiments are “Most Healthy” since condiments generally are a source of added fat, sugar, or salt.
- General “Dip”, “Dipping Sauce” are always “Least Healthy”
- “Other foods” are always “Least Healthy” since these are food generally high in 2 added fat, sugar, and salt.
- Soft drinks, sports drinks, and vitamin enhanced water, energy drinks are high sugar and are always “Least Healthy” unless otherwise specified.

**Assumptions made for ranking "Mixed Dishes with Protein" on concession sales**

- Breakfast items (e.g. “Big Breakfast”, breakfast sandwich, etc.) have eggs.
- Breakfast sandwiches/wraps always have cheese.
- Soups do not have a protein source unless indicated.
- Soup is always “Less Healthy” unless it specifies it is a packaged dry soup mix (which we assume is “Least Healthy”).
- Sandwiches do not have vegetables unless it was in the name (e.g. “tomato tuna sandwich”, and that it did have vegetables in the name it satisfied vegetable requirements.
- Sandwiches have protein (i.e. analyze as mixed dish with protein), but only have a quality protein if it in the product name (i.e. “wrap” has protein but not a quality protein; “chicken wrap” has protein and we assume it is a quality protein; “grilled chicken wrap” has protein and it is clearly a quality protein; “crispy chicken wrap” has protein but it is a low quality protein.
- All pizza has a non-quality protein source (unless it is “cheese pizza”) and it is “Least Healthy” unless the product name or concession audit reveals that it meets the criteria for “Less Healthy” or “Most Healthy”. Cheese pizza is always “Least Healthy”.

## Appendix F - Facility Invitation Letter

January 2017

**We would like to invite you to participate in an important study about food marketing in recreation facilities called “Eat, Play, Live Alberta: Food Marketing”.**

---

Dear Recreation Manager,

As you know, your facility is participating in a research study about food environments in recreation facilities across Canada, called “Eat, Play, Live”. In this study, **we evaluated food and beverage marketing** present in your facility using an observational checklist. It can also be valuable to understand **your customers’ awareness and experiences of food and beverage marketing** from their perspective. We invite your facility to participate in an extension of “Eat, Play, Live”. Specifically, **your facility is invited to participate in a qualitative photo-based project with families who visit your facility regularly.**

This study, **“Eat, Play, Live Alberta: Food Marketing”**, is being conducted by Rachel Prowse, RD, PhD Candidate and Dr. Kim Raine at the University of Alberta. **This study aims to understand parents’ perspectives of food and beverage marketing present in public recreation facilities in Alberta.** The study is being funded by the Canadian Institutes for Health Research.

Research in Canada has shown that **recreation facilities experience many barriers to selling healthy foods and beverages. It is possible that unhealthy food marketing is one of these barriers.** In the “Eat, Play, Live” project, 100% of Alberta facilities had some form of food or beverage marketing. Almost three-quarters of promoted foods, beverages, brands, and retailers were less healthy, inconsistent with health promoting efforts of many Eat, Play, Live sites.

Understanding food marketing in recreation facilities is important to support healthy families. Parents say that they struggle to provide their children with healthy meals while simultaneously trying to meet the demands of their child’s busy sport schedules, often purchasing fast food and forgoing home cooked meals. Food and beverage marketing can undermine parents’ abilities to choose healthy food for their children. **Recreation facilities are the perfect opportunity to sell and promote healthy foods and beverages to support parents in feeding healthy meals and snacks to their children.**

The “**Eat, Play, Live Alberta: Food Marketing**” project will use a **photo interviewing process to understand food marketing in recreation facilities from parents’ perspectives**. Parents’ who regularly (at least once a week) visit your recreation facility for their child’s organized sport or activity will be invited to participate. Participants will be recruited by posters in the facility and by notices in email newsletters. **As the facility representative, we will ask you to support recruitment by helping us post and send notices out.**

**Parents who agree to participate will be asked to take photos of their experiences of food and beverage marketing** (not just advertising) as they visit your recreation facility for their child’s sport. They will be given digital cameras or use their smart phones to take photos over a two week period. **After two weeks, each participant will be interviewed by Rachel Prowse to discuss their photos (approximately 30-60 minutes)**. Additional rounds of data collection and interviewing may be requested, if the investigators believe that there is more to learn from the participants. Participants will be given a gift card of \$30 to a grocery store of their choice for compensation for their time.

