Associations Between Food Parenting Practices and Dietary Intake
Among Children and Adolescents

by
Kathryn Walton

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ABSTRACT

ASSOCIATIONS BETWEEN FOOD PARENTING PRACTICES AND DIETARY INTAKE AMONG CHILDREN AND ADOLESCENTS

Kathryn Walton
University of Guelph, 2018
Advisor: Dr. Jess Haines
Committee Members:
Dr. Andrea Breen
Dr. Emma Haycraft

Food parenting practices influence child and adolescent nutrition. However, existing research has produced equivocal results, likely due to two key limitations: reliance on parent-report and failing to consider the context within which feeding occurs. Parental report data is subject to error and bias, and family functioning may influence how feeding is experienced by the child/adolescent. Further, there is little understanding of how family meal routines are established and why some families eat together while others do not. This thesis includes four papers that aim to address these limitations.

Paper one explores cross-sectional associations between family dinner frequency, a structured food parenting practice, and dietary intake (n = 2,728 youth), while exploring whether family functioning moderates or confounds the association. Regardless of level of family functioning, more frequent family dinners were associated with improved diet quality for youth.

Paper two explores the role of family functioning in the association between observed mothers’ and fathers’ food parenting practices and children’s nutrition risk (n=73 families with preschoolers). Mothers’, but not fathers’, food parenting practices
were associated with their children’s nutrition risk. Family functioning did not moderate or confound these associations.

Paper three qualitatively explores how family meal routines are established (n=20 families with preschoolers). Families approach family meals from one of three overarching orientations: meals for togetherness, nutrition messaging, or necessity. These orientations were influenced by parents’ early life experiences and major life transitions. Differences in the messages parents share about food and eating and challenges they experience with mealtimes were observed across the orientations.

Paper four comments on the future of research exploring food parenting practices. We argue that the current conceptualization of picky eating defines acts of resistance or expressions of preference by a child as deviant behaviour. A reconceptualization of picky eating is presented with suggestions for future research methods to explore food parenting and child eating habits bi-directionally.

Findings from this thesis increase our understanding of the impact of food parenting practices on child and adolescent dietary intake and how family meal routines are established. Results will help improve family-based nutrition interventions and pediatric/adolescent nutrition care in Canada.
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“Weeknight dinner traditions are the making of lifelong food memories”

~ The School Year Survival Cookbook
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<th>Description</th>
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<tbody>
<tr>
<td>AI</td>
<td>Acceptable Intake</td>
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<tr>
<td>AMDR</td>
<td>Acceptable Macronutrient Distribution Range</td>
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<td>95% CI</td>
<td>95% Confidence Interval</td>
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<td>BMI</td>
<td>Body Mass Index</td>
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<td>BMIz</td>
<td>Body Mass Index z-score</td>
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<td>CCHS</td>
<td>Canadian Community Health Survey</td>
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<td>EWCFG</td>
<td>Eating Well with Canada's Food Guide</td>
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<td>FaMOS</td>
<td>Family Mealtime Observation Study</td>
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<td>FFQ</td>
<td>Food Frequency Questionnaire</td>
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<td>g</td>
<td>Grams</td>
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<td>GUTS</td>
<td>Growing Up Today Study</td>
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<td>Healthy Eating Index</td>
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<td>Kg</td>
<td>Kilograms</td>
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<td>Mg</td>
<td>Milligrams</td>
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<tr>
<td>NutriSTEP®</td>
<td>Nutrition Risk Screening Tool for Every Preschooler</td>
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<td>NHS II</td>
<td>Nurses Health Study II</td>
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<td>OR</td>
<td>Odds Ratio</td>
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<td>SSB</td>
<td>Sugar Sweetened Beverage</td>
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<td>Upper Level</td>
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<td>WHO</td>
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<td>Weschler Intelligence Scale for Children III</td>
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<td>YAQ</td>
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1 Chapter One: Introduction

Nutrition plays a key role in the growth and development of young children as well as maintenance of health throughout life. Establishment of healthful eating habits early in life is important as eating habits have shown to track from preschool years to later childhood, adolescence and adulthood. As the main role model and gatekeeper of the home environment, parents play a key role in the development of children’s and adolescents’ eating habits through the food parenting practices they use. Food parenting practices are specific behavioural strategies that parents use to influence what, how much, or whether their children eat\(^1,2\). Food parenting practices have been categorized into three overarching constructs that describe parents’ interactions with their child(ren) during feeding: coercive control, structure and autonomy support\(^1\).

*Coercive control* refers to parent dominance and pressure upon the child during feeding interactions and includes specific practices such as restriction, pressure to eat, and the use of food as a reward or to control behaviour\(^1\). *Structure* refers to the organization of the feeding environment and not only encompasses the food available to the child, but also parents’ modeling of food intake and mealtime routines (i.e. family meals)\(^1\). Finally, *autonomy support* refers to parent practices that promote a child’s eating independence through nutrition education, encouragement, praise and involvement\(^1\).

While research suggests that practices within these three overarching constructs are associated with children’s and adolescents’ dietary intake\(^1\), the majority of food
parenting research has focused solely on the influence of mothers and has not considered the general family context, including the level of family functioning, within which food parenting occurs. Establishing healthy behaviours early before less healthy habits become entrenched is an important public health goal. However, the combined influence of parental food parenting practices and the general home environment on children’s and adolescents’ dietary intake has not been well understood. The development of effective interventions requires a clearer understanding of how food parenting practices and the general family context influence dietary intakes among children and adolescents.

This thesis makes a unique contribution to the body of literature relating to food parenting practices and the dietary intake of children and adolescents. It aims to understand the relationship between food parenting practices and children's and adolescent’s eating habits while considering the family context within which feeding, and mealtimes occur. By providing a clearer understanding of how food parenting practices and the general family context impact child and adolescent dietary intake, results from this thesis will help advance family-based nutrition interventions and pediatric and adolescent nutrition care.

Using data from the Growing Up Today Study 2 (GUTS2), a Harvard-based cohort of adolescents and young adults, the first study in this thesis explores cross-sectional associations between family dinner frequency and improved dietary quality while exploring whether family functioning moderates or confounds the association among a sample of 2,728 adolescents/young adults. We found that regardless of level
of family functioning, frequent family meals are associated with improved diet quality for adolescents and young adults. Specifically, youth who participated in more frequent family dinners reported higher intakes of fruits and vegetables and lower intakes of fast food and take-out consumption. For males, more frequent family dinners were also associated with lower intakes of sugar-sweetened beverages (SSBs) after adjusting for family functioning. Results of this study are presented in Chapter 3.

While the first study suggests that family dinners are an appropriate avenue with which to intervene on adolescent dietary intake regardless of level of family functioning, it is important to explore family meals among a younger population when dietary preferences and habits are established. The second study in this thesis builds on the findings from the first and explores the food parenting practices within the family dinner context among 73 families with preschoolers. Using data from the Family Mealtime Observation Study (FaMOS), we explore the role of family functioning in the association between observed food parenting practices and children's nutrition risk. Nutrition risk was measured using the Nutrition Screening Tool for Every Preschooler (NutriSTEP®) which describes children's risk of inadequate nutrition across five subscales including eating behaviours, dietary intake, parental concerns about food and activity, screen time duration, and the use of supplements. We found mothers' but not fathers’ food parenting practices were associated with their children’s nutrition risk, regardless of level of family functioning. Specifically, we found that mothers’ use of physical restriction was associated with higher nutrition risk and their use of positive comments about their
child’s food was associated with lower nutrition risk for the child. Results are presented in Chapter 4.

The results of the third study are presented in Chapter 5 which aims to understand how family meals are established and how family meal routines are influenced by parents’ own early life experiences with family meals. Informed by a life-course perspective, we conducted semi-structured interviews with 20 families with preschoolers to understand how family meal routines develop and evolve over one’s lifetime. Life-course perspective is a holistic approach to understanding the lives of people over time and posits that behaviours are influenced by both early life experiences as well as key life transitions, such as the transition to parenthood. Thematic analysis identified that families fell into one of three mealtime orientations influenced by parents’ own early life experiences with family meals and life course: 1) Meals for Togetherness, 2) Meals for Nutrition Messaging and 3) Meals for Necessity. The current family meal context including the messages parents shared with their children about food and eating and the challenges experienced with mealtimes differed across these three orientations.

Chapter 6 presents a commentary on the future of research exploring parental feeding practices and understanding children’s picky eating habits. We argue that the current conceptualization of picky eating defines acts of resistance or expressions of preference (acts of autonomy) by a child as deviant behaviour. This conceptualization has guided research that uses a unidirectional, parent to child approach to understanding parent-child feeding interactions. A reconceptualization of picky eating is
presented along with suggestions for future research methods to explore parental feeding practices and child eating habits bi-directionally.

The overall findings of this thesis are drawn together and discussed in Chapter 7. This chapter provides a summary of key findings and their implications, a discussion of the strengths and limitations of the thesis and suggestions and recommendations for future research.
2 Chapter Two: Literature Review

2.1 Introduction

This chapter provides an overview of the existing literature that has explored how food parenting practices, including family meals, are associated with children's and adolescents' dietary intake, with a focus on the role of the general family context on these associations. The literature review first provides an overview of the current knowledge surrounding dietary intakes and health outcomes among children and adolescents and provides an overview of the current state of dietary intake among these populations in Canada. Second, the literature surrounding the development of eating behaviours and food preferences, which lay the foundation for dietary intake, is explored. Specifically, the literature surrounding food parenting practices, including family meals which are considered to be a structured food parenting practice, and the influence these practices have on child and adolescent dietary intake is explored. Third, this literature review seeks to understand the role that the general family context, specifically family functioning, plays in the association between food parenting practices and child/adolescent dietary intake. This chapter ends with a presentation of the overall aims of this thesis.
2.2 Child and Adolescent Nutrition

Nutrition plays a critical role in the growth, development, academic achievement and overall health status of children and adolescents \(^8-11\). Many eating preferences and patterns are established early in life \(^12\) and longitudinal research shows that food preferences and choices during the preschool years are strongly associated with dietary patterns and food choices during adolescents and adulthood \(^13-16\).

2.2.1 Nutrition and Health Outcomes during Childhood and Adolescence

The dietary patterns established during childhood and adolescence not only influence shorter-term health, but also impact risk for later obesity and chronic disease \(^17-19\). The next section provides an overview of the short and long-term impacts of children’s and adolescent’s dietary intake.

2.2.1.1 Impact of Nutrition on Child and Adolescent Health

Nutrition is vital for optimal growth and development of children and adolescents\(^20\) and these formative years lay the physical and cognitive foundation for lifelong health, wellbeing and learning \(^9\). In Canada, and other developed countries, common nutrition concerns among preschool aged children include iron deficiency anemia, food allergies/intolerances, a delayed acquisition of feeding/eating skills, unhealthy food environments, and food insecurity \(^21\). These concerns can lead to poor
overall nutrition causing developmental, behavioural and growth problems. While many of these concerns remain during adolescence, the increasing independence gained during this time also brings about new concerns including an overall decline in diet quality, hallmarked by a low consumption of fruits and vegetables, a high consumption of foods high in saturated fat, sodium and sugar, meal skipping and disordered eating behaviours.

2.2.1.1 Impact of Nutrition on Development and Behaviour

Cognition is a complex set of mental functions in the brain that include memory, thinking, attention and learning and proper nutrition plays a principal role in cognitive development. While brain is the most metabolically active organ in the body, it stores relatively low levels of energy, causing it to rely on dietary intake for glucose (the brain’s preferred energy source). Through childhood and adolescence the brain develops considerably faster than the rest of the body, which may make it particularly vulnerable to nutrient deficiencies caused by poor dietary intake. Protein/Energy malnutrition, especially during the first year of life has been shown to have lasting negative impacts on aspects of behaviour and cognition including motor control, language development, school performance and overall intelligence scores. For example, in a study of 216 children aged 9-15 years of age, where half of the children had experienced moderate to severe protein-energy malnutrition during the first year of life only, 60% of the children who had experienced the malnutrition had attention problems compared to 15% of the well-nourished children. Nutrients including folic
acid, omega-3 fatty acids, iron, vitamin B12, choline and zinc have also been associated with improved cognitive development and functioning. However, studies looking at individual nutrient supplementation to improve cognitive functioning in children and adolescents have produced mixed results.

Despite the evidence of individual macro and micronutrients influencing cognitive development, it is important to consider the diet as a whole; humans eat a variety of combinations of foods whose nutrient compositions likely interact together to support optimal brain functioning. Looking at dietary patterns, there is a large body of evidence to support the association between breakfast consumption and improved cognitive functioning and school performance. A review of studies exploring the association between breakfast consumption and cognitive tasks (n= 45 studies; participants aged 4-18 years), found that breakfast consumption compared to fasting has positive same day influences on tasks requiring memory, executive functioning and attention among children and adolescents. Research has also shown the benefit of in-class breakfast programs on increasing on-task behaviours in the classroom among a small sample of male adolescents 14-19 years of age. Children and adolescents who habitually skip breakfast have been shown to have significantly higher school absences, more behavioural problems and lower grades.

There is also some evidence that overall diet quality, outside of malnutrition or breakfast skipping, influences neurocognitive development. Northstone and colleagues (2012) found that among a sample of 3 966 children in England, the consumption of a “processed diet” (high in fat, sugar and processed/convenience foods;
measured by a food frequency questionnaire (FFQ)) at age 3 was negatively associated with IQ scores at age 8.5 (-1.67 points on the Weschler Intelligence Scale for Children (WISC-III), 95% CI -2.34, -1.00) and that the consumption of a “health conscious diet” (high in salads, fruit vegetables, fish, pasta and rice) was positively associated with IQ scores (1.20 points, 95% CI, 0.52, 1.88), after adjustment for a wide variety of confounders including breastfeeding duration, the number of stressful life events experienced by the child, estimated energy intake, maternal education, social class, maternal age at birth of the child and maternal consumption of oily fish during pregnancy 33. This study suggests that dietary intake during early childhood can have implications on IQ scores during later childhood.

Academic outcomes during the elementary and high school years are indicative of later educational attainment which is associated with higher socio-economic status, better access to health care, and better overall health 27. Given the evidence that nutrition plays a critical role in cognitive and behavioural development and academic outcomes, improving the nutritional status of children and adolescents is an important public health goal.

2.2.1.1.2 Impact of Nutrition on Growth and Risk of Chronic Disease

When considering the healthy growth of children and adolescents, both under and over nutrition can have serious health implications 34. While being underweight is associated with an increased risk of infectious diseases and morbidity and mortality 35,
child and adolescent overweight and obesity have become a pressing public health concern in Canada and other developed countries.\textsuperscript{8,9,21,35-38}

It is estimated that approximately 1 in 7 Canadian children and youth (2-17 years) have overweight or obesity.\textsuperscript{36} While the causes and risk factors for overweight and obesity are multifactorial, dietary intake is an important precursor to weight gain among children and adolescents. Preschoolers’ nutrient needs are high relative to their energy requirements and, as such, there is little room for energy dense, high fat, sugar or salt foods (Faith, Scanlon, Birch, Francis, & Sherry, 2004). Frequent consumption of such foods put children at risk for excessive weight gain. Among adolescents, meal skipping, poor dietary intake including few fruits and vegetables and high amounts of SSBs and fast food and larger portion sizes influence weight gain.\textsuperscript{39} Excessive weight gained during childhood and adolescence is also a major risk factor for later obesity and chronic diseases such as heart disease during adulthood.\textsuperscript{40-42} However, children and adolescents are increasingly being diagnosed with obesity-related chronic diseases such as type two diabetes, high cholesterol, high blood pressure and joint problems that were previously seen almost exclusively among adults.\textsuperscript{38} The concern surrounding the early diagnosis of such diseases is that such diagnoses not only impact on short term health, but also long-term health as chronic diseases typically track into adulthood.\textsuperscript{40,43} This takes a significant toll on both individual health and wellbeing, and the health care system.\textsuperscript{43}

It has been noted that improving dietary intakes to align better with age-appropriate recommendations would make large strides in reducing individual risk of
obesity and chronic disease, as well costs to the health care system \(^9\), however, as discussed below, the diets of Canadian children and adolescents are in need of much improvement.

2.2.2 Current State of Children’s and Adolescent’s Nutritional Status in Canada

Despite this evidence that childhood and adolescence are key times for developing and establishing healthy dietary patterns, few Canadian children or youth are meeting dietary recommendations. According to the Canadian Community Health Survey (CCHS; 2004) \(^{44}\), 70% of children aged 4-8 do not consume the recommended number of servings of fruits and vegetables and 37% do not consume the recommended number of servings of milk and alternatives \(^{37}\). Unfortunately, these low rates of intake continue through adolescence, with 68% of boys and 62% of girls between the ages of 9-13 years not meeting the recommended servings of fruits and vegetables and 61% of boys and 83% of girls aged 10-16 years not meeting milk and alternative recommendations \(^{37}\).

When using the same data CCHS data \(^{44}\) to examine the quality of foods consumed by children, Jessri and colleagues \(^{34}\) found that one-third of children’s and adolescent’s (2-18 years) daily calories were made up of foods not recommended by Eating Well with Canada’s Food Guide (EWCFG)\(^{45,46}\), including foods with trans-fat and high fat (processed snacks, deep fried foods) and sugar foods (candies, sugar sweetened beverages (SSBs)). Findings by Hutchinson and colleagues\(^{47}\) also support these high intakes of “other” foods among younger children. Among a sample of 52
preschoolers (18 months- 5 years), they found that snacking made up approximately one-third of the children’s total daily calories, and only 70% of these snacks contained at least one EWCFG food group. Further, in a survey of Canadian youth across four regions in Canada, 70% of youth in grades 9-12 reported consuming fast food at least once a week. While information on the exact types of foods eaten during these fast food occasions was not collected, food obtained from fast food restaurants is generally higher in calories and fat.

The small number of children and adolescents meeting EWCFG recommendations and the high prevalence of energy-dense snacking and fast food consumption is also concerning when considering their specific macro and micronutrient intake. When examining macronutrient intake, among adolescents, data from the CCHS 2004 suggests that 30% of individuals aged 9-18 years of age have energy intakes that exceed their actual nutrient needs, which increases the risk of excess weight gain.

When examining micronutrient intake, data from the CCHS 2004 also found that 77% of 1-3 year-olds, 93% of 4-8 year-olds and more than 80% of 9-18 year-olds have sodium intakes greater than the tolerable upper intake levels (UL) of 1 500mg, 1 900mg and 2 300mg, respectively. Consumption above these levels is associated with an increased risk of adverse health effects including hypertension and cardiovascular disease. Further, the majority of children and adolescents between the ages of 1-18 were found to be consuming low levels of dietary fibre. The median intakes of fibre for 1-3-year-olds were 9.9g/day and 13.4g/day for 4-8-year-olds which is much less than the recommended Adequate Intake (AI). Similar to children, fibre
intakes below the AI continue to be a concern among adolescents; girls (9-18 years) and boys (9-13 years and 14-18 years) had median fibre intakes 14.0g/day, 16.3 g/d and 18.2 g/d, respectively. The AI for dietary fibre has been set at 14g/1000 kcal/day for individuals over the age of 1 which translates to approximately 19g/day for 1-3-year-olds and 25g/day and 4-8-year-olds. Sex differences in recommendations exist for adolescents with 26 g/day recommended for girls 9-18 years and 31 g/day and 38 g/day for boys 9-13 and 14-18 respectively. Low fibre intake has been associated with increased risk of constipation in the short term and diseases such as obesity, diabetes, coronary artery disease, stroke and certain gastrointestinal diseases in the longer term.

To support the development of effective interventions, a clear understanding of the factors that influence the development of child and adolescent eating habits and food preferences is needed.

2.3 Development of Eating Behaviours and Food Preferences

As discussed above, nutrition is critical during childhood and adolescence as these years are characterized as a time for rapid growth and development. However, nutrient intake is an outcome and to properly understand the mechanisms underlying intake, it is important to consider eating behaviours and how they develop. Notably, eating behaviours and food preferences continue to evolve throughout the lifespan. However, this section will focus on the preschool years as research has highlighted this
as a sensitive time for the development of eating behaviours which lay the foundation for eating behaviours and food preferences during adolescence and young adulthood \(^5^4\). Further, research suggests that new foods are more readily accepted between the ages of 2 and 4 years than they are in later childhood or adolescence \(^1^5\). In fact, the number of foods liked between the ages of 2 and 3 years did not differ significantly at 8 years \(^1^5\), underscoring the importance of the early years.

Children’s eating behaviours during the preschool age are influenced by both physical and psychological changes. The rate of weight gain from birth peaks by the age of two and slows between two to five years of age \(^5^5\). Alongside this period of slower growth, children’s appetites decrease \(^5^6\) and can often be quite erratic \(^5^7\). Children also develop a sense of autonomy, preferring to feed themselves and exercise power in their food selection \(^5^7\); food neophobia (initial rejection or avoidance of new foods) and food jags (short term periods of restricted intake) are extremely common \(^5^8\). Despite this, appetite control is inherent from birth and seems to remain throughout the preschool years, meaning children are able to start and stop eating in response to their hunger and satiety cues \(^1^3,1^4,5^9,6^0\). While individual variations in appetite do occur \(^6^1\), preschoolers have been found to able to effectively compensate for the consumption of energy dense foods \(^6^2,6^3\).

2.3.1 Picky/Fussy Eating

Having a ‘good eater’ is anecdotally a point of pride for many parents and children are often praised for cleaning their plates \(^6^4,6^5\). Not surprisingly then, the most common
parental compliant regarding children’s eating behaviours during the preschool years is picky (or fussy) eating. While there is no universally accepted definition, picky eating has been generally defined as an ‘unwillingness to eat familiar foods or try new foods, severe enough to interfere with daily routines to an extent that is problematic to the parent, child, or parent–child relationship’. Although definitions and measures vary, the prevalence of parents identifying their preschoolers as picky eaters ranges from 14-50%.

The food behaviours described above as typical for preschoolers, including neophobia and food jags are often interpreted by parents being picky. Children also innately prefer sweet and salty flavours. This becomes particularly evident when infants transition from a milk-based diet to eating solid food; fruits seem to be readily accepted whereas vegetables are often initially rejected. This initial rejection of bitter tastes may be evolutionary to ensure that the food is not poisonous. Children’s acceptance of less intrinsically preferred flavours, such as bitter tastes is heavily reliant on their exposures to and experiences with the food. However, parents often interpret initial food rejection as being picky. While in reality, as children develop, they just become better at communicating their likes and dislikes; food refusal is often an exercise in exerting preference. Research suggests that with time and repeated exposure, most children accept new foods.
2.3.1.1 Impact of Picky/Fussy Eating on Preschoolers’ Nutrition and Growth

Some studies that suggest picky eaters consume fewer calories\textsuperscript{68,70,75}, fruits and vegetables\textsuperscript{68,76,77} and dietary fibre\textsuperscript{77} than non-picky eaters. Interestingly however, a study exploring maternal perceptions of picky eating among 12-16 month old children in Australia (n=330), found that picky eating was unrelated to intakes of fruits vegetables, meat or overall diet diversity (measured using a 24-hour recall), but instead, maternal perceptions of their child’s food refusal\textsuperscript{65}. This may in part, help explain the equivocal findings exploring the impact of picky eating on children’s growth. Some research suggests picky eating has no impact on growth\textsuperscript{56,78}, while other studies suggest an increased risk of underweight\textsuperscript{69,79} or overweight\textsuperscript{80}. These mixed findings are also likely due to the unidirectional approaches used in the current body of literature, including the definition of picky eating itself i.e. exploring picky eating from a parent down perspective (parent $\rightarrow$ child). The typical approach and definition do not consider whether children’s dietary intakes are suboptimal due to organic disease\textsuperscript{78}, or in extreme cases a primary psychiatric disorder\textsuperscript{81}, or whether the feeding practices used by well-intentioned parents interfere with preschoolers’ natural dietary behaviours. In the next section, the development of children’s dietary behaviours is explored including the role of food in parenting practices.
2.3.2 Factors Influencing the Development of Preschoolers’ Eating Behaviours and Dietary Intake

The development of children’s eating habits and food preferences is multifactorial making it difficult to tease out the exact mechanisms by which eating behaviours develop. While genetics lay the foundation for the development of appetite and taste preferences, eating habits also evolve during the early years. From the point of conception, research suggests infants are exposed to flavours through their mothers’ diets, in both amniotic fluid and breastmilk. In a recent randomized control trial, mothers (n=97) were assigned to drink various vegetable juices (carrot, beet, celery and a vegetable blend) either during pregnancy or lactation and were compared to women assigned to drink water. Infants whose mothers who drank the vegetable juices during pregnancy or lactation were more likely to accept carrot flavoured cereal at the time of weaning (average age = 7.9 months), than infants whose mothers drank water. These findings suggest that early flavour exposure may help with later acceptance of vegetables. However, developing healthy dietary behaviours likely requires more than having mothers drink vegetable juice during pregnancy and lactation; learning to like foods also continues throughout childhood.

During the first years of life, children are exposed to different foods and flavours and learn what, when and how much to eat from interacting with others. Given their limited autonomy, parents, or other caretakers influence children’s dietary intake and eating behaviours not only through the foods they provide but also by the social
environment they create. Further, research also suggests that eating habits, food preferences, and patterns of disordered eating run in families. Exploring the role of the parent (i.e. food parenting practices) and mealtimes in which children are fed is of importance as parents and the family meal itself provide potential avenues to modify young children’s eating behaviours before unhealthy habits take hold. The next section will discuss food parenting practices in relation to both child and adolescent dietary intakes.

2.4 Food Parenting Practices

In the past, parent feeding was viewed as falling under a larger umbrella known as general parenting styles. Parenting style is considered to be a set of parental characteristics that are stable over time and make up the environmental and emotional context for child-rearing and socialization. The four classic parenting styles, as first described in 1971, are authoritative, authoritarian, permissive and neglectful. The authoritative style is often considered to be the ideal way to parent and is characterized by high warmth and high demandingness towards children. In contrast, authoritarian parenting is associated with high demandingness and low warmth where parents are often insensitive to the child’s developmental needs and are viewed as strict disciplinarians. Permissive parenting is associated with low demandingness and high warmth while neglectful parenting has been associated with both low demandingness and warmth. Under this umbrella of parenting styles are parenting practices which are
intentional and unintentional behaviours performed by parents for child-rearing purposes. While there is a large body of research exploring general parenting styles and parenting practices, it has also been argued that parenting behaviours likely vary across different situations and contexts. Thus, researchers interested in child nutrition and parent feeding, have explored food parenting styles and practices as a separate entity.

However, comparisons between studies have been limited by inconsistencies in terminology and the definitions used to describe these parent feeding styles and practices. In a recent review article exploring food parenting terminology and research, Vaughn and colleagues (2016) use the term “food parenting practices” to describe parent behaviours during feeding interactions. In their concept map, food parenting practices are defined as specific behavioural strategies that parents use to influence what, how much, or whether their children eat. Food parenting then, encompasses a combination of provision and socialization to manage children’s food intake (i.e. what, when and how much the child should eat). Using this definition of food parenting practices, Vaughn and colleagues (2016) defined three overarching food parenting constructs: coercive control, structure, and autonomy support or promotion. Coercive control describes parents’ dominance during the feeding interaction and encompasses practices such as pressure to eat, restriction and use of food as reward. Structure refers to parents’ organization of the child’s environment to facilitate healthy eating behaviours and includes practices such as modelling and creating meal and snack routines (i.e. family meals). Finally, autonomy support or promotion refers to
providing psychological autonomy or encouragement of independence in feeding interactions and food choices through encouragement and education\textsuperscript{1}. For context, Figure 1 displays an adaption of the food parenting practices concept map created by Vaughn and colleagues \textsuperscript{1}. While there are many food parenting practices that fall under the three over-arching food parenting constructs in the original concept map, some are outside the aims of this thesis. The food parenting practices relevant to the research conducted in this thesis are described below.

**Figure 1: Concept Map of Food Parenting Practices adapted from Vaughn et al., 2016**
2.4.1 Associations between Food Parenting Practices and Children’s Dietary Intake

2.4.1.1 Coercive Control

Coercive feeding practices include pressuring to eat, restricting and using food as a reward. These food parenting practices have received substantial research attention \(^{62,97-100}\) and it is hypothesized that these controlling food parenting practices focus children’s attention on external cues, such as parental reward and undermine children’s ability to self-regulate their dietary intake \(^{98}\). However, research examining the influence of these food parenting practices on child dietary intake has produced equivocal results.

2.4.1.1.1 Pressure to Eat

Pressure to eat can be defined as verbally (i.e. “eat 3 more bites”; “try your peas”, “finish your plate”) or physically (i.e. spoon feeding or moving utensils/food closer to the child) coercing a child to eat \(^{100,101}\). Pressure seems to be the most commonly used food parenting practice, especially in response to a child refusing food \(^{100,102-104}\).

While pressure is often used by parents in an attempt to improve the quality or quantity of food eaten \(^{100,105}\), its impact on dietary intake seems to be counterproductive. First, pressuring children to eat fruits and vegetables has actually been associated with lower intakes of these foods and higher amounts of picky eating \(^{77}\). In a recent cross-sectional home-based observational study, mothers’ pressure to eat was associated
with more food refusals among children between the ages of 1-3 years \( ^{106} \). While directionality cannot be teased out (i.e. do parents pressure children who do not eat certain foods, or do children not eat certain foods due to the pressure) in the study by Fries et al., a retrospective study among 407 college students traced disliked foods back to memories of being pressured to eat the same food \( ^{107} \). This finding suggests that pressuring children to eat may, in part, be responsible for the development of disliked foods. Further, when children (n=27) between the ages of 3 to 5 years were randomized to receive either pressure or no pressure while eating vegetable soups in a laboratory setting, the children who were not pressured to eat ate significantly more soup and made fewer negative comments about the food \( ^{108} \). Interestingly, children whose mothers reported they pressured their child to eat at home, were less affected by pressure in the lab setting than children whose mothers did not report using pressure at home \( ^{108} \). While these cross-sectional findings suggest that pressure may have a negative impact on children’s dietary intake, longitudinal studies are needed to assess the impact of longer term or habitual pressure to eat.

