Parental communication and children's food choices : understanding the theoretical processes and conditions of effect

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**PARENTAL COMMUNICATION AND CHILDREN'S FOOD CHOICES:
UNDERSTANDING THE THEORETICAL PROCESSES
AND CONDITIONS OF EFFECT**

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2019

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UNDERSTANDING THE THEORETICAL PROCESSES
AND CONDITIONS OF EFFECT**

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A thesis submitted to Nanyang Technological University in fulfilment of the requirements for
the degree of Doctor of Philosophy

2019

Statement of Originality

I hereby certify that the work embodied in this thesis is the result of original research, is free of plagiarised materials, and has not been submitted for a higher degree to any other University or Institution.

6 March 2019

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Date

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Andrew Yee Zi Han

Supervisor Declaration Statement

I have reviewed the content and presentation style of this thesis and declare it is free of plagiarism and of sufficient grammatical clarity to be examined. To the best of my knowledge, the research and writing are those of the candidate except as acknowledged in the Author Attribution Statement. I confirm that the investigations were conducted in accord with the ethics policies and integrity standards of Nanyang Technological University and that the research data are presented honestly and without prejudice.

12 March 2019

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Date

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Professor May Oo Lwin

Authorship Attribution Statement

This thesis contains material from 2 papers published in the following peer-reviewed journals in which I am listed as an author.

Chapter 3 is published as Yee, A. Z. H., Lwin, M. O., and Ho, S. S. (2017). The influence of parental practices on child promotive and preventive food consumption behaviors: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1): 47. doi: 10.1186/s12966-017-0501-3.

The contributions of the co-authors are as follows:

- I conceived of the study, carried out the design, literature search, data extraction, data analysis, and drafted the manuscript. Professor May Lwin and Associate Professor Shirley Ho participated in discussing the paper, and contributed to refining the study design, providing theoretical and methodological input, and helped revise the manuscript.

The theoretical propositions in Chapter 5 is published in Yee, A. Z. H., Lwin, M. O., & Lau, J. (In Press). Parental guidance and children's fruits and vegetables consumption: Integrating the theory of planned behaviour with interpersonal antecedents. *Journal of Health Communication*. The published paper tested the theoretical model set out in Chapter 5, with a smaller sample of children and adolescents. In contrast, Chapter 5 tested the theoretical model with a larger sample of participants.

The contributions of the co-authors are as follows:

- I conducted the literature review, developed the theoretical model, collected the data, and drafted the manuscript. Professor May Lwin participated in discussing the paper, contributing to the study design, provided theoretical and methodological input, and helped revise the manuscript. Mr. Jerrald Lau helped with the data collection and contributed to methodological input with regard to the data collected from the smaller sample of children and adolescent used in the published paper.

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TABLE OF CONTENTS

Abstract.....	x
Introduction.....	1
Chapter I: Sugar-sweetened beverages and fruits & vegetables: Game-changers in childhood obesity and obesity-related diseases	
1.1 Childhood Overweight and Obesity: A Preventable Problem	7
1.2 Sugar-sweetened Beverage Consumption	8
1.3 Fruits and Vegetables Consumption	10
1.4 Chapter Summary.....	12
Chapter II: Literature Review	
2.1 Socialization Theory	14
2.2 Parents as Socialization Agents in Child Food Consumption.....	16
2.3 Parenting Practices as Communication Process: Shaping Beliefs About Food.....	19
2.4 Parenting Style as Overall Emotional Climate.....	25
2.5 Chapter Summary.....	30
Chapter III: Study One – The Influence of Parental Practices on Child Promotive and Preventive Food Consumption Behaviors: A Systematic Review and Meta-Analysis	
3.1 Background	32
3.2 Method	36
3.3 Results	41
3.4 Discussion	58
Chapter IV: Study Two – The Development and Validation of the Parental Active and Restrictive Food Guidance Questionnaire (PARQ)	
4.1 Background	66
4.2 Method	72
4.3 Results	82
4.4 Discussion	90

Chapter V: Study Three (A) – Integrating Parental Guidance and the Theory of Planned Behavior

5.1 Background	94
5.2 Method.....	102
5.3 Results	108
5.4 Discussion	117

Chapter VI: Study Three (B) – The Moderating Role of General Parenting Styles

6.1 Background	126
6.2 Method.....	132
6.3 Results	135
6.4 Discussion	151

Chapter VII: Implications, Caveats, & Contributions

7.1 Theoretical Contributions.....	159
7.2 Practical Implications	163
7.3 Policy Implications.....	164
7.4 Overall Limitations.....	166

Conclusion

References

Table 1

Appendix A

Appendix B

ABSTRACT

Parents play important roles in helping children develop healthier eating habits. Despite this, research on parenting in the area of child food consumption have often neglected the study of the communicative actions of parents, and the processes and emotional conditions in which they influence the food preferences of children and adolescents. This collection of four studies aims to disentangle the complexities surrounding parental communication and its effects on child food consumption in the contexts of fruits, vegetables, and sugar-sweetened beverage consumption (SSB). Study One – a systematic review and meta-analysis – provided a comprehensive understanding of the state of research about the role that parents play in shaping children’s food consumption. The study found that parents play the roles of gatekeepers, role models, and health communicators, when it comes to children’s food consumption. Most importantly, the study identified two main research gaps; one, that there are multiple imprecise and overlapping parental communication concepts, and two, that there is a lack of research in understanding the processes and conditions in which parental communication affects child food consumption. Studies Two and Three aimed to fill these research gaps. Specifically, Study Two (n = 246), a scale development study, found that the perceived communicative actions of parents can be delineated into four different strategies – active guidance, general discussion, preventive restrictive guidance, and promotive restrictive guidance. A confirmatory factor analysis with a nationally representative sample 1,113 of children and adolescents found that this four-factor structure was robust. The study demonstrated that active communication about food often reflect an evaluative slant, and that rule-based

communication about food can be highly context-dependent. Next, Study Three (A) tested a behavior change model integrating the aforementioned parental communication strategies with the theory of planned behavior in the context of fruits, vegetables, and SSB consumption. Active guidance was found to be a related to attitude, perceived norms, and perceived behavioral control towards consuming fruits and vegetables. Promotive restrictive guidance was positively related to attitude and perceived norms towards consuming fruits and vegetables. Additionally, it was also positively associated with perceived behavioral control towards consuming vegetables. Meanwhile, active guidance was negatively correlated with attitude towards consuming SSB. Preventive restrictive guidance was negatively correlated with attitude, perceived norms, and perceived behavioral control towards consuming SSB. The study demonstrated that active guidance is more effective in promotive contexts, while rule-based communication needs to be directed towards a specific behavioral context to be effective. Finally, Study Three (B) examined the contextual model of parenting style, and found that authoritative parenting moderated the effects of parental active, promotive restrictive, and preventive restrictive guidance on all three proximal predictors of behavior. The study demonstrated that the perceived emotional climate between parents and children can greatly affect the efficacy of communication strategies to encourage a healthier diet. Overall, this thesis has substantially contributed to the literature on parenting practices and child food consumption, and elucidated the processes and conditions in which parental communication can influence changes in children's food consumption.

INTRODUCTION

Childhood overweight and obesity is fast turning into one of the most pressing health problems globally, bringing with it serious consequences that threaten the well-being of individuals over their entire lifetime (Freedman et al., 2005). Obese children are more exposed to physical health risks such as cardiovascular diseases, diabetes, and bone and joint problems. In addition, they are also more likely to be victimized in school, bringing with it potential mental health issues, such as poor self-esteem and perceived stigmatization (Daniels, 2006; Daniels et al., 2005; Dietz, 2004; Janssen, Craig, Boyce, & Pickett, 2004). These health risks are usually brought over into adulthood, as overweight children have a strong probability of remaining overweight in adulthood (Freedman et al., 2005; Guo & Chumlea, 1999).

The need to identify effective ways to prevent and manage childhood obesity is increasingly recognized across the world (World Health Organization, 2014). One recommended way to curb child overweight and obesity is to identify strategies for children to improve their diet by limiting their intake of sugar, increasing the intake of healthier food items such as fruits and vegetables (World Health Organization, 2015a). In order to curtail unhealthy eating choices and promote healthier eating among children, parents have been identified as important socialization agents that can play an important role in shaping children's food preferences (e.g., Melbye, Øgaard, & Øverby, 2013). Specifically, a wide range of parenting practices – which includes active education, setting restrictions, eating behaviors, controlling availability, and

manipulating accessibility – can transmit values, norms, attitudes, and beliefs about food that determines children’s food consumption choices.

Although there is a substantial amount of research that has examined the influence of parents on child food consumption behaviors, there remains several gaps in knowledge that needs to be addressed. First, the concept of parental communication in child food consumption has been under-defined, leading to certain facets being under-studied. As I shall discuss in the later chapters, most research investigating parental influence on child food consumption behavior has focused on rule-making, modeling, availability, and pressure, while active communication has been understudied. Second, the focus on identifying what parents *do* and its direct relation with child food consumption outcomes have led to paucity of research that seeks to understand the *process* of how parents influence children’s eating behaviors. Research that seeks to explain how parents influence children through a theoretical framework that incorporates socio-cognitive mediators is needed. Finally, there exist a dearth of research that takes into account how the complex milieu of parenting behaviors which contribute to a general emotional climate for children can moderate the effects of context-specific parenting practices on food consumption behavior, despite its theoretical and empirical importance.

The purpose of my dissertation is to better understand, from a health behavior change perspective, how parental communication about food drives children’s food consumption behavior. It aims to understand the psychosocial process through which parental communication affects child food consumption, and also to examine if these effects are more pronounced under certain types of parental emotional climate. This helps provide a better understanding of the

process and *conditions* behind how parents influence children's food consumption behavior. Four specific objectives guide my dissertation:

1. Understand the gaps in knowledge in parental communication and child food consumption
2. Assess, elucidate, and validate parental communication constructs in the food consumption context
3. Propose and test a theoretical health behavior change model of parental communication that identifies effective parenting practices and the psychosocial pathways with which they affect children's food consumption behavior
4. Examine the interaction effect of general parenting styles and parenting practices on child food cognitions

Overall, this dissertation contains seven chapters. Chapter I discusses the prevalence of childhood obesity, and the food consumption choices that can contribute to it. It explains why fruits and vegetables, alongside sugar-sweetened beverages, are important child food consumption behaviors for researchers in this area to focus our efforts on. Chapter II provides a literature review on the research examining parenting influence in child food consumption. It also explores the psychology of food preferences, and examines how the theory of planned behavior can explain food consumption behavior. Chapter III details the results of Study One: a systematic review and meta-analysis of existing studies that examined the influence of parental communication variables on child food cognitions and consumption. In this study, I systematically summarized prior research in the field, and sought to understand key parental communication constructs that are consistently linked

with child food consumption outcomes. More importantly, the review pinpointed important research gaps that future studies can address. In Chapter IV, I present the findings from Study Two, where I collated previously used research instruments and conducted in-depth interviews to develop and quantitatively validate a Parental Active and Restrictive Guidance scale. (PARQ). Study Two revealed four distinct ways parents communicate about food – active guidance, general discussion about food, prevention-focused restrictive guidance, and promotion-focused restrictive guidance. Chapter V details the development and the quantitative testing of a health behavior change model built around parental communication research and the theory of planned behavior with a large-scale nationally representative sample of children across the country (Study Three (A)). In this study, it was found that parental communication about food influences food consumption behavior through attitude, perceived norms, and perceived behavioral control towards eating various foods. Chapter VI presents Study Three (B) which examined and probed the potential moderating influence of general parenting styles on the relationship between parental communication about food and child food consumption outcomes. The study found that attempts to socialize children to prefer a healthier diet were more likely to be effective when the emotional climate that parents provided were not only warm, responsive, supportive, but also maturity demanding – characterized by an authoritative parenting style. Parental guidance about food consumption were least effective among parents who were unsupportive, cold, and non-responsive to their children. Finally, Chapter VII discusses the overall theoretical, practical, and policy implications of my findings.