**Benefits:**

- A greater understanding of your facility’s food marketing environment from the perspective of parents. This may be particularly beneficial if you are considering how to support healthy changes to your concession and vending services.
- Understand how recreation facilities can generate supportive environments for their families and communities, which is consistent with the recently released Framework for Recreation in Canada/

**Please respond by ticking the appropriate box on the final page and sending us this form by email.** We will then contact you shortly and provide more information if your facility is able to participate. If we do not hear from you, we may contact you by telephone to see if you are interested in participating.

If you have any questions or concerns, please feel free to contact:

Rachel Prowse  
[contact information]

Thank-you,

Rachel Prowse, RD, PhD Candidate  
Kim Raine, RD, PhD  
Centre for Health Promotion Studies  
School of Public Health,  
University of Alberta

**Consent to contact you to participate in the Eat, Play, Live Alberta: Food Marketing Study**

---

- Yes**, our facility would like to take part. Please contact us with more information.
- Maybe**. Please contact me with more information.
- No**, our facility will not be able to take part at this time.

Recreation Facility: \_\_\_\_\_

Community: \_\_\_\_\_

Your Name: \_\_\_\_\_

Your Job Title: \_\_\_\_\_

e: \_\_\_\_\_

ph: \_\_\_\_\_

**Please scan and email this page to [contact information] Att: Rachel Prowse**

## Appendix G - Facility Agreement for Eat, Play, Live Alberta: Food Marketing

### Study Title: Eat, Play, Live Alberta: Food Marketing

#### Research Investigator:

Rachel Prowse & Kim Raine, PhD  
 Centre for Health Promotion Studies  
 School of Public Health  
 University of Alberta  
 4-347 Edmonton Clinic Health Academy  
 11405 – 87 Ave.  
 Edmonton, AB, Canada T6G 1C9  
 [contact information]

#### Background

- You are being asked to participate in this study because you are the manager or administrator for a recreation centre participating in the research study, Eat, Play, Live.
- As an Eat, Play, Live site, we invite you to participate in a supplemental study evaluating food marketing in your facility (Eat, Play, Live Alberta: Food Marketing).
- This study is being conducted by Rachel Prowse, RD, PhD Candidate and Dr. Kim Raine at the University of Alberta.
- You may contact the investigators by phone or e-mail (see contact information above) if you have any questions.
- This evaluation is being funded by the Canadian Institutes for Health Research.

#### Purpose

- Research in Canada has shown that recreation facilities experience many barriers to selling healthy foods and beverages, one which may be unhealthy food marketing. This study aims to understand parents' perspectives of food and beverage marketing present in public recreation facilities in Alberta.
- You will benefit by becoming more aware of your facility's food marketing environment from the perspective of parents. This may be particularly beneficial if you are considering how to support healthy changes to your concession and vending services.
- You will contribute to the development of new knowledge about the state of food marketing that families are exposed to when they visit recreation facilities and can help generate community sport and recreation centres that support the wellbeing of their communities.

#### Study Procedures

- Facilities that are participating in the Eat, Play, Live project will be invited to participate in this additional study: Eat, Play, Live Alberta: Food Marketing. Facilities will sign this agreement to indicate their involvement in the latter.
- Facilities will help recruit parents to participate in the study through posting signs in their centres and distributing electronic notices through newsletters.
- Parents' who regularly (at least once a week) visit your recreation facility for their child's organized sport or activity will be invited to participate.
- Each parent will sign an informed consent form before participating.

- Participants will be asked to take photos of their experiences of food and beverage marketing (not just advertising) as they visit your recreation facility for their child's sport or activity.
- Digital cameras will be given to participants to take photos, or participants will use their own smart phone.
- After two weeks of photo taking, each participant will discuss their photos in an interview with R.Prowse, which would take 60 minutes. Interviews will be recorded
- In some cases, participants may be asked to participate in another round of photo taking and interviewing if the investigators feel that there is more to learn.
- Each participant will be given a \$30 gift card to a grocery store of their choice for compensation of their time.