Second, pressuring children to eat has also been associated with eating in the absence of hunger among preschoolers in a small body of studies conducted in both the home \( ^{109} \) and laboratory settings \( ^{110,111} \), however results may be dependent on the sex of the child \( ^{109,111} \). For example, Harris and colleagues \( ^{109} \) found that pressure to eat was positively associated with eating in the absence of hunger for boys (but not girls), whereas Boots and colleagues \( ^{111} \) found that it was negatively associated with eating in the absence of hunger among boys (but not girls). Galindo and colleagues did not
explore boys and girls separately. Overall, pressure to eat has been associated with poor dietary intake and eating behaviours, however more research is needed to tease out the potential influence of child sex and the bidirectional nature of pressuring a child to eat.

### 2.4.1.1.2 Restriction

Restriction is defined as parents withholding or limiting a child’s access to certain foods of food groups. To date, research exploring the association between restriction and children’s dietary intake has produced mixed results. For example, although early research found that restricting access to less healthful foods was associated with higher intakes of these foods, results from more recent studies suggest parental restriction may be associated with healthier dietary intakes among young children. Other studies suggest that restricting a food causes children to overeat, have an increased preference for the restricted foods, dessert-type foods and drink more sugar sweetened beverages (SSBs).

These inconsistent findings are likely due in part, to how restriction is defined. Restriction can be defined as being covert or overt, where covert control cannot be detected by the child (i.e. not bringing certain foods into the home, deciding which foods to offer at mealtimes) and overt control can be detected by the child (i.e. moving food away from a child at mealtimes or telling a child they cannot eat a certain food). Research suggests that covert restriction may be associated with healthy dietary intake. For example, covert restriction has been associated with increased intake of healthy
snacks \textsuperscript{121} and increased fruit consumption \textsuperscript{123}. Overall, the associations between restriction and children’s dietary intake have been mixed which may be due to the way restriction has been measured and defined in the literature.

\textbf{2.4.1.1.3 Use of Food as Rewards}

Using foods as rewards has been defined as the use of giving children food for non-nutritive purposes such as to control behaviour or emotion \textsuperscript{23,101}. Parents may provide their children with food to soothe emotions of sadness, anger or boredom or may promise to give or withhold food as a reward or punishment for displaying certain behaviours (i.e. behaving while out at the grocery store). Similarly, parents may also use this tactic by using either a food reward (e.g., giving dessert for eating a vegetable eating) or non-food reward (e.g., sticker) to encourage the consumption of a disliked food. Overall, using a food reward has been found to have negative influence on the quality of children’s dietary intake, often because palatable, sweet foods are used for rewards. For example, children were offered a neutral snack food (i.e. food they neither highly preferred or disliked) in a laboratory setting in four contexts: 1) at snack time, 2) in a non-social context, 3) noncontingently, paired with adult attention, and 4) as a reward \textsuperscript{124}. Sixteen children participated in each condition and results found that presenting the snack food as a reward or non-contingently with adult attention significantly increased the preschoolers’ preference for the food \textsuperscript{124}. Research examining the use of food rewards to increase the consumption of healthy foods has demonstrated counterproductive effects where the use has actually been found to
decrease children’s liking of the food and increase their avoidance of it. It is thought that rewards undermine internal motivation to consume healthy foods and simply increase preferences for the bribed food. Using food to control behaviour has been associated with consuming energy-dense snack foods and less fruit. It has also been suggested that using foods as rewards may make it more difficult for children to accept new foods in the future through mere exposure without a reward.

However, similar to restriction, it should be noted that the type of reward may have different influences on children’s dietary intake. While the research surrounding using foods as rewards for desired behaviour illustrates clear associations with poorer dietary intake, research has suggested that using non-food rewards (i.e. stickers, praise) to encourage children to try novel foods may increase children’s consumption of disliked vegetables. Vaughn and colleagues (2016) suggest that when implemented with clear rules and expectations, non-food rewards may highlight a structured feeding environment that teaches and supports desired behaviours. However, more research is needed to clearly understand the role of non-food rewards on children’s dietary intake and whether they should be included as a coercive feeding practice or explored separately from other types of food-based rewards.

2.4.1.2 Structure

Structured food parenting practices are non-coercive practices such as modeling, monitoring children’s intake, and creating meal and snack routines that allow children
agency in developing their own food preferences and behaviours \textsuperscript{57} and have been associated with healthy dietary intakes \textsuperscript{74,127,128}.

\textbf{2.4.1.2.1 Modelling}

Parental modelling can be defined as behaviours displayed by the parent to the child that either intentionally or unintentionally influence a child’s food intake \textsuperscript{101,129}; a parent may intentionally eat a food to encourage their child to eat it, or they may unintentionally serve as a role model just by being present and eating with their child \textsuperscript{129}. Notably then, modelling can have both positive \textsuperscript{101,128,129} and negative effects on children’s food intake \textsuperscript{89,130,131}. For example, Brown and Ogden (2004) found that parents consumption of unhealthy snack foods was strongly associated with children’s consumption of such foods \textsuperscript{89}. However, the majority of research exploring the role of parental modelling has defined and measured modelling to focus on the positive benefits modelling can have on a child’s dietary intake (i.e. increased fruit and vegetable consumption).

Early research suggests that children are more likely to eat and accept new foods when they watch their parent, or another family member consume the food. For example, toddlers have been found to put food in their mouths more readily when observing a parent eat the food, as compared to a stranger modeling the same behaviour \textsuperscript{132} and young children have been more likely to accept spicy foods when older family members model the consumption of such foods \textsuperscript{133}. More recent research has found fathers’ reported modelling of healthy eating is associated with lower risk of
inadequate nutrition among preschoolers \(^{134}\). Further, in a study testing methods with which to increase children’s preferences for disliked vegetables found that parents modelling the consumption of the vegetable was important to improving children’s liking of it \(^{74}\). Observational research has also found maternal modelling to be associated with higher levels of food enjoyment and lower levels of pickiness \(^{128}\) and food refusal \(^{127}\).

### 2.4.1.2.2 Meal and Snack Routines

Meal and snack routines are parent-created structures and expectations surrounding eating occasions including the timing, location, atmosphere and presence of family members \(^1\). The most commonly researched aspect of the meal and snack routines is the presence of family members during meals (i.e. family meals) and there is extensive research linking family meals to healthful dietary intakes among both children and adolescents \(^{135,136}\) and reduced risk for disordered eating among adolescents \(^{135,137-141}\). Given this large body of research, family meals as a subset of structured food parenting practices, is explored more thoroughly later in this thesis (see section 2.5).

A smaller body of evidence beyond eating with family members also suggests that parents can set up the mealtime environment to support healthful intakes among their young children \(^{127}\). Powell and colleagues (2017), found that mealtimes without distractions (i.e. screens, toys, books) and where children were provided with some autonomy (allowed some input towards food choices and portioning) were associated with less picky eating among preschoolers \(^{127}\). Fitzpatrick and colleagues (2007) also found that the TV was a particularly important mealtime distraction to consider \(^{142}\). Each
night the family ate together was positively associated with fruit (OR= 1.14, 95% CI 1.07-1.21) and vegetable consumption (OR= 1.15, 95% CI 1.08-1.23), but serving fruits (OR= 0.95, 95% CI 0.91, 0.99) and vegetables (OR= 0.94, 95% CI 0.90-0.98) decreased with each night the television was on during meals 142. These findings suggest that the television may distract from opportunities to talk about or model healthful dietary intake. Interestingly, despite less potential communication about food, families’ opinions about the role of the TV during meals is mixed; some report avoiding it due to the distraction from family time, others report the TV being important for engaging members in discussion and “enjoy” watching it together during meals, and others yet use the TV to purposefully avoid family communication 143. It is this last group of families that highlight an important criticism of the current body of food parenting practice and family meal research. Factors in the general family context may influence the mealtime environment. The role of the general family context, family meals and children’s dietary intake will be discussed later in this thesis (see section 2.7.2).

2.4.1.2.3 Monitoring

Monitoring is the extent to which parents “keep track” of their child’s dietary intake, and consumption of specific foods (usually snacks, sweets and foods that are higher in fat) 1,144. The evidence surrounding the benefit of parental monitoring has been mixed with some studies suggesting an association with healthier dietary intakes 144-146, and others suggesting no association 147,148. When it comes to monitoring, there may be too much of a good thing; too much monitoring may be counterproductive and produce
negative eating habits. While not significant, Mellin and colleagues (2002) found evidence of a curvilinear association between parental monitoring and unhealthy dieting behaviours among overweight adolescent girls (grades 7, 9 and 11); moderate levels of parental monitoring were associated with the lowest frequency of unhealthy dieting behaviours and the highest frequencies of such behaviours were seen among the extreme levels of parental monitoring (low and high). Similar to other food parenting practices, the temporal order of the use of monitoring has not been well explored; it is possible that parents may be more likely to monitor the intakes of their children if they are picky eaters or are exhibiting unhealthy weight-control/dieting behaviours. The context in which monitoring is conducted may also matter. Similar to restriction, covert monitoring may be more likely to support healthful eating than constantly asking a child what he/she has eaten (overt monitoring). As part of another structured food parenting practice, family meals provide an excellent opportunity for parents to covertly monitor the dietary intake of their children.

2.4.1.3 Autonomy Support or Promotion

Feeding practices that fall under autonomy support are practices used by the parent to allow children age-appropriate autonomy. For example, allowing children to self-regulate their intake, educating children about nutrition, and creating a supportive environment through positive encouragement. Autonomy support has been less defined in the food parenting realm, likely because food parenting practices have typically
measured from the parent perspective and not accounted for the child’s role in feeding interactions\textsuperscript{57}. Research has also tended to focus on coercive feeding practices.

2.4.1.3.1 Encouragement

Encouragement to eat is defined as a non-coercive, gentle form of motivation for children to eat or try new foods (i.e. “Your broccoli looks yummy”)\textsuperscript{1,101}. Positive encouragement has not been well defined in the literature as clear distinctions between positive encouragement and verbal pressure are not often made\textsuperscript{129,151}. Despite this, there is a small body of literature that suggests positive encouragement is associated with increased consumption of fruits and vegetables\textsuperscript{74,86} and lower nutrition risk\textsuperscript{134}. However, the success of positive encouragement may depend on the nature of the statement. Research suggests that the encouragement in the form of praise should be tied to the action, not to the person. For example, “great job for trying your broccoli!” vs. “you’re such a good boy for trying your broccoli!”\textsuperscript{1,126}. Similar to food rewards, praising the child may undermine internal motivations for trying the food, as discussed above. Future research should examine aspects of encouragement and praise more thoroughly.

2.4.1.3.2 Nutrition Education

Nutrition education describes a parent’s attempt to pass along nutrition knowledge to help their children make healthy, informed food choices\textsuperscript{1}. It is thought that education supports children’s autonomy as it guides internalization of eating habits\textsuperscript{1}.
Education can start early, with simple messages such as “milk helps your make your bones and teeth strong” for preschoolers, and become more complex as children age, such as food label reading for adolescents. However, to date nutrition education has really only been explored using simple messages. Interestingly, a cross-sectional, parent-report study found that parents’ use of nutrition education (i.e. telling the child the food was good for them or healthy) had a negative association with vegetable consumption among 4-12 year-olds. The authors hypothesized that the cross-sectional design could not tease out the temporal order of the association and that the use of education was likely a tactic to increase consumption of disliked vegetables. Further, the interplay between nutrition education and other food parenting practices is unknown. For example, nutrition education may not be successful unless paired with parent modelling of healthful behaviours. If a parent does not eat vegetables themselves, the negative modeling may undermine positive messages to the child about vegetables being healthy. Positive effects of nutrition education may also rely on parents first being informed about nutrition, and second, having a healthy relationship with food and eating themselves. Future research should further explore the association between nutrition education and child dietary intake.
2.5 Family Meals

As mentioned above in section 2.4.1.2.2, family meals are a key aspect of structured food parenting and there is substantial research interest in understanding the influence family meals have on the dietary intake of children and adolescents. In fact, the body of literature supporting the benefits of family meals has grown to the point that family meals are now recognized as key contributor to the overall health and wellbeing for children and adolescents \(^{153,154}\). Notably, the majority of research studies exploring the benefits of family meals have been conducted with adolescents, however, the smaller body of research exploring the benefits among children suggests that the benefits found among adolescents do extend to younger ages. For example, both children and adolescents who frequently share meals with family members have been shown to have healthier dietary intakes, eating behaviours \(^{135,136}\) and wellbeing \(^{155,156}\) compared to those that eat fewer or no family meals. Adolescents who frequently eat family meals have also been shown to experience lower levels of substance abuse, delinquency, and depression, in comparison to those who do not have regular family meals \(^{141,155-157}\). Further, frequent family meals have been associated with improved academic outcomes among both children and adolescents \(^{156,158,159}\).
2.5.1 Family Meals and Dietary Intake

As mentioned, children and adolescents who frequently share meals with members of their family have healthier dietary intakes and lower levels of disordered eating than those who do not eat with other members of their family. A large meta-analysis (pooled data for n= 182,836) of children and adolescents (mean age = 2.8-17.3 years) found that participating in family meals at least 3 times per week was associated with a 20% reduction in the odds of eating unhealthy foods (OR= 0.80, 95% CI: 0.68–0.95) and a 24% increase in the odds of eating healthy foods (OR= 1.24, 95% CI: 1.13–1.37) in comparison to those whose families share few or no meals together. Specifically, family meals have been associated with higher intakes of fruits and vegetables, dairy products and micronutrients including fibre, calcium, iron and folate. Frequent family meals have also been found to be protective against consumption of less healthy foods including SSBs and fried foods.

Rates of disordered eating have also been found to be lower amongst adolescents who participate in frequent family meals. In the meta-analysis by Hammons et al (2011), the results of three studies examining family meals and disordered eating were pooled (n= 104,353 adolescents) and the odds of engaging in disordered eating was 35% less for those who participated in family meals ≥ 5 meals/week in comparison to those who participated in rare or no family meals (< 1 meal/week). While family meals seem to be protective for both adolescent males and
females, the benefits for the reduction in disordered eating habits may be stronger among females. For example, in a large U.S. based study of adolescents (9-14 years of age), females who participated in family meals most days of the week (≥ 5 days/week) were less likely to engage in purging, bingeing or dieting habits in comparison to those who ate family meals rarely or never; results were similar but non-significant among males.

2.5.1.1 Explanations linking family meals to improved dietary intake

Family meals are a regular routine that allows family members to connect and communicate each day, which may be one mechanism by which family meals are associated with psychosocial benefits for children and adolescents. As a subset of structured food parenting practices, there are a few hypotheses that help explain how family meals lead to improved dietary intake. Family meals provide increased opportunities for other structured food parenting practices to occur including monitoring and modelling of dietary intake as well as autonomy support food parenting practices such as encouragement and nutrition education. Parents have a better idea of the foods their children are eating when they sit down and eat with them. Covert restriction has been associated with improved dietary intake among children. Some research has proposed that through increased monitoring or awareness of their children’s dietary intake during family meals, parents are able to make sure that healthful foods available and offered to their child by covertly restricting access to other foods. In addition to monitoring, frequent family meals also provide an opportunity for parents to model
healthy eating behaviours, which can lead to improved dietary intake among children and adolescents. Mealtimes also provide an opportunity for parents to positively encourage their children to try new foods and talk to their children about nutrition and healthy eating. Marshall and colleagues (2011) found that parents’ communication about food and nutrition was positively associated with fruit and vegetable intake among their 4-13 year old children\textsuperscript{167}. Finally, when children and adolescents eat at home with their families, they have less opportunities to eat out at restaurants or fast-food outlets where meals are significantly higher in calories and fat\textsuperscript{168}.

2.5.2 Rates of Family Meal Participation

Overall, rates of family participation seem to be fairly high among families with young children\textsuperscript{169-171}. This is not surprising considering children have little independence during the early years and require their parents to purchase and prepare meals. However, independence surrounding food choices increases as children age and research suggests that family meal participation decreases among adolescents in the U.S.\textsuperscript{172,173}. Research by Neumark-Sztainer and colleagues (2010) from Project EAT (Eating Among Teens), suggests that in addition to child age, there may be socio-economic differences among family meal participation, with frequency being inversely associated with maternal employment and positively associated with socio-economic status\textsuperscript{173}. Interestingly however, a large nation-wide study of 14 791 14- and-15 year-olds in the U.S. found that even among families with higher socio-economic status (participants were children of the Nurses Heath Study II, (NHS II)), secular trends in
family dinner frequency declined over a 12 year period from 1996-2008 among both male and female adolescents \(^{172}\).

More recent Canadian data also suggest relatively low levels of family meal participation. Lillico and colleagues (2014) reported that among a sample of 20,923 adolescents in grades 5-12 from 4 Canadian regions (schools in Hamilton, Thunder Bay and across the provinces of Quebec and Prince Edward Island), only 68% of those in grades 5-8 reported eating family meals 5 or more times/week \(^{48}\). This rate was found to decline with age as only 52% of those in grades 9-12 reported frequent family meals \(^{48}\). Regional differences in family meal participation were reported which suggests that norms surrounding structured food parenting practices like family meals may vary even across the same country; students in Quebec were significantly more likely to participate in frequent family meals than those living in the other three regions \(^{48}\).

The decline in participation is of concern given the benefits of family meals on adolescent dietary intake. Further, dietary intake \(^{161,162}\) and family meal participation \(^{174}\) during adolescence has been found to track into adulthood, which suggests that family meals not only have implications on an individual’s future dietary intake and risk of chronic disease, but may also influence the inter-generational transmission of mealtime practices \(^{174,175}\).

### 2.5.2.1 Barriers to family meal participation

There is a large body of literature exploring barriers to family meal participation among families with children and adolescents. A Canadian qualitative study reported
that employed mothers feel that family meals add pressure to their day and they have difficulty making healthy meals happen, despite recognizing their importance. Parent work schedules is the most frequently cited barrier to shared meals. As children get older and are involved in extra-curricular activities and part-time jobs, conflicting schedules become even more challenging. The concept of time shortage has been called “time poverty” or “time bind” and despite being the most frequently cited barrier to shared meals, does not fully explain the decline in family meals. Other commonly cited barriers include difficulty meal planning, not having a regular meal routine, the frustration of feeding picky eaters and for some, the cost of serving healthy foods. There is also some evidence that lower levels of family functioning may also be a barrier to family meals, however this has not been well explored. Higher family functioning has been associated with higher rates of family meals. Further, focus groups with adolescents revealed that a dissatisfaction with family relations is a major barrier to shared meals.

The few intervention studies that have aimed to address the commonly cited family meal barriers to increase participation have reported mixed success. In their 2015 review of family interventions, Dwyer and colleagues only found six studies specifically aimed at increasing family meal participation among children and adolescents; four out of six interventions were successful. The successful interventions were conducted in a variety of settings (i.e. home, community, parent work place and the Internet) and varied as to who they targeted including adolescents, parents or the family as a whole. Intervention tactics also varied, but commonalities
included goal setting and group activities. These findings suggest that a variety of approaches to increasing family meal participation may be successful, however the small number of effective interventions, make it difficult to compare the studies to make recommendations for future interventions. All six interventions were also conducted in the U.S and Dwyer and colleagues identified that family meal cultures and customs may differ among families from different counties or cultural groups. To address this, Dwyer and colleagues (2015) suggest future interventions should be able to be tailored to individual families and that interventions should focus on those that face multiple barriers to sharing meals including families with adolescents, single parent or parents have long and varied work schedules or other time constraints. Berge and colleagues have done some important work in this area by interviewing parents from single and dual-headed families. Their results suggest that single and dual-headed families face different barriers towards family meals and require different strategies and supports to overcome their barriers. Understanding parents’ perceptions towards family meals is also an important piece of this puzzle. As the gatekeepers of the family food environment, parent perceptions of the benefits of family meals in the context of life’s competing responsibilities is key. In addition, understanding why and how families establish family meal routines, despite the many barriers, is also important to informing effective family-based interventions and identifying families to target in the interventions.
2.6 Methods for Assessing Food Parenting Practices

Vaughn et al. (2013), recently conducted a systematic review of existing measures used to understand food parenting practices. Fifty-seven unique instruments were identified, among which parent-report surveys or researcher-led structured interviews (either in-person or telephone) were most commonly used \(^88\). A few studies have also used semi-structured interviews to qualitatively assess food parenting practices \(^184,185\). Direct observation has also been used to assess food parenting practices in a relatively small number of studies \(^186\). Each of these modes for assessing food parenting practices are described below.

2.6.1 Parent Report Questionnaires

Parental-report is the most common mode with which food parenting practices are assessed in the current literature \(^88,98\). Usually administered using a paper or computer- assisted survey, but also by researcher-led structured interviews (phone or in-person), parental report measures can capture participant’s feelings, attitudes and perceptions of their own behaviours \(^187\). The most commonly used parental-report measure is the Child Feeding Questionnaire (CFQ) \(^188\); the CFQ has been cited in over 800 studies. The CFQ includes 31 items which assess parental beliefs, attitudes and practices towards child feeding across seven factors: perceived responsibility in child feeding, parent-perceived weight history, perceived child weight history, parents’ concern about child weight and monitoring, restricting and parental pressure towards
child eating habits \(^{188}\). Another parental report measure that is gaining in popularity is the Comprehensive Feeding Practices Questionnaire (CFPQ), a 49 item, 12 factor questionnaire that expands on items included in the CFQ to provide more insight into the complex interactions parents may have with their children with regards to food \(^{144}\).

The major strength of parental-report questionnaires is that they are economical and time efficient. They also involve the least participant burden in comparison to other available methods, which in combination, make parental-report questionnaires an ideal mode for large cross-sectional and longitudinal studies. Some evidence also suggests that parental-report questionnaires may useful for capturing habitual feeding patterns as they are able to assess a broad range of feeding interactions \(^{98,144}\), however this method has not been shown to correlate with observed parental food parenting practices as will be discussed below \(^{98,100}\).

### 2.6.1.1 Limitations of Parental- Report Questionnaires

The major limitations associated with parental-report questionnaires is that they are subject to inaccurate recall and systematic personal biases related to factors such as parent’s expectations, their mood at the time of survey completion and social desirability \(^{187,189}\). A heavy reliance on parental-report measures may also undermine cross-cultural differences in studies due to potential differences in participant response styles \(^{189}\). Further, the lack of association between reported and observed measures suggests that parent-report measures are only able to capture parent perceptions of their practices, rather than their actual behaviours. Many people find it difficult to
recognize how their own behaviours impact others, however food parenting is a social interaction and thus solely focusing on parental perceptions will not capture the bi-directional parent-child interactions that occur during feeding\textsuperscript{187, 190}. Furthermore, even when comparing two methods of self-report (mother vs. daughter), one study indicated that maternal report of restriction was not reflected in their daughters’ report, further highlighting the concern of the ability of questionnaires to capture actual behaviours\textsuperscript{191}. Finally, parental-report questionnaires only provide a quantitative understanding of parental feeding practices; important nuances as well as a more in depth understanding of parent perceptions and experiences that are captured by qualitative methods (semi-structured interviews as well as some observational methods) are missed. For example, when thinking about structured food parenting practices such as family meals, parent-report is most often used to focus on the frequency of shared meals and does not capture the emotional environment of the family meal.

2.6.2 Parental-Report using Semi-Structured Interviews

While used less frequently, semi-structured interviews have also been used to assess parental feeding practices. The questions used to guide semi-structured interviews are diverse, but common themes include open-ended questions relating to the parent’s own history and experiences with eating, feelings about mealtimes, perceptions of success and challenges surrounding child feeding and parent/child weight status\textsuperscript{184}. Semi-structured interviews may be conducted in focus groups\textsuperscript{192, 193} or one-on-one interviews\textsuperscript{184, 194} and provide researchers with unique data that provide an
in-depth understanding of the ‘how’ and ‘why’ of parent’s behaviours and beliefs as opposed to the ‘what’ which is typically the focus of other methodologies. While this depth is the major strength of semi-structured interviews, the specific method with which they are conducted (focus group vs. one-on-one interviews) may impact the quality of the data. For example, some questions asked during these interviews are sensitive (i.e. one’s own feelings about being parented as a child and how that impacts current child feeding) and often elicit strong emotions that may not be divulged in group settings. Additional strengths of semi-structured interviews include allowing for the exploration of cultural differences in feeding practices and greater participant understanding as the interviewer may provide clarification.

2.6.2.1 Limitations of Parent-Report Interviews

The major limitations of semi-structured interviews are similar to that of parent-report questionnaires. This method is also subject to inaccurate recall and systematic personal biases. Social desirability bias may play a greater role in this methodology due to the face-to-face nature. In addition, concerns regarding the validity of all types of parent-report measures have been reported. For example, in one study, mothers of preschoolers reported different feeding practices when assessed by both questionnaire and semi-structured interview, and in a second study, maternal reports of infant feeding practices assessed by semi-structured interviews differed from results provided by video-taped observations of their feeding practices. Differences in the nature and number of probes used by interviewers may have played
a role in these divergent findings\textsuperscript{194}. Finally, while focus groups may save some time, semi-structured interviews, regardless of the format are costly and take time both in the data collection and analysis stages due to the need to train interviewers and transcribe and analyze interviews.

### 2.6.3 Direct Observation

Direct observations are invaluable tools for exploring research questions that require understanding the mechanisms involved in social interactions, as they allow researchers to view overt processes within an interaction in real time\textsuperscript{187}. Direct observations are considered to be the gold standard\textsuperscript{88} for assessing food parenting practices because they allow researchers to understand parents’ actual behaviours instead of their perceived behaviours. Observations use objective coding schemes, making them less subject to the systematic biases associated with parental-report measures\textsuperscript{187,195}. Further, observational techniques allow researchers to summarize aspects of the feeding interaction as it unfolds over the duration of the observation and provides information to how the interaction is influenced by social conditions including behavioural triggers and reactions by others\textsuperscript{187}. Another strength of direct observations is that unlike parent-report measures, they do not rely on participant understanding of questions and as such do not weaken potential cross-cultural differences associated with participant response style\textsuperscript{189}. Direct observation also allows researchers to understand the climate and structure (family meal) of feeding interactions as well as the distractions that may not be reported on parent-report questionnaires (i.e. presence of
screens, toys as distractions etc.). Finally, from a clinical perspective, direct observations are useful for identifying and targeting behaviours for intervention because they are more closely tied to actual behaviours versus perceptions 196.

2.6.3.1 Direct Observations in Laboratory Settings

Direct observations exploring parental feeding practices have been assessed in both laboratory and home settings. Laboratory settings are often used to assess a specific dimension of food parenting. For example in a recently published study, Pesch and colleagues (2018) had mother-child dyads (n=50; mean child age= 5.9 years) participate in a laboratory cupcake eating experiment to explore how mothers’ negative comments were associated with the child’s subsequent bites of the highly palatable food 197. Using a Structured Eating Protocol 198 allows researchers to observe parent and child responses to different types of foods in a controlled setting without the variability and distractions that are inherent in a home environment 199. A laboratory environment can be standardized or manipulated as required to answer the research question 200. As a controlled environment, the laboratory setting is also beneficial if researchers want to measure the amount of food that participants eat 200. However, the observations obtained in a laboratory setting are not naturalistic and depending on the study question, may not be generalizable to feeding interactions at home or in other settings (i.e. at a restaurant). While setting up laboratories to look like a dining room or restaurant may help lessen the effects of these limitations, they do not give insight into how the home environment influences feeding interactions 200.
2.6.3.2 Direct Observation in Home Settings

Home-based observations of parental feeding practices are a relatively new and promising focus of future research as they capture more typical interactions and consider the home environment. Home-based observations may be more typical and naturalistic than those that occur in a lab setting, thus reducing impact of the Hawthorne Effect (or camera reactivity)\textsuperscript{201}. Beyond getting a glimpse into the family’s “real world”, other benefits of home-based observations include being able to obtain multiple observations more easily (i.e. families do not need to come into a lab on multiple occasions), and data can be collected on multiple families at the same time (multiple video cameras can be sent to multiple families at once)\textsuperscript{200}.

The most commonly used observation code is the Bob and Tom’s Method for Assessing Nutrition (BATMAN) scale\textsuperscript{202}, which codes parent-child feeding interactions in ten second intervals, looking at children’s playing with food or refusing food, but focusing more so on parent encouragement or discouragement and the child’s subsequent response. BATMAN has been found to be a reliable (test-retest reliability $r=0.84$) measure of parental feeding practices within a sample of children 12-36 months\textsuperscript{202}. Another home-based observational coding scheme that has been developed more recently is the Family Mealtime Coding System (FMCS; Appendix 1)\textsuperscript{100}, which was created to reflect the CFQ\textsuperscript{188} and consists of four main subscales: pressure to eat, physical prompts to eat, restriction of food consumption and use of incentives/rewards (either reward to get child to eat or reward for other behaviours). Frequencies are
calculated for each of these subscales to understand the parental feeding practices that occurred during the meal. The FCMS was found to be a reliable measure of parental feeding practices among preschool aged children (inter-rater reliability >86.5%)\textsuperscript{100}. Briefly, a variety of other food parenting scales have been developed, also stemming from previously validated parent-report measures. For example, Hughes and colleagues (2007) developed an observational checklist of the Child Feeding Styles Questionnaire\textsuperscript{203} which specifies the frequency of food parenting practices according to their nature (i.e. authoritarian, authoritative, indulgent and uninvolved) and the food group to which the behaviour is directed (i.e. fruits, vegetables, dairy, entrée and starch)\textsuperscript{104,204}. For example, physically feeding a child vegetables would be coded as an authoritarian attempt at vegetables, and asking the child to just try a vegetable would be coded as an authoritative attempt at vegetables\textsuperscript{204}. Inter-rater reliability has been found to be very high for this measure (kappa = 1.0)\textsuperscript{204}. Scales have also been developed to explore individual food parenting practices such as parent modelling\textsuperscript{128} and the mealtime environment (i.e. TV, screens or other distractions such as toys during the meal, whether parent eats same food as child)\textsuperscript{103,127,198}.