With few studies on parental communication and food consumption behaviors situated in Asia, alongside the lack of studies that account for the nuances of socio-cognitive mediators and conditional effects arising from the complex milieu of parenting behaviors, it was hoped that this thesis will contribute to the field of health communication by examining a comprehensive parental communication theoretical framework that can help to predict child food consumption behaviors from a health behavior change perspective. Overall, my findings have contributed to the research in this domain, clarifying the facets of parental guidance and the theoretical processes and conditions with which they influence children's food consumption behavior. This has the potential to provide useful knowledge for researchers, health promotion professionals, and motivated parents who are convicted to finding ways to better the physiological and psychological well-being of children across the world.

CHAPTER I

SUGAR-SWEETENED BEVERAGES AND FRUITS & VEGETABLES: GAME-CHANGERS IN CHILDHOOD OBESITY

1.1 Childhood Overweight and Obesity: A Preventable Problem

With an estimated 42 million children under the age of five being overweight worldwide (World Health Organization, 2015a), childhood obesity is an increasingly important global health problem. In Singapore, childhood obesity has increased over the years, with 13% of children being found to be obese in 2017 (Ministry of Health, 2018). This is an exponential increase from 2% in 1976 (Gupta et al., 2010). This steep upward trajectory of childhood obesity rates mean that much needed attention and resources should be put towards curbing it.

Childhood obesity has serious consequences for the well-being of children and adults. In addition to physical health risks such as cardiovascular diseases, diabetes, and bone and joint problems, obese kids are also likely to be victimized in school, bringing with it potential socio-emotional health problems, such as poor self-esteem and perceived stigmatization (Daniels, 2006; Daniels et al., 2005; Dietz, 2004; Janssen et al., 2004). Perhaps most importantly, these health risks are usually brought over into adulthood, as overweight and obese children are likely to remain overweight and obese in adulthood (Freedman et al., 2005; Guo & Chumlea, 1999). One contributing factor to the longevity of obesity as a disease is that food consumption habits, one of its key contributors, are formed during childhood (Coulson, Eiser, & Eiser, 1998; de Droog, Valkenburg, & Buijzen, 2010; Issanchou, 2017). As

these food consumption habits and preferences can be difficult to alter in adulthood, children are likely to remain overweight or obese as adults if they consume an unhealthy diet throughout their lives (Hill, Casswell, Maskill, Jones, & Wyllie, 1998). Since food consumption habits and preferences are formed early in childhood, targeting eating behavior when children are younger can help to improve their physical and emotional well-being even after they move into adulthood.

Ultimately, childhood obesity is a preventable problem that arises out of lifestyle-related behaviors. One recommended way for combatting and managing child overweight and obesity is to encourage children to improve their diet by limiting their intake of fats and sugars, while increasing consumption of healthy food choices such as fruits and vegetables (World Health Organization, 2015a). A variety of food choices, such as high-fat foods, snacks, and sweets have been blamed for contributing to the obesity epidemic (World Health Organization, 2015b). Specifically, consumption of high energy-dense foods, along with the insufficient intake of high nutrient-dense foods, are potential food consumption choices that lead to obesity (Kant, 2000). Among them, the avoidance of sugar-sweetened beverages (SSB) and the consumption of fruits and vegetables have been highlighted to as important foods to target in order to combat obesity.

1.2 Sugar-sweetened Beverage Consumption

First, reducing the intake of sugars is especially important as it contributes to excess calories, as well as metabolic syndrome diseases such as hypertension (Lustig, Schmidt, & Brindis, 2012). Specifically, there have been concerns that the intake of free sugars –disaccharides (e.g., sucrose) and

monosaccharides (e.g., glucose and fructose) –, contribute significantly to excessive weight gain (Ludwig, Peterson, & Gortmaker, 2001; Malik, Pan, Willett, & Hu, 2013; World Health Organization, 2015c).

The causal influence of free sugars on adiposity is more than just in increasing caloric intake. Several researchers have identified free sugars as “empty calories” that do not register like other type of calories, contributing to decreased insulin sensitivity, which can create feelings of hunger (Lustig, 2006a; Stanhope et al., 2009). This sense of hunger can then drive individuals into a vicious feedback loop of obesity-related eating behaviors, potentially altering our brain’s reward system (Lustig, 2006b, 2013).

Consisting of beverages such as soft drinks, energy drinks, fruit drinks, and vitamin water drinks, SSB are the main source of added sugars for many people, contributing significantly to childhood obesity (Ebbeling et al., 2006; Malik et al., 2010). Despite its harmful effects, consumption of SSB among children is at a worrying level. In the U.S., 6.2% of the total energy intake of children aged between 6 and 11 is from SSB (Welsh, Sharma, Grellinger, & Vos, 2011). Other estimates suggest that above 50% of all drinks consumed by fourth- to sixth-graders in the U.S. are SSB (Cullen, Ash, Warneke, & De Moor, 2002). In the U.K., the numbers are similar, with 6% of the daily energy intake of children between ages 4 and 18 coming from SSB (Department of Health and the Food Standards Agency, 2011). In Mexico, the energy intake from SSB are increasing as well, with more than 12% of the daily energy intake coming from these sugary drinks (Barquera et al., 2008). Similar trends can be found in Asian countries such as Taiwan and Singapore (Pan et al., 2011; Yamada, 2012). In Singapore, it is estimated that around 28% of children aged

between 4 and 9 consume SSB twice a week at the minimum (Yamada, 2012). Moreover, Singaporean children were found to consume an average of seven SSB servings a day (Goh & Jacob, 2011). With SSB potentially having an adverse effect on childhood obesity and its associated health problems (Bremer & Lustig, 2012), more effort is needed to examine ways to reverse these worrying trends.

In an attempt to combat the negative impact of SSB consumption, governments across the globe have responded to the call of researchers (Lustig et al., 2012) and implemented policy regulations such as imposing advertising restrictions targeting children and imposing taxes on SSB (Cheong, 2014; Frizell, 2014). From a health communication perspective, it is necessary to identify and examine the causal factors that lead to SSB consumption in order to develop effective intervention strategies in combatting SSB consumption among children. With suggestions that existing interventions targeting children's sugar intake being largely ineffective (Lustig et al., 2012), comprehensive understanding of the social and psychological mechanisms that drive SSB consumption among children can provide important rationales and material for the development of strong interventions.

1.3 Fruits & Vegetables Consumption

Other than free sugars, the consumption of fruits and vegetables have been mooted as a possible barrier against obesity and its associated diseases (Boeing et al., 2012; Qian, Nayga, Thomsen, & Rouse, 2015; Slavin & Lloyd, 2012). Increased fruits and vegetables consumption work to prevent and reduce obesity through increased intake of dietary fiber. Specifically, the higher levels of dietary fiber found commonly in many fruits and vegetables have been

argued to provide increased satiation without being extremely calorie-dense (Smith, 1987). Recent studies have found that the intake of soluble fibers found in certain fruits and vegetables like apples, oranges, pears, cucumbers and carrots can also lower blood sugar levels and increase people's energy expenditure while resting (De Vadder et al., 2014). Since fruits and vegetables can provide higher levels of satiety, and at the same time induce metabolic benefits such as increased energy expenditure while resting, encouraging the increased consumption of fruits and vegetables can be effective in fighting obesity. The evidence for the use of fruits and vegetables in combatting obesity has led to the development of some fruits and vegetables based interventions, which have been empirically demonstrated to be effective in tackling obesity (Perry et al., 1998; Qian et al., 2015).

Despite its health benefits, children still do not consume sufficient amount of fruits and vegetables, with large percentages of children in several countries consuming below the daily recommended amount. In the U.S., although fruit consumption has increased, it was found that 60% of children did not consume sufficient fruits to meet the daily recommendations (S. A. Kim et al., 2014). To make matters worse, 93% of children were found to not eat enough vegetables based on recommended guidelines. A similar situation is found in Europe, where around two-third and three-quarter of adolescent girls and boys do not eat at least one piece of fruit daily (The Organisation for Economic Co-operation and Development, 2012). Mirroring the situation in the U.S., a European study among 11-year-old children found that the average consumption of fruit and vegetables was below recommended levels, with vegetables consumption lower than fruit (Lynch et al., 2014). This is not

surprising, as children tend to prefer and hold more positive attitude towards consuming fruits than vegetables (Edwards & Hartwell, 2002). In Singapore, only 11.2% of adult Singaporeans consume at least two servings of fruits and vegetables a day, with more than one-fifth of Singaporeans consuming insufficient daily dietary fiber intake (Health Promotion Board, 2010). Among children, previous studies have found that the consumption of fruits and vegetables were inadequate, with 80% of school-aged children not meeting the daily recommendations for fruits and vegetables consumption (Ministry of Health, 2018). This is not surprising, as previous studies have found that around 50% of children meals were low in fiber (K. L. Ang & Foo, 2002). As is the case with SSB consumption, fruits and vegetables consumption among children is not ideal, contributing to diet that leads to obesity.

1.4 Chapter Summary

As eating habits are developed at a young age and are more resistant to change later in life, it is crucial to target eating habits early in life so as to reduce the risks of obesity and its related diseases in the future. Two types of foods – SSB and fruits and vegetables – have been highlighted as strong contributors to the obesity pandemic. In order to effectively reduce obesity rates, aiming to change children's eating habits, specifically of SSB and fruits and vegetables, is an important area of research to probe. Outside of genetic predispositions (Grimm & Steinle, 2011), it has been mooted that the social environment, comprising of parents and caregivers, is an important starting point where attitude, familial and cultural beliefs, and behavioral beliefs about food and eating are formed (Savage, Fisher, & Birch, 2007). Hence, I focus on the crucial role that parents play in shaping children's beliefs about healthy and

unhealthy foods in this dissertation. The emphasis will be on parental communication strategies that can be utilized to encourage a healthier diet among school-aged children. To begin, I will first review the literature on parenting and food consumption, and how socialization theory can provide a conceptual framework for understanding the influence of parental communication on child food consumption.