#### Benefits

- By participating in Eat, Play, Live Alberta: Food Marketing, you will:
  - gain a greater understanding of your facility's food marketing environment from the perspective of parents, which may be particularly beneficial if you are considering how to support healthy changes to your concession and vending services
  - understand how community sport and recreation centres can support the wellbeing of their communities through supportive environments, which is consistent with the 2015 Framework for Recreation in Canada
  - contribute to the development of new knowledge about the state of food marketing that families are exposed to when they visit recreation facilities to help protect children's health in general

#### Risk

- There are no known or anticipated risks or inconveniences to you by participating in this research.

#### Voluntary Participation

- Your participation in this research must be completely voluntary.
- If you do decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study your facility's data will not be used.

#### Confidentiality & Anonymity

- In terms of protecting your anonymity, your name and the name of your facility will not be used during the data analysis phase.
- Your confidentiality and the confidentiality of the data will be protected by researchers using a pseudonym to identify your recreation facility.
- Photos and electronic files will be stored on a secure network drive at the University of Alberta which is password protected and accessible only to the investigators and research assistants.
- Photos will not be released without permission from participants and your facility.
- Hard copies of the data will be stored in locked filing cabinets at the University of Alberta.
- Data from this study will be disposed of in five years. Transcripts from interviews will be shredded, computer files deleted, and audio files erased.
- It is anticipated that the results of this study will be shared with others as reports to the Canadian Institutes for Health Research and Provincial Advisory Committee for the Eat, Play, Live study in Alberta. It may also be used in published articles, and for presentations at scholarly meetings and other recreation and health service provider meetings.
- We may use the data we get from this study in future research, but if we do this it will have to be approved by a Research Ethics Board.

Further Information

If you have any further questions regarding this study, please do not hesitate to contact:

Rachel Prowse

[contact information]

In addition to being able to contact the researcher at the above phone number, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Research Ethics Office at the University of Alberta (780-492-0459).

Your signature below indicates that you understand the above conditions of having your facility participate in this study, that you have had the opportunity to have your questions answered by the researchers and that you agree to having your facility take part in the research study.

<i>Name of <u>manager/administrator</u></i>	<i>Signature</i>	<i>Date</i>
---	------------------	-------------

Recreation Facility: \_\_\_\_\_

Community: \_\_\_\_\_

**YOUR** Contact information:     Same as above

**NAME:** \_\_\_\_\_

**TITLE:** \_\_\_\_\_

**e:** \_\_\_\_\_

**ph:** \_\_\_\_\_

**Please sign, scan and email this page to [email address] Att: Rachel Prowse**



## Appendix H – Recruitment Poster

Do you like taking **photos**?

And talking about your  
**child and food**?

Participants needed for research on:  
***CHILDREN'S FOOD & RECREATION***

We are looking for volunteers to take part in a study of *parents' and guardians' perceptions of food and beverages in and around children's sports at recreation facilities.*

If you have:

- a child (2-17 years old) who visits this recreation facility at least once a week for your child's organized sport or activity, you can participate!

You would be asked to:

- take photos in your recreation facility, and
- participate in an interview about your photos.



Your participation would involve using your smart phone or a digital camera (temporarily provided) to take photos at your local recreation facility. You will be required to attend 2 sessions (one 30 minute introductory meeting before you take photos, and one follow-up 60 minute interview). In appreciation for your time, you will receive a \$30 gift card for a grocery store of your choice. Child care can be arranged for meetings and interviews as needed.

For more information about this study, or to volunteer for this study, please contact:

**Rachel Prowse, RD**

University of Alberta  
[contact information]



This study has been reviewed by, and received ethics clearance by the University of Alberta Research Ethics Board 1.

Call Rachel Prowse  
204-996-7525  
Email:  
[prorowse@ualberta.ca](mailto:prorowse@ualberta.ca)

Call Rachel Prowse  
204-996-7525  
Email:  
[prorowse@ualberta.ca](mailto:prorowse@ualberta.ca)

Call Rachel Prowse  
204-996-7525  
Email:  
[prorowse@ualberta.ca](mailto:prorowse@ualberta.ca)

Call Rachel Prowse  
204-996-7525  
Email:  
[prorowse@ualberta.ca](mailto:prorowse@ualberta.ca)

Call Rachel Prowse  
204-996-7525  
Email:  
[prorowse@ualberta.ca](mailto:prorowse@ualberta.ca)

Call Rachel Prowse  
204-996-7525  
Email:  
[prorowse@ualberta.ca](mailto:prorowse@ualberta.ca)

Call Rachel Prowse  
204-996-7525  
Email:  
[prorowse@ualberta.ca](mailto:prorowse@ualberta.ca)

Call Rachel Prowse  
204-996-7525  
Email:  
[prorowse@ualberta.ca](mailto:prorowse@ualberta.ca)

## **Appendix I – Recruiting email sent to parents from facilities**

Recruitment Email to be sent out by facilities

Do you like taking **photos**? And talking about your **child** and **food**?