\textbf{2.6.3.3 Limitations of Direct Observations}

Despite the promising nature of home-based direct observations to capture authentic parent-child feeding interactions, direct observational methods are not without their limitations. First, the major drawback associated with direct observational techniques is that they are time consuming in both collection and coding phases.
They require training of observers and, if more than one coder is used, inter-observer reliability checks are needed. This high cost and time requirement often limits the number of observations that can be carried out, which may lead to issues of low power and stability of the data across observations. If there is high variability among the observed behaviours, this may lead to low occurrence of some behaviours, or findings that do not represent stable estimates. While home-based observations make it easier to collect multiple observations, this method also places the data in the hands of the participant which increases the potential for lost data or unusable data (i.e. families do not behave as instructed; camera position cuts family members out of view, or families do not speak required language during recordings). Second, there has been some discussion surrounding the ability of direct observations to capture habitual feeding practices. Some argue that short-term, within meal effects of parental feeding practices may differ from the longer-term impact on child eating that may be captured in parent-report methods. Further, observations usually only capture interactions surrounding feeding during set eating times and do not consider interactions surrounding food (meal prep) or eating at other times during the day (e.g., snacks). Similarly, observations also do not allow for the exploration of covert restriction. Poor eating habits and dietary intake develop overtime, and Faith and Scanlon, et al. (2004) argue that results from a single or few short-term observations should be interpreted cautiously. However, due to the concerns with the ability of parental-report methods to capture actual behaviours (vs. parent perceptions of their behaviours), multiple observations may still provide more valid measures of parent behaviours.
Third, there is a concern that regardless of location (lab or home), the presence of an observer or observation device (video-camera etc.), may affect participant behaviour and cause atypical interactions. While, without deceiving participants, it is impossible to conduct a pure comparison between behaviour with and without an observer, findings from Jacob and colleagues (1994) suggest that family interactions at mealtimes are largely unaffected by the observer effect. The research team observed distressed (fathers diagnosed with alcoholism or depression) and non-distressed intact families (n=87) interacting at mealtimes and employed varying levels of intrusiveness to observe their behaviour using audiotape over a two week period. During the first week, a ‘fixed recording condition’ was implied in which families self-activated the recording device each night at the start of dinner. The second week was a ‘random recording condition’ where three recorders were placed throughout the home and families were told that the recorders would randomly turn on throughout the day; in reality, only the recorder in the dining room worked, and it was scheduled to only turn on during the family’s dinner hour. Results found very little evidence of reactivity across the recording conditions among both distressed and non-distressed families. While there was a significant difference in positive interactions between the fixed recording and random recording, a main effect for group status (alcoholic, depressed, or non-distressed) existed which suggests that any impact the observation conditions had on family behaviour, the influence of the distressed diagnosis persisted above the reactivity. Little is known about the reactivity effects of videotaping on family interactions, as there are no known studies comparing video recordings to other methods of direct
observation. Based on their research assessing food parenting practices using video recordings, Koivisto and colleagues suggest recording multiple observations and not using the first video in order to reduce reactivity effects. However, other studies examining parenting children with behaviour problems suggest that behaviours do not change over the course of multiple sessions. For example, Hughes and colleagues, found that when observing 4-year-olds’ conversations with their mothers at home over four sessions, the first session was atypical in that there was more talk about being observed, but there were no actual differences between the first and later sessions with regards to the nature and frequency of conversations (the variables under investigation). Thus, Gardner suggests that using unobtrusive equipment and familiarizing families with the recording procedures may be sufficient to deal with concerns of reactivity and recommends that all observations be coded.

Finally, unlike parent-report measures, direct observations are associated with greater participant burden and are unable to capture participant’s perceptions of the interaction.
2.7 Key Limitations of Existing Research Exploring Food Parenting Practices

Food parenting practices play an important role in young children’s dietary intake, however, the research aiming to understand the association between food parenting practices and children’s dietary intake has produced equivocal results. Recent scientific reviews\textsuperscript{73,186,209} have identified that these inconsistent findings are likely due to the methodological limitations of current research exploring the effects of parenting practices including the reliance on parental self-report to assess parental feeding practices. Furthermore, the current body of literature does not account for the general family context in which parental feeding occurs, including the role of family functioning and the inclusion of fathers. In addition, the majority of food parenting research has been conducted outside of Canada where norms surrounding parenting and food parenting practices may differ. Each of these limitations are expanded upon below.

2.7.1 Limited use of Direct Observation

Direct observation is needed to accurately characterize parental feeding practices. The vast majority of research exploring the impact of parental feeding practices on child outcomes has relied on parental report of feeding practices. The use of self-report data introduces potential error through inaccurate recall or bias due to social desirability, which limits the validity of parent self-report. Recent research has found inverse associations between parental report and observed food parenting.
practices, as well as no associations at all. While direct observation is considered the gold standard for assessing food parenting, a recent systematic review looking specifically at observational approaches to evaluate food parenting practices, found only 13 studies that used observation to assess food parenting. A handful of observational studies have been published since this 2015 review, however, it is still a relatively new method of assessing food parenting practices and additional research using this method is needed to understand how food parenting practices are associated with child eating habits and nutritional intake.

2.7.2 Lack of consideration for the general family context

Research needs to consider the context in which food parenting practices occur. Family systems theory posits that individual or family behaviours must be understood within the global family context or system. General family factors, such as family functioning, may moderate the associations of food parenting practices and children’s dietary intake because they influence how the feeding practices are experienced by the child.

Family functioning is defined by how family members manage daily routines, communicate and connect emotionally with one another. Poor family functioning has been associated with poor adherence to treatment in families with diabetes and cystic fibrosis, and while few studies have explored its role in health behaviours, there is some evidence that general family functioning may also be associated with family meal frequency and adolescent dietary intake and eating behaviours. Haines and
colleagues (2016) found that high family functioning was associated with lower odds of disordered eating among males and females (adjusted odds ratio [AOR] females = 0.53; 95% CI = 0.45–0.63; AOR males = 0.48; CI = 0.39–0.60) between the ages of 14-24 (n= 6 382) and a lower odds of eating fast food one or more times per week for females (AOR = 0.74; CI = 0.61–0.89); models were adjusted for participant age and family structure. Among a younger population, Martin-Biggers et al (2018) found that high family cohesion (an aspect of family functioning) was associated with modestly higher intakes of fruits and vegetables ($\beta$= 0.58 servings/week, Standard Error (SE) 0.26, 95% CI 0.06, 1.09) among 2-5 year-olds (n= 550). While these results highlight the potential impact family functioning may have on dietary intake, the mechanisms by which family functioning influences the association between food parenting practices and children’s and adolescent’s dietary intake are unknown.

In a recent systematic review, Goldfarb and colleagues (2015) compared studies that did and did not adjust for family-level confounders when examining the relationship between family meals, a structured food parenting practice, and adolescent risk behaviors (i.e. substance abuse, smoking). Significant findings between family meals and adolescent outcomes were more common when studies did not account for family level confounders such as family connectedness. These results underscore the importance of adequately accounting for potential confounding by factors within the general family context when exploring the association between food parenting practices, including family meals, and child/adolescent outcomes.
Failing to consider family functioning may inappropriately identify food parenting practices as a predictor of dietary intake when the positive association identified may be true for only some families, i.e., those with high family functioning, or may be due to a third variable, i.e., the family’s level of functioning. Using family meals, a structured food parenting practice, as an example, Figure 2 provides a conceptual model of the potential pathways by which family meals and family functioning may lead to improved dietary intake among children and adolescents. Future research needs to consider the general family context, including the level of family functioning in studies exploring the association between food parenting practices and child/adolescent dietary intake.
Figure 2: Conceptual Framework: Potential pathways by which family meals and high family functioning may lead to improved dietary intake

2.7.3 Exclusion of Fathers

Deemed “the forgotten parent”\textsuperscript{219}, fathers have been previously excluded or underrepresented in the food parenting research. Typically, when fathers have been included in research, their data has been pooled with mothers, which limits any interpretation of the individual influence fathers may have on their children’s dietary intake. Changing societal roles and an increase in both dual-income and single-father homes make it important to consider the role of the father\textsuperscript{12,134,219}. For example, in
Canada, the number of dual-income families with at least one child under the age of 16 rose from 35.9% in 1976 to 69.4% in 2015 \(^{220}\). In families where one parent stays home, the number of stay-at-home dads rose from 1 in 70 in 1976 to 1 in 10 in 2015 \(^{221}\). Further, according to Statistics Canada, 49% of fathers report providing care to and helping their children and 30% of fathers claimed or intended to claim paternity leave in 2015 \(^{222}\). A recent U.S. study reported that 62% of fathers reported sharing food parenting responsibilities with their partner and 15% reported having sole responsibility \(^{223}\). These changing social roles underscore the need to understand how fathers’ food parenting practices influence children’s eating behaviours and nutritional intake.

The relatively small body of research that has explored fathers’ food parenting practices has found that fathers play an important role in the development of their children’s dietary intake. For example, in a cross-sectional study of 150 fathers, Vollmer and colleagues (2015) found a positive association (\(\beta=0.39, p<0.0001\)) between father and child diet quality \(^{224}\). Walsh and colleagues (2016) examined longitudinal associations between fathers dietary intake and those of their children at 20 months, 3.5 and 5 years \(^{225}\). Positive associations were found between fathers consumption of fruit and sweet snacks and children’s consumption at 20 months and 5 years \(^{225}\). Results also found that fathers’ consumption of fruit, sweet snacks and SSBs at child age 20 months predicted child consumption of these foods at 3.5 and sweet snack and SSB consumption at 5 years \(^{225}\). After adjustment for mothers’ consumption of the same foods, fathers’ consumption of sweet snacks at child age 20 months predicted their consumption of these snacks at 3.5 years \(^{225}\). These results suggest that not only do
fathers’ dietary choices influence children’s dietary intake early on, but that they continue to impact children as they age, despite mother’s consumption. In the even smaller body of literature exploring differences between mothers’ and fathers’ food parenting practices, some parent-report \(^{134}\) and observational studies \(^{103,226}\) have reported differences in the types of food parenting practices mothers and fathers use with their children during mealtimes. However, other parent-report \(^{99,227}\) and observation studies \(^{100}\) have found no differences in the types of food parenting practices used by mothers and fathers. Studies have also found that the associations between parenting practices and child intake may differ for mothers and fathers. For example, Watterworth and colleagues (2017) found that fathers’, but not mothers’ reported modelling of healthy eating behaviours was associated with lower nutrition risk among their children \((\beta = -2.21, p = 0.01)\), as measured using the Nutrition Screening Tool for Every Preschooler (NutriSTEP\textsuperscript{®}) \(^{21,134}\). 

Taken together, the lack of father involvement in food parenting research and the evidence that fathers’ eating habits and food parenting practices not only influence those of their children, but that their influence potentially differs from mothers, underscores the need to include both mothers and fathers in future studies exploring food parenting practices. Furthermore, the lack of consideration for the role fathers play during mealtimes may help, in part, to explain the equivocal findings of the current body of literature exploring the impact of food parenting practices (mostly mothers’) on children’s dietary intake.
2.7.4 Lack of Canadian Studies

There are only two known Canadian studies that have explored food parenting practices. Both studies relied on parent-report of their food parenting and only one focused on the association between food parenting practices and children’s dietary intake. Recent studies that have used direct observational techniques to explore parental feeding practices have been conducted in the United States, Europe, and Australia. No Canadian studies have used observational techniques to explore food parenting practices. The feeding context and cultural expectations surrounding feeding may be different in Canada. Furthermore, the majority of observational studies conducted in these other countries have been conducted in laboratory or childcare settings where the feeding environment may not be as reflective of the home environment. Research using an observational measure of food parenting practices in the Canadian context is needed to elucidate how food parenting practices influence the eating habits of Canadian children.

2.8 Summary and Thesis Aims

Poor dietary intake during childhood and adolescence has implications for growth, overall health and chronic disease risk throughout the lifecycle. Research suggests that food parenting practices, including the structure provided through family meals, play an important role in development of eating behaviours and food preferences during the early years, and subsequent dietary intake during adolescence. Eating
behaviours and dietary intake during childhood and adolescence have been found to track into adulthood making it particularly important to establish healthy habits early in life.

However, much of our understanding of the role food parenting practices play in the development of healthful behaviours and dietary intake is limited because research has not considered the role the general home environment may play. Family functioning describes the way a family communicates and problem solves, and how connected members feel to the family unit. It is possible that family functioning modifies or confounds associations between food parenting with children’s dietary intake. Thus, to provide unbiased and accurate estimates of the association between food parenting practices and child and adolescent dietary intake, future research must consider the influence of family functioning on these associations.

Our understanding of food parenting practices has also been limited by measurement factors. Food parenting practices have most often been measured by parent-report which introduces bias and does not allow for an understanding of the home environment or the bi-directional nature in which feeding occurs. Further, much of the research surrounding family meals has been conducted amongst adolescent populations. It is important to explore family mealtimes among younger populations such as preschoolers when behaviours are being developed, to understand why families eat together. This will provide researchers with a clearer understanding of how to support families in continuing the tradition together as rates of family meal participation often decline during adolescence. Notably, there has also been a lack of
studies exploring food parenting practices and family meals in Canada, where norms surrounding parenting practices and family time may differ from other parts of the world.

Therefore, the primary objective of this thesis is to understand the association between food parenting practices and child and adolescent eating habits, while considering level of family functioning. A secondary objective is to understand the factors that influence the establishment of family meals among families with young children. A tertiary objective is to provide direction for future research on food parenting practices that can facilitate the understanding of bidirectional nature of parent ←→ child feeding interactions. Specifically, this thesis aims to:

1. Examine cross-sectional associations between family meal frequency and dietary intake among a large, national sample of U.S youth (n= 2,728), while exploring how family functioning may influence the association via effect modification or confounding. While the data is American, using a large, available data set allows for the opportunity to explore the role of family functioning among a sample where frequent family meals have been previously found to be associated with improved dietary intake.

2. Explore the role of family functioning in the cross-sectional association between mothers' and fathers' food parenting practices and preschool children's risk for inadequate nutrition using direct observations of food parenting practices in the Canadian context (n=77 families).
3. Qualitatively describe parent perceptions of family meals among families with preschoolers (n= 20) to understand why they eat together. As a structured food parenting practice, few studies have explored the parent actions leading to the creation of meal routines. Specifically, this study aims to understand how parents’ own early life experiences with family meals and their major life transitions (i.e. becoming a parent) impact both their approach to family meals in the current context, and the messages they share with their children about nutrition and mealtimes.

4. Based on findings from the previous three aims, argue for a reconceptualization of picky eating and food parenting measurements and definitions that consider the bi-directional influence on children’s eating behaviours.

Findings from this thesis will increase our understanding of the impact of food parenting practices on child and adolescent dietary intake and how family meal routines are established and influenced by parents’ own early life experiences with family meals. This information will help improve pediatric and adolescent nutrition care in Canada as well as the development of effective family-based nutrition interventions.
3 Chapter 3:

Exploring the role of family functioning in the association between family dinner frequency and dietary intake among adolescents and young adults

3.1 Manuscript

This chapter has been published in *JAMA Network Open*:

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**Title:** Exploring the role of family functioning in the association between family dinner frequency and dietary intake among adolescents and young adults

**Authors:**

Kathryn Walton, MSc, RD¹
Nicholas J. Horton, ScD²
Sheryl L. Rifas-Shiman, MPH³
Alison E. Field, ScD⁴
S. Bryn Austin, ScD⁵,⁶,⁷
Emma Haycraft, PhD⁸
Andrea Breen, PhD¹
Jess Haines, PhD, RD¹

¹Department of Family Relations & Applied Nutrition, University of Guelph, Guelph ON Canada; ²Department of Mathematics and Statistics, Amherst College, Massachusetts, USA; ³Division of Chronic Disease Research Across the Lifecourse, Department of Population Medicine, Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston, MA, USA; ⁴Department of Epidemiology, School of Public Health, Brown University, Rhode Island USA; ⁵Channing Division of Network Medicine, Brigham & Women’s Hospital & Harvard Medical School; ⁶Division of Adolescent/Young Adult Medicine, Boston Children’s Hospital; ⁷Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health, Massachusetts USA; ⁸School of Sport, Exercise & Health Sciences, Loughborough University, United Kingdom

**Corresponding Author:**

Kathryn Walton
50 Stone Rd E.
University of Guelph
Guelph, ON Canada
N1G 2W1
kwalton@uoguelph.ca
647-988-4684

**WORD COUNT:** 3 414
KEY POINTS

**Question:** Does family functioning moderate or confound the association between family dinner frequency and dietary intake among youth?

**Findings:** In this cross-sectional study of 1,559 females and 1,169 males (14-24 years of age), family functioning did not moderate or confound the association between family dinner frequency and improved dietary intake.

**Meaning:** When the goal is to improve dietary intake, family dinners are an appropriate intervention target for all adolescents and young adults regardless of level of family functioning.
3.2 Abstract

**Importance:** Eating meals, particularly dinner, with family members has been associated with improved dietary intake among youth. However, existing studies have not examined how family functioning may moderate or confound this association.

**Objective:** To examine whether level of family functioning is associated cross-sectionally with family dinner frequency and dietary intake among a national sample of adolescents and young adults.

**Methods:** Linear regression models were used to examine the extent to which family dinner frequency was associated with self-reported intake of fruit and vegetables, sugar-sweetened beverages (SSB), fast food and take-out food. To explore effect modification by family functioning, an interaction term for family functioning and family dinner frequency was included for each dietary outcome. To explore confounding, models adjusted for family functioning were run. All models were stratified by sex and included participant age, educational attainment of mother’s spouse/partner and family structure as covariates. Analyses for this manuscript were conducted between 2017 and 2018.

**Results:** Participants were 1,559 female and 1,169 males participating in the U.S. Growing Up Today Study 2 (GUTS2) who were 14-24 years old and living with their parents in 2011. The majority of participants identified as White (92.6%). More frequent family dinners were associated with higher quality dietary intake regardless of level of family functioning; interactions between family functioning and family dinner frequency
were non-significant. Associations between family meal frequency and dietary intake outcomes did not change substantively when adjusting for family functioning. In adjusted models, more frequent family dinners were associated with higher intakes of fruits (females: $\beta = 0.09 \text{ servings/day}, \text{ CI}= 0.04, 0.15$; males: $\beta = 0.07 \text{ servings/day}, \text{ CI}= 0.01, 0.12$) and vegetables (females: $\beta = 0.21 \text{ servings/day}, \text{ CI}= 0.12, 0.30$; males: $\beta = 0.19 \text{ servings/day}, \text{ CI}= 0.09, 0.30$), and lower intakes of fast food (females: $\beta = -0.04 \text{ times/week}, \text{ CI}= -0.07, 0.00$; males: $\beta = -0.10 \text{ times/week}, \text{ CI}= -0.15,-0.04$) and take-out foods (females: $\beta = -0.04 \text{ times/week}, \text{ CI}= -0.07,-0.01$; males: $\beta = -0.06 \text{ times/week}, \text{ CI}= -0.10,-0.02$). More frequent family dinners were associated with lower intakes of SSBs for males only ($\beta = -0.07 \text{ servings/day}, \text{ CI}= -0.13,-0.02$).

Conclusions: More frequent family dinners are associated with healthful dietary intakes among youth, regardless of level of family functioning. Family dinners may be an appropriate intervention target for improving dietary intake among youth.

Word Count: 370
3.3 Introduction

Adolescence and young adulthood are vulnerable life stages for the development of obesity\textsuperscript{235,236}. Poor dietary intake has been identified as a key risk factor for excess weight gain among these populations with diet quality often declining from childhood to adolescence and young adulthood\textsuperscript{24,236}. Numerous studies have found that more frequent family meals are associated with improved dietary intake among adolescents and young adults\textsuperscript{135,136,160,164,165,173}. However, none of the existing studies have examined how family functioning may influence the associations via effect modification or confounding. Failing to consider family functioning may inappropriately identify family meals as a predictor of dietary intake when the positive association identified may be true for only some families, i.e., those with high family functioning, or may be due to a third variable, i.e., the family's level of functioning\textsuperscript{237}.

Family functioning is defined by how family members manage daily routines, communicate and connect emotionally with one another\textsuperscript{212-214}. While no studies have examined how family functioning may influence the association between family meals and dietary intake, existing studies have shown that general family functioning is associated with family meal frequency\textsuperscript{181} and adolescent dietary intake\textsuperscript{217}. Berge and colleagues (2013)\textsuperscript{181} found that general family functioning was associated with more frequent family meals (girls: $\beta = 0.31$ meals/week, Standard Error (SE) 0.02, $p< 0.001$; boys: $\beta = 0.25$ meals/week, SE= 0.03, $p< 0.001$) and with improved dietary intake among adolescents; higher fruit and vegetable consumption among females ($\beta = 0.06$
servings/day, SE= 0.03, p= 0.037) and lower fast food consumption among males (β= -0.09 times/week, SE= 0.03, p< 0.001). Haines and colleagues (2016)\textsuperscript{217} found that high family functioning was associated with lower odds of eating fast food one or more times per week among female adolescents and young adults (AOR = 0.74; 95% CI = 0.61–0.89)\textsuperscript{217}. Among a younger population, Martin-Biggers et al (2018)\textsuperscript{218} found that high family cohesion (an aspect of family functioning) was associated with modestly higher intakes of fruits and vegetables (β= 0.58 servings/week, Standard Error (SE) 0.26, 95% CI 0.06, 1.09) among 2-5 year-olds (n= 550). These findings underscore the importance of examining the potential modification or confounding influence family functioning may have on the association between family meals and dietary intake.

This study aims to examine the cross-sectional association of family dinner frequency with adolescent/young adult dietary intake among a national sample of U.S. males and females, while accounting for family functioning by examining whether it moderates or confounds the association. Results will provide us with a clearer understanding as to the role family dinners play in improving dietary intake and if this positive association exists for all families regardless of level of family functioning\textsuperscript{155,238}. This understanding will inform the content and appropriate targets for interventions focused on improving the dietary intake of adolescents and young adults.
3.4 Methods

3.4.1 Study design and population

Participants are from the U.S.-based Growing Up Today Study 2 (GUTS2). GUTS2 is an on-going cohort study of offspring of nurses (participants in the Nurses Health Study II; NHS II). The GUTS2 cohort was established in 2004; study staff contacted 20 700 women in NHS II who had children aged 9–17 years and subsequently mailed questionnaires to 8 826 females and 8 454 males whose mothers granted consent to contact their child. A total of 6 002 females and 4 918 males completed and returned questionnaires thereby consenting to participate in the GUTS2 cohort. Follow-up questionnaires (online and mailed paper copies) have been sent to participants bi-annually. This study was approved by the Institutional Review Board at the Brigham and Women’s Hospital and followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines for cross-sectional studies.

We restricted analyses to the 2011 questionnaire where both family dinner frequency and family functioning were assessed (n= 6 659). Participants with missing data on family dinner, dietary intake and family functioning were excluded from the analyses (n= 1 632), resulting in an analytic sample of 5 027 (3 055 females and 1 972 males). Because participants may live away from their parents, we ran separate models examining only participants who reported living with their parents “most of the time” (n=2
Results were similar among those that live with their parents “most of time” and those that have moved away (data not shown).

3.4.2 Measures

*Family Dinner Frequency* was measured using the question, “How often do you sit down with other members of your family to eat dinner or supper?”. Response options were “never/almost never” (coded as 0x/week), 1-2 times/week (coded as 1.5x/week), 3-4 times/week (coded as 3.5x/week), 5 or more times/week (coded as 5x/week).

*Dietary Intake* was examined via four behaviors: intake of fruit and vegetables, sugar-sweetened beverages (SSB), fast food, and take-out food. *Fruit and vegetable intake* were measured using a 27-item food frequency questionnaire (FFQ) assessing intake over the past year using a 10-point ordinal scale ranging from 0-≥6x/day. We analyzed fruit and vegetable intake separately and fruit intake was analyzed excluding fruit juice to reflect whole fruit consumption. *SSB intake* was measured using 4 questions assessing intake of soda, non-carbonated fruit drinks, sports drinks, and energy drinks over the past year using a 10-point ordinal scale ranging from 0-≥6x/day. *Fast food intake* was measured using the following question answered on a 5-point ordinal scale ranging from “never” to “once a day or more”: “How often did you eat something from a fast food restaurant (McDonalds, KFC, Wendy’s etc.) in the past year?”. *Take-out food consumption* was measured using the question: “How often did you eat something from a takeout restaurant (Chinese food, pizza, deli, supermarket fully prepared food, Applebee’s to-go) in the past year?".
**Family Functioning** was assessed using 9-items from the General Family Functioning Scale of the Family Assessment Device\textsuperscript{239}. To meet space limitations in the 2011 survey, only 9 items from the original 12-item scale were included; 3 items were worded similarly and were thus excluded (e.g., we included “individuals are accepted for who they are” but did not include “we feel accepted for who we are”). The Cronbach’s alpha for the 9 included items is 0.87 indicating strong internal consistency. The scale consists of statements about families to which participants indicated the degree to which they agreed on a 4-point scale (strongly disagree to strongly agree) and includes items that measure the overall health/pathology of the family relating to six dimensions of family functioning: a) problem solving, b) communication, c) roles, d) affective responsiveness, e) affective involvement, and f) behavioral control\textsuperscript{239,240}. We divided the sum by 9 to give a mean score from 1.0 to 4.0; lower scores indicate better family functioning. Scores were explored as both a continuous and dichotomous variable; we used the cut-point <2.17 to indicate high functioning based on previous evidence that this cut-point effectively discriminates between healthy and unhealthy functioning in families with young children and older adolescents\textsuperscript{214,240,241}.

**Covariates**

**Age.** We calculated participants’ age from their birthdate and the date the 2011 questionnaire was returned.

**Educational Attainment of Mother’s Spouse/Partner.** Family meal frequency has been found to be highest among those with higher socio-economic status (SES)\textsuperscript{164}. As
a measure of SES, participants’ mothers reported on their spouse/partner’s educational attainment in the NHS II in 1999 by indicating the “highest level of education completed by your current spouse or partner”. Response options included “less than high school”, “high school graduate”, “2-year college”, “4-year college”, “graduated school” or “not applicable”. Responses were dichotomized to “graduated college” and “not graduated college”.

**Family Structure.** Family meal frequency has been found to be highest among those from dual-headed households. Family structure was determined based on the most recent report of mothers’ living status which was reported on in the NHSII in 2005. Response options included: mother lives with child and spouse/partner, mother lives with child without partner and mother does not live with child. Family structure was then dichotomized as “mother lives with child and partner” and “other”.

### 3.4.3 Statistical analyses

While data was collected in 2011, analyses from the current study were conducted between 2017 and 2018. Analyses were stratified by participants’ sex; family meal frequency and the impact of family meals on youth outcomes have been found to differ by sex. We ran analyses separately among participants who indicated that they live with their parents most of the time. Findings are similar to that of the full sample; results are shown only for participants who live at home most of the time. Descriptive and frequency statistics were run to describe the study sample.
We first examined whether family functioning modified the association between family dinner frequency and dietary intake. We ran linear regression models including an interaction variable (family functioning*family dinner frequency) with family functioning as both a continuous and dichotomous measure. Results were similar for both continuous and dichotomous models; we present the p-values for the interaction terms from the continuous model. We also present our results stratified by level of family functioning (high vs. low). Second, we examined whether family functioning confounded the association between family dinner frequency and dietary intake using linear regression adjusted for family functioning. Because the distribution of the residuals from the linear regression models were skewed, we replicated the models using a log-transformed and a dichotomized form of the outcomes. Results were consistent using these transformed outcomes. The untransformed results are reported since they are most straightforward to interpret. Participants’ age, educational attainment of mother’s spouse/partner, and family structure were included as covariates in all models. All p-values were from two-sided tests and results were deemed statistically significant at p <0.05.

3.5 Results

3.5.1 Participant characteristics

In 2011, participants were between the ages of 14- 24 years (mean age= 19.4 ± 1.9 years), 92.6% identified as ‘white’, and 80.3% lived in dual-parent homes (Table
Two-thirds (68.7%) of the mothers’ spouse/partners had graduated college. Most participants reported a high level of family functioning (76.6%), and on average had 3.4 (+ 1.6) family dinners/week.

### 3.5.2 Family dinner frequency and adolescent/young adult dietary intake

**Females**

Our results suggest no significant effect modification by family functioning on the association of family dinner frequency with dietary intake among females. While the effect estimates for some dietary outcomes differed slightly among females from high or low functioning families, no substantive differences were observed (Table 3.2).

More frequent family dinners were associated with improved dietary intake (Model 1; Table 3). Family dinners were associated with higher intakes of fruits ($\beta$=0.11 servings/day, 95% CI= 0.05, 0.16) and vegetables ($\beta$= 0.25 servings/day, 95% CI= 0.17, 0.34), and lower consumption of fast food ($\beta$= -0.05 times/week, 95% CI= -0.09, -0.02) and take-out food ($\beta$= -0.04 times/week, 95% CI= -0.08, -0.01) in models adjusted for age, mothers’ spouse/partner’s educational attainment and family structure. Frequent family dinners were not significantly associated with SSB consumption for females (model 1, table 3.3: $\beta$= -0.02 servings/day, 95% CI= -0.04, 0.01). Attenuation of the effect was minimal (less than 5%) when family functioning was included in the model (Model 2, Table 3.3). In models adjusted for family functioning, more frequent family meals were associated with higher intakes of fruits ($\beta$= 0.09 servings/day, 95% CI= ...
0.04, 0.15) and vegetables (β = 0.21 servings/day, 95% CI= 0.12, 0.30). More frequent family meals were associated with lower intakes of fast food (β = -0.04 times/week, 95% CI= -0.07, 0.00) and take-out food (β = -0.04 times/week, CI= -0.07, -0.01). Frequent family dinners were not significantly associated with reduced SSB intake for females in the model adjusted for family functioning (model 2; β = -0.02 servings/day, 95% CI= -0.04, 0.01).

Males

Similar to our results among females, our results among males show no significant effect modification by family functioning on the association of family dinner frequency with dietary intake; results are similar for males in high and low functioning families (Table 3.2).