CHAPTER II

LITERATURE REVIEW

2.1 Socialization Theory

As Leo Tolstoy once noted in his magnum opus *War and Peace*, “*everything depends on upbringing*”. Indeed, parents, and the way they educate their children, can have substantial influence on the way children behave across a wide range of behavioral contexts (Maccoby, 2014), from delinquency (Hoeve et al., 2009) to academic performance (Fan & Chen, 2001). The importance of parental guidance extends to the area of nutrition as well. Most notably, the increasing global obesity epidemic has prompted scholars from public health, nutrition, and communication to better understand the role parents play in shaping children’s food choices (Davison et al., 2015; Loth, MacLehose, Larson, Berge, & Neumark-Sztainer, 2016; Lwin, Shin, Yee, & Wardoyo, 2017). As food preferences are shaped early in childhood, understanding the role parents play in shaping children’s food choices is crucial, since their communicative actions can potentially impact the well-being of children throughout their entire lifetime (Ventura & Worobey, 2013).

Most notably, parents are educators, role models, and gatekeepers in the lives of their children (Case & Paxson, 2002). In the context of food consumption, public health and health communication researchers have identified several food-related parenting practices which are key determinants of child food consumption (Vaughn et al., 2016; Vaughn, Dearth-Wesley, Tabak, Bryant, & Ward, 2017; Vaughn, Tabak, Bryant, & Ward, 2013a; Yee, Lwin, & Ho, 2017). In order to better understand how parents can promote healthy behaviors among children, it is important to situate the question within

a meaningful theoretical framework that seeks to explain the influence of social contexts on children and vice versa. Socialization theory provides a useful conceptual framework to examine parental influence.

According to Maccoby (2007), socialization refers to the “*processes whereby naïve individuals are taught the skills, behavior patterns, values, and motivations needed for competent functioning* (p.13).” Socialization is a complex, multi-directional process involving the web of social contexts children find themselves in and the learning that takes place within them. These social contexts range from the family, school, media and the broader society and culture. In general, the purpose of research conducted from the perspective of socialization is to understand the processes through which children learn cognitions and behaviors that allow them to function adequately in society (Maccoby, 1992).

Socialization researchers view children as active learners that influence and are influenced by the social interactions they encounter within the web of social contexts they find themselves in (Maccoby, 2014; Moschis & Churchill Jr, 1978). Specifically, these social interactions occur with “socialization agents” who consists of individuals, such as parents and peers, or organizations, such as the media and schools, who directly influence a child’s learning on how to function adequately in society (Hastings, Utendale, & Sullivan, 2007; Laible & Thompson, 2007; Moschis & Churchill Jr, 1978). Classical consumer socialization research places parents as the primary agent of the socialization process, while peers, school and the media are secondary, asserting influence as children grow older (Dotson & Hyatt, 2005; Ekström, 2006; John, 1999; Moschis, 1985; Ward, 1974).

2.2 Parents as Socialization Agents in Child Food Consumption

Building on the theoretical framework of consumer socialization, parental socialization of children takes place through myriad communicative actions that transmit beliefs and information about the behavioral context those actions take place in. In the context of food consumption, parents are hypothesized to transmit beliefs such as knowledge, values, attitudes, norms and behaviors to children through their words and behavior (Pedersen, Grønhøj, & Bech-Larsen, 2012). Specifically, food-related cognitions has been demonstrated to be modifiable by socialization agents since research conducted in the late 1930s (Duncker, 1938).

Since then, a great deal of research has been conducted on the role of parental communication in children's socialization of food consumption behavior, with students of this strand of research coming from a range of disciplines such as developmental psychology (e.g., Baumrind, 1968; Birch, 1999), public health (e.g., Elfhag, Tholin, & Rasmussen, 2008; Hearn et al., 1998; van der Horst et al., 2006), and health communication (e.g., Buijzen, 2009; Koerner & Fitzpatrick, 2002; Lwin et al., 2017). As such, a wonderful diversity of approaches have been utilized to examine the impact of parental communication on children. This diversity also means that there is a great deal of variation in the choice of parental communication variables to examine, resulting in some unavoidable conceptual overlaps. Despite this, a broad consensus among researchers examining parental influence on child food consumption is that the influence comes from context-specific behaviors and actions parents engage in that influences a child's socialization outcomes (Darling & Steinberg, 1993). The spectrum of strategies and actions parents

exhibit which socializes children in the context of food consumption has been identified by public health, health communication, and nutrition researchers as *food parenting practices* (Vaughn et al., 2016; Vaughn et al., 2017).

Food parenting practices consists of a variety of parental behaviors that are communicative in nature. These include promotion-focused practices such as nutrition education, praise, reasoning, and encouragement, control-focused practices such as restriction and pressure, and structure-related practices such as modelling, food availability, and accessibility (Vaughn et al., 2016). These food parenting practices has been found to be associated with a number of child food consumption behaviors.

For example, parents actively guiding about nutrition have been found to be associated with greater fruits and vegetables intake and lower SSB intake (Lwin et al., 2017; Melbye & Hansen, 2015). Rule-setting, on the other hand, has been found by some researchers to lead to increased consumption of healthy foods and lower consumption of unhealthy foods (de Bruijn, Kremers, de Vries, van Mechelen, & Brug, 2007; Vaughn et al., 2017; Vereecken, Keukelier, & Maes, 2004). Other studies had conflicting findings, with some researchers finding the opposite effect taking place (Boots, Tiggemann, Corsini, & Mattiske, 2015; Monge-Rojas et al., 2010). Somewhat counterintuitively, when parents use food as a reward, or reward the consumption of healthy food with other incentives in an effort to encourage the behavior, it can sometimes backfire and lead to less healthy food consumption outcomes (Birch, Birch, Marlin, & Kramer, 1982). For example, modelling effects, where children learn behaviors vicariously from socialization agents and imitate them (Bandura, 1998), have been supported in the context of food consumption (Oliveria et al.,

1992). Specifically, studies have indicated that children were more likely to consume either foods when their parents are reported to consume them, suggesting potential modelling effects (Blanchette & Brug, 2005; Fisher, Mitchell, Smiciklas-Wright, & Birch, 2002; van der Horst et al., 2007). Likewise, studies have found that the mere availability and accessibility to fruits and vegetables, which is structurally controlled by parents, can result in a child's increased consumption of them (Hearn et al., 1998; Johnson & Birch, 1994).

Overall, three kinds of overarching parenting practices have been identified in the research examining the socialization of food consumption behaviors among children – promotion-centric, control-centric, and structural practices (Vaughn et al., 2016). While structural practices such as modelling and availability have been found to have consistent associations with child food consumption outcomes, much of the findings from research examining *overt* social interaction between parent and child in the form of promotion-centric and control-centric practices have been mixed (as I shall discuss in Chapter III). One possible explanation for the mixed results from studies is that the conceptualization and operationalization of these two broad forms of parenting practices are at times inconsistent and vague. For example, in one study, a promotion-centric parenting practice might be teaching about nutrition (Melbye & Hansen, 2015), while in another study, it can refer to teachable moments such as asking a child to “try at least a couple of bites but don’t have to eat it all” (Papaioannou et al., 2013). As such, one of the goals of this dissertation is to clarify, explicate, and operationalize these parenting practices from a communication perspective.

2.3 Parenting Practice as Communication Process:

Shaping Beliefs about Food

In tandem with the conceptual issues is the problem that many of the studies examining the influence of parenting practices have neglected the communication process that accounts for the purported effects of these parenting behaviors on children (as we shall discover in Chapter III). While there is burgeoning literature on parenting practices and child food consumption outcomes, many studies have only examined direct associations between parenting variables and child food consumption outcomes, neglecting the psychosocial pathways with which food consumption is influenced. In essence, *why* and *how* children are influenced by parents have rarely been formalized and examined in explanatory behavior change models.

In health behavior change research, explanatory models of behavior change have sought to identify the key psychological drivers of health behavior (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003). All of these psychological drivers, such as attitude, perceived norms, and self-efficacy, deal with beliefs about a specific behavior in question – which in this study, refer to child food consumption of fruits, vegetables, and SSBs. By definition, beliefs are socially constructed and negotiated, as communication is central in the formulation and internalization of evaluative beliefs (attitude), normative beliefs (perceived norms), and self-efficacy beliefs (perceived behavioral control). The premise of my thesis is that parenting practices' influence on child food consumption is rooted in a communication process, where parents transmit information about food through their actions, which then shapes a child's perception and beliefs regarding food. While research in health behavior change

has largely focused on the decision-making process in the adoption of various health behaviors like eating (Baranowski et al., 2003), research on parental influence in the area of food consumption rarely take into account the decision-making process. A comprehensive understanding of how parenting practices influence child food consumption behavior would benefit greatly from a theoretical framework that helps explain the process of how social information gets translated into actual behavior.

One of the most popular, parsimonious, and predictive models of health behavior that have been utilized in health communication and psychology is the theory of planned behavior (Ajzen, 2015; Armitage & Conner, 2001). The theory of planned behavior views health behavior as being driven directly by one's intention to perform said behavior (Ajzen, 1991). The theory of planned behavior postulates that the performance of a behavior is directly preceded by one's intention to perform a behavior (Ajzen, 1991). According to Ajzen (1991), *intention* refers to “*indications of how hard people are willing to try...(and) how much of an effort they are planning to exert, in order to perform* (p. 181)” a behavior. Accordingly, it is theorized that the stronger one's intention to perform a behavior, the greater probability one would actually engage in the performance of the behavior. In other words, a child's intention to consume fruits, vegetables, or SSBs would predict his or her subsequent consumption of those foods.

Intention is directly preceded by three factors – attitude towards the behavior, subjective norms regarding the behavior, and perceived behavioral control to perform the behavior (Fishbein & Ajzen, 2010). First, attitudes refer to a general evaluation of an object along dimensions such as pleasant-

unpleasant, good-bad, or healthy-unhealthy among people (Ajzen, 2001). The evaluation of an object or behavior is based on the expectancy-value model, which posits that individuals hold beliefs about the expected value outcome of a behavior. These beliefs about the expected value of the behavior summates into an overall attitude towards the behavior (Fishbein, 1963). Although there can be many differing, and even conflicting, beliefs about the value of a behavior in question, only beliefs that are accessible in memory can contribute to an individual's prevailing attitude about the behavior. Accessibility is determined by the frequency and recency of an expected value being activated, as well as the importance of a belief about a behavior (Ajzen, 2001), highlighting the central role communication plays in attitude formation in the area of food consumption. Parents who communicate frequently and emphatically about why eating or avoiding certain foods are important, can increase the accessibility of beliefs that lead to a child's attitude towards consuming certain foods, shaping the likelihood of them eating or choosing to avoid certain foods (Lwin et al., 2017).