We are looking for volunteers to take part in a study of parents' and guardians' perceptions of food and beverages in and around children's sports at recreation facilities.

If you have a child (between 2-17 years old) who visits this recreation facility at least once a week for your child's organized sport or activity, you can participate!

You would be asked to:

- take photos in your recreation facility, and
- participate in an interview about your photos.

Your participation would involve using your smart phone or a digital camera (temporarily provided) to take photos at your local recreation facility. You will be required to attend 2 sessions (one 30 minute introductory meeting before you take photos, and one follow-up 60 minute interview). In appreciation for your time, you will receive a \$30 gift card for a grocery store of your choice. Child care can be arranged for meetings and interviews as needed.

For more information about this study, or to volunteer for this study, please contact:

**Rachel Prowse, RD**

University of Alberta

[contact information]

This study has been reviewed by, and received ethics clearance by the University of Alberta Research Ethics Board 1.

**Appendix J - Photo Interview Consent Form for Eat, Play, Live Alberta: Food Marketing*****Photo Interview Consent Form***  
**for Eat, Play, Live Alberta: Food Marketing****Study Title: Eat, Play, Live Alberta: Food Marketing****Research Investigator:**

Rachel Prowse & Kim Raine, PhD  
Centre for Health Promotion Studies  
School of Public Health  
University of Alberta  
4-347 Edmonton Clinic Health Academy  
11405 – 87 Ave.  
Edmonton, AB, Canada T6G 1C9  
[contact information]

**Background**

- You are invited to participate in this study because you are a parent with a child who regularly (at least one a week) visits a recreation facility.
- This study is being conducted by Rachel Prowse, RD, PhD Candidate and Dr. Kim Raine at the University of Alberta.
- You may contact the investigators by phone or e-mail (see contact information above) if you have any questions.
- This evaluation is being funded by the Canadian Institutes for Health Research.

**Purpose**

- Research in Canada has shown that recreation facilities experience many barriers to selling healthy foods and beverages. This study aims to understand parents' perspectives of food and beverage marketing present in public recreation facilities in Alberta.
- Your participation will contribute to new knowledge about the types of food marketing that children may be exposed to and how parents and families perceive food marketing.

**Study Procedures**

- You will sign an informed consent form before participating (see below).

- You will be asked to take photos of food and beverage marketing during your visit to your local recreation facility for your child's sport or activity. You may use your smart phone or we will give you a digital camera to use. You will have two weeks to take photos.
- After two weeks of photo taking, you will meet with R.Prowse to discuss your photos, which should take 60 minutes. Interviews will be recorded.
- In some cases, you may be asked to participate in another round of photo taking and interviewing.
- You will be given a \$30 gift card to a grocery store of their choice for a thank-you for participating in the study.
- If you need child care during the interviews, that can be arranged.

### Benefits

- By participating in this study, you will be able to give your thoughts about the place your child visits to be active.
- Your participating will contribute to future efforts to make sport and recreation facilities healthy for families.

### Risk

- Participation in this study may cause some inconvenience to you, including time required to take photos and meet with investigators.
- There are no known or anticipated risks to you by participating in this research.

### Voluntary Participation

- Your participation in this research must be completely voluntary.
- If you do decide to participate, you may withdraw at any time within one month of the interview without any consequences or any explanation. R.Prowse will inform you of this date during your second interview.
- If you do withdraw from the study your data will not be used, unless your data has already been analyzed.
- To make sure that you continue to consent to participate in this research, we will ask for your verbal consent each time you meet with the investigators.