Among males, participation in more frequent family dinners was significantly associated with higher intakes of fruits (β = 0.08 servings/day, 95% CI= 0.02, 0.13) and vegetables (β = 0.20 servings/day, 95% CI= 0.10, 0.30), and lower consumption of fast food (β = -0.10 times/week, 95% CI= -0.16,-0.04), take-out food (β = -0.06 times/week, 95% CI= -0.10, -0.02) and SSBs (β = -0.07 servings/day, 95% CI= -0.13,-0.02), adjusted for age, mothers’ spouse/partner’s educational attainment and family structure (Model 1, Table 3.3). Attenuation was minimal (less than 5%) for the association between frequent family dinner participation and higher-quality dietary intake after adjusting for family functioning among males (Model 2, Table 3.3). Specifically, frequent family meals were
still associated with higher intakes of fruits ($\beta = 0.07$ servings/day, 95% CI= 0.01, 0.12) and vegetables ($\beta = 0.19$ servings/day, 95% CI= 0.09, 0.30), and lower intakes of fast food ($\beta = -0.10$ times/week, 95% CI= -0.15, -0.04), take-out food ($\beta = -0.06$ times/week, 95% CI= -0.10, -0.02) and SSBs ($\beta = -0.07$ servings/day, 95% CI= -0.13, -0.02).

### 3.6 Discussion

In this U.S. nationwide cohort, we observed that frequent family dinners are significantly associated with improved dietary intakes among youth and that family functioning does not moderate or confound these associations. To our knowledge, this is the first study to explore the role of family functioning in the association between family dinner frequency and improved diet quality.

It has been argued that family dysfunction may interfere with families’ abilities to organize and prepare healthful family meals and diminish the impact or quality of role modeling; families who have regular family meals are also likely to have higher family functioning. However, our findings suggest that not only are there families with lower levels of functioning participating in frequent family meals, but that family dinners are associated with improved dietary intake, regardless of level of family functioning. While our results found no evidence of effect modification by level of family functioning, research on the association between family meal frequency and disordered eating suggests that females may be more susceptible to variations in family functioning than males. Loth and colleagues found that the protective nature of frequent family meals
against disordered eating behaviors was moderated by level of family functioning among females, but not among males. Among females in low functioning families, frequent family meals were associated with greater odds of engaging in disordered eating behaviors\(^{244}\). These results suggest that impact of family meal frequency and level of family functioning varies depending on the outcome of interest.

Our results are consistent with existing research showing that frequent family meals are associated with improved dietary intake among youth\(^{135,160,162,164,165,173}\). Neumark-Sztainer and colleagues\(^ {164}\) found that after controlling for sociodemographic variables, including mothers’ employment status and socioeconomic status (primary marker was parental education level), frequent family meals were positively associated with intake of fruits and vegetables and negatively associated with soft drink consumption. Our results extend this past research by examining whether frequent family dinners are associated with improved dietary intakes over and above the influence of family functioning\(^ {181,217}\).

Our results suggest that family dinners are an appropriate target for improving youth dietary intake. While for some families, family-based therapy to improve family functioning may be important for other aspects of adolescent health or to reduce engagement in risky behaviors, such as drug use\(^ {155}\), when the goal is to improve dietary intake, participation in frequent family meals is an appropriate intervention method, even for families with lower levels of functioning. Previous research from the GUTS cohorts indicates that youth participation in family dinners has been on the decline since the
cohort was established in 1996. Future studies need to explore methods to support families in eating together, especially during this life stage when individuals are at increased risk of poor dietary intake and excess weight gain, in comparison to other life stages.

Participating in frequent family meals reduces opportunities available to eat outside of the home; food eaten at home is often healthier than food eaten outside of the home. While we did not examine the types of foods eaten during the shared dinners in this study, our result showing that frequent family meals were associated with lower levels of take-out food consumption suggests that dinners are likely to have been prepared in the home.

Importantly, although our study adds to a large body of literature highlighting the many benefits of frequent family meals, few interventions focused on the importance of family meals exist and only one has focused on adolescents. DeBar and colleagues developed a 5-month program for overweight adolescent females (mean age =14.1 ± 1.4 years) in a primary care setting focused on family meals, healthy eating and other markers of wellbeing including physical activity and mental health. At 12-month follow-up, intervention participants reported a smaller decline in family meals (3.85 to 3.51 vs. 4.34 to 3.29 meals/week, p=0.03) and less fast food consumption (1.17 to 1.00 times/week vs. 1.27 to 1.55 times/week, p= 0.02) in comparison to control participants. While this research highlights the success that family meal interventions can have, it targeted only overweight females. Future research should explore
interventions aimed at increasing the frequency of family meals within a broader population of youth.

Exploring differences between high and low functioning families who participate in frequent family meals and those who don’t may also point to important areas of intervention. Given the associations among high family functioning and family dinner participation\textsuperscript{181,217}, it may be especially important to test strategies to support lower functioning families in times of transition and stress or when life necessitates that they spend mealtimes at work or providing care for others, to ensure that they continue eating together. In their research exploring the differences in family meal barriers between single and dual-headed families, Berge et al\textsuperscript{180} highlight this idea of tailoring intervention strategies based on sociodemographic characteristics. Given our finding that there are both high functioning, and dual-headed families who do not participate in frequent family dinners, more general strategies to support family dinners will also be beneficial to many. Work schedules, after school activities and a lack of meal planning are commonly cited barriers to family dinner participation\textsuperscript{153}. Interventions that promote youth involvement in meal preparation may be particularly promising to not only lessen the burden of time, but to also strengthen the benefits shared meals have on their dietary intake\textsuperscript{254}.

This study has a number of limitations that should be considered when interpreting our results. All data are based on self-report and thus there is the potential for bias and misinterpretation. Due to data availability, the analyses of this study were
restricted to the 2011 GUTS2 questionnaire and were thus cross-sectional in nature. Future studies should employ longitudinal designs, which will also help to understand how the association between family dinner frequency, dietary intake and family functioning changes and evolves within families over time. This study measured only family dinners, as opposed to family meals in general, which may under-represent the frequency with which participants eat with other family members. However, previous research has suggested that there is no difference in reporting a protective relationship between studies that consider family meals in general versus dinner specifically\(^{155}\). Although we have a large study population of participants who reside throughout the U.S., our cohort is not a representative sample of U.S. adolescents/young adults. Participants are children of registered nurses and the cohort is >90% white, which may reduce the generalizability of our findings. We calculated 40 tests (Tables 2 and 3) and did not adjust for multiple comparisons. However, of these tests, 29 were statistically significant at the 0.05 level, much larger than the 2 we would expect by chance. Finally, the small effect sizes for some of our outcomes suggest that while a linear association exists between family meal frequency and improved dietary intake, over and above family functioning, a threshold effect is possible given the relatively low levels of fast food, take-out and SSB consumption among this population. Future research should examine these associations among populations where consumption of such foods is higher.
3.7 Conclusion

While research has indicated that family dinners may be associated with improved dietary intake among youth, no studies have explored how level of family functioning may moderate or confound the association. Our results suggest that frequent family meals are associated with higher intakes of fruits and vegetables and lower intakes of fast food and take-out for both female and male youth in both high and low functioning families. Family meals are an appropriate intervention target to help improve the dietary intake of youth. Future studies should examine ways to support families in eating together frequently as well as methods of keeping children engaged in family meals as they transition into adolescence and young adulthood.

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**ACKNOWLEDGEMENTS:**

KW participated in study conception and design and led the manuscript preparation. JH obtained funding for this study; she participated in data collection, study conception and design. NH supported the study design and data analyses. SRS conducted all data analyses. AE & SBA participated in data collection, supported the study design and critically reviewed the manuscript. EH & AB critically reviewed the manuscript for content and contribution to the literature. All authors have reviewed the final manuscript.
### Table 3.1: Participant Characteristics according to Sex and Family Dinner Frequency

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total (N=2728)</th>
<th>Adolescent/Young Adult Sex</th>
<th>Family Dinner times/week</th>
<th>&lt;5 times (N=1681)</th>
<th>≥ 5 times (N=1047)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, mean (SD)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years</td>
<td>19.4 (1.9)</td>
<td>19.4 (1.9)</td>
<td>19.5 (1.9)</td>
<td>19.7 (1.9)</td>
<td>19.0 (1.8)</td>
</tr>
<tr>
<td><strong>Race, No./No. (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>2453 / 2649 (92.6)</td>
<td>1050 / 1145 (91.7)</td>
<td>1403 / 1504 (93.3)</td>
<td>1511 / 1629 (92.8)</td>
<td>942 / 1020 (92.4)</td>
</tr>
<tr>
<td>Other</td>
<td>196 / 2649 (7.4)</td>
<td>95 / 1145 (8.3)</td>
<td>101 / 1504 (6.7)</td>
<td>118 / 1629 (7.2)</td>
<td>78 / 1020 (7.6)</td>
</tr>
<tr>
<td><strong>Family Structure, No./No. (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual-Parent Home</td>
<td>2155 / 2685 (80.3)</td>
<td>933 / 1160 (80.4)</td>
<td>1222 / 1525 (80.1)</td>
<td>1308 / 1659 (78.8)</td>
<td>847 / 1026 (82.6)</td>
</tr>
<tr>
<td>Single Parent Home</td>
<td>530 / 2685 (19.7)</td>
<td>227 / 1160 (19.6)</td>
<td>303 / 1525 (19.9)</td>
<td>351 / 1659 (21.2)</td>
<td>179 / 1026 (17.4)</td>
</tr>
<tr>
<td><strong>Mother’s Spouse or Partner’s Educational Level, No./No. (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than College Education</td>
<td>806 / 2576 (31.3)</td>
<td>343 / 1105 (31.0)</td>
<td>463 / 1471 (31.5)</td>
<td>544 / 1570 (34.6)</td>
<td>262 / 1006 (26.0)</td>
</tr>
<tr>
<td>College Education</td>
<td>1770 / 2576 (68.7)</td>
<td>762 / 1105 (69.0)</td>
<td>1008 / 1471 (68.5)</td>
<td>1026 / 1570 (65.4)</td>
<td>744 / 1006 (74.0)</td>
</tr>
<tr>
<td><strong>Family Functioning, No. (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High*</td>
<td>2091 (76.6)</td>
<td>889 (76.0)</td>
<td>1202 (77.1)</td>
<td>1223 (72.8)</td>
<td>868 (82.9)</td>
</tr>
<tr>
<td>Low*</td>
<td>637 (23.4)</td>
<td>280 (24.0)</td>
<td>357 (22.9)</td>
<td>458 (27.2)</td>
<td>179 (17.1)</td>
</tr>
<tr>
<td>Family Functioning Score Score**, Mean (SD)</td>
<td>1.9 (0.5)</td>
<td>1.9 (0.5)</td>
<td>1.8 (0.5)</td>
<td>1.9 (0.5)</td>
<td>1.8 (0.5)</td>
</tr>
<tr>
<td><strong>Family Dinner Frequency, mean (SD)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dinners/week</td>
<td>3.4 (1.6)</td>
<td>3.4 (1.6)</td>
<td>3.3 (1.7)</td>
<td>2.4 (1.3)</td>
<td>5.0 (0.0)</td>
</tr>
<tr>
<td>Fruit without juice, mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Servings/day</td>
<td>1.5 (1.6)</td>
<td>1.3 (1.4)</td>
<td>1.5 (1.8)</td>
<td>1.3 (1.5)</td>
<td>1.7 (1.8)</td>
</tr>
<tr>
<td>Vegetables, mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Servings/day</td>
<td>2.3 (2.7)</td>
<td>2.1 (2.6)</td>
<td>2.4 (2.7)</td>
<td>2.1 (2.4)</td>
<td>2.7 (3.1)</td>
</tr>
<tr>
<td>Sugar-Sweetened Beverages (SSB), mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Servings/day</td>
<td>0.8 (1.2)</td>
<td>1.1 (1.5)</td>
<td>0.5 (0.8)</td>
<td>0.8 (1.2)</td>
<td>0.7 (1.1)</td>
</tr>
<tr>
<td>Fast Food, mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Times/week</td>
<td>1.0 (1.3)</td>
<td>1.2 (1.5)</td>
<td>0.8 (1.1)</td>
<td>1.1 (1.4)</td>
<td>0.8 (1.1)</td>
</tr>
<tr>
<td>Take-out food, mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Times/week</td>
<td>0.9 (1.1)</td>
<td>0.9 (1.1)</td>
<td>0.8 (1.0)</td>
<td>0.9 (1.2)</td>
<td>0.7 (0.9)</td>
</tr>
</tbody>
</table>

* Cut-off for family functioning (high= <2.17; low= ≥2.17)
** Lower scores indicate better family functioning
Table 3.2. Linear regression models examining associations of family dinner frequency (times/week) with dietary outcomes, stratified by level of family functioning (high vs. low)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Females</th>
<th>Males</th>
<th>Interaction p-value</th>
<th>Females</th>
<th>Males</th>
<th>Interaction p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effect estimate (95% CI)</td>
<td>Interaction p-value</td>
<td></td>
<td>Effect estimate (95% CI)</td>
<td>Interaction p-value</td>
<td></td>
</tr>
<tr>
<td><strong>Fruit without juice/day</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Family Functioning</td>
<td>0.07 (0.01, 0.14)*</td>
<td>0.18</td>
<td></td>
<td>0.08 (0.02, 0.14)*</td>
<td>0.05 (-0.04, 0.14)*</td>
<td>0.90</td>
</tr>
<tr>
<td>Low Family Functioning</td>
<td>0.14 (0.04, 0.25)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vegetables/day</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Family Functioning</td>
<td>0.27 (0.17, 0.38)*</td>
<td>0.17</td>
<td></td>
<td>0.23 (0.11, 0.35)*</td>
<td>0.11 (-0.07, 0.30)</td>
<td>0.89</td>
</tr>
<tr>
<td>Low Family Functioning</td>
<td>0.12 (-0.02, 0.27)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sugar Sweetened Beverages (SSBs)/day</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Family Functioning</td>
<td>-0.04 (-0.07, -0.01)*</td>
<td>0.29</td>
<td></td>
<td>-0.05 (-0.11, 0.01)</td>
<td></td>
<td>0.66</td>
</tr>
<tr>
<td>Low Family Functioning</td>
<td>0.02 (-0.03, 0.08)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fast Food times/week</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Family Functioning</td>
<td>-0.06 (-0.10, -0.02)*</td>
<td>0.71</td>
<td></td>
<td>-0.10 (-0.17, -0.03)*</td>
<td></td>
<td>0.94</td>
</tr>
<tr>
<td>Low Family Functioning</td>
<td>0.00 (-0.08, 0.08)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Take out times/week</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Family Functioning</td>
<td>-0.04 (-0.08, -0.01)*</td>
<td>0.59</td>
<td></td>
<td>-0.04 (-0.10, 0.01)</td>
<td></td>
<td>0.77</td>
</tr>
<tr>
<td>Low Family Functioning</td>
<td>-0.04 (-0.11, 0.03)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Adjusted for age, mothers’ spouse/partner’s educational attainment, and family structure

2Family Functioning scores ≥2.17= high functioning and <2.17= low functioning

* indicates significant results at p <0.05 level
Table 3: Linear Regression Models examining associations of Family Dinner Frequency (times/week) with Dietary Outcomes, adjusting for family functioning

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1 Effect estimate (95% CI)</td>
<td>Model 2 Effect estimate (95% CI)</td>
</tr>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td></td>
<td>Model 1 Effect estimate (95% CI)</td>
<td>Model 2 Effect estimate (95% CI)</td>
</tr>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td>Fruit without juice/day</td>
<td>0.11 (0.05, 0.16)*</td>
<td>0.09 (0.04, 0.15)*</td>
</tr>
<tr>
<td></td>
<td>0.08 (0.02, 0.13)*</td>
<td>0.07 (0.01, 0.12)*</td>
</tr>
<tr>
<td>Vegetables/day</td>
<td>0.25 (0.17, 0.34)*</td>
<td>0.21 (0.12, 0.30)*</td>
</tr>
<tr>
<td></td>
<td>0.20 (0.10, 0.30)*</td>
<td>0.19 (0.09, 0.30)*</td>
</tr>
<tr>
<td>Sugar Sweetened Beverages (SSBs)/day</td>
<td>-0.02 (-0.04, 0.01)</td>
<td>-0.02 (-0.04, 0.01)</td>
</tr>
<tr>
<td></td>
<td>-0.07 (-0.13, -0.02)*</td>
<td>-0.07 (-0.13, -0.02)*</td>
</tr>
<tr>
<td>Fast Food times/week</td>
<td>-0.05 (-0.09, -0.02)*</td>
<td>-0.04 (-0.07, 0.00)*</td>
</tr>
<tr>
<td></td>
<td>-0.10 (-0.16, -0.04)*</td>
<td>-0.10 (-0.15, -0.04)*</td>
</tr>
<tr>
<td>Take out times/week</td>
<td>-0.04 (-0.08, -0.01)*</td>
<td>-0.04 (-0.07, -0.01)*</td>
</tr>
<tr>
<td></td>
<td>-0.06 (-0.10, -0.02)*</td>
<td>-0.06 (-0.10, -0.02)*</td>
</tr>
</tbody>
</table>

Model 1. Adjusted for age, mothers’ spouse/partner’s educational attainment, and family structure
Model 2. Adjusted for Model 1 covariates plus family functioning

* indicates significant results at p < 0.05 level
Chapter Four:

The Family Mealtime Observation Study (FaMOS): Exploring the role of family functioning in the association between mothers’ and fathers’ food parenting practices and children’s nutrition risk

4.1 Manuscript

This chapter has been formatted for journal submission:

Walton K, Haycraft E, Jewell K, Breen A, Randall Simpson J & Haines J. The Family Mealtime Observation Study (FaMOS): Exploring the role of family functioning in the association between mothers’ and fathers’ food parenting practices and children’s nutrition risk.
The Family Mealtime Observation Study (FaMOS): Exploring the role of family functioning in the association between mothers’ and fathers’ food parenting practices and children’s nutrition risk

Authors:

Kathryn Walton, MSc, RD¹ (kwalton@uoguelph.ca)

Emma Haycraft, PhD² (e.haycraft@lboro.ac.uk)

Kira Jewell, BASc¹ (kjewell@uoguelph.ca)

Andrea Breen, PhD¹ (abreen@uoguelph.ca)

Janis Randall Simpson, PhD, RD¹ (rjanis@uoguelph.ca)

Jess Haines, MHSc, PhD, RD¹ (jhaines@uoguelph.ca)

¹ Department of Family Relations & Applied Nutrition, University of Guelph, Guelph Ontario, CA

² School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, UK

Word Count: 4 650 (max 5 000)
4.2 Abstract

**Background:** Few studies have explored how the general family context may influence associations between food parenting practices and child eating. The aim of this study was to explore the associations between mothers’ and fathers’ food parenting practices and children’s nutrition risk, while examining whether family functioning modifies or confounds the association.

**Methods:** We conducted a cross-sectional study using home observations to assess mothers’ and fathers’ food parenting practices during dinnertime using the Family Mealtime Coding System (FMCS) among 73 Canadian families with preschoolers (mean age= 3.3 ± 1.1 years). Children’s risk of nutritional inadequacy was calculated using NutriSTEP®, which identifies nutrition problems across five subscales: eating behaviours, dietary intake, parental concerns about food and activity, screen time duration, and the use of supplements. Linear regression models examined the association between food parenting practices and children’s nutrition risk. To explore effect modification by family functioning, we included an interaction term (family functioning * food parenting practices). To explore confounding, we ran models adjusted for family functioning.

**Results:** Mothers’, but not fathers’, food parenting practices were associated with their children’s nutrition risk. Among mothers, more frequent physical food restriction was associated with higher nutrition risk in their child (β=0.37 NutriSTEP® points, 95% CI=
1.91, 7.13) and more frequent positive comments about the target child’s food were associated with lower nutrition risk ($\beta=-0.29$ NutriSTEP® points, 95% CI= -0.51, -0.06) in models adjusted for parent educational attainment and child BMI z-score. Family functioning did not modify these associations and these associations remained significant after adjustment for family functioning.

**Conclusion:** Mothers’ use of physical restriction and positive comments about their child’s food are related to their child’s risk of nutritional inadequacy, regardless of level of family functioning. Results suggest that helping mothers focus on using more positive encouragement rather than restriction may help to reduce their child’s nutrition risk. Future research should test interventions aimed at changing these food parenting practices among families with preschoolers at medium-high nutrition risk.

**Word Count:** 324 (max 350)

**Key Words:** family meals, food parenting practices, preschoolers, nutrition risk, direct observation
4.3 Introduction

Nutrition plays a critical role in the growth, development, school readiness, subsequent academic achievement and overall health status of young children. Eating preferences and patterns are established early in life and longitudinal research shows that food preferences and choices during the preschool years are strongly associated with dietary patterns and food choices later in life. This stability of eating habits from early childhood to adulthood suggests that young children’s dietary intake has important implications not only for children’s current health, but also their risk of future chronic disease. Despite this evidence that the preschool age is a key time for establishing healthy dietary patterns, few Canadian preschoolers are meeting dietary recommendations, and it is estimated that 11-30% have moderate risk for poor nutritional intake and 10-17% have high risk, as assessed by the Nutrition Screening Tool for Every Preschooler (NutriSTEP®), a validated measure used to assess eating habits and identify nutrition problems in preschool aged children.

Parents are the primary influence in young children’s lives and there is evidence to suggest that parents’ food parenting practices may influence children’s dietary intake and their resulting risk of inadequate nutrition (i.e. their nutrition risk). However, existing research exploring the influence of food parenting practices has produced equivocal results. For example, although early research found that restricting access to less healthful foods was associated with higher subsequent intakes of these
foods \textsuperscript{112}, results from more recent studies suggest that parental restriction may be associated with healthier dietary intakes among young children \textsuperscript{113}.

Recent scientific reviews \textsuperscript{73,257} have identified that these inconsistent findings may be due to the methodological limitations of existing research, including a reliance on parental report to assess food parenting. The validity of such reports is limited due to potential error through inaccurate recall or bias due to social desirability. Recent research has found inverse associations between parental report and observed feeding practices \textsuperscript{210}, as well as no associations at all \textsuperscript{100,102,186}. Therefore, direct observation is needed to more accurately explore associations between food parenting practices and children’s nutrition risk.

In addition to a reliance on parental-report measures, the current literature does not account for the feeding context, including the home environment in which feeding interactions transpire and the presence of mothers \textit{and} fathers during mealtimes. Family systems theory posits that individual or family behaviours must be understood within the global family context or system \textsuperscript{211}. General family factors, such as family functioning, may moderate the associations of food parenting practices on children’s nutrition risk because they influence how the feeding practices are experienced by the child \textsuperscript{258}. Family functioning is defined by how family members manage daily routines, communicate and connect emotionally with one another \textsuperscript{258}. There is some evidence that family functioning is associated with frequency of fast food consumption among adolescent females \textsuperscript{217}, but the mechanisms by which family functioning influences
dietary intake remain largely unknown, especially among young children where the home environment is thought to be quite influential.

Although mothers have traditionally held the primary role in feeding children, fathers also play an important and increasingly more prominent role during feeding interactions. Unfortunately, fathers have been underrepresented in existing feeding research. Mothers and fathers have been found to differ in the food parenting practices they use, highlighting the need to explore the potentially differential relationship between their food parenting and their children’s nutrition risk. Further, the existing body of literature has been built by studies conducted outside of Canada where feeding and parenting norms may differ. To date, only two studies exploring food parenting practices among preschoolers have been conducted in Canada; both used parental report of food parenting practices.

The overall aim of this study is to address the limitations of existing research through a cross-sectional study to examine the associations between mothers’ and fathers’ food parenting practices, assessed via direct observation in the home, and children’s nutrition risk among a sample of Canadian families with preschool aged children. We hypothesized that 1) the children of parents who engage in controlling and pressuring food parenting would have higher NutriSTEP® nutrition risk scores and therefore poorer nutritional status than those whose parents do not use these food parenting practices and 2) children whose parents use positive encouragement during meals would have lower NutriSTEP® nutrition risk scores than those whose parents do
not use these food parenting practices. The second aim of this study was to examine whether family functioning modifies or confounds the association of food parenting practices and children’s nutrition risk. We hypothesized that family functioning would moderate the association between controlling food parenting practices and children’s nutrition risk. Compared to children from families with high family functioning, the positive associations between controlling food parenting practices and nutrition risk would be stronger among children from families with low family functioning.

4.4 Methods

4.4.1 Participants and Procedure

We recruited families to participate in the Family Mealtime Observation Study (FaMOS) through a variety of methods including Facebook, posters in daycare centres, visits to library story times and word of mouth. Families were eligible to participate if 1) they had a child between the ages of 18 months and 5 years, 2) it was typical for the family to eat meals together, and 3) parent(s) were able to speak and respond to surveys in English. In families with more than one child within our target age range, the child with the closest birthday to the date of the first home visit was chosen to be the target child; in the case of twins, a coin was flipped to randomly choose the target child.

Once families were confirmed as eligible to participate, a research assistant (RA) visited each family in their home at a time that was convenient for the family. During this visit, parents provided consent. Where possible, in two-parent homes, both parents
were asked to be home during this initial visit. The parent(s) decided on three mealtimes over the following week to record. All observations collected were of the evening meal. The evening meal was chosen as it was identified by parent(s) as the typical ‘family meal’ and, in two-parent homes, the time when both parents usually ate with the target child. Families were reminded that we wanted to see ‘typical’ family mealtime experiences and that there was no reason to do anything special on the nights they recorded their meal. In cases where English was the family’s second language, families were reminded to speak English during the recorded mealtimes. Each family was provided with a video camera and tripod to record their meals and the RA assisted the parent(s) with the initial video camera set-up and placement to ensure that all family members were in-view of the recording and that their faces could be seen. The RA measured parents’ and target children’s heights using a calibrated stadiometer and weights using a calibrated electronic scale. Following the home visit, we emailed parents a link to a 15-minute online questionnaire which asked parents to report on their food parenting practices and aspects of their home environment, and to complete a nutrition risk questionnaire for the target child; in two parent families, each parent was sent an individual link to the questionnaire to complete.

On the evenings that a family was scheduled to record, an RA called or texted the family 15 minutes prior to the scheduled start of their mealtime to remind them to turn on the camera; families were asked to record their entire meal. Study staff were not present during mealtime recordings. One hour after the family meal, an RA called or
texted the family to confirm that they were indeed able to record, and to note any atypical events that may have occurred during the meal (i.e. target child had a temper tantrum during the meal, camera ran out of battery). If the family was unable to record, another date was chosen for recording.

Following the recording of the three meals, an RA visited the family home again to pick up the camera. During this second home visit, the RA confirmed that three observations were recorded on the camera and that the parent questionnaires had been completed. Families were provided with a $50 grocery gift card for participating. This study was approved by the University of Guelph Research Ethics Board (REB#14OC033).

4.4.1.1 Measures

*Observed food parenting practices:* We used the Family Mealtime Coding System (FMCS) \(^{100,259}\) to measure mothers’ and fathers’ feeding practices. The FMCS was created to reflect the Child Feeding Questionnaire \(^{188}\) and seven of its subscales were used in the current study: *pressure for target child to eat* (“eat three more bites”), *physical prompts for target child to eat* (spoon feeding child or putting food on the utensil for child to pick up), *verbal restriction of target child’s food consumption* (“you can’t have any more”), *physical restriction of target child’s food consumption* (moving a specific food away from child), *food rewards to encourage target child to eat* (“if you eat your peas, you can have ice cream”), *non-food rewards to encourage target child to eat* (“if you finish your meal, you can watch TV”) and *positive comments about food* (either
comments about food in general, the parent’s own food, or the target child’s food, explored separately). All instances of each food parenting behaviour were logged and frequencies of occurrence for each behaviour were calculated for the mealtime observation. The FMCS has been found to be a reliable measure of parental feeding practices among preschool aged children (inter-rater reliability >86.5%) 100,259.

**Target Child’s Nutrition Risk:** We measured the target child’s nutrition risk using the Nutrition Screening Tool for Every Preschooler (NutriSTEP®) 21. NutriSTEP® was developed by registered dietitians and is a 17-item questionnaire used to assess eating habits and identify nutrition problems in preschool aged children (3-5 years) across five subscales: eating behaviours, dietary intake, parental concerns about food and activity, screen time duration, and the use of supplements 21. The primary parent (parent who completed the questionnaire first) completed the NutriSTEP® questionnaire for the target child. NutriSTEP® has been validated against registered dietitians’ assessment of the child’s nutritional status (based on medical and nutritional history, 3-day food records and anthropometric measurements) among a large sample of ethnically and geographically diverse families in Canada 21. Scores on NutriSTEP® and registered dietitians’ ratings were correlated (r=0.48, p=0.01) and the questionnaire was found to be reliable when completed by parents on two separate occasions, 2-4 weeks apart (kappa >0.75) 21. Individual questions are answered using a tailored Likert scale, which are then coded into a numerical score through the use of the designated NutriSTEP coding system. These scores are then summed to generate a nutrition risk score for the
target child (ranging from 0 to 68), with higher scores representing greater nutrition risk. For descriptive purposes, scores were tabulated to determine three levels of risk of poor nutrition: low (scores ≤ 20), medium (scores 21-25) and high (scores >25) 21. For regression analyses, NutriSTEP® scores were explored as a continuous variable.

4.4.1.1 Covariates and moderating variables

*Parental Educational Attainment:* As an indicator of socio-economic status, mothers and fathers reported their educational attainment individually on an 8-pt Likert Scale ranging from 8th grade or less to Postgraduate Training or Degree.

*Child Body Mass Index (BMI):* Trained research assistants measured children’s heights and weights during home visit 1, as described above. Based on the World Health Organization (WHO) growth charts, we calculated BMI z-scores using WHO Anthro Software (version 3.2.2, WHO, Switzerland) to assess child weight adjusted for age and sex.

*Family Functioning:* We measured family functioning using the ‘general functioning’ subscale of the McMaster Family Assessment Device (FAD) 239. Because family functioning is a family-level variable, we used the primary parent’s report of family functioning. The scale consists of statements about families to which participants indicated the degree to which they agreed on a 4-point scale (strongly disagree to strongly agree) and includes items that measure the overall health/pathology of the family relating to six dimensions of family functioning: a) problem solving, b)
communication, c) roles, d) affective responsiveness, e) affective involvement, and f) behavioral control. It has been validated against experienced family therapists’ clinical ratings and found to correspond with clinicians’ ratings of healthy and unhealthy families; ‘general functioning’ subscale \( t(39) = 2.49, p < 0.05 \) \(^{214}\). Test-retest reliability has also been reported for the ‘general functioning’ subscale when completed by participants one week later \((r= 0.71) \) \(^{214}\). We averaged responses to each of the 12 items comprising the ‘general functioning’ subscale to create an overall score; higher scores indicate lower levels of family functioning \(^{239}\). For descriptive purposes, a cut-off of 2.17 was used to distinguish high and low functioning families \((< 2.17= \text{high functioning}, \geq 2.17= \text{low functioning}) \) \(^{214}\). For regression models, family functioning was explored as a continuous variable.