Next, perceived subjective norms refer to the types of beliefs one has about the popularity and social approval of a target behavior. Originally, Ajzen (1991) defined normative beliefs as “the likelihood that important referent individuals or groups approve or disapprove of performing a given behavior (p.195)”. This means that Ajzen (1991) conceived of subjective norms as reflecting a person's belief about the social approval of a behavior. In addition to research on the theory of planned behavior, research conducted within the social norms approach (SNA) has identified two distinct types of normative beliefs (Perkins & Berkowitz, 1986). First, injunctive norms are beliefs about

what others think one ought to do (in the context of a specific behavior). In this sense, injunctive norms are similar to the original conceptualization of subjective norms in the theory of planned behavior (Lapinski & Rimal, 2005; Ravis & Sheeran, 2003). Second, descriptive norms are beliefs about what others actually do. In other words, descriptive norms are the perceived popularity of a behavior. This is derived from either significant others (e.g., parents, peers), or social groups one identifies with (e.g., school, sports team). In a paper that sought to provide guidance on how to construct questionnaire that tapped on theory of planned behavior variables, Ajzen (2006) suggested that the operationalization of subjective norms in the theory of planned behavior should encompass both descriptive and injunctive components. As what *ought* (injunctive norms) is sometimes confused with what *is* (descriptive norms) (Cialdini, Reno, & Kallgren, 1990), the two different types of perceived norms can sometimes be difficult to untangle (Rimal & Real, 2005). This might be especially true for young children and adolescents, who might perceive social approval and popularity as congruent. For example, when children are seated in the canteen and see all their friend group having vegetables on their plates, they might think that they ought to eat vegetables too.

As explicated by Lapinski and Rimal (2005), normative beliefs are social in nature, and communication processes shape the perception of norms. Most importantly, significant others, such as parents, play an important role in communicating normative information to an individual. This can be done through structural factors such as modelling, which can shape perceived descriptive norms (Cruwys, Bevelander, & Hermans, 2015), or through the communication of rules and restrictions, which indicate beliefs about what an

individual ought to do (Ajzen, 2015). As with attitudinal beliefs, the salience of normative beliefs can be driven by the accessibility of those beliefs (Ajzen, 1991; Cialdini et al., 1990). Hence, the frequency of communicating normative information to children about eating certain foods can lead to greater accessibility, and hence, salience of normative beliefs about eating certain foods.

Lastly, perceived behavioral control refers to the degree of control one believes he or she has in performing the behavior. It indicates a person's "*perception of the ease or difficulty of performing the behavior of interest* (Ajzen, 1991; p. 183)." Once again, perceptions of control, especially among children, is shaped by the communicative actions of parents. For example, having parents who do not set any rules regarding a behavior would logically entail a greater perception of control over said behavior by children. In contrast, parents who set too many rules can shape a poor sense of control over a behavior. Melbye et al (2013) provided some support for this proposition, when they found that parental restrictions lead to lower self-efficacy to consume vegetables among children. Similarly, the salience of control beliefs is partially determined by the accessibility of those beliefs in an individual's memory. Another study found perceived parental control of sugary drinks and less healthy foods was associated with lower self-efficacy to consume sugary drinks and less healthy foods, which was in turn negatively correlated with sugary drinks and less healthy food consumption (Ma & Hample, 2018a).

According to the theory of planned behavior, the more positive the attitude, subjective norm, and perceived behavioral control, the more likely an individual will formulate a stronger intention to perform a behavior, which is

hypothesized to lead to the performance of the behavior (Fishbein & Ajzen, 2010). In addition, perceived behavioral control is hypothesized to lead to behavior directly, as it is argued to contribute to unique variance in the performance of behavior, and can also serve as a proxy for actual behavioral control (Ajzen, 1991).

In general, the theory of planned behavior's core variables have been found to be highly predictive of a range of different health behaviors (Hagger, Chan, Protoherou, & Chatzisarantis, 2016) which includes food consumption choices (Ajzen, 2015), where the theory of planned behavior' has been found to explain a substantial amount of variance in healthy eating, such as the consumption of fruits and vegetables (Conner, Norman, & Bell, 2002; de Bruijn et al., 2007; Kvaavik, Lien, Tell, & Klepp, 2005). The theory of planned behavior's predictive power on food consumption has been found to extend to intervention studies (Kothe, Mullan, & Butow, 2012), and to samples of young adolescents (Lien, Lytle, & Komro, 2002).

While the theory of planned behavior has been shown to be predictive in the context of healthy eating, it does not specify how cognitions specified in the theory change (attitude, perceived norms, and perceived behavioral controls towards consuming different types of food), limiting its utility (Sniehotta, Pesseau, & Araújo-Soares, 2014). In other words, the theory of planned behavior identifies which levers to pull for behavioral change, but does not indicate how they can be shifted. Some scholars have suggested that, one way researchers can build on the theory of plan behavior is to identify behavior change techniques and background factors that might influence the three proximal predictor variables in the theory of planned behavior (Conner, 2015).

As I have described above, parents are sources of information that transmit various beliefs about food consumption behavior to children through a range of communicative actions. Utilizing the theory of planned behavior as a core explanatory theoretical framework, we can better understand how parenting practices influence food consumption behavior, by examining how they influence the psychological drivers of food consumption among children. Figure 1 highlights the conceptual framework that elucidates the process by which parents socialize children in the context of food consumption.

Figure 1. Diagram depicting the how parental socialization leads to decision-making about food; the intrapersonal level factors depict the theory of planned behavior's three proximal predictors of food consumption behavior

2.4 Parenting Style as Overall Emotional Climate

Even as we acknowledge the influence of food-related parenting practices on children's food consumption behavior, it is argued among developmental psychologists that behavior-specific parenting behaviors occur in the context of a wide array of "other" parenting behaviors (Darling & Steinberg, 1993). This backdrop of "other" parenting behaviors have been conceptualized as parenting styles, defined as *"a constellation of attitudes toward the child that are communicated to the child and that, taken together, create an emotional climate in which the parent's behaviors are expressed"*

(Darling & Steinberg, 1993, p. 488)”, and, according to the *contextual model of parenting style*, are hypothesized to moderate the effect of behavior-specific (or context-specific) parenting practices on socialization outcomes (Spera, 2005). This means that a comprehensive understanding of parental communication’s effects on food consumption needs to take into account the global emotional climate generated from children’s perception of parenting style, in addition to context-specific parenting practices.

First conceptualized by Baumrind (1967), her original articulation of parenting styles saw her identify three types of qualitatively different parenting styles – permissive, authoritarian, and authoritative parenting. Further conceptualization work on Baumrind’s (1967) original typology revealed that parenting styles can be reduced to two dimensions: *responsiveness* and *demandingness* (Baumrind, 1991; Maccoby & Martin, 1983). *Responsiveness* broadly refers to how warm, involved, open, emotionally supportive, and autonomy granting parents are, manifesting in parental behaviors that are conducive for the healthy development of self-regulation and individuality. In contrast, *demandingness* refers to parents’ level of maturity demands for the child. According to the typology of parenting styles, *authoritative* parents are high in both responsiveness and demandingness. They are supportive, responsive and warm, and combine demands for maturity with a great deal of two-way communication (Baumrind, 1978). *Authoritarian* parents are those high in demandingness but low in responsiveness. These parents are not warm and responsive to their children, and have high demands for maturity as they are intolerant of it. As such, authoritarian parents are strict, demand obedience, and assert their power over their children through rules, orders and punishment.

Indulgent parents score moderate to high in their responsiveness, but are very relaxed in their demands for maturity among their children. Building on Baumrind's (1967) typology, Maccoby and Martin (1983) added another dimension to the original typology which they conceptualized as *neglectful* parenting. *Neglectful* parents are low in both responsiveness and demandingness, disengaged from their child's life.

In line with Baumrind's (1967) initial observations about authoritative parenting and desirable socialization outcomes, authoritative parenting has been found to be associated with more desirable child eating behaviors, while high levels of control and demandingness without responsiveness has been found to lead to negative child eating behaviors. Theoretically, emotional climates that are harsh and controlling such as those fostered by authoritarian parents, can lead to poorer emotional and behavioral regulation in children (Barber, Stolz, Olsen, Collins, & Burchinal, 2005; Morris, Silk, Steinberg, Myers, & Robinson, 2007). Subsequently, poor regulation of emotions and behavior can lead to poor dietary habits such as emotional and disinhibited eating (Goossens, Braet, & Decaluwé, 2007; Harrist, Hubbs-Tait, Topham, Shriver, & Page, 2013; Scholten, Schrijvers, Nederkoorn, Kremers, & Rodenburg, 2014; Tan & Holub, 2011). Studies that examine the influence of parenting style directly on child eating behaviors have found that authoritative parenting can lead to a child healthy eating compared to other types of parenting styles (Hughes & Papaioannou, 2018a; Kremers, Brug, de Vries, & Engels, 2003; Lopez et al., 2018a). In Hong Kong, authoritative parenting style was significantly associated with children meeting fruit recommendation (Chan, Yeung, Leung, Lo, & Tsang, 2018).

Socialization researchers have distinguished between three conceptually distinct constructs in examining the effects of parental socialization on children: socialization goals (e.g. encouraging a healthier diet), parenting practices parents use to guide children (e.g. active guidance of food consumption), and perceived parenting style (or emotional climate in which the practices take place) (Darling & Steinberg, 1993). While context-specific parenting practices are related to a specific socialization goals, parenting styles are aspects of parenting behavior that are not goal-directed. Since parenting style is not constrained to a particular behavioral context, it conveys parents' emotional attitude toward the child, rather than toward the behavior of the child. Terming this the *contextual model of parenting style*, Darling and Steinberg (1993) argued that while parenting practices are direct mechanisms of influence on child socialization outcomes, parenting style “*alters the parents' capacity to socialize children by changing the effectiveness of their parenting practices* (p.493).” In other words, parenting style can be understood as a moderating variable that interacts with context-specific parenting behaviors in influencing child behavior (Kremers et al., 2013; Larsen et al., 2015; Papaioannou et al., 2013; Spera, 2005)¹. As Koerner and Fitzpatrick (2006) puts it, “*behavior that is functional in the context of one family type might be dysfunctional in the context of another family type, and vice versa* (p. 59).”

There are a number of proposed theoretical reasons for this. First, it is argued that parenting style transforms the nature of the interaction between

¹ While parenting style is expressed partly through parenting practices, Darling and Steinberg (1993) was explicit in saying that “parenting style is not simply a more distal variable mediated through proximal parenting practices (p.493)”.

parent and child, such that parenting practices employed by authoritative parents are qualitatively different from those employed by other types of parents (Darling & Steinberg, 1993). One example is that *control* is qualitatively different between authoritative and authoritarian parents. While both authoritative and authoritarian are highly demanding, researchers have argued that their demandingness is qualitatively different in that authoritative parents exhibit behavioral control, while authoritarian parents exhibit psychological control (Barber, 1996; Baumrind, 1989; Steinberg, Elmen, & Mounts, 1989). Psychological control is characterized by the withdrawal of affection, appeals to pride and guilt, personal attacks, and shaming, leading to the manipulation of the relationship between parent and child in order to exert control over the child's thought processes and behavior (Barber, 1996). Meanwhile, behavioral control refers to pressures to conform to rules and regulations. This can manifest in the style in which parenting practices are employed by parents. For example, in the context of this thesis, psychologically controlling restrictive guidance might include parents saying that a child is too fat, and hence need to cut down in sugary drink consumption. If a child breaks those rules, a psychologically controlling parent might withdraw affection and induce guilt. Meanwhile, restrictive guidance absent of psychological control might involve parents appealing to the rules that have been set, and focus on how it is important to follow the rules that have been set. Hence, while psychological control can facilitate negative outcomes, behavioral control can help children achieve certain socialization goals (Darling & Steinberg, 1993).