### Confidentiality & Anonymity

- In terms of protecting your anonymity, your name and the name of your facility will not be used during the data analysis phase.
- Your confidentiality and the confidentiality of the data will be protected by researchers using a pseudonym to identify you or your recreation facility.
- Photos and electronic files will be stored on a secure network drive at the University of Alberta which is password protected and accessible only to the investigators and research assistants.
- Hard copies of the data will be stored in locked filing cabinets at the University of Alberta.
- Data from this study will be disposed of in five years. Transcripts from interviews will be shredded, computer files deleted, and audio files erased.

- It is anticipated that the results of this study will be shared with others as reports to the Canadian Institutes for Health Research and Provincial Advisory Committee for the Eat, Play, Live study in Alberta. It may also be used in published articles, and for presentations at scholarly meetings and other recreation and health service provider meetings.
- The photos you take will not be released without your permission.
- We may use the data we get from this study in future research, but if we do this it will have to be approved by a Research Ethics Board.

Further Information

If you have any further questions regarding this study, please do not hesitate to contact:

Rachel Prowse  
[contact information]

In addition to being able to contact the researcher at the above phone number, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Research Ethics Office at the University of Alberta (780-492-0459).

Your signature below indicates that you understand the above conditions of participation in this study, that you have had the opportunity to have your questions answered by the researchers and that you consent to participate.

\_\_\_\_\_

*Name of Participant*                      *Signature*                      *Date*

Recreation Facility: \_\_\_\_\_

Community: \_\_\_\_\_

Contact information:

e: \_\_\_\_\_

ph: \_\_\_\_\_

**Please sign, scan and email this page to [contact information] Att: Rachel Prowse**

### Appendix K - Participant Information Form

Date (i.e. June 4, 2016): \_\_\_\_\_

Recreation Facility: \_\_\_\_\_ City/Town: \_\_\_\_\_

Name: \_\_\_\_\_

Phone number: \_\_\_\_\_ Email address: \_\_\_\_\_

Gender: \_\_\_\_\_ Year of birth: \_\_\_\_\_

**1. Do you have one or more children who are 17 years old or younger?**

YES                       NO

**2. How old are your children?**

Check off the age of your children from oldest to youngest.

Age (years)	Child 1	Child 2	Child 3	Child 4	Child 5	Child 6	Child 7	Child 8	Child 9
2-3									
4-5									
6-7									
8-9									
10-11									
12-13									
14-15									
16-17									
18+									

**2. Of these children, do you have at least one child who visits your recreation facility at least once a week for an organized sport or activity?**

YES                       NO

**PLEASE COMPLETE OTHER SIDE**

**If yes, how often?**

Check off the frequency that each child attends the recreation facility from oldest to youngest.

Frequency	Child 1	Child 2	Child 3	Child 4	Child 5	Child 6	Child 7	Child 8	Child 9
1x/week									
2-3x/week									
4-5x/week									
6-7x/week									

**5. Do you usually stay at the recreation facility when your child is at the facility?**

- YES                       NO

**If yes, how often do you stay at the recreation facility when your child is at the facility?**

Check the frequency that you stay at the facility with your child from oldest to youngest.

Frequency	Child 1	Child 2	Child 3	Child 4	Child 5	Child 6	Child 7	Child 8	Child 9
Always									
Usually									
Rarely									
Never									
Not Applicable									

**6. Would you identify as an ethnic minority?**

- YES                       NO

**7. What was your household income last year before taxes?**

- less than \$15,000  
 \$15,000 - \$49,999  
 \$50,000- \$74,999  
 \$75,000 - \$100,000  
 more than \$100,000  
 Prefer not to answer

**THANK YOU!**



## Appendix L - Eat, Play, Live Alberta Initial Meeting Guide

### 1. Introductions

- Facilitator introduction
- Participant introduction

### 2. Review study protocol and informed consent form.

*The research study that you are invited to participate in aims to understand how parents with children who regularly attend organized sport or activity at a recreation facility experience food marketing. This study will ask you to use your smart photo, or a digital camera to take photos of your recreation facility when you visit it with your child during their sport or activity. You will have two weeks to take photos. After, you will send me the photos and I will develop them. Then we will meet to discuss your thoughts about the photos you've taken in an interview. I will be recording the interview. Only the transcripts of your interview(s) will be used in data analysis. The photos are only used as prompts in the interview. All data and copies of photos will be stored on secured servers at the University of Alberta. After five years they will be destroyed. The findings from this data will be shared with Alberta recreation facilities, and provincial stakeholders, as well as other researchers. If any photos are requested for use in knowledge sharing, we will obtain your permission before using them. All information will be anonymized and confidential. Your name and community will not appear anywhere. Your participation is completely voluntary and you may withdrawal at any point, up until your data is analyzed after which it cannot be removed because it has been anonymized.*