### 4.4.1.2 Data Analysis

Videos of the mealtime observations were coded using Noldus Observer XT 12.5 (Noldus Information Technology, Netherlands). To reduce camera reactivity, only mealtimes two and three were coded; video one was used as a warm-up for families \(^{100}\). Videos were coded by two independent coders and a random sample of 20% of the videos were coded by both coders. We calculated intra-rater and inter-rater reliability using Observer XT’s reliability function. Our inter-rater reliability \((\text{kappa} = 0.8)\) and intra-rater reliability \((\text{kappa} = 0.82)\) were both excellent \(^{260}\).

Analyses were run separately for mothers and fathers as previous research has suggested differences in mothers’ and fathers’ food parenting practices \(^{223}\). For both the
mothers and fathers, there were no statistically significant differences in food parenting practices used in videos 2 and 3 (data not shown), thus scores for parenting practices were averaged across the two observations. We calculated descriptive and frequency statistics for each food parenting practice to understand the practices used during mealtimes as well as Mann-Whitney U-tests of difference between mothers’ and fathers’ food parenting practices. We ran linear regression models to examine the association between food parenting practices and children’s NutriSTEP® risk scores. To examine whether family functioning modifies the association between food parenting practices and NutriSTEP® risk scores, we ran linear regression models including an interaction variable (family functioning*food parenting practice). There was no evidence of modification by family functioning (p >0.05 for the interaction terms; results not shown), so we then included family functioning in the model as a covariate to examine whether family functioning confounds the association between food parenting practices and NutriSTEP® risk scores. Based on previous research, all models were also adjusted for parent educational attainment and child BMI z-score \textsuperscript{131,189}. We also explored whether associations between food parenting practices and child nutrition risk score differed by child sex; results from stratified models showed no difference by child sex (results not shown). Statistical analyses were conducted using SPSS version 25 for Mac (PASW, IBM, New York USA).
4.5 Results

4.5.1 Participant and family-level characteristics

Of the families who expressed interest in our study by completing our eligibility screener (n=112), two were ineligible because they did not have a child within our target age range, three lived too far away for RAs to conduct home visits, one indicated that they did not speak English during mealtimes and 29 of the families did not follow-up to schedule a home visit. We scheduled and completed home visits with 77 families; we were unable to obtain video data from 4 families; one family found that the camera was too distracting for the target child, and 3 families spoke languages other than English during their meal recordings.

Thus, our final sample for analysis consisted of 73 families (137 parents; 74 mothers, 63 fathers). Most of parents (n=73) identified as the "primary parent" (by completing the questionnaire first) were mothers. The majority of parents in this study were married or living with a partner (94.5%; Table 4.1), 85.3% of parents reported having graduated from College or University or more (i.e. post-graduate degree), and 86.1% of families reported a total household income of $50 000/year. The majority of parents also identified as 'White' (84.6%). Most of the families in this study participated in family dinners 7 days a week (83.6%) and 90.4% were considered to have high family functioning (scores < 2.17).
The average age of the target child was $3.3 \pm 1.1$ years and 56.2% were female (Table 4.2). The majority of children (65.3%) were considered to have a healthy weight status and low nutrition risk (89.0%).

4.5.2 Exploration of Mealtime Videos and Food Parenting Practices

The average meal length was 24.46 minutes. Our results suggest that overall, mothers used more food parenting practices than fathers (Table 4.3). Mothers used significantly more controlling feeding practices, specifically, verbal restriction (mothers: $1.31 \pm 1.59$; fathers: $0.63 \pm 0.88$; $p < 0.05$), food rewards (mothers: $0.75 \pm 1.79$; fathers: $0.49 \pm 1.13$, $p < 0.05$) and non-food rewards (mothers: $0.31 \pm 0.57$; fathers: $0.14 \pm 0.36$, $p < 0.05$) than fathers. Mothers also used more positive encouragement, specifically towards the target child’s food during meals, than fathers (mothers: $7.12 \pm 5.31$; fathers: $4.26 \pm 3.45$, $p < 0.05$).

4.5.3 Exploration of Food Parenting Practices and Target Child’s NutriSTEP® Risk Scores

4.5.3.1 Mothers

Among mothers, more frequent physical restriction of food was associated with higher NutriSTEP® nutrition risk scores in their child ($\beta=0.37$ NutriSTEP® points, 95% CI= 1.91, 7.13) and more frequent positive comments about the target child’s food were associated with lower nutrition risk ($\beta=-0.29$ NutriSTEP® points, 95% CI= -0.51, -0.06) in
models adjusted for parent educational attainment and child BMI z-score (Model 1; Table 4.4). These associations remained significant after adjustment for family functioning (Model 2; Table 4.4). No other significant associations between mothers’ food parenting practices and the target child’s nutrition risk scores were found.

4.5.3.2 Fathers

Among fathers, no significant associations between food parenting practices and the target child’s nutrition risk were found in the models adjusted for parental educational attainment and child BMI z-score (Model 1; Table 4.4). Similar to our results with mothers, adjustment for family functioning did not change our results among fathers (Model 2; Table 4.4).

4.6 Discussion

In this sample of Canadian parents of preschool aged children, we observed that mothers’ use of physical restriction was associated with higher nutrition risk for their child and her use of positive comments towards the target child’s food was associated with lower nutrition risk. Fathers’ food parenting practices were not significantly associated with their children’s nutrition risk. Family functioning did not modify or confound these associations. To our knowledge, this is the first study to explore the associations of observed food parenting practices with preschool children’s nutrition risk while considering the potential influence of family functioning on these associations.
Our finding that maternal use of physical restriction of food was associated with greater risk of nutritional inadequacy supports our hypothesis that controlling food parenting practices would be associated with increased nutrition risk. This finding is consistent with previous longitudinal research that suggests restriction undermines a child’s ability to recognize their own hunger and satiety cues and increases eating in the absence of hunger, thereby increasing the child’s risk for overeating and potential for increased nutrition risk. Similar to previous observational studies, we observed fairly low levels of parental restriction. It has been suggested that overt restriction (i.e. taking food away from a child or telling them to stop eating a certain food) may occur more often during less structured eating occasions such as snack time and that covert restriction may occur more during structured mealtimes (i.e. not bringing certain foods into the home or offering them at mealtimes). Future research should explore the association of restriction and children’s dietary intake and eating behaviours throughout the day using a longitudinal study design to help tease out the directionality of the association.

Our finding that mothers’ positive comments about the target child’s food were associated with lower nutrition risk among children supports our initial hypotheses. Research by Holley and colleagues found parental modelling and positive comments to be helpful in increasing children’s consumption of disliked vegetables. Positive encouragement, without pressure, has also been related to lower reported levels of fussy eating and greater reports of food enjoyment in preschoolers. Taken together,
these results suggest that positive parental comments may be an effective method of both increasing intake of healthful foods and decreasing nutrition risk scores among preschool aged children. Future research should test the ability of interventions to teach parents to use positive encouragement rather than controlling feeding practices to improve dietary intake and reduce nutrition risk among preschoolers.

It has been argued that family dysfunction may diminish the impact of positive role modeling and intensify adverse impacts of controlling feeding practices during mealtimes. However, our results suggest family functioning does not modify or confound the association between parents’ food parenting practices and preschoolers’ nutrition risk. Contrary to our hypotheses, the associations between controlling food parenting practices and greater nutrition risk were not stronger among children from families with low family functioning. Similarly, effect estimates did not change when family functioning was added to the analytic models. When it comes to reducing children’s nutrition risk, our findings suggest that food parenting practices are an important avenue of intervention, regardless of level of family functioning. However, future research should seek to replicate our findings in populations with diverse levels of family functioning; it is possible that the limited variability of family functioning in our sample may have contributed to the null effects of family functioning on the associations explored.

Mothers’, but not fathers’, food parenting practices were associated with children’s nutrition risk. However, this finding is contrary to previous research using
mother and father reports of food parenting; among a sample of Canadian parents
Watterworth and colleagues 134 found that fathers’, but not mothers’, reported ‘restriction
for health’ was associated with higher nutrition risk among children. Comparisons
between the two studies are difficult due to Watterworth and colleagues’ 134 use of
parental report of food parenting practices, as previous research has found little
association between observed and reported food parenting practices 100,102,186,210.
Mealtime observations only capture overt restriction and parents may use covert
restriction, which would not be observed during mealtime videos, but can be captured in
food parenting questionnaires. Future research should explore the use of mixed
observational and parent-report methods in an attempt to more accurately capture both
overt and covert restriction 262.

We found that mothers used significantly more verbal restriction and food and
non-food rewards than fathers during meals. Overall, we found that positive comments
about the target child’s food (e.g., “your broccoli looks delicious”) was the most
commonly used food parenting practice among both mothers and fathers, followed by
verbal pressure to get the child to eat (e.g., “eat 3 more bites”) for mothers and positive
comments about food in general (e.g., “milk helps us grow strong bones and teeth”) for
fathers, which is similar to previous observational research 103. Our findings suggest that
mothers and fathers differ in the food parenting practices they use. While observational
studies including fathers have been limited 223, the research exploring differences in
mothers’ and fathers’ observed food parenting practices has produced conflicting results
One U.K.-based study that used the FMCS reported no significant differences in the frequency of mothers’ and fathers’ food parenting practices. However, similar to our findings, an American study by Orrell-Valente and colleagues found overall, mothers used significantly more food parenting practices than fathers and they tended to use praise more frequently too. Interestingly, the study which showed no difference between mothers’ and fathers’ food parenting was conducted in the U.K., suggesting that food parenting practices could be regionally and culturally defined. These inconsistent results highlight the importance of exploring both mothers’ and fathers’ food parenting practices to further understand how parents may influence each other’s food parenting practices and how this interaction between mothers and fathers may impact children’s dietary intake. Harris and colleagues have pioneered work in this area and found that, compared to discordant mother-father pairs, Australian mother-father pairs who concordantly report low levels of pressure to eat had children with lower levels of pickiness. Additional research is needed to understand the impact of concordance/discordance between mothers’ and fathers’ food parenting practices in Canada.

Our study had a number of key strengths. First the inclusion of fathers in this study is fairly unique within studies exploring food parenting practices, or children’s health in general. This allowed for a more accurate analysis of the context in which preschoolers from primarily two-parent families are fed. Second, the use of direct observation allowed us to more accurately explore associations between food
parenting practices and children’s nutrition risk. Further, these observations were conducted in the home, without the presence of a RA, to allow for typical mealtime interactions to occur. Many studies exploring food parenting practices have either been conducted in lab settings or in the home in the presence of an RA where interactions are more likely to be atypical. Third, the use of a validated nutrition risk screening tool also adds to the strength of our study, ensuring an accurate measure of nutrition risk. Finally, this study is the first to observe food parenting practices in a Canadian context, which allows us to better understand the mealtime environments in which Canadian preschoolers are fed.

Despite the many strengths, there are limitations that should be noted when interpreting our results. This study was cross-sectional and thus the bi-directional nature of parent-child feeding interactions cannot be determined. For example, it is possible that more controlling feeding practices are used with picky eaters; parents may use these practices in an attempt to improve their child’s nutritional intake. Prospective research is needed to understand the temporal order of the association between food parenting practices and children’s dietary intake as well as the bi-directional nature of these feeding interactions. While families recorded three mealtimes, we only observed food parenting practices during the evening meal. It is possible that food parenting practices differ during less structured eating occasions such as snack time. The level of nutrition risk reported in this study was much lower than previous studies exploring NutriSTEP® risk scores in Canada. Results may differ among families with children who
have higher nutrition risk. Similarly, the families in this study also had high levels of family functioning. Results may also differ among families with lower functioning. While we found a significant association between mothers’ use of physical restriction and mothers’ positive comments about the target child’s food with NutriSTEP® risk scores, it should be noted that the effect size of the associations was relatively small. For example, when looking at mothers’ use of physical restriction, a rise in 0.27 points on the NutriSTEP® scale may not be clinically significant. We only have NutriSTEP® data from one parent (primarily mothers) which may impact our findings and explain the lack of association between fathers’ food parenting practices and NutriSTEP® scores. Parents may perceive their child’s nutrition risk differently; future research should seek to understand differences in how mothers’ and fathers’ report their child’s nutrition risk. Finally, the families in this study were highly educated and the majority identified as ‘White’ and so our results may not be generalizable to more diverse populations.

4.7 Conclusion

Mothers’ observed use of physical restriction was associated with increased nutrition risk and her use of positive comments about the target child’s food was associated with lower nutrition risk among preschool aged children. Family functioning did not moderate or confound the associations between parental food parenting practices and children’s nutrition risk. Results suggest that supporting parents to use more positive encouragement rather than restriction may help to reduce preschoolers’ nutrition risk. Future research should test interventions aimed at changing food
parenting practices among families with preschoolers at medium-high nutrition risk. While we did not find any associations between fathers’ food parenting practices and preschoolers’ nutrition risk, we found differences among the types and frequency of food parenting practices employed by mothers and fathers. This underscores the importance of including fathers in food parenting research. As this was the first Canadian study to observe food parenting practices, future research is needed among more diverse populations, including those with more socio-economic diversity, higher levels of nutrition risk and lower levels of family functioning, to further elucidate the association between food parenting practices and children’s nutrition risk in Canada.

List of Abbreviations: FaMOS= Family Mealtime Observation Study; BMI= Body Mass Index; NutriSTEP®= Nutrition Screening Tool for Every Preschooler; WHO= World Health Organization

DECLARATIONS

Ethics Approval: This study was approved by the University of Guelph Research Ethics Board (REB#14OC033).

Consent for Publication: Not applicable.

Availability of Data and Material: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Funding: Funding for the Family Mealtime Observation Study (FaMOS) was provided by the Canadian Foundation for Dietetic Research (CFDR).

Author’s Contributions: KW, JH & EH developed study methods and sought funding. KW led the study, data analysis and manuscript preparation. EH was part of KW’s
dissertation committee, developed the mealtime coding scheme, supported video coding and manuscript preparation. KJ conducted study visits, coded videos and supported study analysis. AB was part of KW’s dissertation committee, assisted with study methods and manuscript preparation. JRS supported manuscript preparation and assisted with interpretation of results. JH is KW’s PhD advisor and supported the study, analyses, manuscript preparation and interpretation of results.

Acknowledgements: The authors would like to thank the families that participated in FaMOS, who generously welcomed us into their homes to allow us to learn from their mealtimes.
Table 4.1: Parent and family-level characteristics of participants in the Family Mealtime Observation Study (FaMOS) (N= 73 Families; 137 Parents)

<table>
<thead>
<tr>
<th>Parental Characteristics (N=137)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relation to Child</strong></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>74 (54.0)</td>
</tr>
<tr>
<td>Father</td>
<td>63 (46.0)</td>
</tr>
<tr>
<td><strong>Parental Age in years, mean (SD)</strong></td>
<td>36.1 (9.5)</td>
</tr>
<tr>
<td><strong>Parental Educational Attainment</strong></td>
<td></td>
</tr>
<tr>
<td>High School Education or Less</td>
<td>5 (3.7)</td>
</tr>
<tr>
<td>Some College or University</td>
<td>15 (11.0)</td>
</tr>
<tr>
<td>College Graduate</td>
<td>18 (13.2)</td>
</tr>
<tr>
<td>University Graduate</td>
<td>50 (36.8)</td>
</tr>
<tr>
<td>Post Graduate Training or Degree</td>
<td>48 (35.3)</td>
</tr>
<tr>
<td><strong>Parent Race/Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>115 (84.6)</td>
</tr>
<tr>
<td>Chinese</td>
<td>5 (3.7)</td>
</tr>
<tr>
<td>Latin American</td>
<td>6 (4.4)</td>
</tr>
<tr>
<td>Other (South Asian, Southeast Asian, West Indian, Black, Aboriginal/Indigenous)</td>
<td>10 (7.3)</td>
</tr>
<tr>
<td><strong>Parent Birth Country</strong></td>
<td></td>
</tr>
<tr>
<td>Outside of Canada</td>
<td>18 (14.9)</td>
</tr>
<tr>
<td><strong>Parental Weight Status (BMI, kg/m²) ii, mean (SD)</strong></td>
<td>26.9 (6.5)</td>
</tr>
<tr>
<td>Underweight (BMI &lt;18.5)</td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>Normal Weight (BMI 18.5- 24.9)</td>
<td>56 (43.8)</td>
</tr>
<tr>
<td>Overweight/Obese (BMI &gt; 25)</td>
<td>71 (55.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family- Level Characteristics (N=73)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Family Structure</strong></td>
<td></td>
</tr>
<tr>
<td>Married or living with a partner</td>
<td>69 (94.5)</td>
</tr>
<tr>
<td><strong>Total Household Income</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;$ 49 999/year</td>
<td>10 (13.9)</td>
</tr>
<tr>
<td>$50 000- $99 999/year</td>
<td>25 (34.7)</td>
</tr>
<tr>
<td>≥ $100 000/year</td>
<td>37 (51.4)</td>
</tr>
<tr>
<td><strong>Family Functioning, mean SD</strong></td>
<td>1.62 (0.39)</td>
</tr>
<tr>
<td>High (&lt; 2.17)</td>
<td>66 (90.4)</td>
</tr>
<tr>
<td>Low (≥ 2.17)</td>
<td>7 (9.6)</td>
</tr>
<tr>
<td><strong>Family Dinners (days/week)</strong></td>
<td></td>
</tr>
<tr>
<td>Every day (7 days/week)</td>
<td>61 (83.6)</td>
</tr>
<tr>
<td>Most days (4-6 days/week)</td>
<td>9 (12.3)</td>
</tr>
<tr>
<td>Rarely (&lt; 3 days/week)</td>
<td>3 (4.1)</td>
</tr>
</tbody>
</table>

i One same-sex couple

ii Parent weight missing for pregnant mothers (n=9)
Table 4.2: Characteristics of children participating in the Family Mealtime Observation Study (FaMOS) (N=73)

<table>
<thead>
<tr>
<th></th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child Age,</strong></td>
<td>mean (SD) 3.3 years (1.1)</td>
</tr>
<tr>
<td><strong>Child Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>41 (56.2)</td>
</tr>
<tr>
<td><strong>Child Race/Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>57 (78.1)</td>
</tr>
<tr>
<td>Other (including Latin American, Southeast Asian, Chinese, Black and West Indian)</td>
<td>16 (21.9)</td>
</tr>
<tr>
<td><strong>Child Weight Status (BMI z-score),</strong></td>
<td>mean (SD) 0.9 (1.9)</td>
</tr>
<tr>
<td>Healthy Weight</td>
<td>47 (65.3)</td>
</tr>
<tr>
<td>At risk of Overweight</td>
<td>19 (26.4)</td>
</tr>
<tr>
<td>Overweight/Obese</td>
<td>6 (8.3)</td>
</tr>
<tr>
<td><strong>NutriSTEP® Score,</strong></td>
<td>mean (SD) 13.3 (5.2)</td>
</tr>
<tr>
<td>Low risk (&lt; 20)</td>
<td>65 (89.0)</td>
</tr>
<tr>
<td>Medium risk (21-25)</td>
<td>6 (8.2)</td>
</tr>
<tr>
<td>High risk (&gt; 25)</td>
<td>2 (2.7)</td>
</tr>
</tbody>
</table>

1 Child weight missing for one child who declined measurement
Table 4.3: Descriptive and frequency statistics for mothers’ and fathers’ observed food parenting practices\(^a\) with target child and Mann-Whitney \(U\)-tests of difference between mothers’ and fathers’ observed food parenting

<table>
<thead>
<tr>
<th></th>
<th>Mothers (N=74)</th>
<th>Fathers (N=63)</th>
<th>Mann-Whitney (U)-test (Z)-scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>Verbal Pressure to eat</td>
<td>4.37 (5.22)</td>
<td>0</td>
<td>37.5</td>
</tr>
<tr>
<td>Physical Pressure to eat</td>
<td>2.31 (4.22)</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>Verbal Restriction</td>
<td>1.31 (1.59)</td>
<td>0</td>
<td>9.5</td>
</tr>
<tr>
<td>Physical Restriction</td>
<td>0.21 (0.43)</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Use of Food as Reward</td>
<td>0.75 (1.79)</td>
<td>0</td>
<td>14.5</td>
</tr>
<tr>
<td>Use of Non-Food Rewards</td>
<td>0.31 (0.57)</td>
<td>0</td>
<td>2.5</td>
</tr>
<tr>
<td>Positive comments about food in general</td>
<td>3.91 (3.29)</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Positive comments about own food</td>
<td>1.83 (1.47)</td>
<td>0</td>
<td>7.5</td>
</tr>
<tr>
<td>Positive comments about target child's food</td>
<td>7.12 (5.31)</td>
<td>0</td>
<td>25</td>
</tr>
</tbody>
</table>

\(^a\) Measured by the Family Mealtime Coding System

*Significant at \(p <0.05\) level
<table>
<thead>
<tr>
<th>Observed Food Parenting Practice</th>
<th>Mothers (n=74)</th>
<th>Fathers (n=63)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 1</td>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Effect Estimate (95% CI)</td>
<td>Effect Estimate (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal Pressure to eat</td>
<td>0.01 (-0.22, 0.24)</td>
<td>0.01 (-0.22, 0.24)</td>
<td>0.03 (-0.36, 0.46)</td>
<td>0.05 (-0.35, 0.50)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Pressure to eat</td>
<td>-0.06 (-0.37, 0.20)</td>
<td>-0.06 (-0.37, 0.21)</td>
<td>0.21 (-0.08, 0.80)</td>
<td>0.21 (-0.09, 0.81)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal Restriction</td>
<td>-0.00 (-0.77, 0.74)</td>
<td>-0.00 (-0.77, 0.74)</td>
<td>0.13 (-0.79, 2.17)</td>
<td>0.14 (-0.73, 2.31)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Restriction</td>
<td><strong>0.37 (1.91, 7.10)</strong></td>
<td><strong>0.37 (1.97, 7.21)</strong></td>
<td>0.05 (-2.91, 4.16)</td>
<td>0.07 (-2.79, 4.66)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of Food as Reward</td>
<td>-0.14 (-1.07, 0.26)</td>
<td>-0.14 (-1.07, 0.27)</td>
<td>-0.08 (-1.45, 0.75)</td>
<td>-0.08 (-1.45, 0.76)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of Non-Food Rewards</td>
<td>-0.15 (-3.47, 0.69)</td>
<td>-0.15 (-3.52, 0.68)</td>
<td>0.00 (-3.43, 3.58)</td>
<td>0.01 (-3.40, 3.70)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive comments about food in general</td>
<td>-0.16 (-0.62, 0.10)</td>
<td>-0.16 (-0.62, 0.11)</td>
<td>0.15 (-0.18, 0.67)</td>
<td>0.17 (-0.15, 0.72)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive comments about own food</td>
<td>-0.16 (-1.42, 0.23)</td>
<td>-0.16 (-1.42, 0.25)</td>
<td>-0.12 (-1.18, 0.43)</td>
<td>-0.13 (-1.23, 0.41)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive comments about target child’s food</td>
<td><strong>-0.29 (-0.51, -0.06)</strong></td>
<td><strong>-0.29 (-0.51, -0.06)</strong></td>
<td>-0.27 (-0.75, -0.00)</td>
<td>-0.27 (-0.75, 0.01)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dependent Variable: NutriSTEP® Risk Score, continuous
Model 1. Adjusted for parent educational attainment and child BMI-z score, continuous
Model 2. Adjusted for parent educational attainment, child BMI-z score and family functioning, continuous
Estimates where the 95% CI does not include 0.0 are bolded
5 Chapter Five:

Dishing on Dinner: A life-course approach to understanding the family meal context among families with preschoolers

5.1 Manuscript

This chapter has been formatted for journal submission as:

Walton K, Jewell K, Breen A, Haycraft E & Haines J. Dishing on Dinner: A life-course approach to understanding the family meal context among families with preschoolers. Submitted to *IJNEB*.
Dishing on Dinner: A life-course approach to understanding the family meal context among families with preschoolers

AUTHORS:
Kathryn Walton, MSc, RD¹
Kira Jewell, BASc¹
Andrea Breen, PhD¹
Emma Haycraft, PhD²
Jess Haines, MHSc, PhD, RD¹

¹ Department of Family Relations & Applied Nutrition, University of Guelph, Guelph Ontario, CA
² School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, UK

ACKNOWLEDGEMENTS: This study was funded by the Canadian Foundation for Dietetic Research (CFDR)

CONFLICT OF INTEREST: The authors declare that they have no competing interests.

WORD COUNT: 4423
5.2 Abstract

Objective: Family meals promote healthful dietary intakes and wellbeing among children. This study aims to understand how family meals are established and how family meal routines are influenced by parents’ own experiences with family meals.

Participants: 20 families (21 mothers; 15 fathers) with a child between the ages of 18 months-5 years.

Design: Semi-structured, in-person interviews.

Analysis & Results: Thematic analysis identified that families fell into one of three mealtime orientations: 1) Meals for Togetherness, 2) Meals for Nutrition Messaging and 3) Meals for Necessity. These orientations were informed by parents’ own experiences and major life transitions, e.g., parenthood. The current family meal context including the messages parents shared with their children about food and eating and the challenges experienced with mealtimes differed across these orientations.

Conclusions and Implications: Understanding how parents’ own early life experiences and major life transitions influence why families eat meals together may have important implications for the intergenerational transmission of mealtime practices as well as the content and timing of intervention strategies that are likely to support family meals as children age.

WORD COUNT: 177 (max 200)

KEY WORDS: family meal, life course perspective, preschoolers, family context, eating behaviour
5.3 Introduction

Family meals promote healthful dietary intakes and wellbeing among children and adolescents. Those who frequently share meals with members of their family have been found to have higher intakes of fruits and vegetables, lower prevalence of disordered eating, lower levels of substance abuse, and improved academic outcomes when compared to children and adolescents who do not have regular family meals. Dietary behaviours and family mealtime practices are established early in life and research suggests that these tend to track into adulthood. While it is important to identify interventions that can help improve the quality and quantity of family meals among families with young children, few family meal interventions have been tested.

To guide the development of family meal interventions, we first need to understand what motivates or influences parents of preschoolers to establish and maintain family meal routines. Existing studies that have examined parents’ perceptions of family meals have focused on the perceived benefits and barriers of eating together. These studies have found that parents of preschoolers value eating together as a time to connect as a family and promote healthful eating, but experience frequent barriers including a lack of time, conflicting schedules and the challenge of feeding picky eaters. While understanding the perceived barriers and benefits of family meals is important, understanding what factors influence the
establishment of family meal routines is also critical to inform interventions designed to promote family mealtimes.

This study aims to understand how family meals are established and how family meal routines are influenced by parents' own early life experiences with family meals. Informed by a life-course perspective, we aim to understand how family meal routines develop and evolve over one’s lifetime. Life-course perspective is a holistic approach to understanding the lives of people over time and posits that behaviours are influenced by both early life experiences as well as key life transitions, such as the transition to parenthood. The results of this study will help inform the timing and content of family meal interventions, as well as the families to target for intervention.

5.4 Methods

5.4.1 Sample and Study Design

This qualitative study included 20 families (21 mothers, 15 fathers), who participated in the Family Mealtime Observation Study (FaMOS), an observational study exploring mealtimes and parent feeding practices among families with preschool-aged children (described elsewhere). Families were eligible to participate in FaMOS if: 1) they had at least one child between the ages of 18 months-5 years (the target child of the study; in families with more than one child in this age range, the child with the closest
birthdate to study visit was chosen), 2) it was typical for the family to eat together, 3) the main person who serves the child dinner was available to participate, and 4) parents could speak and understand English. Families were invited to participate in this qualitative sub-study via email. All study protocols were approved by the University of Guelph Research Ethics Board (REB# OC14033).

5.4.2 Procedures

Parents participated in an in-home interview. In two-parent families (n= 18), both parents were invited to participate and were interviewed together (fathers from two families were unable to participate due to scheduling conflicts). Interviews were conducted by the lead author and a trained research assistant and lasted approximately 45 minutes. Families received a $40 grocery gift card for participating. All interviews were audio recorded. One to two days after the interview, notes outlining parents’ responses to each question were sent to the family to allow for clarification or additional thoughts. Interviews were then transcribed verbatim and any clarifications derived from the member-checking process were noted in the transcription.

Interviewers followed a semi-structured interview guide, developed by the authors and informed by life course perspective \(^5,6\) (Table 5.1). We asked questions about parents’ experiences with family meal routines across their life course, including as a child, and their current mealtime routines. We defined data saturation as the point at which there appeared to be no new ideas/themes introduced by participants \(^271\)
5.4.3 Data Analysis

We used a deductive or directive approach to thematic analysis whereby the questions in the interview guide served as the framework for devising the initial codes\(^{272-274}\). We met as a team to discuss the transcripts and generate the initial categories using the interview guide for structure. Based on our discussions, five themes (described in the results) were generated; four themes were deduced from the interview guide and one emerged from the data that was not based on the interview guide. The emerging theme we found was that families fell into one of three family mealtime orientations based on their reasons for participating in family meals (Table 5.2). No other themes emerged. Two analysts (KW; KJ) first coded families based on their mealtime orientation. Then, the analysts independently coded each transcript using the five themes deduced from the interview guide to understand similarities and differences in content across the three mealtime orientations. Coding was conducted using qualitative analysis software (NVivo). Inter-rater reliability calculated by the software revealed a high level of agreement (94%) between the two analysts.
5.5 Results

Nearly all (90%) of the families reported having family meals every day. This was a well-educated sample with 47.6% of mothers and 26.6% of fathers reporting post-graduate degrees or training; 40% of families reported a total household income of greater than $100 000/year (Table 5.3).