Second, it is argued that authoritative parenting helps children become more receptive to parental efforts to transmit their values, beliefs, and attitudes,

while less responsive and demanding parents lead to children being less receptive to their parents' efforts to socialize them (Darling & Steinberg, 1993). The authoritative parent's respect for the child, comfort in their authority, and their recognition of the child's separateness and capacity to behave autonomously, is posited to positively affect the child's willingness to be socialized by his or her parents. In other words, authoritativeness can increase the effectiveness of parenting practices because children of authoritative parents are more open to the socialization attempts of parents (Darling & Steinberg, 1993).

In the context of food consumption, researchers have consistently argued for the testing of such a contextual model of parenting effects which takes into account parenting style as a contextual moderator (Kremers et al., 2013; Larsen et al., 2015; Sleddens, Gerards, Thijs, De Vries, & Kremers, 2011). In fact, a small number of studies have shown that food parenting practices are largely more effective when conducted in a generally positive parenting style (Joyce & Zimmer-Gembeck, 2009; Lessard, Greenberger, & Chen, 2010; Sleddens et al., 2014; Tung & Yeh, 2014; van der Horst et al., 2007). For example, Lessard et al (2010) found that persuasion can have opposite effects depending on whether the parent is perceived to be high or low in parental warmth. In addition, a systematic review investigating the effects of non-responsive parenting practices in Southeast Asia has found that non-responsive parenting practices are related to child overweight and obesity (Lindsay, Sitthisongkram, Greaney, Wallington, & Ruengdej, 2017). Despite this, as we shall discuss in Chapter III (Study One) later, there are very few

studies that have taken into account the moderating effect of parenting styles on the effect of context-specific parenting practices.

2.5 Chapter Summary

The literature suggests that parents are important socialization agents in helping children develop appropriate food cognitions and consumption. Specifically, they engage in various communicative actions which can influence children's food consumption behavior. Although there is a rich amount of research that has examined the effectiveness of parenting practices on child food consumption behavior, there is a dearth of studies that consider the communication and socialization process by which parenting practices effect children. Moreover, developmental psychologists have highlighted the need to explore the moderating role that parenting styles play in modifying the socialization effects of context-specific parenting practices. Likewise, few studies have taken that into account. As such, our current understanding of parenting practices' influence on child food consumption behavior is incomplete. To fill this gap in our understanding, it is of utmost importance to first survey the research landscape in the area of parenting practices and food consumption, and to elucidate the different parenting practices that have been examined by researchers so far. In the next chapter, I will systematically review the literature and conduct a meta-analysis of existing studies in order to better understand the state of research in this domain.

CHAPTER III

Study One

THE INFLUENCE OF PARENTAL PRACTICES ON CHILD PROMOTIVE AND PREVENTIVE FOOD CONSUMPTION BEHAVIORS: A SYSTEMATIC REVIEW AND META-ANALYSIS ²

3.1 Background

The narrative review in the preceding chapter provided an overview of the conceptual framework I have utilized to examine and contribute to the study of parental communication and its influence on child food consumption. The purpose of this study is to systematically review empirical studies in order to (1) assess the food parenting practices that have been studied by researchers so far, (2) ascertain the hypothesized effects of parenting practices on child SSB and fruits and vegetables consumption, and (3) clarify the research gaps identified in the preceding chapters. In terms of its contribution to the field, this study provides researchers with a useful synthesis of empirical studies examining the influence of parental communication on healthy and unhealthy food consumption. More importantly, this study serves as a foundational study for the subsequent studies that will be discussed in the next two chapters.

² This chapter is published in the International Journal of Behavioral Nutrition and Physical Activity. The full reference of the paper is: Yee, A. Z. H., Lwin, M. O., and Ho, S. S. (2017). The influence of parental practices on child promotive and preventive food consumption behaviors: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1): 47. doi: 10.1186/s12966-017-0501-3.

Currently, there are no comprehensive systematic reviews and meta-analyses surveying the influence of parenting practices and parenting styles on child SSB and fruits and vegetables consumption. Existing reviews have either focused on examining a broad array of determinants of SSB consumption without an in-depth examination of the role of parents (Paes et al., 2015; Rasmussen et al., 2006), or examined the influence of singular parental practices – such as availability and role modelling – on various child food consumption behaviors (Cook, O'Reilly, DeRosa, Rohrbach, & Spruijt-Metz, 2015; Wang, Beydoun, Li, Liu, & Moreno, 2011). Reviews that have focused on parental influence have examined parental practices in only one specific food consumption outcome, namely fruits and vegetables consumption, and these reviews do not quantitatively summarize the effect sizes between the parenting variables and child food consumption outcomes (Pearson, Biddle, & Gorely, 2009; van der Horst et al., 2006).

Recently, around the same time that this study was conducted, Vaughn et al (2016) presented a content map that aimed to summarize the research on food parenting practices. Her team organized the different food parenting practices that have been studied into three broad categories: autonomy support or promotion, coercive control, and structure. Although the method utilized in Vaughn et al.'s (2016) is different from those adopted in my own study here³, there are important similarities in the conclusions of both our studies⁴. Perhaps

³ Vaughn et al. (2016) worked with a group of content experts to develop the content map, while my study relied on a systematic review that grouped constructs through a coding process with multiple coders

⁴ Specifically, my thesis highlights the importance of active guidance, which is similar to the higher-order construct of promotion practices described by Vaughn et al (2016).

more importantly, Vaughn et al. (2016) conducted a qualitative summary of food parenting practices research, and grouped them into higher-order categories, but did not conduct a quantitative meta-analysis to provide an understanding of the effects of parenting practices across the literature.

Most importantly, while there are theoretical and empirical reasons to suggest that parenting practices influence child food consumption outcomes through cognitive mediators (e.g. de Bruijn, Kremers, de Vries, et al., 2007), and that their effects are moderated by parenting style (e.g. Sleddens et al., 2014), there are currently no studies that assessed existing research to examine if these theoretical propositions are supported. Furthermore, despite the vast amount of research examining parenting practices across multiple age groups of children, there are currently no studies that examined if the effects of various parenting practices differ according to child age.

This study addresses gaps in the literature by presenting the results from a comprehensive systematic review and meta-analysis of studies designed to examine the relationship between parental factors (which includes both *context-specific parental practices* and more *general parenting styles*) and child food consumption behaviors in two different contexts: one preventive, and the other promotive in nature (SSB and fruits and vegetables consumption).

This study opted to examine the effects of parenting practices in promotive versus preventive contexts because the various food parenting practices are not always neutral in their persuasive intent. For example, although modelling and food availability can be considered neutral in the sense that they both can simultaneously promote healthy and unhealthy food consumption, other parenting practices, such as rewarding food consumption,

rewarding with verbal praise, and pressure are employed by parents to increase healthy food consumption. Taking into account Darling and Steinberg's (1993) tripartite conceptualization of the socialization process – socialization goals, parenting practices, and parenting styles –, it is hoped that by examining parenting effects on two related (food consumption) but distinctly different socialization goals (healthy versus unhealthy), the study can illuminate important nuanced effects of parenting practices that might be missed if it was focused on only one single food consumption context⁵.

Based on the preceding literature review, this study seeks to answer three research questions:

RQ1: What are the different types of food parenting practices used to socialize children into consuming more/less healthy/unhealthy foods?

RQ2: What are the effects of the different types of food parenting practices on children's healthy/unhealthy food consumption and cognitions?

RQ3: What is the proportion of research that have examined the cognitive mediating mechanisms through which parenting practices influence children's healthy/unhealthy food consumption?

RQ4: What is the proportion of research that have examined the moderating effects of general parenting styles on parenting practices' relationship with children's healthy/unhealthy food consumption?

RQ5: How does child age moderate the effect of parenting practices on children's healthy/unhealthy food consumption?

⁵ This was ultimately validated in Study 2, where it was found that restrictive guidance can serve either preventive or promotive functions.

3.2 Method

The review was conducted in two phases. First, an extensive systematic review of the literature was done to identify the parental factors related to child food consumption behavior. Next, a meta-analysis was conducted following these classifications, with studies which contain the requisite statistical information.

3.2.1 Literature Search

In order to find relevant studies of parenting effects on child food cognitions, choice, and intake, a literature search was conducted in the following major databases: Web of Science, PsycINFO, ERIC, and PubMed. The search strategy relied on using a combination of parental factors keywords and child food consumption keywords. Parental factors keywords were matched with a child food consumption keyword for every search. The parental factor keywords were: “parenting”, “parent* communication”, “parent* strateg*”, “parent* style*”, “parent* practice*”, “parent* feed* strateg*”, and “parent* feed* practice*”. The keywords for child food consumption were: “eating”, “food consumption”, “soft drink*”, “sweetened beverage*”, “fruit*”, and “vegetable*”. To ensure comprehensiveness, the reference lists of key articles were hand searched to identify literature not retrieved from the initial search. An initial search was conducted in December 2015. The list of studies was updated with a second round of search in March 2016.

3.2.2 Inclusion and Exclusion Criteria

An article had to fulfill the following criteria to be eligible for inclusion: (1) the subjects of study had to be healthy children or adolescents below the age of 18; (2) the studies had to utilize quantitative methods (surveys and

experiments were both included), with statistical significance being reported; (3) the independent variable(s) must contain one parenting practice or style; (4) the dependent variable(s) were either food cognitions such as attitudes (implicit and explicit), liking, preference or social norms, or food consumption choice and/or intake of fruits and vegetables or SSB.

Articles that were excluded were: (1) articles not published in English; (2) studies that involved only overweight or obese parents and/or children⁶; (3) studies that stratified analyses according to BMI without providing overall effect sizes; (4) studies that examined the dependent variable(s) of eating problems and styles such as eating disorders, disordered eating, and emotional eating, as well as BMI⁷; and (5) intervention studies.

3.2.3 Analytical Approach

In the first phase, a three-step process was utilized to identify relevant studies for the systematic review. First, the retrieved papers were screened and shortlisted using their titles. Next, the abstracts of the shortlisted articles were screened in another round of shortlisting. Two reviewers were involved in shortlisting the articles. Overall, percent agreement between the reviewers were at 92%. All disagreements were discussed between the reviewers and resolved by revisiting the inclusion/exclusion criteria and by coming to a consensus. Finally, entire articles were retrieved from the database and screened, with eligible studies being retained for the review. The associations between

⁶ Findings from studies that comprise of only overweight/obese population might have findings that are not generalizable to non-overweight/obese populations

⁷ This systematic review is concerned with parenting effects on the consumption of foods in two contexts – healthy and unhealthy foods –, rather than the development of eating disorders, which are psychiatric disorders

parenting factors and child eating outcomes were represented with “+” for a significant positive association, “-” for a significant inverse association, and “0” for a null association. Associations with a reported *p* value below 0.05 were considered significant. In studies with univariate and multivariate results, the associations considered were taken from the multivariate analysis. Studies with statistical analyses indicating the significance level were included. Mediation and moderation effects are stated in the final column of Table 1 (attached at the end of the thesis). In stratifying the analysis according to child age, Piaget’s three stages of cognitive development in children was utilized (Ginsburg & Oppen, 1988). Parental factors that saw less than two studies conducted within a developmental stage were omitted from the analysis⁸.