### 3. Answer questions participant has about study.

*Do you have any questions?*

### 4. Have participant sign informed consent form.

*Please review and sign the informed consent form if you would like to participate.*

### 5. Ask participant to complete participant information form.

### 6. Explain the project.

- Participant Expectations

- You will take photos during a two week period(s).
  - You will provide electronic copies of your photos to the investigators.
  - You will participate in a follow-up interview(s).
  - You will own the photos you take.
  - You will select a group of photos that are most meaningful to you.
- **Project Focus**
    - Recreation facilities provide opportunities to both be active and eat.
    - Sometimes when families are busy with sports they end up eating food away from home.
    - Our environments can influence what we eat. One environmental feature is food marketing.
    - Food marketing is broader than just advertising. It can include:
      - Product - What types of foods and beverages are available to purchase
      - Price - The costs of certain foods and beverages (financial and non-financial)
      - Place - Where foods and beverages are available to purchase, how easy access is, or where they are promoted
      - Promotion - How foods and beverages are promoted through signs, messages, programs
    - Food marketing increases the recognition, appeal, and consumption of certain products.
    - **Question to guide photo taking: What is the recreation facility saying about food and eating?**
    - Take photos of what you think the recreation facility is saying about food and eating while visiting the facility for your child's sport or activity. Feel free to take photos of things in and around your child's sport, as well as in the facility overall, or anything out of the facility (i.e. at home or in the community) that you think is related.

**7. Train participant on how to use digital camera (if applicable).**

**8. Review ethical practices for photo taking.**

- Do not take photos if it would put you in danger.
- Do not take photos in bathrooms or change rooms if anyone is present in the room besides you.
- Do not take photos of individuals without asking their permission first.

## Appendix M - Eat, Play, Live Alberta Follow-up Interview Guide

### Tasks:

#### 1. Re-Introductions

- Facilitator introduction
- Participant introduction

#### 2. Review previously signed informed consent form. Obtain verbal consent for ongoing participation.

It has been a while since you signed your consent letter and I just wanted to make sure you are still ok to participate in this interview. You can withdraw at any time even though you originally consented to the study. Do you still consent to participate? Did you need me to explain anything about the research study to you before we proceed?

- YES (continue to 3)
- NO (stop)

#### 3. Explain that the interview will be recorded.

I am going to record this call then transcribe the interview following the call. Be assured that your name or the name of your facility will not be used during the data analysis phase or in any of the written reports. Sometimes we like to directly quote key points made by participants in our reports but when we do, we do not identify the respondent by name or facility. Do you consent to being recorded?

- YES (continue to 4)
- NO (stop)

#### 4. Begin recording.

#### 5. Complete interview (see interview guide below).

## **INTERVIEW SEM-STRUCTURED GUIDE**

- Participants will review the photos identified as meaningful to them with the interviewer.
- “Show me what you think the recreation facility saying about food and eating?”

List of topics to cover:

- Rationale for selecting photos
- Interaction between self and photo content, child and photo content, family and photo content
- 4Ps of marketing (product, price, place, promotion)
- Different levels influencing or affected by marketing (intrapersonal, interpersonal, institutional, community, policy)

Prompting questions:

- Tell me about (visiting the recreation centre/your kid’s sport) over the last couple weeks (Question type - grand tour descriptive)
- I don’t have any children. Can you describe a typical visit to the recreation centre for your kid’s sport? (Type - mini tour descriptive)
- Show me the photos you took. Tell me about them. (Type – task oriented descriptive)
- Can you sort these photos into two or more piles in terms of how they are alike or different? (Type – contrast set sorting)
- Can you describe some of the different ways your kids (you) have experienced food marketing in recreation centres? (Type – structural)
  - Can you give me an example of \_\_\_\_\_? (Type – example descriptive)
- Can you recall any personal experiences (you or your child) has had with \_\_\_\_\_ (items in photos, folk terms, sets) (Type – experience descriptive)
- How do you see your child/family/community in the photos? (Type – descriptive)