We identified that families fell into one of three, overarching family mealtime orientations, which describe families’ approach to mealtimes: 1) Meals for Togetherness (n=7), 2) Meals for Nutrition Messaging (n=8), and 3) Meals for Necessity (n=5). Briefly, parents in the ‘Meals for Togetherness’ described that the focus of the family meal is to bring family together and to connect socially. These parents discussed how social interaction during the meal is more important than the food provided. Parents in the ‘Meals for Nutrition Messaging’ described that the focus of the family meal is to support healthful eating and discussed how eating together at mealtimes is driven by a desire to ensure their kids eat well. Mealtimes are also an opportunity to teach their child about nutrition and portion sizes. Finally, parents in the ‘Meals for Necessity’ orientation described that having family meals is a required role of parenting and that their mealtimes are very functional. These parents described how meals ensure their child eat regularly and serve as a time to teach manners. These overarching mealtime orientations, including representative quotes are described further in Table 5.2.
Across the three mealtime orientations, we identified four major themes from our analysis. The first two themes relate to parents’ historical experiences with family meals: 1) early life experiences with mealtimes and 2) stability and change. The remaining two themes relate to the impact of parents’ historical mealtime experiences on the current family meal context: 3) messages and goals for children about mealtimes, food and eating and, 4) challenges with sharing mealtime messages and goals. Below we summarize these themes using representative quotes and compare and contrast them across the three mealtime orientations.

5.5.1 Parents’ Historical Mealtime Experiences

5.5.1.1 Early Life Experiences with Mealtimes

Parents’ perceptions towards family meals and their current family’s routines seemed to be largely influenced by their early life experiences with family meals. Parents in the ‘Meals for Togetherness’ orientation emphasized the social aspects of their childhood meals. As one father highlights, parents in this orientation remember mealtimes full of conversation and connection whereby interactions are warm and family members enjoy each other’s company:

“[Meals] were always this time of this is our family…catch up with each other and figure out what we’re going on about, if we have any problems we want to talk about, kind of thing.” (Family 10, Father, Meals for Togetherness)
This quote contrasts with the memories of many parents in the other two orientations, where memories of mealtimes did not seem to contain the same element of connection. Here two fathers in the ‘Meals for Nutrition Messaging’ and ‘Meals for Necessity’ recall their mealtimes:

“…the main goal [of the meal] was to get in and out as quickly as possible.” *(Family 16, Father, Meals for Nutrition Messaging)*

“I don’t really [remember any conversation], not even ‘wash your hands’, [it was] ‘just start digging for food’.” *(Family 8, Father, Meals for Necessity)*

These quotes highlight how mealtimes in the ‘Meals for Nutrition Messaging’ and ‘Meals for Necessity’ were more focused on eating. This was further reflected in the memories parents from these orientations had about pressuring food parenting practices or food battles during meals. The pressuring food parenting practices parents from ‘Meals for Nutrition Messaging’ and ‘Meals for Necessity’ remember are illustrated in the following excerpt:

“Yeah, I had a lot of food battles, I don’t know what they’d be over. I remember being asked to try a lot of things and I’d just flat out refuse.” *(Family 5, Mother, Meals for Necessity)*

All parents in the ‘Meals for Nutrition Messaging’ orientation reported receiving messages about nutrition and many also reported receiving messages about weight during meals, as highlighted in the following quotes:
“They used to tell me that I had to eat my spinach and it would make me strong and told me that Popeye ate it and so I should, so there was definitely an effort to have us eat well.” (Family 19, Mother, Meals for Nutrition Messaging)

“Yeah, so, for decades I would hear “oh, why you so fat?” and then, “Oh, why you no finish your rice?”. Uhh, these are conflicting messages here… so, it was always like “eat everything, but why are you so fat?” (Family 18, Father, Meals for Nutrition Messaging)

Messages about avoiding certain foods seemed to stem from their own parents’ concerns with body image and dieting. Many parents, both mothers and fathers, in the ‘Meals for Nutrition Messaging’ orientation describe their memories of their parents dieting. As one mother recalled:

“I remember my mother going on many diets, many fad diets, so, I watched that. I think that for me, a lot of messages were about self-control equals good body type and that kind of stuff”. (Family 16, Mother, Meals for Nutrition Messaging)

Parents in the ‘Meals for Necessity’ orientation did not report memories of nutrition messaging or dieting; in this orientation, it seemed that pressuring to eat was focused on ensuring children ate during the meal. Here a father describes mealtimes as a time to get fed and move on to other activities:
“[Meals were] more just like ‘feed the family’ instead of trying to eat particularly healthy food, you know. Probably more just like ‘get us to eat’.”  
*(Family 5, Father, Meals for Necessity).*

### 5.5.1.2 Stability and Change

For most parents, the mealtime orientations they grew up in tracked as a stable trajectory, providing lifelong context for their eating habits and mealtime experiences. The ‘Meals for Togetherness’ orientation seemed to be the most stable over time, with almost all parents in this orientation also growing up in homes where meals were eaten for togetherness. As one parent stated: “You continue the cycle with what [you’ve] learned from [your] parents” *(Family 3, Mother, Meals for Nutrition Messaging).*

However, according to the life course perspective, there are major points in life where trajectories of typical behaviour may change. For parents whose childhood meal orientations did not track throughout their lives, forming adult relationships and being immersed in their partner’s food culture as well as transition to parenthood seemed to be the points of transition that impacted their current mealtime orientation. Parents reported that these large life events created deep, fundamental and lasting changes to their mealtime routines. Here two mothers describe the differences between their own childhood meals and those of their partners:

“I actually like that aspect more about [husband’s] family more so, let’s talk about stuff. Um, whereas a lot of my childhood I remember, my father just
wanted it to be quiet, um, while we ate together.” (*)

“It was a bit of a clash of cultures, that way, because I came from like everything has to be [homemade], like processed is the worst, and [husband] had everything processed. I won that battle, I have to say.

(*Family 16, Mother, Meals for Nutrition Messaging)

Feeding a child brought a new awareness or intention to mealtimes for all families, however it was most prevalent for parents in the ‘Meals for Nutrition Messaging’ orientation. In the excerpt below, a mother describes how her mealtime habits changed in response to her new responsibility as a parent:

“Before we moved to this house, we didn’t have really a dining room and we used to sit and eat in front of TV and watch TV while we ate. And that has, after having [child], changed, and we now sit together as a family.”

(*Family 14, Mother, Meals for Nutrition Messaging)

While the quote above describes positive mealtime changes in response to parenting, for some families in the ‘Meals for Nutrition Messaging’ orientation, the transition to parenting seemed to be associated with anxiety about their children’s dietary intake and was the point at which their mealtimes shifted to focus on nutrition:

“I have to make food, like I have- I am responsible now to… a lot of my life centres around food with a heavy responsibility. Whereas before [cooking]
was sort of a nice exploration." (Family 19, Mother, Meals for Nutrition Messaging)

5.5.2 Impact of historical meal experiences on current family meal context:

5.5.2.1 Messages and goals for children about mealtimes, food and eating

Parents’ own experiences with family meals throughout their life course seemed to influence the messages about mealtimes, food and eating that they currently share with their children. The family’s mealt ime orientations served as the contextual foreground for the main messages they want to share; messages about social connection, eating a healthy diet and to provide structure to the day. Table 3 describes the messages and goals parents across the three mealt ime orientations have for their child(ren) about mealtimes, food and eating.

5.5.2.2 Challenges in sharing mealt ime messages and goals

Consistent with the life course perspective, not only do mealt ime routines shift and change as the family unit evolves, but so do the challenges that parents experience in sharing their mealt ime goals and messages with their children. All families noted some challenges with family meals including meal timing and feeding picky eaters, however the main challenges and the impacts of these challenges in sharing the mealt ime messages varied across the mealt ime orientations.
Families in the ‘Meals for Togetherness’ orientation reported few challenges in sharing their mealtime messages and goal of connection but noted that this may change as their child gets older and the family mealtime is challenged by other activities (e.g. extra-curriculars and part-time jobs). Families in the other orientations were not future-orientated in their concerns.

“[My concern for the future] is that we might not be sitting together at the table. So, my concerns would be finding time, to have those really important conversations.” (Family 1, Mother, Meals for Togetherness)

Parents in the ‘Meals for Nutrition Messaging’ orientation reported many challenges in sharing their messages about healthy eating including having feelings of general frustration towards mealtimes with their young children. Here two mothers describe their thoughts towards feeding and mealtimes:

“It’s not always a positive uhhh feeling at supper. And I blame the children for that.” (Family 19, Mother, Meals for Nutrition Messaging)

“I feel like [dinner], it’s just such a fraught thing…” (Family 2, Mother, Meals for Nutrition Messaging)

Some of these challenges may be related to parents’ reports of wanting to control their child’s intake during mealtimes. For some families, this control may stem from their own concerns and challenges with body image and is consistent with their own early
mealtime memories. In the following example, one mother shares her concerns that her daughter might follow her own habit of linking food to self-image:

“I don’t want her to feel like she has to diet, I just want her to think about it in a positive way, that reflects a good self-image too, like, for me food is so tied to physical appearance.” (Family 14, Mother, Meals for Nutrition Messaging)

While parents in the ‘Meals for Necessity’ orientation talked about wanting meals to provide structure to their child’s day, they reported having difficulties modeling healthy behaviours for their children and found the amount of work involved in mealtimes challenging.

“I find myself like making him breakfast and then two hours later realizing like “I haven’t eaten anything today” (Family 11, Mother, Meals as Necessity)

“I want them to enjoy food, you know, food should be enjoyable, like it’s an experience. It should be- it shouldn’t be so much work. Like I just feel like it’s so much work.” (Family 17, Mother, Meals as Necessity)
These parents also reported scheduling changes to be actually disruptive to their participation in family meals, whereas families in the other orientations just noted the challenges associated with scheduling.

“Cause like there are some days where we have slipups where, especially with like, these first two weeks of school where we’ve been so busy […]. I’ve got school, you’ve got school, we’ve had appointments…we’re like, ‘grab something on the road, we don’t have time’.” (Family 8, Mother, Meals for Necessity)

5.6 Discussion

This study aimed to understand how family meals are established and how family meal routines are influenced by parents’ own life experiences. We found that families fall into one of three overarching orientations describing their reasons for participating in family meals: 1) Meals for Togetherness, 2) Meals for Nutrition Messaging, and 3) Meals for Necessity. Our findings suggest that these orientations are informed by parents’ own early life experiences as well as major life transitions, e.g., parenthood, and that these orientations influence their current family meal context, the messages they share with their children about food and eating and the challenges they experience with mealtimes.

Across all three mealtime orientations, we found that parents’ memories of childhood mealtime experiences informed the trajectory and context of their current
family meals. While a recent review paper examining the importance of family meals recommended that future research focus on the intergenerational transmission of family meals to help understand predictors of high family meal participation, few studies have examined how family meal practices are disseminated from one generation to the next. Malhotra and colleagues found that mothers’ childhood experiences informed their perceptions of the benefits and barriers to family meals with preschoolers. Similar to our findings, Trofholz and colleagues found that the lessons mothers learned about family meals from their own parents influenced the lessons they shared with their school-aged children. While both studies highlight the importance of parents’ early experiences, they were conducted among primarily racially/ethnically diverse immigrant populations, and only include mothers’ perspectives of the family meal experiences. Our study extends this work by including primarily Canada-born parents as well exploring fathers’ perspectives, which has typically been left out of research focused on children’s health.

The use of the life course perspective to frame our exploration of the family mealtime context highlighted some important areas for intervention. First, for many parents, childhood mealtime routines and orientations seemed to track into parenthood. This illustrates the importance of intervening among families with young children to establish family meals, which could be expected to impact the intergenerational transmission of this routine. However, we also found that major life transitions, e.g., marriage or parenthood, appear to impact the family’s mealtime routines and orientation.
suggesting that for some individuals, life transitions may cause changes to these behaviours. This highlights the fluidity of dietary routines and behaviours from a life-course perspective and signals important windows of opportunity for behaviour change regarding the establishment of family meals.

While we found that challenges were more common among the ‘Meals for Nutrition Messaging’ and ‘Meals for Necessity’ orientations, families across all three orientations described meal timing and feeding picky eaters as key challenges to family meals. These findings are consistent with previous mealtime challenges reported by families with preschoolers. While challenges alone highlight important areas of intervention, including tips to deal with picky eaters and meal ideas for busy evenings, our results provide insight towards which families may benefit from certain supports. Our results also underscore the need to trial interventions tailored to different mealtime orientations.

5.6.1 Implications for Research and Practice

Similar to previous quantitative studies, the preschoolers in this study frequently participated in family meals. However, our results extend this research by highlighting important variations in the mealtime environments among families who participate in frequent family meals. Our results suggest that it is important to understand the reason why families eat together to properly understand the challenges they may face and to provide tailored supports. Previous interventions aimed at increasing family meal frequency have not explored mealtime orientations which may
explain the equivocal findings among families with preschoolers\textsuperscript{248,267}. Our findings suggest that intervention strategies may need to be tailored to the family mealtime orientation. Below we discuss the implications of each mealtime orientation as well as specific intervention messages and considerations for healthcare professionals. Future research should focus on applying and testing these orientations in both practice and research/intervention settings.

5.6.1.1 Meals for Togetherness

Based on parents’ descriptions of their own childhood meals, this orientation seems to be the most stable over the life-course, despite life’s transitions. Parents in this orientation appear to focus on the importance of the social aspects of family meals, which seems to set the context for relaxed mealtimes and reduced anxiety towards their children’s intake. While their children are small, they also do not seem to struggle with finding time for mealtimes but acknowledge that this may be a challenge in the future. These families can be encouraged to continue eating together for family bonding and be reminded that their modelling during this time will set their children up for positive psychosocial development\textsuperscript{153} and lifelong healthy eating\textsuperscript{87,135}. These families may benefit from support to continue having family meals as their children age, and their lives get busier.
5.6.1.2 Meals for Nutrition Messaging

Parents’ describe mealtimes as a source of anxiety and frustration due to their concern about their child’s nutritional intake during the meal. Based on parents’ descriptions of their historical experiences with meals, this orientation is particularly vulnerable at the time of transition to parenthood. Health care professionals should acknowledge the family’s participation in shared meals as an excellent way to promote healthy eating habits. However, given their less favorable perception of family meals, it is possible that these families may struggle to continue the practice of eating together as children gain independence; mealtimes may be fraught with power struggles surrounding eating. Research by Harris and colleagues suggests that it is important to identify families that have concerns early (regardless of the presence of an actual feeding or growth problem), before escalating parent anxiety during feeding interactions negatively impacts the food parenting practices used (more pressuring tactics, including control) and the resultant mealtime environment. Thus, these families will likely benefit from support with how to take a more relaxed approach to family meals that focuses on the social benefits and enjoyment of family meals with a reduced focus on healthy eating. Given parents’ reported desire to control their child’s intake during meals, and their own challenges with body image, some parents may also benefit from counselling supports for their own food challenges.
5.6.1.3 **Meals for Necessity**

Parents in this orientation describe family meals as important for providing structure to their children’s day, and note many challenges associated with the routine. Families in this orientation should be applauded for providing routine and structure to their child’s day through regular mealtimes; research strongly supports the benefits of routines in young children’s development \(^{267,279}\). Families in this orientation may struggle to continue the tradition of eating together as children age and no longer require supervision during meals. Health professionals are encouraged to reiterate to families that these routines and structure are also beneficial for children as they grow up. Families in this orientation struggled with finding time to eat together and reported that this routine is interrupted when other life responsibilities arise. Health Professionals can also help families to problem solve through challenges when they arise and provide supports for making the process easier (i.e. quick and easy recipes, reminders that any meal eaten together counts). The parents in this orientation also talked about their challenges in modelling healthful eating habits for their children. Reminding these parents that while routine is important, their own eating habits also influence the development of their children’s habits will also be beneficial; some parents may require extra counselling to support their own behaviour change.

### 5.6.2 *Strengths and Limitations*

Our study has many strengths, including qualitatively exploring the family meal context, and the intergenerational transmission of family meal routines as well as...
suggesting mealtime orientations as an important avenue for future intervention. Our study also included the father perspective for a more complete understanding of the family meal context.

Despite these strengths there are limitations to note when interpreting our findings. Families signed up to participate in a study about mealtimes and as such, may have more interest in mealtimes and food than families that did not sign up for the study. Similarly, the majority of families in this study reported participating in family meals 7 days a week. While we found diversity in the mealtime experiences described by parents in this study, the mealtime orientations may not extend to those outside the study, or families that share fewer meals together or do not participate in family meals at all. Finally, the families participating in this study had fairly high income and educational attainment and the majority of parents identified as ‘White’; our results may not be generalizable to other populations. Future research should explore this idea of mealtime orientations among populations that are more diverse both socio-economically and ethnically/racially.

5.7 Conclusions

Families participating in this study were found to fall into one of three, overarching mealtime orientations that informed the context of their meals, the messages they share with their children about food and eating and the challenges they experienced with mealtimes. Our results suggest that understanding the reasons why
families eat meals together has important implications for the intergenerational transmission of mealtime practices, as well as the intervention strategies that are likely to be beneficial to families as their preschool children age. While meal orientations seem to track throughout the life-course, they are also fluid and vulnerable to life’s transitions. Future research should focus on understanding these orientations in more diverse populations and testing their ability to inform practice in a variety of settings including dietetic counselling and intervention planning.
Table 5.1: Semi-Structured Interview Guide Exploring Parent Feeding Practices and Family Meal Experiences

1. What do you feel works well with regards to your families’ meal routine?
2. What does not work as well?
3. Think back to your own childhood. What do you remember about mealtimes? Probe with the following: Can you remember a specific meal that you shared with your family? Please describe it is as much detail as you can. Who was there, what do you remember, what makes it memorable? Was this meal a typical experience in your house?
4. How would you describe your relationship to food and eating? Has this changed over time?
5. What kind of messages about food and eating did you get from your parents growing up?
6. Besides your family growing up, what else has influenced your relationship with food and the way you approach eating in your own life?
7. What is the main message you want your child to learn about food and eating? What messages do you hope your child will get from you?
8. How successful do you feel in this? If they don’t feel very completely successful might ask: What do you think would help you experience more success in this?
<table>
<thead>
<tr>
<th>Orientation</th>
<th>Description</th>
<th>Representative Quotes Describing the Mealtime Orientation</th>
<th>Messages and goals for children about mealtimes, food and eating</th>
<th>Representative Quotes of the messages and goals for children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Family Meals for Togetherness</strong></td>
<td>Parents described that focus of the family meal is to bring the family together and to connect socially. Parents discussed how social interaction was a more important aspect of the family meal than the food provided. These were the only families to talk about the importance of culture in their mealtime routine and food choices.</td>
<td>&quot;I think everyone does completely different things, but meals are a priority for us. We like food and we like being together.&quot; <em>(Family 1, Mother)</em>&lt;br&gt;&quot;Having good conversation is more important than the actual food.&quot; <em>(Family 12, Mother)</em>&lt;br&gt;&quot;...mealtimes are fun, an enjoyable process, it's a social process.&quot; <em>(Family 20, Father)</em></td>
<td>The main goal of mealtimes is to share messages about food being a time to connect socially and to bond as a family. Parents did not have specific nutrition related goals for eating together, but instead wanted their child to love eating and cooking out of pure enjoyment. These parents reported very few of their own memories of receiving specific nutrition messaging or food battles which is consistent with their current mealtime environment</td>
<td>&quot;We always make an effort to like not have TV on, um, to sit at the table, uh, to talk to each other. We explain to [target child] why we do that, 'cause it's the only time that we all get to see each other. So, um, yeah, I would definitely say that we make a point to have it, dinner, be dinner.&quot; <em>(Family 10, Father)</em></td>
</tr>
<tr>
<td><strong>Family Meals for Nutrition Messaging</strong></td>
<td>Parents described that the focus of the family meal is to support healthful eating. Parents discussed how eating together at mealtimes was driven by a desire to ensure kids are eating well and the importance of educating their child about nutrition and portion sizes.</td>
<td>&quot;I mean I definitely think about [nutrition] a lot, I would say, you know, I have pretty strong [opinions].&quot; <em>(Family 9, Mother)</em>&lt;br&gt;&quot;Every day that's one [my son's] primary objectives, is to eat healthy.&quot; <em>(Family 13, Father)</em>&lt;br&gt;&quot;We have a big focus in our house on trying to talk about healthy food.&quot; <em>(Family 18, Mother)</em></td>
<td>The main mealtime goal was about ensuring their children have a healthy diet. These parents did not report specific goals surrounding togetherness. Many parents talked about wanting to control their child's intake.</td>
<td>&quot;Yeah, I think that we've also been hammering in like, not, overtly, but it's just because of the way we do stuff, umm, portion control. [...] So, I think she's got great grasp of what uhh, what she should eat a lot of, and what she should not eat a lot of.&quot; <em>(Family 18, Father)</em></td>
</tr>
</tbody>
</table>

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Parents in this orientation described their family meals as being very functional and as a required part of parenting. Parents described how meals ensured their child ate regularly and how mealtimes served as a time to teach manners.

“The meals for us, it’s mostly about getting fed.” (Family 7, Mother)

“As for like, the table routine, I don’t think we really have, like a, I don’t think we have like a specific [routine], no. Yeah, but just mostly hurry up, get home, eat and then we’re done.” (Family 8, Mother)

“Um, well habits. So, eating, for one, eating three times a day, snacks, you know, more too about his manners, ‘Sit down quietly, stop moving, sit down and finish and then you’re done’.” (Family 11, Father)

The main mealtime goal for families in the ‘Meals for Necessity’ orientation was to provide structure to the day.

While parents in this orientation did not have goals of togetherness, they did have nutritional goals for their children. However, these goals seemed to be aspirational, with parents often using words such as “hope”.

“We try with the kids, well, actually, all the time we try and make it a habit for them, um, three meals a day.” (Family 8, Mother)

“I would hope that she would be able to like know portion control… and wherever she is, she knows that when you’re full, you stop eating kind of thing.” (Family 17, Mother)

“I have gotten her used to watching TV and having dinner, because it’s quiet time for me, I can just eat and be like ‘Nourish myself, turn off my brain’.” (Family 7, Mother)
Table 5.3: Demographics of Participating Families (n=20)

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<tr>
<th>Category</th>
<th>Mean (SD)</th>
<th>N (%)</th>
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<tbody>
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<tr>
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<td>Postgraduate training or degree</td>
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<td><strong>Father Educational Attainment (n=15)</strong></td>
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<tr>
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<td><strong>Total Household Income/Year</strong></td>
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<td>7 (35.0)</td>
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<td>$60 000- $99 999</td>
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<tr>
<td>&gt;$100 000</td>
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<td><strong>Family Dinner Frequency</strong></td>
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<td>Every day (7 days/week)</td>
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<tr>
<td>Most days (4-6 days/week)</td>
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</table>

1 One same-sex couple
6 Chapter Six:

Time to re-think picky eating?: A relational approach to understanding picky eating

6.1 Manuscript

This chapter has been published in the International Journal of Behavioural Nutrition and Physical Activity as:

Time to re-think picky eating?: A relational approach to understanding picky eating

Authors:
Kathryn Walton, MSc, RD¹ (kwalton@uoguelph.ca)
Leon Kuczynski, PhD¹ (lkuczyns@uoguelph.ca)
Emma Haycraft, PhD² (e.haycraft@lboro.ac.uk)
Andrea Breen, PhD¹ (abreen@uoguelph.ca)
Jess Haines, MHSc, PhD, RD¹ (jhaines@uoguelph.ca)
¹ Department of Family Relations and Applied Nutrition, University of Guelph, Guelph ON
² Department of Psychology, Loughborough University, United Kingdom

Corresponding Author:
Kathryn Walton, MSc, RD
Department of Family Relations & Applied Nutrition
University of Guelph
50 Stone Rd. E
Guelph, ON N1G 2W1
kwalton@uoguelph.ca
6.2 Abstract

**Background:** Estimates of picky eating are quite high among young children, with 14-50% of parents identifying their preschoolers as picky eaters. Dietary intake and preferences during the preschool years are characterized by slowing growth rates and children developing a sense of autonomy over their feeding and food selection. We argue that the current conceptualization of picky eating defines acts of resistance or expressions of preference (acts of autonomy) by a child as deviant behaviour. This conceptualization has guided research that uses a unidirectional, parent to child approach to understanding parent-child feeding interactions.

**Objectives:** By reviewing the current feeding literature and drawing parallels from the rich body of child socialization literature, we argue that there is a need to both re-examine the concept and parent/clinician perspectives on picky eating. Thus, the objective of this paper is two-fold: 1) We argue for a reconceptualization of picky eating whereby child agency is considered in terms of eating preferences rather than categorized as compliant or non-compliant behaviour, and 2) We advocate the use of bi-directional relational models of causality and appropriate methodology to understanding the parent-child feeding relationship.

**Discussion:** Researchers are often interested in understanding how members in the parent-child dyad affect one another. Although many tend to focus on the parent to child direction of these associations, findings from child socialization research suggest that
influence is bidirectional and non-linear such that parents influence the actions and cognitions of children and children influence the actions and cognitions of parents. Bi-directional models of causality are needed to correctly understand parent-child feeding interactions.

**Conclusions:** A reconceptualization of picky eating may elucidate the influence that parental feeding practices and child eating habits have on each other. This may allow health professionals to more effectively support parents in developing healthy eating habits among children, reducing both stress around mealtimes and concerns of picky eating.

**Word Count:** 306

**Key Words:** picky eating, fussy eating, bi-directional research methods, parent-child relationship, parental feeding practices
6.3 Background

Picky/fussy eating has been defined as an ‘unwillingness to eat familiar foods or try new foods, severe enough to interfere with daily routines to an extent that is problematic to the parent, child, or parent–child relationship’\textsuperscript{67,68}. Although definitions and measures vary, estimates of picky eating are quite high in the preschool age group, with 14-50% of parents identifying their preschool age children as picky eaters\textsuperscript{69,70}.

The early years are characterized as a time for rapid growth and development, with the rate of weight gain peaking by age two and slowing between the ages of two and five years\textsuperscript{55}. Coinciding with this decreased rate of growth, most preschoolers also experience a decrease in appetite\textsuperscript{56}. During this time, children’s appetites can also be quite erratic, with neophobia (initial rejection or avoidance of new foods) and food jags (short term periods of restricted intake) being extremely common\textsuperscript{58}. In fact, from an evolutionary perspective, it is actually expected that young children show initial rejection of new foods to ensure that they are not poisonous\textsuperscript{72}. Research suggests that with time and repeated neutral exposures, most children will accept new foods\textsuperscript{72}.

Although changes in dietary intake during the preschool years are influenced by physical changes such as slowing growth rates, children also change psychologically, developing a sense of autonomy, preferring self-feeding, and exercising their own power in food selection. As agents of their own preferences and actions, children may
resist eating foods that are unappealing to them. Many of these food selection behaviours that are considered normal in the development of children’s eating habits (i.e., neophobia and food jags) are often considered by parents to be ‘picky.’ In this paper, we argue that the current conceptualization of picky eating defines agentic acts of resistance or expressions of preference by a child as deviant behavior. Similar pathologizing of child agency can be found in the child socialization research, whereby the majority of traditional parent-education and training methods view expressions of autonomy as deviant “noncompliance” and focus on external contingencies such as rewards and punishments as strategies for managing undesirable child behaviour.

Parental efforts to influence children’s food choices, such as asking the child to “eat one more bite”, as well as parents’ unrealistic expectations about preschoolers’ dietary intake may lead to increased parental concern and intrusiveness, as well as increased child resistance. This cycle of parental intrusiveness and children’s agentic resistance may cause stressed parent-child feeding interactions characterized by clashes between the parent’s will and the child’s will.

Research has shown that parental feeding practices influence child dietary intake. Parental feeding practices encompass a combination of provision and socialization (teaching manners and appropriate eating habits), and are used to manage children’s food intake (i.e. what, when and how much the child should eat). Traditionally, the specific actions that constitute parental feeding practices have been used to categorize a parent’s overall feeding style. Specifically, parental feeding
practices have been categorized on the type of control the parent exerts over the feeding interaction. Directive control, or coercive control, refers to feeding practices that are highly controlling such as pressuring the child to eat, restricting certain foods or food groups, and the use of food as a reward. Non-directive control refers to feeding practices that aim to influence child eating via less direct methods, such as monitoring the child’s intake, modelling of desired eating habits and food intake and gentle encouragement. Directive feeding practices have shown to be associated with poorer dietary intake; by focusing children’s attention on external cues, such as parental rewards or pressure, these directive feeding practices could undermine children’s ability to self-regulate their dietary intake.

The use of directive feeding practices may develop from parental concern about their child’s dietary intake or lack of knowledge about age-appropriate eating behaviours. This concern may be exacerbated because of parents’ perception that their child’s refusal of certain foods constitutes disobedience or noncompliance such that parents’ focus becomes compliance to authority rather than the promotion of healthy or diverse food choices. We argue that by helping parents and practitioners to recognize and respect children’s agentic responses as an aspect of the normal etiology and development of young children’s eating habits, parental concern surrounding child eating habits may subside, allowing for more relaxed and enjoyable feeding interactions.
Conceptualization of picky eating as a deviant or non-compliant behaviour has guided research, which is based on a parent-centered unidirectional perspective (i.e. exclusive focus on what the parent believes, wants or does) to understanding parent-child feeding interactions. However, parenting - including parental feeding practices - is, in part, a response to child characteristics and behaviours, as much as child eating habits are, in part, a response to those of the parent. Further, when thinking about the parent-child relationship, researchers are often interested in understanding how members in the dyad affect one another: do the parent’s feeding practices influence the child, or does the child’s behaviour influence the feeding practice used by the parent? While many researchers tend to interpret associations between parent and child measures as parental influence on the child, the reality is that parenting influences child eating habits and child eating habits influence parenting in non-linear ways. Thus, we need to use bi-directional approaches to correctly understand parent-child feeding interactions. Moving our thinking about picky eating from a, unidirectional (parent → child) perspective, to that of a bi-directional (parent ↔ child) perspective where parent and child co-actions create expectations for feeding interactions, may be the first step in elucidating the relationship.

The dialectical causal concept of co-action implies that the feeding outcomes are the joint product of the agentic actions of both parent and child. Co-actions can be cooperative (i.e. parent and child negotiate an outcome is mutually acceptable and allows the goals of both to be upheld during eating), or uncooperative (i.e. parent and
child resist each other during mealtimes, and do not produce mutually acceptable outcomes) 281. This shift to a bidirectional perspective will allow researchers to understand the influence that parental feeding practices have on child outcomes and vice versa. Such an understanding will allow health professionals to more effectively support parents in developing healthy eating habits among children, thereby reducing stress around mealtimes and concerns of picky eating.