As there were no standardized terminologies for parental factors, with researchers often utilizing conflicting definitions with regard to similar terms, I attempted to develop a list of overarching parental constructs by examining each study’s operationalized measurement items. First, I examined all the measures used across every study. Next, I grouped the measurement items into arbitrarily named parental practice variables based on face validity. When operationalized measurement items grouped together came from a wide range of differently named constructs (across different researchers), the variable they represent were given a new term in order to avoid confusion (e.g. *parental encouragement through rationale* and *parent nutrition teaching* were classified under *active guidance*). On the other hand, when a group of measures

⁸ Without at least two studies, there are no ways to examine differences within and across age groups, since there is only information from one study. As such, they were left out in the analysis that sought to examine age group differences in effects.

representing a variable were derived from a commonly used term, the term was retained (e.g. *modeling*). The principle guiding criteria for the organization of these constructs is utility; to try and sort the domain of parental communication research such that existing theoretical constructs can be understood with some clarity. Once all the factors were identified and named, two reviewers classified the measures in each included study based on the identified constructs.

Disagreements were resolved through a discussion between the reviewers.

In the second phase, a meta-analysis was conducted for studies that were eligible for the calculation of effect sizes using the Comprehensive Meta-Analysis 2 software. In order for studies to be included in the meta-analysis, the quantitative information required for computation of overall effect size, such as sample sizes, means, correlations, odds ratios and test statistics must have been available. Studies without these required information were excluded. In order to generate overall effect sizes, data from studies that included correlations, means with standard deviations, or odds ratios were converted into Pearson's product-moment correlation scores, resulting in commensurable effect sizes across studies. The conversions were executed using established formulas (Borenstein, Hedges, Higgins, & Rothstein, 2009). Studies utilizing Spearman correlation coefficients were also included, as Spearman correlation coefficients are equivalent or only slightly smaller as compared to Pearson's product-moment correlation scores (Gilpin, 1993). These correlation coefficients were then weighted according to the corresponding study's sample size and standard error, resulting in a weighted correlation score (Hedges & Olkin, 1985). Following that, the overall effect sizes of each predictor and outcome were calculated by averaging the weighted correlation coefficients across the eligible studies. As

some studies utilized a combination of food items within a single category as dependent variables (e.g., fruits and vegetables as separate measures), the meta-analysis was conducted by averaging the correlations between an independent variable and the dependent variables within a category, so that only a single correlation score is computed for either healthy or unhealthy food consumption⁹. This meta-analysis was conducted using random effects models. An *a priori* assumption guided this choice. Since studies included in this analysis were not identical, it was not possible to assume a true effect size across the studies. The studies were conducted independently across different age groups of children, and across different cultural contexts, indicating that the use of random effects models was more appropriate in the analysis (Borenstein, Hedges, Higgins, & Rothstein, 2010). Figure 2 displays a PRISMA flowchart illustrating the systematic process of conducting the review.

3.3 Results

A total of 6448 titles were located from the literature search (Web of Science = 1692; ERIC = 190; PsycINFO = 708; PubMed = 3858). After removing duplicates, there were a total of 2237 unique titles potentially relevant for inclusion in this review. After screening the titles, 556 articles were retained for abstract screening. Following that, 158 full-text articles were retrieved and scanned in their entirety for eligibility, with 82 articles being retained for analysis. Six articles were added after hand searching the reference lists of

⁹ For example, if Study A examined the effects of restrictive guidance on fruits and vegetables consumption and found their correlations as $r = .15$ and $r = .25$, the correlations would be averaged ($\frac{.15 + .25}{2} = .20$), such that a single $r = .20$ is used to represent restrictive guidance of food consumption's correlation with healthy food consumption.

relevant articles, resulting in a total of 88 articles utilized in this review. A summary of the studies can be viewed in Table 1 (at the end of the thesis).

Figure 2. PRISMA Flow Diagram

3.3.1 Characteristics of Included Studies

Most of the studies were cross-sectional studies ($n = 66$), with the rest being longitudinal ($n = 14$), experimental ($n = 5$), and quasi-experimental ($n = 3$). Among the studies, 49% involved children in the pre-operational stage (ages 2 to 6; $n = 43$), 33% involved those in the concrete operational stage (ages 7 to 11; $n = 29$), while only 16% of the studies involved those in the formal

operational stage (ages 12 to 18; $n = 16$)¹⁰ (Ginsburg & Oppen, 1988). Most studies were situated in the U.S., Europe, and Australia, with the exception of three studies: one being situated in Israel, one in Costa Rica, and another in Hong Kong. The spread of parent-report ($n = 33$), child-report ($n = 28$), and parent-child matched samples ($n = 27$) were evenly matched. Despite this, most studies with parent-report measures consisted of a large number of female participants.

With regard to specific target food items being examined, 64% of studies examined parental influence on fruits/vegetables consumption ($n = 56$), 24% examined SSB consumption¹¹ ($n = 21$), 51% examined some form of unhealthy eating¹² ($n = 45$), and 10% examined healthy foods consumption¹³ ($n = 9$). Since specific food items (e.g. fruits/vegetables, SSB) were measured in the composite measures of general healthy and unhealthy food consumption, the subsequent analysis of the effects of parenting on child food consumption considered them under the concepts of healthy (promotive) and unhealthy (preventive) food consumption.

A total of ten parental factors were identified from the literature. They included the context-specific parental practices of restrictive guidance (or rule-making) ($n = 48$), followed by modeling (or parents' own food consumption behavior) ($n = 37$), availability (or the control of availability) ($n = 36$), parental pressure to eat ($n = 25$), food as reward ($n = 12$), rewarding food consumption

¹⁰ Articles were grouped into these three groups of developmental stages using the mean age of the children under study

¹¹ Including high-energy drinks

¹² Including unhealthy snacks, low-nutrient density food, junk foods, and non-core foods; some of these composite measures of unhealthy eating consisted of a component of SSB consumption

¹³ Including core-foods and healthy snacking (eg. fruits as snacks)

(n = 10), rewarding food consumption with praise (n = 9), accessibility (n = 6), and active guidance (or verbal education and encouragement) (n = 5).

Meanwhile, the effects of general parenting styles were examined in 18% of the studies (n = 16).

3.3.2 Context-Specific Parental Practices and Child Food Consumption

Restrictive Guidance. Restrictive guidance is defined as the frequency with which parents set limits, rules, or restrictions regarding food consumption. Closely related to the parental mediation dimension of restrictive mediation (Valkenburg, Piotrowski, Hermanns, & de Leeuw, 2013), this includes a range of overt parental restriction constructs such as rule-making and parental overt control. Among the included studies, 33 examined the relationship between parental restrictive guidance and healthy eating such as fruits and vegetables intake. Amongst these, 13 indicated a positive relationship with healthy eating, three yielded a negative relationship, whilst 17 indicated a non-significant relationship. For unhealthy eating such as the consumption of SSB, restrictive guidance was found to reduce consumption in 16 out of 38 studies. Eight studies suggested that parental restrictive guidance is associated with *higher* consumption of unhealthy foods among children, while 14 studies indicated a null relationship. This suggests a large amount of heterogeneity in the relationship between restrictive guidance and both healthy and unhealthy child food consumption behaviors.

Modeling. Modeling was measured in two ways across the literature. First, modeling was measured as parental intake of a target food item. In such a case, a positive relationship between parent and child intake was indicative of a significant modeling effect. Second, modeling was measured as the frequency

in which parents eat healthily and demonstrate the benefits and pleasure of eating healthily in front of children. In both cases, modeling was consistently found to be associated with child eating. Among the 31 studies that examined modeling and healthy food consumption, 28 found a significant positive relationship, while three saw no significant association. Among the 16 studies that examined modeling and unhealthy food consumption, 13 showed a significant positive association, while three saw no significant association. This suggests that the effects of parental modeling on child food consumption behavior are homogenous and significant.

Parental Control of Availability. Parental control of availability simply refers to whether a particular food is available at home. Since children develop food preferences through consistent exposure to foods (Birch, 1992, 1999; Birch, McPhee, Steinberg, & Sullivan, 1990), the availability of food would be crucial in determining whether children develop healthy food preferences rather than energy-dense food preferences such as SSB. Availability was measured in two ways across the reviewed studies. First, it was measured with regards to actual availability of a target food item (this can be measured as availability or non-availability of a target food). Second, it was measured as a parental strategy that involves parents controlling the availability of unhealthy foods in a covert manner (Boots et al., 2015; Brown, Ogden, Vögele, & Gibson, 2008; Durao et al., 2015).

Among the 27 studies examining availability of healthy foods and healthy foods consumption, an overwhelming 19 studies indicated a positive association, whilst five indicated a null relationship. Likewise, availability of healthy food, non-availability of unhealthy foods, as well as parental control of

availability of unhealthy foods, were associated with decreased unhealthy eating in 18 out of 22 studies. Three studies indicated a null relationship. These results suggest that availability or control of food availability can be a consistent predictor of child food consumption.

Pressure to eat. Parents can also pressure children into eating more food (Scaglioni, Salvioni, & Galimberti, 2008). This practice refers to parents utilizing verbal communication to try and persuade their children to consume more food. Pressure can manifest in a parent asking his or her child to clean up their plates, even if the child says he or she is not hungry (Birch et al., 2001). Underlying parental pressure to eat is a fear that a child is not consuming enough food. Although parents' intention when utilizing pressure is to encourage sufficient nutrient intake, some researchers have argued that it can have the opposite effect, leading to lower fruits and vegetables intake (Fisher et al., 2002; Galloway, Fiorito, Lee, & Birch, 2005). Of the 22 studies that examined pressure to eat and healthy food consumption, 14 showed no significant associations. Six studies found significant negative associations, where pressure was shown to be associated with less healthy food consumption. Only two studies found a positive association. With regards to unhealthy food consumption, eight studies showed that pressuring a child to eat was associated with significantly higher unhealthy food intake, while 13 studies showed that there were no significant associations.

Food as reward. Parents might also utilize food as a reward when children exhibit desirable behavior. Three studies found a negative association between using food as reward and healthy food consumption, with the large majority of studies (n = 7) finding no significant relationships between the two

variables. In contrast, six out of ten studies that examined the influence of food as reward on unhealthy eating found a positive relationship. As unhealthy foods such as sweet snacks are most often used as the reward item, this practice tends to increase preferences for unhealthy foods (Birch & Fisher, 1998; Savage, Fisher, & Birch, 2007b). However, less is known about how the utilization of healthy foods such as fruits and vegetables as reward can influence child food consumption outcomes.