It should be noted that there have been some important, pioneering, steps toward a bidirectional perspective on parent-child feeding interactions. In their review of food parenting practices, Vaughn and colleagues 1 discuss the idea of ‘autonomy support’ and parent feeding practices that can nurture a child’s ability to self-regulate, including providing children with choice, discussing rules and boundaries surrounding food and emotional support during feeding interactions. Using a discordant twin analysis, Harris and colleagues 282 found that mothers vary their feeding practices for twin children who differ in their ‘food fussiness’; mothers reported using more pressure to eat and more rewards with the fussier twin in comparison to the less fussy twin 282. Vandeweghe and colleagues 283 also found a differential effect on strategies used to get children to try disliked vegetables, whereby children high in reward sensitivity responded strongest to rewards, and children low in reward sensitivity respond best to verbal encouragement. However, while the few prospective studies examining parental feeding practices and child eating habits are useful for assigning direction to
associations with more confidence, they often explore the interaction from a unidirectional (parent → child) $^{284,285}$ or (child → parent) $^{114}$ perspective.

Given the need to both re-examine the concept and parent/clinician perspectives of picky eating, the objective of this paper is two-fold: 1) We argue for a reconceptualization of picky eating whereby children’s resistance during eating is considered as children’s agency in expressing eating preferences rather than categorized as compliant or non-compliant behaviour, and 2) We advocate the use of bi-directional relational models of causality and appropriate methodology to understanding the parent-child feeding relationship.

6.4 Discussion

6.4.1 Re-Conceptualizing picky/fussy eating

Although research has suggested that picky eaters often have reduced energy intake $^{68,70,75}$, eat fewer fruits and vegetables $^{68,76,77}$ and have lower intakes of dietary fibre $^{77}$, the impact on child growth has been mixed, with some studies suggesting no impact $^{56,78}$, while others suggest a higher risk of being underweight $^{69,79}$ or overweight $^{80}$. The unidirectional approaches used in the current body of literature, including the definition of picky eating itself, limit the interpretation of this research. Are the children’s dietary intakes suboptimal due to organic disease $^{78}$ or in extreme cases, a primary
psychiatric disorder (i.e. avoidant restrictive food intake disorder) \(^{81}\), or because the feeding practices used by their well-intentioned parents purse compliance to their unrealistic wishes as a goal? We argue that labelling a child as a “picky”, “fussy” or “noncompliant” itself may contribute to difficult feeding interactions because such labels pathologize what may be normal variations in children’s feeding preferences and increase parent and child stress. This increased stress may lead to either an escalating cycle of discordance between parent’s and child’s will or a situation in which parents withdraw from their efforts and cater to the child’s will, allowing poor dietary habits to prevail. Briefly, it should be noted that while food neophobia and short-term food jags are very common, children who eat an extremely limited range of foods for long periods of time, who do not accept foods back after food jags (which results in intake being further restricted), and those who refuse entire categories of food textures or nutrition groups may require more support from a dietitian and an in-depth assessment of the parent-child feeding interaction. In cases where suboptimal intake has impacted the child’s growth (i.e. dropping percentiles), as identified using age- and- sex-appropriate growth charts, more intensive therapy, in addition to the discussion of and support focused on parent and child roles during eating, may also be warranted. The majority of parent-defined “picky” eaters do not fall into these definitions; however, all parent concerns related to their child’s dietary intake should be explored to reduce anxiety and the potentially negative feeding practices that result from this concern.
In the child socialization literature, researchers have proposed that resistance can be a positive aspect in the social development of a child by providing a context for children to assert their autonomy within the parent-child relationship and develop the social skills with which to appropriately express their autonomy in a socially acceptable manner. Within the realm of feeding, we can understand this as the process by which children learn socially appropriate ways of social interaction, including table manners, and explore the food in their environment. Rather than labelling children as “noncompliant” or “picky eaters”, parents can be encouraged to re-conceptualize children’s actions during mealtimes as agentic preferences, some of which are discriminating regarding non-nutritional qualities such as taste, texture, presentation, and familiarity. Rather than focusing on control strategies for obtaining compliance to parental preferences, we can focus parent attention on fostering children’s healthful intakes and expanding their children’s culinary horizons through non-directive feeding practices such as modelling, participatory education, and setting positive relational contexts for meals. In addition, it may be constructive for parents to adopt accommodation rather than exact, immediate compliance as an acceptable outcome of feeding interactions. Accommodation implies that the child acknowledges that the parent has been heard and that the nature of the cooperative response is a creative, negotiated outcome that reflects the joint agency of parents and children. Accommodating the child’s agency and accepting the child’s accommodations of the parent’s efforts may ward off the negative directive feeding practices by allowing children’s eating behaviours and food preferences to evolve naturally in coactions with
their parent. Among preschoolers, accommodation may take the form of partial acceptance of the parent’s request such as trying or tasting the food served or by negotiating the amount, or nature (e.g. not including the sauce) of the food. Parents can also align conversations with their preschoolers that allow for collaboration, for example, rather than asking children to “eat three more bites”, parents could ask their children’s perspective regarding their internal state of satiety, such as “does your tummy feel like it has more room”, or the child’s experience of the food, “Does this taste okay to you?” Research supports that this respect for autonomy leads to positive child outcomes; in their study of Mexican-American mother-child dyads, Hays and colleagues found that mothers who used explanations and minimal pressure during feeding had children who displayed greater understanding of the role of food in maintaining health. Further, discouraging child agency encourages children to eat past their natural satiety points, prohibiting their ability to self-regulate intake. Finally, the children of parents who model healthful eating habits have been reported to be less ‘fussy’, try more likely to try disliked vegetables and have higher intakes of fruits and vegetables.

Implied in our re-framing of the view of picky eating, is the distinction between the parent’s desire for child compliance to their own immediate, short term goals (getting the child to eat the meal in front of them) and the long-term goal of fostering children’s internalization of more diverse and healthy food preferences. Parents use power-assertive methods, i.e., controlling or coercive feeding practices, to achieve short term objectives (such as using food as a reward to get a child to eat his or her
vegetables or pressuring the child to eat “just one more bite”), but use explanations and modelling when longer term objectives are the goal (such as explaining how milk helps grow strong bones and teeth, or modelling polite table manners during meals)\textsuperscript{229,289}. Labelling a child as a ‘picky/fussy’ eater may cause parents to focus too heavily on short-term objectives of getting the child to eat. By encouraging parents to re-frame picky eating as an appropriate act of agency, we may be able to foster mutually reciprocal parent-child relationships that are more conducive to positive feeding interactions both in the short and long term. In fact, research has suggested that pressuring children to eat new foods may cause dislike for the food \textsuperscript{125}.

6.4.2 Understanding parent-child dynamics in feeding situations: moving from unidirectional to interactional to dialectical conceptions of the feeding process

Our reconceptualization of feeding emerges from changes that have occurred in the understanding of socialization processes where there has been an increasing recognition of the role of children’s agency and influence in parent-child dynamics \textsuperscript{281}. Historically, the unidirectional framework, on which much feeding research is based, was challenged many years ago by Bell’s 1968 demonstration that correlations between parenting behaviors and children’s outcomes can be plausibly interpreted as the effects of children’s temperament on parental practices \textsuperscript{290}. Bell and Harper’s 1977 control process model was an early bidirectional approach to explain child effects using an interactional model where changes in parent and child behaviors emerge from
reciprocal exchanges and reactivity in parent and child behaviors over time. Bell and Harper suggested that parents and children establish a range of appropriateness for their interactions, including the frequency and intensity of behaviours that can be tolerated by the other. When one partner in the dyad exceeds this range at either the upper or lower level, the other takes action to bring the others behavior into their own range of tolerance. For example, parents may have an expectation about what and how much food the child should eat, as well as the table manners the child is expected to display. If a child acts at the lower level of this expectation, and does not eat his vegetables, the parent may react to increase their intensity of a specific feeding practices to increase the intake of the vegetables (i.e. pressure the child to eat). Thus, parental pressure is an effect of the child’s noncompliance. In an extension of the control process model from the child’s perspective, if the pressure used by the parent exceeds his or her tolerable range, he or she will act so as to evade or stop the parent’s pressure; the child’s resistant actions are an effect of the parent’s behaviors. Parent and child will escalate their attempts to bring the other’s behavior under control until one succeeds, thus completing the feeding interaction and forming a basis for the next. This example highlights the typical parent-child interaction that occurs with children that are labelled as “picky eaters.” Although the control process model is useful for understanding detrimental processes that may occur in feeding interactions, it is limited in that it focuses on the reciprocal behavioral and emotional reactivity of parents and children as well as linear behavioral control tactics rather than constructive processes involving parent and child agency. More recently this interactional or
behavioral approach to bidirectional influence has been challenged by dialectical or transactional models of bidirectional processes.

6.4.3 A dialectical approach to the bi-directional parent-child relationship

Interactional models of parent-child processes examine parents and children reciprocally exchanging behaviors or reacting to each other emotionally and there is little consideration of parent or child agency. In contrast, in new dialectical models, both parent and child are understood to have agency. The main facets of the dialectical approach are that the parent-child relationship is based on social transactions rather than interactions, meaning that parents and children engage in mutual meaning-making, rather than just reacting to one another's behaviours. Applications of the dialectical model to the phenomenon of parent-child feeding and eating can be understood in three distinct but interrelated processes: transactional, relational, and bilateral processes of agency, influence and power.

The transactional model was first developed by Sameroff and presented the idea that the child alters his parent and is, in turn, altered by his changed parent. The model focuses on qualitative transformations that occur as parents and children respond to and make sense of the contradiction represented by the other person's actions. For example, parents have their goals for children such as teaching children about healthy eating or wanting them to eat the foods served, and in turn children have unique likes and dislikes as well as their own ideas about their eating and what the parent’s behavior means to them.
Kuczynski and De Mol (2015) built upon this model with their social relational theory. A distinctive feature of the social relational model is that it places equal emphasis on the perspectives of both the parent and the child. Both parents and children are agents who maintain their own autonomy in the meaning of the feeding relationship by interpreting messages from the other, and acting on those meanings; a child’s refusal to eat certain foods may be seen as their attempt to show autonomy over their eating, but also may communicate to parents that they did not appreciate the pressure to eat. During the preschool years, children develop increasingly assertive and skillful strategies for overtly challenging parents. This could be why battles surrounding picky eating are often strongest during this age group. As children age, they use more covert strategies to achieve their goals while evading confrontations in effort to both preserve their own agenda and protect their relationships with parents despite pursuing their own goals.

The social relational model also emphasizes the importance of the long-term parent-child relationship as a context for understanding how parent and child agency is expressed as well as the dynamics of bidirectional influence occurring between parents and children. Despite differences in their perspectives and goals, the parent and child are bound by a mutual relationship in which they both have a stake and thus, try to accommodate each other’s perspectives. Each feeding transaction incorporates past and anticipated future feeding interactions, making up the relationship context for feeding.
In addition, social relational theory proposes that the parent child relationship is complex. On a daily basis bidirectional transactions between the parent and child engage different domains of the relationship including attachment, authority and intimacy. Power dynamics are important to consider in each of these domains as parents and children co-act to reach a mutual understanding. In the authority domain, parents use their asymmetrical power to influence children’s eating behaviors and bidirectional dynamics can take the form of conflict and coercion or mutual accommodation of the others’ agency. In the attachment domain, power is complementary whereby the child seeks to be fed and the parent provides; bidirectional dynamics can take the form of mutual responsiveness or non-responsiveness to each other’s needs. In the intimacy domain, power is relatively equal and allows parents and children to share and co-create meaning during opportunities such as mealtimes set up for mutual enjoyment. Interactions where one imposes or rejects meaning is destructive to intimacy.

The conflicts that arise in each of these domains may go beyond the immediate situation and may influence how parents and children understand the nature of their relationship. For example, within the authority domain, when a parent refuses to ‘short order cook’ for the child after the child refuses to eat the meal served, the child will learn that the parent’s power prevails when conflict arises. Within the attachment domain, parents’ responsiveness and non-responsiveness to children’s requests for food will have implications for the child’s sense of security in the relationship, as well as on the
child’s overall eating habits. In fact, research has shown that in comparison to high parental responsiveness, the low responsiveness shown in neglectful parenting is associated with significantly higher odds of obesity among young children (OR= 1.56, 95% CI 1.14-2.14)\textsuperscript{295}. It is argued that in this context, children do not gain the self-regulation skills that form the basis of healthy eating\textsuperscript{296}. Finally, within the intimacy domain, mealtimes can serve as a time to construct mutual closeness, cooperation and conversation in the context of feeding, and thus promote an anticipation of that feeding is a context for enjoyable interaction.

The implication of the dialectical consideration of context is that feeding is not just about nutrition, it is about relationships. What happens in the feeding situation has implications for other domains of the relationship including authority, attachment and intimacy and each context has implications for the dynamics of feeding interactions. When measuring feeding interactions from bi-directional perspective, we need to consider the relational climate (broader family context) within which the feeding interaction occurs.

In summary, the dialectical approach focuses on mutual meaning making between parent and child. Focusing on three domains of interaction, conflicts within these domains give rise to new meaning making and the basis for the next parent-child interaction. From this approach, it is important to view both the parent and child perspectives simultaneously rather than as separate entities.
6.4.4 Applications of the dialectical model to current practice

While not empirically tested, Ellyn Satter’s ‘dynamics of feeding’ principle guides some of the professional advice given to parents about feeding their children. This model views the parent as responsible for ‘what’, ‘where’ and ‘when’ the child eats, and the child as responsible for ‘whether’ and ‘how much’ he eats. This model fits well within the dialectical approach as it recognizes that parents and children are equally co-acting agents and allows parents and children to come to a place of mutual understanding and trust in their feeding transactions. Parents are responsive to the child’s needs and, in turn, the child can show autonomy over his or her eating habits. Conflict that does arise within this model allows both parent and child to adjust their expectations for future transactions, allowing mealtimes to become a time to build mutual intimacy and enjoyment.

From a research perspective, we are still in the pioneering stages of considering bi-directionality in the parent-child feeding relationship. Kuczynski and Parkin provide a helpful guide for adapting feeding research to a dialectical model of bi-directionality. First, parents and children need to be viewed as equal agents. By the very nature of this, researchers are suggested to challenge linear thinking. While linear outcomes are often a “happy ending” for research projects, continuous change and new synthesis are expected outcomes of socialization research where parents and children continually learn more about and adapt their relationship through transactions. Re-conceptualizing picky eating to consider child agency rather than dichotomizing eating
behaviour as compliant and non-compliant, is an important first step in moving towards this dialectical perspective. Second, rather than thinking about parents and children as individuals engaged in discrete social interactions, Kuczynski and Parkin suggest thinking of them as engaging in transactions in a long-term relationship context. Third, rather than focusing on direct causation between behaviours (i.e. parent feeding practices) and outcomes (i.e. child dietary intake), it is important to search out conditions associated with change; contradictions present opportunities for change and potential intervention. These steps were designed by Kuczynski and Parkin to provide personal resolutions for researchers transforming into transactional research. Moving forward, we suggest two practical implications of these resolutions in future research: 1) researchers need to observe feeding interactions between parents and children and 2) where feasible, feeding interactions need to be observed longitudinally, or at a minimum, consider parents’ and, when age appropriate, children’s long-term goals associated with the relationship. In the next section, we provide suggestions for methods that are well suited towards the idea of child agency and a dialectical model of bi-directionality.

6.4.5 Directions for Future Research

Future research should consider the bi-directional relationship that encompasses parent-child feeding interactions from a dialectical approach. Although understanding how parent and child behaviours influence each other is important, we argue that it is also important to think about how parents and children make meaning
from these interactions to either change or sustain behaviour. Mealtimes are a continuation of other parent-child interactions that occur throughout the day and so feeding and accepting what is being fed might not be about the food item or compliance to the parent, but could be influenced by meaning making around other aspects of family life. Using a dialectical lens will allow future research to underscore the complexity of what is happening during family mealtimes. Introducing a dialectical approach to understanding parent-child feeding practices is an important step in acknowledging this complexity.

Mixed-method longitudinal studies are the best method with which to explore this. Observational methods provide an objective measure of both parent and child behaviours and a longitudinal design will provide insight into how the feeding relationship develops and changes over time as the parent-child relationship itself develops and changes. Further, observational methods account for the context within which the feeding interaction occurs. While one study \(^{104}\) found associations between parent reported feeding style, observed feeding practices and the emotional feeding climate, no other associations have been found between observed and reported parental feeding practices \(^{100}\); observations capture practices that may be either too complex, decontextualized or habitual for parents to report using rating scales as the sole method. Such methods also allow researchers to understand child agency within the context of the feeding interaction. Further, when thinking about intervention research, observational methods designed to consider parent-child feeding transactions
provide a novel opportunity to tailor feeding interventions to the specific parent-child dyad while considering the broader relationship within which feeding occurs. For example, video-taped meals could be used as a novel counselling technique whereby the practitioner can provide specific input and feedback on the interactions observed.

Qualitative interviews also provide a unique opportunity to support the objective measures collected through observation by allowing parents to reflect upon or provide more context towards the complexity of parenting, child feeding, and family life. Qualitative methods can be thought of as the cognitive counterpart of observational methods in that both are concerned with interactions and experiences as they occur in natural environments. This method may be helpful in clarifying parent and child cognitions that make up the experience of feeding as well as the meanings, attributions and goals that parents and children construct from those experiences. Interviews and event diaries may be constructed from a bi-directional framework whereby parents are asked to report on the relational ways in which mealtimes are structured. For example, using the critical incidents technique, parents can provide narrative descriptions of their actions during meals by commenting on specific instances during meals in which they were influenced by their child and in turn, their response to these influences.
6.5 Conclusions

Throughout this paper we have presented an alternative conceptualization of picky/fussy eating whereby the child is granted agency in their eating habits, as well as for a dialectical perspective of the parent-child feeding relationship whereby both parents and children have agency to understand their co-actions in the context of their greater relationship. In combination, we believe that this reconceptualization of picky eating may strengthen our understanding of the parent-child feeding relationship, elucidating the influence that parental feeding practices and child eating habits have on each other. Finally, from an applied standpoint, in addition to promoting appropriate parental expectations and non-directive feeding practices, health professionals are encouraged to challenge the labelling of ‘picky eater’ and instead, focus conversations with parents around their expectations of children’s eating and the interactions they have with their children during mealtimes.

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7 Chapter Seven: Integrated Discussion

7.1 Thesis Summary

This thesis makes a unique contribution to the literature by exploring the association between food parenting practices and child/adolescent dietary intake and examining the role of the general family context in which parent-child feeding interactions occur. Results suggest that despite level of family functioning, food parenting practices play an important role in the dietary intake of children and adolescents. Additionally, this thesis provides an understanding towards why families engage in structured food parenting practices, in particular family meal routines. By exploring how parent’s own early life experiences with shared meals shape their current family meals, this thesis provides important information for future interventions aimed at promoting and increasing family meal participation, including which families to target. Finally, this thesis challenges the current conceptualization of food parenting practices and children's eating habits as unidirectional and provides insights for future research to approach parent-child feeding interactions using a bi-directional relational model. Findings from this thesis will help improve pediatric and adolescent nutrition care in Canada as well as the development of effective family-based nutrition interventions.
We found that among both adolescents (Study 1) and preschool aged children (Study 2) the level of family of family functioning did not moderate or confound the associations between food parenting practices and dietary intake. The lack of consideration for the general family context in which food parenting practices occur, in particular family meals, is a chief criticism of the large body of family meal research. It has been argued that the families who participate in family meals may be different from those that don’t; family dysfunction may interfere with the ability to plan and prepare healthy meals or diminish the quality of modelling that occurs during mealtimes.

However, the findings in study 1 not only suggest that there are lower functioning families who participate in frequent family dinners, but that frequent family dinners were associated with higher quality dietary intake regardless of level of family functioning. Interactions between family functioning and family dinner frequency were non-significant and associations between family dinner frequency and dietary intake outcomes did not change substantively when adjusting for family functioning. For females (n= 1 559) and males (n= 1 169) frequent family dinners (> 5 meals/week) were associated with higher intakes of fruits and vegetables and lower intakes of fast food and take out. For males, frequent family dinners were also associated with lower consumption of SSBs. Study 2 also found that level of family functioning does not interfere with observed food parenting practices among a sample of parents of preschoolers (n=73 families). The study found that mothers’, but not fathers’ food parenting practices were associated with their child’s nutrition risk scores (measured by NutriSTEP®), regardless of level of family functioning. Specifically, mothers’ use of physical restriction was associated with higher
nutrition risk and their use of positive comments towards their child’s food was associated with lower nutrition risk. The results of study 1 add to the large body of research linking frequent family meals to improved dietary intake among adolescents and the results of study 2 are consistent with research exploring the impact of coercive and non-coercive food parenting practices on young children’s dietary intake. However, these studies extend previous findings and suggest that food parenting practices are associated with healthier dietary intake as children age (preschoolers to adolescence), regardless of level of family functioning.

The results of studies 1 and 2 also extend the body of literature that explores the association between family functioning and child and adolescent dietary intake. These studies have found positive associations between family functioning and the dietary intake of children and adolescents. While family functioning provides a contextual overlay, studies 1 and 2 explore specific food parenting practices and suggest that these are important for dietary intake regardless of the associations family functioning may have with the dietary intake and food parenting practices themselves (see Figure 2, section 2.7.2). While the results of studies 1 and 2 need to be replicated in more diverse populations, they are the first to take into account the general family context when examining associations between food parenting and dietary intake among children and adolescents.

While studies 1 and 2 are the first to explore the role of family functioning in the association between food parenting practices and child dietary intake, studies have found that family functioning influences other health outcomes. Loth and colleagues
found a differential effect of family functioning on the association between frequent family meals and adolescent disordered eating behaviours. Loth found that for girls, but not boys, in low functioning families, frequent family meals were associated with greater odds of engaging in unhealthy weight control behaviours. Further, studies exploring associations between family meal and adolescent well-being, or risk taking behaviours such as smoking or alcohol use have found that associations are attenuated after controlling for level of family functioning. Taken together, these results suggest that impact of family meal frequency and level of family functioning varies depending on the outcome of interest. However, when it comes to improving dietary intake, food parenting practices, including family meals, may be an appropriate avenue of intervention among families with children and adolescents, even for those with lower functioning. As will be discussed below, future interventions should test the ability of improving these foods parenting practices, including increasing family meal participation, to improve dietary intake and lower nutrition risk among children and adolescents.

Study 3 found that families with preschoolers (n=20) approached mealtimes from one of three over-arching orientations (Meals for Togetherness, Meals for Nutrition Messaging and Meals for Necessity). While these mealtime orientations seemed to track across the lifespan, for some parents, major life transitions such as meeting their current partner or becoming a parent led to fundamental changes in the way individuals approach eating and mealtimes. The mealtime orientations seemed to inform the context of the families’ meals, the messages parents share with their children about
food and eating and the challenges families experienced with mealtimes. These results suggest that understanding the reasons why families eat meals together has important implications for the intergenerational transmission of mealtime practices, as well as the intervention strategies that are likely to be beneficial to families as their preschool children age.

While study 1 found that there both high and low functioning families participate in frequent family meals, understanding additional family context such as mealtime orientation may highlight important differences between families that do and do not participate in frequent family meals. For example, study 3 suggests that families who participate in frequent family meals may do so either to spend time together as a family, to ensure their child is eating a healthful diet or to provide structure to their child’s day. It is possible that families who do not participate in frequent family meals do not have an underlying motivation or reason to do so. However, the applicability of these mealtime orientations to families that do not participate in frequent family meals is unknown. It is also unknown whether the maintenance of family meal frequency over time differs across families with these different orientations. Future longitudinal research should seek to understand change in family meal frequency across these mealtime orientations among families who engage in frequent family meals as well as families who engage in less frequent family meals.

Study 3 adds to a small body of literature that examines the intergenerational transmission of family meal routines. Malhotra and colleagues269 found that mothers’ childhood experiences informed their perceptions of the benefits and barriers to family
meals with preschoolers. Interestingly mothers’ whose parents were absent during their childhood meals reported that mealtimes were important occasions to communicate with their own children\textsuperscript{269}. While study 3 found the mealtime orientations seem to track throughout the life cycle, this study suggests that in some cases, parents may purposefully approach meals differently from those of their own childhood. Similar to study 3, Trofholz and colleagues\textsuperscript{175} found that the lessons mothers learned about family meals from their own parents influenced the lessons they shared with their school-aged children. All parents in this study reported being taught how to cook that eating together is important, and in turn sharing these messages with their own children\textsuperscript{175}. Only parents who were taught about healthy eating as a child reported sharing such messages with their own children\textsuperscript{175}.

The mealtime orientations found in study 3 may provide further insight into how the general family context influences food parenting practices. However, the association between the meal orientations, food parenting practices and dietary intake is unknown. It is possible that food parenting practices used during meals differ based on mealtime orientation. For example, parents in the ‘Meals for Nutrition Messaging’ orientation may use more restriction during meals to control their child’s intake: study 2 found mothers’ physical restriction of food to be associated with higher risk of nutritional inadequacy among their preschool-aged children. Future work should explore the association between the mealtime orientations, food parenting practices and child/adolescent dietary intake. Again, this highlights also the importance of considering the general family context when exploring food parenting practices.
The fourth manuscript in this thesis builds on findings from the first three by examining limitations in the way food parenting has been conceptualized in the literature. Paper four argues that this conceptualization has, in some ways, restricted our understanding of children’s eating habits. For example, picky eating has been cited as a challenge that may parents face in feeding their young children (including the parents participating in studies 2 and 3). However, our current conceptualization of food parenting from a parent → child perspective limits our understanding of the origin of the “picky eating” (i.e. is the child “picky” due to organic disease, or in extreme cases a primary psychiatric disorder, or do the feeding practices used by a well-intentioned parent interfere with his/her natural dietary behaviours). While the few prospective studies examining parental feeding practices and child eating habits are useful for assigning direction to associations with more confidence, they also often explore the interaction from a unidirectional (parent → child)\textsuperscript{284,285} or (child → parent)\textsuperscript{114} perspective\textsuperscript{57}. A recently published study by Jansen and colleagues (2017) did explore the interaction from a (child → parent → child) perspective\textsuperscript{301} and showed that picky eating at age 1 ½ was found to be prospectively related to reports of picky eating at ages 4 and 6 years. Results also suggested that parents reported adapting their feeding practices to children’s picky eating\textsuperscript{301}. Specifically, path analyses found pickiness at 1 ½ years predicted more maternal pressure at 4 years (B=0.18, 95%CI: 0.15, 0.21, p < 0.001), which in turn was associated with more fussiness at age 6 years (B=0.17, 95%CI: 0.14, 0.20, p < 0.001)\textsuperscript{301}. 

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Although understanding how parent and child behaviours influence each other is important, paper 4 presented a dialectical model for approaching parent ↔ child interactions during meals. With this approach, both parent and child have agency during feeding transactions, highlighting that a parent and child don’t simply react to one another’s behaviours; they react and then create meaning for future interactions. The commentary in this paper sets the stage for the future of food parenting research and suggests methods that are well suited towards the idea of parent and child agency and a dialectical model of bi-directionality. For example, as will be discussed in section 7.3.2, next steps for study 2 would be to explore the video observations from a dialectical perspective. Observations could be used to determine how both parents and child display agency during the meal and how this agency informs parent-child interactions. Specifically, how does physical restriction (removal of child agency) influence the child’s immediate behaviour and the next parent-child feeding interaction? While cross-sectional analyses provide interesting insights, longitudinal studies are also needed to understand how parent-child interactions change over time and influence child and adolescent outcomes long-term.

7.2 Strengths and Limitations

7.2.1 Strengths

A key strength of this thesis is that it addresses many of the gaps in the current body of food parenting literature. First, this thesis explores the role of the general family
context on the association between food parenting practices and child/adolescent dietary intake. Studies 1 and 2 are the first studies to explore whether family functioning moderates or confounds the association between food parenting practices and the dietary intake of children, adolescents and young adults. While Loth and colleagues have previously explored the role of family functioning in the association between family meals and adolescent disordered eating behaviours, family functioning has not been previously explored in studies exploring food parenting practices and dietary intake. The exploration of this association among young children (study 2) is particularly interesting because the general family context is arguably the main influence on their behaviours during this time.

Study 3 was the first study to uncover that families had different mealtime orientations that seemed to inform the context of the families’ meals, the messages parents’ share with their children about food and eating and the challenges families experienced with mealtimes. Further, few studies have qualitatively examined the intergenerational transmission of family meal traditions, and study 3 is the first to include fathers’ perspectives. Manuscript 4 is the first to present a novel approach to exploring food parenting practices that takes into account the general family context. The dialectical model opens up our understanding that food parenting is about more than just nutrition and food intake, it is about relationships; it is this understanding that highlights the importance for future bidirectional research to consider the relational climate, or the general family context in which feeding interactions occur.
The use of direct observations in the home to understand food parenting practices is also a key strength of this thesis. The use of direct observation in study 2 allowed for a more accurate exploration of the associations between food parenting practices and children’s nutrition risk. Intra and inter-rater reliability was found to be high supporting the reliability of the results. As discussed previously, the majority of food parenting research has been based on parent-report of their food parenting practices which introduces bias due to social desirability, misunderstanding of questions or an inability to report habitual behaviours. Further, these observations were conducted in the home, without the presence of a RA, to allow for typical mealtime interactions to occur.

The inclusion of fathers in studies 2 and 3 helps to fill in an important gap in the literature as fathers have been mostly excluded from food parenting and children’s health research. Study 2 highlighted differences in the food parenting practices mothers and fathers use during mealtimes, which highlights the importance of exploring the role of fathers during mealtimes further. By interviewing parents about their family meals together, study 3 found that the parent relationship itself was monumental for many in shaping their current approaches to food and mealtimes. Together, these findings highlight the importance of considering the influence of both parents on child dietary intake in dual-headed homes.

A fourth key strength of this thesis is that studies 2 and 3 were conducted in Canada where food parenting has been largely unexplored; there have only been two other studies to measure food parenting in Canada and neither used observational
methods. Findings from study 2 suggest that norms surrounding food parenting may be regionally and culturally defined. Specifically, in study 2, the food parenting practices mothers’ and fathers’ used were found to differ. However, a U.K study using the same FMCS to measure food parenting practices found no differences between mothers’ and fathers’ food parenting practices \(^{100}\). More Canadian studies are needed to elucidate the association between both mother’s and fathers’ food parenting practices and their child’s nutritional outcomes.

The range of different research methodologies to explore the association between food parenting practices and child/adolescent dietary intake was also a strength of this thesis. While studies 1, 2 and 3 were all cross-sectional in design, study 1 used a large data set to explore the association using adolescent report and study 2 employed the use of direct observation in the home to measure food parenting practices. Interestingly, this use of adolescent and parent report of family functioning also highlights the strength of using mixed-methods and approaching the same question from different perspectives. The finding that neither adolescent report (study 1) nor parent report (study 2) of family functioning moderated or confounded the association between food parenting practices and child/adolescent dietary intake strengthens our findings that the association exists regardless of level of family functioning among the two age groups. The use of qualitative methods in study 3 revealed findings that would not have been possible with quantitative analyses. Finally, the inclusion of a commentary paper in this thesis allowed for the current conceptualization of food parenting and picky eating to be challenged and for new methodologies to be
presented. By reviewing literature outside the body of food parenting practices, parallels were drawn from the rich child socialization literature and lessons of how parent-child interactions are understood and applied in that field of research were learned and shared.

### 7.2.2 Limitations

Despite the many strengths, there are limitations to note when interpreting the findings of this thesis. The non-experimental approach of studies does not allow for causation to be inferred. Future intervention research that explores how changing food parenting practices influences children’s and adolescent’s dietary outcomes are needed for causal evidence for food parenting practices. Holley and colleagues have done work in this area and found that parent-led interventions in the home using repeated exposure and a combination of modelling and non-food rewards are successful at increasing children’s consumption of disliked vegetables. These results suggest that dietary changes are possible when changing food parenting practices. Similarly, outside of presenting ideas for future research, bi-directionality was not explored in this thesis. For example, in study 2, it is possible that more controlling feeding practices are used by mothers who have children who are picky eaters in an attempt to improve their child’s nutritional intake. Prospective research is needed to determine the temporal order of the association as well as the bi-directional nature of feeding interactions.

The use of self-report of family functioning (studies 1 and 2), adolescent dietary intake (study 1) and preschooler nutrition risk (study 2) may limit the validity of our
findings due to the susceptibility of social desirability bias. However, in studies 1 and 2, family functioning was measured using the General Functioning subscale of the McMaster Family Assessment Device which has been validated against experienced family therapists' clinical ratings and found to correspond with clinicians’ ratings of healthy and unhealthy families; ‘general functioning’ subscale (t (39) = 2.49, p < 0.05) . Test-retest reliability has also been reported for the ‘general functioning’ subscale when completed by participants one week later (r= 0.71) . Regarding our measures of dietary intake, in study 1, adolescent/young adult dietary intake was measured using the Youth Adolescent Questionnaire (YAQ), which is valid and reliable self-administered food frequency questionnaire (FFQ). The YAQ was validated against 24-hour recalls among a national sample of 261 U.S. youths ranging in age from 9-18 years; average correlation coefficient for individual nutrients was 0.54 after accounting for within-person error. Among a similar sample the questionnaire was also found to be reliable when completed by participants one year later; Pearson correlation coefficients ranged from 0.39 for meats to 0.57 for soda which indicates moderate-strong correlations. The FFQ is an appropriate tool for measuring dietary intake among large samples due to its practicality, low participant burden and acceptability in measuring dietary intakes among adolescents and young adults. In study 2, preschooler nutrition risk was measured using the NutriSTEP® which has been validated among a large sample of ethnically and geographically diverse families in Canada. The questionnaire was validated against registered dietitians’ assessments of the child’s nutritional status (based on medical and nutritional history, 3-day food...
records and anthropometric measurements)\(^4\). Scores on NutriSTEP\(^\circledast\) and RD ratings were correlated \((r=0.48, p=0.01)\)\(^4\). The questionnaire was also found to be reliable when completed by parents on two separate occasions, 2-4 weeks apart \((\text{kappa} >0.75)\)\(^4\). NutriSTEP\(^\circledast\) was chosen in this study due to its accuracy in measuring nutrition risk among preschoolers, its low participant burden and as an accountability measure in Ontario\(^306\), its ability to compare findings to other Canadian samples.

The generalizability of the findings in studies 1, 2 and 3 need to be considered. The majority of participants in the studies presented in this thesis are from high SES, are highly educated and identify as White. Further, the participants in studies 1, 2 and 3 may be different from the general population based on selection bias. The adolescents and young adults in study 1 were participants of GUTS2 which is a longitudinal cohort study of offspring of participants in the Nurses Health Study (NHS II). Given that all GUTS participants are the offspring of nurses, it is possible that participants may have a heightened interest in research or their health in general as compared to the general population. Similarly, the families in studies 2 and 3 were recruited to participate “in a study about family meals” (see Appendix 2 for FaMOS recruitment poster). The families that signed up to participate may be different from families that did not sign up to participate, including having a heightened interest in research, shared meals or nutrition. Future studies should explore the findings of this thesis among more diverse populations including those with lower SES and more ethnic/racial diversity.

Overall, the dietary intakes of the adolescents and young adults in study 1 and the preschoolers in study 2 were fairly good. The adolescents and young adults consumed
low amounts of fast food, take out and SSBs in study1 and the preschoolers in study 2 had low risk of nutritional inadequacy. The low variability in dietary intake among these study samples may have contributed to the small effect sizes observed in studies 1 and 2. Future studies should explore the associations between food parenting practices and children’s dietary intake in samples where the consumption of fast food, take out and SSBs or nutrition risk is known to be higher\textsuperscript{307,308}.

Similarly, the parents in study 2 reported fairly high levels of family functioning and as such, findings need to be replicated among populations with lower functioning. Care should be exercised when generalizing the findings of this research to more diverse populations including those with poorer dietary intake and lower levels of functioning as it serves as another example of the under-representation of at-risk populations in research\textsuperscript{309}. The use of home video observations in study 2 may have exacerbated this since it is possible that lower functioning families did not want to have their mealtimes recorded. As this was the first Canadian study to employ observational techniques to understand food parenting practices, a convenience sample was recruited. Future research should focus on recruiting more diverse families and higher-risk populations for studying the association between food parenting practices and dietary intake in the Canadian context.
7.3 Implications and Future Research Directions

7.3.1 Implications of Findings for Public Health and Dietetic Practice

The findings presented in this thesis have important implications for public health and dietetic practice. First, the findings from studies 1 and 2 suggest that for preschoolers through to adolescents, food parenting practices are associated with dietary intake, regardless of level of family functioning. Given the overall poor dietary intake of Canadian children and youth, the promotion of healthful food parenting practices, including structured and autonomy support or promotion (see Figure 1; section 2.4) may be a promising way to improve diet quality of children and adolescents. For example, as a structured food parenting practice, interventions aimed at promoting family meal participation especially among adolescents where rates of shared meals seem to decline\(^{172}\), may help improve dietary intakes. Healthful dietary intakes among adolescents not only have implications on their current health and academic achievement, but also their long-term risk of chronic disease and the intergenerational transmission of eating habits and routines as they enter parenthood. As an autonomy support or promotion food parenting practice, teaching parents to focus on positive, non-coercive encouragement towards their child’s eating rather than coercive food parenting, may not only reduce their child’s risk of nutritional inadequacy in the short term, but help to promote lifelong healthful dietary intakes and an increased enjoyment of food.
When planning to teach healthful food parenting practices, the discussion in paper 4 highlights the importance of re-framing the definition of “picky eating” to allow for child agency. By re-conceptualizing the child’s autonomy, eating habits that are developmentally appropriate, are not seen as deviant. Addressing parent concerns about picky eating while discussing the normal changes in preschoolers eating behaviours that correspond to their slowed growth and budding independence may be helpful. Regardless of a child’s level of nutrition risk, concerns regarding picky eating should always be addressed. Parents tend to focus on the short-term feeding goals (i.e. getting the child to eat) when their child is picky vs. long-term feeding goals (i.e. teaching an enjoyment of healthy eating or meals as a time to connect with family members). Short-term feeding goals tend to be more coercive, which in the long run may erode the feeding relationship and potentially lead to a decline in family meals.

Addressing parent concerns related to picky eating also highlights the importance of tailoring interventions to promote positive food parenting practices to the individual family. As suggested by Dwyer and colleagues\textsuperscript{183}, there has been limited evidence towards the success of one-size-fits-all family meal interventions. Study 3 identified that supports tailored to the families’ mealtime orientation may be more likely to create fundamental and lasting changes to mealtime routines than using a general approach. For the challenge of feeding a picky eater, for example, a family with the ‘Meals for Togetherness’ orientation can be reminded that simply eating together allows for important modelling of healthful eating habits that will help promote healthier dietary intakes. They can also be reminded to use positive encouragement to promote short-
term intake rather than coercive pressure or restriction of favourite foods to preserve their longer-term goal of togetherness at mealtimes. For families in the ‘Meals for Nutrition Messaging’ orientation, teaching parents about their child’s growth changes, their ability to regulate their appetite and to expect fairly sporadic intake from their child, may help ease concerns about nutritional inadequacies. Drawing from studies 1 and 2, reminding parents that structured food parenting practices such as family meals and autonomy support food parenting practices such as positive encouragement have been shown to be associated with better dietary intake and lower risk of nutritional inadequacies, respectively, will likely be helpful in promoting their goals of healthy eating. Finally, for families in the ‘Meals for Necessity’ orientation, providing strategies that may it easier to feed a “picky eater” to make the overall mealtime more enjoyable may be helpful. Specifically, encouraging parents to include their child in the meal preparation through age appropriate tasks, and to not short-order cook when their child refuses food may be beneficial in helping them to continue the tradition of eating together to provide structure to the day. However, as discussed below, the mealtime orientations need to undergo further testing among larger and more diverse samples.

Finally, while study 2 did not find fathers’ food parenting practices to be associated with children’s nutrition risk, other studies have found an association\textsuperscript{134}. Study 2 did find that mothers and fathers use different food parenting practices during mealtimes, which in itself, highlights the importance of including fathers in the conversations and counselling surrounding children’s dietary intake. Encompassing the
family context, including and considering all parties involved in feeding the child may be important when improving dietary intake.

7.3.1.1 Knowledge Translation

The implications of findings for public health and dietetic practice present important messages about food parenting that should be translated and disseminated to both health professionals and parents of children and adolescents. These messages include the importance of food parenting practices, including family meals as a structured food parenting practice in promoting healthful dietary intakes among children and adolescents, the importance of giving children agency during meals, and the importance of mothers’ and fathers’ food parenting practices. While further testing of the influence of food parenting practices are necessary, and will be discussed below, ideas for knowledge translation are presented.

First with the rise in the use of social media\textsuperscript{310}, information regarding the importance of healthful food parenting practices, including family meals on child and adolescent dietary intake can be shared directly with parents on popular platforms including Facebook, Twitter and Instagram. Sharing health information on these platforms is becoming increasingly important to keep evidence-based information afloat amidst a sea of otherwise questionable and poorly-evidence advice\textsuperscript{310}. Campaigns and messages targeted specifically to fathers are especially important to highlight the important role they play in the development of their child’s eating behaviours.
Building on services that already exist to support families in creating healthful behaviours for their children, information from this thesis could also be shared through public health and EarlyON Centres (centres across Ontario offering high-quality early years programming to families free of charge). Specifically, a review for staff regarding the most up-to-date information on food parenting through lunch and learns and printed guidelines would be beneficial. Programs that are inclusive of fathers or that are specifically aimed at fathers are few and far between. Given the fact that study 2 found mothers’ and fathers’ food parenting practices to differ in frequency, the messages and programming that are successful for mothers may not extend to fathers.

The NutriSTEP® questionnaire is an accountability indicator for public health in Ontario which makes the findings of study 2 quite relevant to Ontario public health practitioners. A webinar highlighting the findings of this thesis in relation to NutriSTEP® would be an inexpensive and feasible method to reach many public health professionals. The findings from study 2 present specific food parenting practices (restriction and positive encouragement) that may be an important focus for counselling parents of children with moderate to high nutrition risk.

7.3.2 Future Research Directions

The findings and implications of this thesis present many ideas and directions for future research. Future research directions are discussed below with regards to two areas of focus: food parenting research methodologies and interventions and nutrition education.
7.3.2.1 Food Parenting Research Methodologies

The need for longitudinal research exploring food parenting practices is highlighted by this thesis and by the work of others. Longitudinal research will help to further understand the causal relationship and temporal order of the association between food parenting practices and child dietary intake and eating behaviours. Longitudinal designs will also help researchers to understand how the association changes and evolves over time. While there have been some prospective studies examining food parenting practices and child dietary intake, they have been primarily based on parent-report data; longitudinal observational data is needed.

The qualitative findings from study 3 present interesting opportunities for future quantitative and observational research. Quantitative survey methods would allow for the testing of mealtime orientations among larger and more diverse samples; the mealtime orientations may or may not hold up amongst those that do not participate in frequent family meals (> 5 meals/week). A set of questions could be developed to assign families to a mealtime orientation or parents could simply be asked to identify with one of the three orientations, with the inclusion of an ‘other’ option to account for variations among larger samples. Survey questions should be pilot-tested and evaluated prior to inclusion in a large survey, using methods such as cognitive interviews, test-retest reliability and expert face validity to ensure that parents interpret the questions as intended, that their reports are reliable and that questions appear to cover the concepts intended. The development of survey questions to understand
family mealtime orientations could also be applied to observational research. Many observation food parenting practice measures, including the FMCS used study 2, were adapted from parent-report surveys. Mealtime observations in the home may be able to identify the families’ mealtime orientation or provide additional information to support the definitions of each mealtime orientation. While there are observational coding schemes to assess the emotional climate of the family meals, no observational measure of families’ goals or approaches to family meals are known to exist. As a first step, the mealtime videos of the 20 families who participated in study 3 could be reviewed with a lens towards the mealtime orientation (i.e. do mealtime conversations or food parenting practices differ by meal orientation).

Future food parenting research should consider a dialectical approach to bi-directional research. Many directions and approaches for researching food parenting practices using this approach are presented in paper 4. While observational techniques for measuring dialectical parent-child feeding interactions should be tested and developed, there are other, perhaps more approachable methods that may be the first stepping stone to developing such measures. For example, interviews and event dairies, or even video reviews of mealtimes could be constructed from a bi-directional framework whereby parents are asked to report on the relational ways in which mealtimes are constructed. Through use of a critical incident technique, parents could comment on instances in which they were influenced by their child, and their behaviour was then influenced.
As discussed throughout this thesis, mealtime observations only capture overt restriction (i.e. taking food away from a child or telling them to stop eating a certain food) and parents may use covert restriction (i.e. not bringing certain foods into the home), which would not be observed during mealtime videos, but can be captured in food parenting questionnaires. Future research should explore the use of mixed observational and reported methods in attempt to more accurately capture both overt and covert restriction. Research could employ statistical techniques for multiple informants/information sources\textsuperscript{262}, which would incorporate data from both parental report and observed feeding practices. These advanced statistical techniques are often used in psychological research when multiple reports of a behaviour are obtained, (e.g., parent and teacher report of child behaviour)\textsuperscript{314,315}. These techniques could be applied to food parenting research allowing for the integration and use of the information from both parent report and observation of food parenting to obtain a more thorough understanding of how food parenting practices influence children’s nutrition.

Co-parenting during the meals of dual-headed families is also an interesting area of exploration. Harris and colleagues have explored the concordance/discordance between mothers’ and fathers’ food parenting practices in relations to their child’s picky eating; parents with concordant feeding reported lower levels of picky eating among their child\textsuperscript{263}. While exploring differences in mothers’ and fathers’ feeding practices is interesting, it is possible that parents adjust their feeding practices based on one another. Replicating Harris’s findings using video observations would be an interesting first step. Similarly, video observations examining parent-parent interactions and their
influence on children would be an informative area of future research in terms of understanding the dynamics of family mealtimes to create effective food parenting interventions. The critical incidence technique discussed above could also be applied to parent-parent interactions whilst feeding their child.

Finally, while family functioning was not found to influence the association between food parenting practices and child and adolescent dietary intake or nutrition risk, it is possible that other aspects of the general family context, including parenting stress or home chaos may impact the association. Parental stress has been defined as a complex construct involving behavioural, cognitive and affective components related to a person’s appraisal of his or her role as a parent. Research suggests that high parenting stress may lead to increased obesity risk among children in two ways, 1) triggering the child’s own physiological response to stress and 2) parent stress may lead to compromised parenting which promotes unhealthful behaviours. My Master’s research found that children with highly stressed parents were less likely to meet physical activity guidelines on weekdays than children with normally stressed parents (OR = 0.33, 95% CI, 0.12-0.95) and that parents experiencing high stress were also less likely to set limits on the amount of TV their children watched (OR = 0.32, 95% CI, 0.11, 0.93). The association between parental stress and children’s dietary intake has not been well explored. Home chaos has been defined as the among of commotion, business and noise in the home and has been found to be associated with emotional overeating in 3 and 4 year-olds. The association between parenting stress or home chaos and food parenting practices has not been well explored, nor has the potentially
modifying effect of these general family context factors on the association between food parenting practices and children’s dietary intake. Future research should seek to explore the influence of these other general family factors in elucidating the association between food parenting practices and children’s dietary intake.

7.3.2.2 Interventions and Nutrition Education Research

The findings from this thesis inform the future development and testing of interventions aimed at improving the dietary intake of children and adolescents. First, given the findings of study 1, interventions aimed at increasing the frequency of family meals among families with adolescents is of importance given the decline in shared meal participation seen during this time \(^{172}\). Results from study 1 suggest that family meals are an appropriate avenue of intervention as they are associated with improved diet quality for males and females in both high and low functioning families. As suggested by Dwyer and colleagues\(^{183}\), tailored messaging and supports are an important feature of successful interventions. Intervention ideas for those not participating in frequent family meals and supports aimed at keeping those who are frequently sharing meals together doing so are described below. Despite this, it is important to note that while dietary intake is better among those that participate in frequent family meals, few adolescents are meeting dietary recommendations\(^{34,37,49}\) regardless of their participation in family meals\(^{321}\). Thus, it is suggested that all interventions include healthy eating and nutrition education components. The messages
shared should not only focus on the foods eaten during family meals but also those eaten during other meals and snacks throughout the day\textsuperscript{161}.

For families that do not participate in frequent family meals, testing interventions aimed at increasing participation is an important initial step. Focusing on general messages such as highlighting that any shared meal together (breakfast, lunch or dinner) can provide benefits\textsuperscript{153}, that each shared meal matters (families don’t have to go from 0 shared meals to 5 to reap benefits)\textsuperscript{161} and providing support for the adolescents themselves to be involved in the meal preparation may be helpful. Further, examining differences between high and low functioning families who do and do not participate in frequent family meals may provide insights into tailored intervention messages and supports. Specifically, for low functioning families not participating in frequent family meals, activities or supports that target improvement in functioning may be intrinsically beneficial while supporting other adolescent health behaviours (i.e. reduced disordered eating\textsuperscript{244}). For example, Fishel (2016)\textsuperscript{322} suggests it may be helpful to teach low functioning families non-competitive games that encourage positive conversations and reduce tension during meals. Family meals may even help improve functioning over time\textsuperscript{322}.

For families that already participate in frequent family meals, interventions that seek to maintain this practice as children progress through adolescence are also needed. Given the associations among high family functioning and family dinner participation\textsuperscript{181,217}, it may be especially important to test strategies to support lower functioning families in times of transition and stress or when life necessitates that they...
spend mealtimes doing other activities. Work schedules, after school activities and a lack of meal planning are commonly cited barriers to family dinner participation and it is hypothesized that these barriers may be more challenging for families with lower levels of functioning. Again, interventions that include components to encourage youth involvement in meal preparation may be particularly promising to not only lessen the burden of time, but to also strengthen the benefits shared meals have on their dietary intake.

The findings from study 2 suggest the need to test the ability for food parenting practices to improve children’s NutriSTEP® scores. Specifically, does reducing the frequency of maternal physical restriction and promoting positive encouragement help to lower NutriSTEP® scores among children at moderate-high risk of nutritional inadequacy? Findings from the Australian-based NOURISH randomized control trial (RCT) suggest that teaching first-time mothers healthful food parenting practices including responsive feeding (recognizing child’s hunger and satiety cues) and the importance of healthy foods vs. energy dense, nutrient poor foods when their child is between 4-13 months of age can be effective in changing maternal food parenting practices. These changes in food parenting practices were associated with small improvements in child eating behaviours, food preferences and consumption of fruits and vegetables up to 3.5 years later, highlighting the lasting impact healthful food parenting practices may have. However, interventions aimed at changing food parenting practices need to be tested in the Canadian context and these interventions should include fathers.
Eating habits and food preferences change and develop rapidly during the early years and it is also unknown whether interventions during infancy would provide lasting changes beyond the early years. Therefore, focusing on the preschooler age group, may be beneficial as parent complaints/concerns surrounding children’s eating habits and picky eating tend to peak during this time\textsuperscript{57,66}. Using paper 4 as a model and including the information on reconceptualization of “picky eating” may be helpful in improving children’s dietary intakes. For example, Ellyn Satter’s ‘dynamics of feeding’ principle\textsuperscript{2} guides some of the professional advice given to parents about feeding their children by dietitians and fits well within the dialectical approach to bi-directionality as it recognizes that parents and children are equally co-acting agents and allows parents and children to come to a place of mutual understanding and trust in their feeding transactions\textsuperscript{57}. This model views the parent as responsible for ‘what’, ‘where’ and ‘when’ the child eats, and the child as responsible for ‘whether’ and ‘how much’ s/he eats\textsuperscript{2}. While there is anecdotal evidence that this ‘division of responsibility’ is successful in promoting healthful eating habits among young children, it has not been empirically tested\textsuperscript{2}. An intervention testing the ‘dynamics of feeding’ approach may be a promising first step to experimentally testing food parenting practices and the bi-directionality of parent $\leftrightarrow$ child feeding interactions to improve children’s dietary intakes.

Given the lack of association between parent-reported and observed food parenting practices, videos present a promising educational tool for intervention. Videos of family meals provide insights into context-specific and in-the-moment behaviours and may provide opportunities for parents to reflect upon and discuss their food parenting
practices in relation to their child and the feeding interaction. Video feedback is a tool used in many parenting interventions, especially those focused on parents with children who have behavioural problems, whereby the health professional/interventionist provides supportive and corrective information about interactions with the child, rather than by discussing hypothetical behaviours or role-playing. Video feedback in the home would allow for typical interactions, and the opportunity for parents to share their perspectives on their food parenting practices. While video review and feedback has been found to be helpful in changing generally coercive parenting practices, its impact on food parenting practices is unknown. Interventions testing the impact of video review on food parenting practices and the feasibility and acceptability of using videos as a counseling/behaviour change tool are needed.
7.4 Conclusion

There is still much to be learned about the association between food parenting practices and children and adolescent dietary intake. However, findings from this thesis help to progress our understanding of this association. Studies 1 and 2 were the first to explore the role of family functioning in the association between food parenting practices and dietary intake. Results from this research suggest that food parenting practices, including family meals, a structured food parenting practice, are associated with child and adolescent dietary intake and nutrition risk, regardless of level of family functioning. These findings are important when considering future interventions aimed at improving food parenting practices and child/adolescent dietary intake.

Study 2 was the first study to explore observational food parenting practices in Canada. Using the NutriSTEP® questionnaire, results suggest that reducing mothers’ use of physical restriction and increasing mothers’ use of positive encouragement may beneficial among children with moderate-high risk of nutritional inadequacy.

The findings from study 3 highlight that families with preschoolers may approach mealtimes from one of three mealtime orientations that are informed by parents own early-life memories of family meals and their major-life transitions. The mealtime orientations in turn, inform the messages about food and eating parents share with their children and the challenges they experience with shared meals. These findings provide a greater understanding of why and how families create their family routines, which could prove beneficial in the development of tailored mealtime interventions.
Finally, this thesis advances the understanding of bi-directional approaches to studying food parenting practices and children’s eating behaviours. By reviewing the child socialization literature, paper 4 is the first to present ideas for studying food parenting and children’s picky eating from a dialectical approach to bi-directionality. The reconceptualization of picky eating and the directions for future research presented in paper 4 will help to strengthen the understanding of the parent-child feeding relationship, elucidating the influence that parental feeding practices and child eating habits have on each other.

In conclusion, this thesis underscores the importance of food parenting practices including family meals, and parent-child interactions on the dietary intake of children and adolescents. Findings from this thesis can help improve pediatric and adolescent nutrition care in Canada and inform the development of effective family-based nutrition interventions.
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9 Appendices

9.1 Appendix 1: Family Mealtime Coding System
**OPERATIONAL DEFINITIONS:**
**FAMILY MEALTIME CODING SYSTEM – extended version**

Note: variables are coded separately for up to two caregivers. Coding for both caregivers can occur simultaneously.

<table>
<thead>
<tr>
<th>Variable coded</th>
<th>Recipient</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure to eat (verbal) – from primary</td>
<td>Target child</td>
<td>Parental verbal encouragement to consume more food, such as: “eat a little bit more”, “have some peas” or “eat three more mouthfuls”. Includes gentle use of coercion, such as: “just eat the meat”, or “try a mouthful”.</td>
</tr>
<tr>
<td>caregiver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical prompt to eat – from primary</td>
<td>Target child</td>
<td>Parental use of physical encouragements to get child to eat, usually by offering food to the child. Includes placing food on the spoon/fork and offering it to the child, or putting food on the cutlery ready for the child to pick up and eat.</td>
</tr>
<tr>
<td>caregiver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal restriction – from primary</td>
<td>Target child</td>
<td>Verbally limiting children’s consumption of foods, for example by not letting them have any more cheese or garlic bread, or by restricting the amount of biscuits the child is allowed to eat. An example could be: “you can’t have any more” or “you’ve had enough of that”.</td>
</tr>
<tr>
<td>caregiver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical restriction – from primary</td>
<td>Target child</td>
<td>Physically limiting children’s consumption of foods, for example by not letting them have any more cheese or garlic bread, or by restricting the amount of biscuits the child is allowed to eat. This could be by moving the garlic bread away or taking a food away from the child/table.</td>
</tr>
<tr>
<td>caregiver</td>
<td></td>
<td>Note: this does not refer to controlling or limiting portion sizes which are given to the child.</td>
</tr>
<tr>
<td>Use of incentives / conditions – from</td>
<td>Target child</td>
<td>Verbal use of incentives or bargaining in an attempt to increase children’s food consumption. For example, “Mummy will be so happy if you eat your beans”, or “eat this then you can have pudding”.</td>
</tr>
<tr>
<td>primary caregiver</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NB – these variables can be coded for the secondary caregiver too.

**Acceptance / rejection of feeding practices**

Coding can also occur for whether or not each of the above behaviours was ‘accepted’ or ‘rejected’ by the child. For example, with verbal pressure, if “eat your peas” lead to the child having another mouthful, this would be ‘acceptance’, whereas if the child pushed the peas away, this would be ‘rejection’. 
Verbal comments made about food can also be coded as part of the FMCS.

<table>
<thead>
<tr>
<th>Variable coded</th>
<th>Recipient</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive comments - from target child</td>
<td>About food</td>
<td>Positive, enthusiastic comments about food or the mealtime. Examples include: “this food is yummy”; “more please!”; “I like carrots!”; “look Mummy I ate it all up”; “I love ice cream!”</td>
</tr>
<tr>
<td>Positive comments about food - from primary caregiver</td>
<td>Anyone at the meal</td>
<td>Code anything said about food in a positive tone, such as “well done for trying that broccoli” or “this is delicious, isn’t it”? Divide these comments into one of 3 subtypes:</td>
</tr>
<tr>
<td>NB – this variable can be coded for the secondary caregiver</td>
<td></td>
<td>a) Positive comments about the caregiver’s own food – e.g., “My carrots are delicious!”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Positive comments about food in general – e.g., “Vegetables are tasty and good for you.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Positive comments about the child’s food – e.g., “Your peas look yummy!”</td>
</tr>
</tbody>
</table>

Finally, the ease of the child to feed can be coded on a 5-point scale, and the overall mealtime tone can be coded from 1-3.

<table>
<thead>
<tr>
<th>Variable coded</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>How difficult/easy target child is to feed</td>
<td>1 = difficult – much resistance to offers of food, refusal to eat. Disagreements regarding food consumed. Tantrums. Disliking or refusing foods given/offered</td>
</tr>
<tr>
<td></td>
<td>2 = moderate – sometimes eats nicely and without difficulty, but sometimes refuses foods, is fussy or slow, or requires prompts or encouragements.</td>
</tr>
<tr>
<td></td>
<td>3 = easy – usually autonomous feeder, who eats what given, with little protest or conflict. May request more food. Usually uses correct implements, or eats well with fingers.</td>
</tr>
<tr>
<td>Overall tone of entire mealtime (predominantly)</td>
<td>1 = less enjoyable – more arguments, more pressure, less laughter, generally more negative.</td>
</tr>
<tr>
<td></td>
<td>2 = neutral – functional mealtime, good discussion, some laughter, good interaction.</td>
</tr>
<tr>
<td></td>
<td>3 = enjoyable – excellent interaction between parents and with child, lots of laughter and conversations.</td>
</tr>
</tbody>
</table>

To reference the FMCS, please cite the following:

Some articles which have used the FMCS include:

For any questions, please contact Dr. Emma Haycraft: E.Haycraft@lboro.ac.uk. Thank you.
9.2 Appendix 2: Family Mealtime Observation Study (FAMOS)

Recruitment Poster
Family Meal Study

As a parent, you are the expert of your family, so we want to learn from you! By videotaping your supper, we want to learn what mealtimes really look like for families with young children.

We are Looking for families with a child ages 2 - 5 living in Guelph or Toronto

Compensation:
$50 grocery store gift card

What’s Involved:

Home Visit #1
We will come to your home and...
• Give you a camera
• Measure the height and weight of you and your child

Home Visit #2
We will come to your home and...
• Pick up the camera
• Ask about your experience in the study
• Provide you with your $50 grocery gift

Home Visit #3
Some families may be randomly selected for a 1 hour interview about family meals

Participants will:
• Complete an online parent questionnaire
• Videotape 3 supper meals

To participate or to find out more:
please contact Kathryn at famos@uoguelph.ca