Rewarding food consumption materially. Rather than using food as a form of reward, parents can sometimes reward healthy food consumption with material or playtime rewards (Orrell-Valente et al., 2007; Savage et al., 2007b). According to self-determination theory (Deci & Ryan, 1985, 2000), providing extrinsic rewards for an activity can potentially decrease the motivation and desire to perform the activity. When a reward is provided for eating a certain food, a child will tend to devalue the instrumental activity performed to receive the reward, as the child will see the activity as a means to an end (Birch, Marlin, & Rotter, 1984). In other words, if eating healthy food is the only way a child can get to play outside, the child might see it as a chore, and subsequently hold negative mental associations, feelings, and cognitions about the food.

Out of ten studies, most studies ($n = 6$) found no significant relationships between rewarding food consumption and child healthy eating. Three studies found a positive association, while one study found a negative association. Among the four studies that examined the relationship between rewarding food consumption and unhealthy eating, one study found a positive association. This positive association could be due to a single item in the composite measure of rewarding food consumption belonging conceptually

closer to using food as reward (e.g., dessert as contingent upon eating something the child doesn't like) (Vereecken et al., 2004).

Rewarding with praise. Parents can reward children with praise rather than material or hedonic rewards. Some researchers have suggested that praise is qualitatively different from other types of rewards (Orrell-Valente et al., 2007), likely because praise fulfills and fosters the intrinsic needs of relatedness, competence, and autonomy, as compared to extrinsic rewards. Among seven studies that examined the relationship of praise with healthy food consumption, four found positive relationships, while three yielded non-significant results. With regards to unhealthy eating, one study found that praise was associated with savory snack consumption among girls only, while the other studies ($n = 4$) found no significant relationships.

Accessibility. Parental control of food accessibility refers to “*whether the foods are prepared, presented, and/or maintained in a form that enables or encourages children to eat them* (Hearn et al., 1998, p. 26)”. Six studies examined the relationship between making food accessible and child fruits/vegetables intake. Four studies indicated a positive relationship, while two indicated a null relationship, suggesting that accessibility can potentially be a useful parental strategy in encouraging healthy eating.

Active Guidance. Active guidance or education is defined as the degree which parents actively discuss, verbally interact, and instruct their child with regards to food. Only five studies examined the influence of active guidance on child food consumption. In these studies, the measures indicating active guidance were encouragement through rationale (e.g., eating vegetables is good for you) (Vereecken et al., 2004), or nutritional teaching regarding types of food

(Melbye & Hansen, 2015). Amongst the studies, one found a positive relationship between active guidance and vegetables consumption, as well as a negative relationship between active guidance and SSB consumption. However, the four other studies have indicated a non-significant relationship between active guidance and healthy or unhealthy eating.

3.3.3 Cognitive Mediators of Food Consumption

Five studies sought to examine the influence of parenting on food cognitions such as preference (Bante, Elliott, Harrod, & Haire-Joshu, 2008), liking (Cooke et al., 2011; Corsini, Slater, Harrison, Cooke, & Cox, 2013), subjective norms (de Bruijn, Kremers, de Vries, et al., 2007), desire (Jansen, Mulken, & Jansen, 2007), and attitudes (de Bruijn, Kremers, de Vries, et al., 2007; Taylor, Wilson, Slater, & Mohr, 2011). Although all five studies indicated some level of significant relationships between parenting variables and food cognitions, mediation through these cognitions were not tested statistically. Only one reviewed study examined potential psycho-social *mediators* between parenting variables and child food consumption (Young, Fors, & Hayes, 2004). In the study, the researchers found that self-efficacy partially mediated the effects of modeling on fruits and vegetables consumption.

3.3.4 General Parenting Styles and Moderation Effects

Parenting researchers recognize that individual context-specific parenting behaviors are a part of a complex milieu of other parenting behaviors, so no individual parenting practice (e.g. such as the use of active guidance) can be isolated and tested for its influence without considering other facets of parenting (Darling & Steinberg, 1993). In view of this, general styles of

parenting can be viewed as a circumstantial construct that would moderate the influence of context-specific parenting behaviors such as active parental guidance, using food as reward, pressuring children to eat and so on (Kremers et al., 2013; Larsen et al., 2015; Papaioannou et al., 2013). This perspective adopts the view that context-specific parenting practices can have different effects when employed by families who utilize a different parenting style (Koerner & Fitzpatrick, 2006).

In general, most studies reviewed examined the direct relationship between parenting variables and child food consumption outcomes. Only approximately 10% ($n = 9$) of all the articles reviewed examined the *moderating* influence of general parenting styles, indicating a lack of empirical understanding about the complex influence of parenting styles on the effects of parenting practices. Amongst those that examined parenting styles as a moderator, one noted that restrictive guidance situated in an authoritarian parenting style showed stronger effects on fruits intake, whilst availability situated in an authoritative parenting style showed stronger effects on fruits and vegetables intake (De Bourdeaudhuij et al., 2009). Another study utilizing parental *feeding* style as a moderator supported this, as they found that restrictive guidance led to lower intake of low-nutrient-density foods among less permissive parents (Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2012). One study found that restrictive guidance had stronger positive associations with healthy eating, and stronger negative associations with unhealthy eating when parental warmth is high, suggesting that whilst demandingness/control might lead to more effective restrictive guidance, warmth can also play a role in moderating the effects in the same direction

(Ray, Kalland, Lehto, & Roos, 2013). Another study echoed these findings, as they found that restrictive guidance and availability were more strongly associated with lower child SSB intake amongst children with highly responsive, as well as moderately demanding parents (van der Horst et al., 2007). Other studies contradicted these findings. Specifically, one study found that children under an indulgent parental feeding style (low in demandingness, high in responsiveness) saw greater positive relationship between restrictive guidance and fruits and vegetables consumption (Papaioannou et al., 2013). Likewise, two other studies found that restrictive guidance was associated with lower SSB intake only when behavioral control was low among parents (Rodenburg, Oenema, Kremers, & van de Mheen, 2012; Sleddens et al., 2014).

Other than its moderating effects on restrictive guidance, one study found that the strongest associations between modeling and child fruit consumption occurred among children who were under a highly controlling parenting style (Rodenburg et al., 2012). Another study also found that controlling the availability of food was also more effective in reducing SSB intake amongst children of parents who reported higher control (Sleddens et al., 2014). Of all nine studies, only one study found no moderating effect from parenting styles (Taylor et al., 2011).

3.3.5 Differences by Child Age

Eighty-six studies were included in the stratified analysis of studies based on child age. Two studies were omitted as there was insufficient information regarding the mean age of the children being referred to available within the full-text article. Table 2 summarizes the findings of the studies being

reviewed, according to child age. Interestingly, some age differences can be observed.

First, all three studies that examined restrictive guidance among older children in the formal operational stage (FOS) found no significant associations with healthy food consumption. This was in contrast to studies with younger children in the pre-operational stage (POS) and concrete operational stage (COS), where a large amount of heterogeneity exists, and with a substantial proportion of studies finding a significant positive relationship (40% and 35% respectively). Interestingly, a greater proportion of studies showed that restrictive guidance had a negative relationship with unhealthy food consumption among children in FOS (83%), as compared to those in the COS (45%) and POS (29%).

Unsurprisingly, a greater proportion of studies among older children (COS compared to POS) found a positive relationship between active guidance and healthy food consumption, and a negative relationship between active guidance and unhealthy food consumption. This suggests that active guidance might be more useful in shaping food consumption behaviors with children that are at a more advanced developmental stage. Unfortunately, there were no studies that involved children in the FOS for comparisons.

More studies appear to show the undesirable effects of pressuring a child to eat among younger children. 36% of the studies involving children in POS found a negative relationship with healthy food consumption, while 55% found a positive relationship with unhealthy food consumption. However, for samples involving older age groups, a vast majority of studies found no significant relationship between pressuring and both types of food consumption.

Rewarding food consumption either with praise or with tangible rewards appear to be more effective in promoting healthy eating among younger children in the POS, with 50% of the studies finding a positive relationship between rewarding food consumption and healthy food consumption, and 80% finding a positive relationship between rewarding with praise and healthy food consumption. However, these significant findings were non-existent among those in the COS.

Table 2. Systematic review of parental predictors on child healthy and unhealthy food consumption by age

Healthy Food				Unhealthy Food		
PRE-OPERATIONAL STAGE (Age 2 to 6)						
Predictors	<i>Pos.</i>	<i>Neg.</i>	<i>N.S.</i>	<i>Pos.</i>	<i>Neg.</i>	<i>N.S.</i>
Restrictive Guidance	35% (6)	12% (2)	53% (9)	33% (7)	29% (6)	38% (8)
Active Guidance	0%	0%	100% (2)	-	-	-
Availability	78% (7)	0%	22% (2)	100% (7)	0%	0%
Accessibility	67% (2)	0%	33% (1)	-	-	-
Modeling	100% (14)	0%	0%	67% (2)	0%	33% (1)
Pressure to eat	14% (2)	36% (5)	50% (7)	55% (6)	0%	45% (5)
Rewarding food consumption	50% (3)	0%	50% (3)	-	-	-
Reward with verbal praise	80% (4)	0%	20% (1)	0%	0%	100% (2)
Food as reward	0%	25% (2)	75% (6)	71% (5)	0%	29% (2)
CONCRETE OPERATIONAL STAGE (Age 7 to 11)						
	<i>Pos.</i>	<i>Neg.</i>	<i>N.S.</i>	<i>Pos.</i>	<i>Neg.</i>	<i>N.S.</i>
Restrictive Guidance	40% (4)	10% (1)	50% (5)	9% (1)	45% (5)	45% (5)
Active Guidance	50% (1)	0%	50% (1)	0%	50% (1)	50% (1)
Availability	92% (12)	0%	8% (1)	88% (7)	0%	13% (1)
Accessibility	67% (2)	0%	33% (1)	-	-	-
Modeling	87% (13)	0%	13% (2)	78% (7)	0%	22% (2)
Pressure to eat	0%	14% (1)	86% (6)	14% (1)	0%	86% (6)
Rewarding food consumption	0%	0%	100% (3)	0%	0%	100% (3)
Reward with verbal praise	0%	0%	100% (2)	0%	0%	100% (2)
Food as reward	0%	50% (1)	50% (1)	50% (1)	0%	50% (1)
FORMAL OPERATIONAL STAGE (Age 12 to 18)						
	<i>Pos.</i>	<i>Neg.</i>	<i>N.S.</i>	<i>Pos.</i>	<i>Neg.</i>	<i>N.S.</i>
Restrictive Guidance	0%	0%	100% (3)	0%	83% (5)	17% (1)
Active Guidance	-	-	-	-	-	-
Availability	67% (2)	0%	33% (1)	60% (3)	20% (1)	20% (1)
Accessibility	-	-	-	-	-	-
Modeling	50% (1)	0%	50% (1)	100% (4)	0%	0%
Pressure to eat	-	-	-	-	-	-
Rewarding food consumption	-	-	-	-	-	-
Reward with verbal praise	-	-	-	-	-	-
Food as reward	-	-	-	-	-	-

Note. Values in brackets reflect the number of studies that found either a positive, negative, or non-significant effect

3.3.6 Meta-Analysis Findings

After the systematic review, a smaller subset of 37 studies with available statistics was utilized to conduct a quantitative meta-analysis. Except for the relationship between accessibility and unhealthy food consumption, all relationships had at least two eligible studies, allowing us to compute a meta-analytic effect size for each relationship between variables. As illustrated in Table 3, five out of the nine parental communication variables had a statistically significant weighted correlation with child *healthy* food consumption. Specifically, active guidance ($r = .15, p < .001$), availability ($r = .24, p < .001$), modeling ($r = .32, p < .001$), and verbal praise ($r = .15, p < .05$) were significantly and positively correlated with child healthy food consumption. The effect sizes were small to medium according to guidelines developed by Cohen (1988, 1992). Pressuring children to eat had a small but significant negative correlation with child healthy food consumption ($r = -.04, p < .05$). Restrictive guidance, accessibility, and rewarding food consumption were not significantly correlated with child healthy food consumption.

With regards to child *unhealthy* food consumption, (see Table 4) restrictive guidance ($r = -.11, p < .01$), and verbal praise ($r = -.04, p < .05$) had small but significant negative correlations with child unhealthy food consumption. On the other hand, availability ($r = .34, p < .001$), modelling ($r = .35, p < .001$), pressure to eat ($r = .04, p < .05$), and using food as reward ($r = .14, p < .05$) were positively correlated with child unhealthy food consumption. Active guidance and rewarding food consumption were not significantly correlated with child unhealthy food consumption.

Table 3. Meta-analysis of parental predictors of child healthy food consumption (32 unique studies included)

Predictors	K	N	Effect Size	95% CI		Q
				Low	High	
Restrictive Guidance	13	9628	.05	-.01	.11	70.984***
Active Guidance	2	1142	.15***	.09	.21	0
Availability	15	23825	.24***	.17	.31	298.711***
Accessibility	3	10704	.10	-.04	.24	48.842***
Modeling	18	20104	.32***	.25	.39	291.395***
Pressure to eat	11	10808	-.04*	-.08	.00	27.025**
Rewarding food consumption	4	4124	.03	-.02	.07	6.265
Reward with verbal praise	4	3381	.15*	.00	.30	54.611***
Food as reward	3	1509	-.07*	-.13	-.01	2.245

Note. Effect size calculations were based on random effects model.

K = number of studies; N = total sample size for all studies; Effect Size = Pearson's r; CI = confidence interval; Q = heterogeneity in effect sizes between studies

p < .05, **p < .01, * p < .001.*

Table 4. Meta-analysis of parental predictors of child unhealthy food consumption (23 unique studies included)

Predictors	K	N	Effect Size	95% CI		Q
				Low	High	
Restrictive Guidance	15	14539	-.11**	-.17	-.04	193.800***
Active Guidance	2	1142	-.04	-.24	.17	10.664***
Availability	6	3421	.34***	.21	.46	56.146***
Accessibility	-	-	-	-	-	-
Modeling	5	1593	.35***	.22	.47	28.800***
Pressure to eat	9	8686	.04*	.00	.08	17.856*
Rewarding food consumption	3	2569	.06	-.04	.15	8.939**
Reward with verbal praise	4	3381	-.04*	-.07	-.01	2.744
Food as reward	4	1644	.14*	.03	.25	7.137

Note. Effect size calculations were based on random effects model.

K = number of studies; N = total sample size for all studies; Effect Size = Pearson's r; CI = confidence interval; Q = heterogeneity in effect sizes between studies

p < .05, **p < .01, * p < .001*

3.3.6.1 Meta-Analysis Moderated by Child Age

Together with the systematic review suggesting some age differences, a significant Q statistic in the meta-analysis suggests that there was heterogeneity in the effect sizes between studies (Rosenthal, 1991). As such, examining age as a moderator in the analysis could reveal potential differences. Among the nine parental communication variables, active guidance, rewarding food consumption and using food as reward did not have heterogeneous results across study in the context of child *healthy* food consumption, thus they were excluded from the analysis. Likewise, reward with verbal praise and food as reward were excluded from the analysis in the context of child *unhealthy* food consumption due to it fulfilling the assumption of homogeneity. Additionally, active guidance was excluded from the analysis as there were only two studies available for moderator analyses. Tables 5 and 6 summarizes the results of the meta-analysis moderated by child age.

Table 5. Moderator analysis of child healthy food consumption

Predictors	Moderator		K	effect size
Restrictive Guidance	Age Group	POS	8	.03
		COS	3	.06
		FOS	2	.08
Availability	Age Group	POS	6	.16**
		COS	8	.26***
		FOS	1	.53***
Accessibility	Age Group	POS	1	.26***
		COS	2	.04
Modeling	Age Group	POS	9	.34***
		COS	7	.24***
		FOS	1	.42***
Pressure	Age Group	POS	8	-.06*
		COS	3	-.01
Reward with Verbal Praise	Age Group	POS	2	.26***
		COS	2	.04

Note. Effect size calculations were based on the random effects model.

*K = number of studies; Effect Size = Pearson's r. * $p < .05$, ** $p < .01$, *** $p < .001$.*

The results showed that although availability had a significant positive relationship with healthy food consumption across all age groups, it had a stronger association with healthy food consumption among older children. However, this ought to be read with caution, as among the FOS group, only one study was utilized in the analysis. Echoing the results of the systematic review analyses stratified by child age, the undesirable effects of parental pressuring on healthy food consumption was found only among younger children, and not older children. Likewise, the positive associations between rewarding with verbal praise and healthy food consumption existed only among younger children, and not older children.

Table 6. Moderator analysis of child unhealthy food consumption

Predictors	Moderator		K	effect size
Restrictive Guidance	Age Group	POS	9	-.03
		COS	3	-.19***
		FOS	3	-.20*
Availability	Age Group	POS	5	.37***
		COS	1	.22***
Modeling	Age Group	POS	2	.48***
		COS	3	.27***
Pressure	Age Group	POS	6	.05
		COS	3	.04
Reward with Verbal Praise	Age Group	POS	2	-.08**
		COS	2	-.02

Note. Effect size calculations were based on the random effects model.

*K = number of studies; Effect Size = Pearson's r. * $p < .05$, ** $p < .01$, *** $p < .001$.*

With regard to unhealthy food consumption, the results indicated that restrictive guidance was more effective in reducing unhealthy food consumption among older children. Last, rewarding desirable eating behavior with verbal praise had a negative association with unhealthy food consumption only among younger and not older children.

3.4 Discussion

The systematic review of parental factors and child promotive and preventive food consumption outcomes yielded a total of ten potential parental factors, nine of which captured context-specific parental factors, and one of which referred to parenting styles as a moderating factor. Of these, availability or the control of availability of food items, along with parental modeling, were consistently associated with both desirable and undesirable food consumption cognitions and consumption. This was supported by both the systematic review

and the meta-analysis¹⁴. First, meta-analytic procedures found that they had the strongest correlations with both child's healthy and unhealthy food consumption. Second, the systematic review found that a vast majority of studies support the direction of relationship as indicated in the meta-analysis.

First, parents availing food can increase consumption from the possibility that children eat whatever that is available to them. Next, parental modeling could possibly convey attitudinal, norms-based, and self-efficacy beliefs to children, which drives consumption behavior (Bandura, 2004). According to social cognitive theory, modeling refers to the process whereby an individual (in this case a child) learns through his or her observations of another person performing a behavior (Bandura, 1998, 2001). Specifically, it is hypothesized that a child will imitate or adopt behaviors when they observe an influential role model in their lives (e.g., a parent) perform said behaviors. Modeling effects take place because observations of other people eating will influence their own beliefs about what to eat, and how much is appropriate to eat (Herman & Polivy, 2005). Some researchers have defined modeling as a type of parental communication strategy, consisting of parental encouragement for their children to adopt their own behaviors intentionally through overt verbal communication and covert non-verbal strategies (Musher-Eizenman & Holub, 2007; Palfreyman, Haycraft, & Meyer, 2014; Vaughn, Tabak, Bryant, & Ward, 2013b). Specifically, modeling can also occur when parents explicitly display to their children that they enjoy certain food items, leading to a child's vicarious learning about the enjoyment of eating certain food types. Such

¹⁴ Around the same time that this study was conducted and published, another systematic review found similar conclusions (Ong, Ullah, Magarey, Miller, & Leslie, 2017)

explicit displays of eating behaviors are used as a parenting strategy to promote attitude towards, and subsequently, consumption of certain foods among children.

Restrictive guidance was found to be negatively associated with unhealthy food consumption, while its association with healthy food consumption was mixed. This was supported by both the systematic review and meta-analysis. When the analyses were stratified by age, an interesting pattern emerged. The relationship between restrictive guidance and unhealthy food consumption was more powerful among older children, as compared to those in the POS. One possible reason is that younger children in the POS are less able to follow rules or limits set out by parents due to limited self-regulation capabilities (Kopp, 1982). Another possible reason for this could be that restrictive guidance was often operationalized as rule-setting *regarding* unhealthy foods, and not healthy foods, and hence the associations were found for unhealthy food consumption and not healthy food consumption. As Vaughn et al. (2016) suggested, restriction has often been employed in the context of unhealthy foods. In the next chapter, I will attempt to clarify the conflicting results by distinguishing between *preventive* and *promotive* rules and restrictions.

Next, using food as reward was found to be related to higher levels of unhealthy eating among children. This was supported in both the systematic review and meta-analysis. This is likely due to the fact that foods used as rewards are often unhealthy. By rewarding children's behavior with these unhealthy food items, children might associate these unhealthy items as positive

and valuable, hence consuming more of them when they have the chance (Birch, Zimmerman, & Hind, 1980).

Pressuring children to eat can lead to effects unintended by the parents. Although a small number of studies found a positive association between pressuring and healthy eating, a larger number of studies found a negative association. Moreover, seven studies showed that pressuring can be associated with higher unhealthy food consumption. This is also played out in the meta-analysis, with pressuring being shown to have a small negative correlation with healthy food consumption and small positive correlation with unhealthy food consumption. However, age-stratified analyses revealed that these unintended effects tend to be limited to younger children, as the effects are non-significant in studies involving older children.

The evidence that rewarding food consumption can influence child food consumption was weak, as most studies included in the systematic review showed no significant effects. The meta-analysis also showed no significant correlation between rewarding food consumption and child food consumption. On the other hand, a larger proportion of studies found that verbal praise might lead to higher healthy foods consumption, indicating that rewarding with material rewards and praise are distinct practices with different outcomes. However, it is important to note that rewarding with praise appeared to be more useful with younger children in the POS, with the effects diminished in studies involving older children.

Although the number of studies examining accessibility was small, the majority of studies in the systematic review indicated that accessibility can have a positive influence on healthy foods consumption. This was not supported in

the meta-analysis, as there was a non-significant correlation between accessibility and child healthy food consumption. One reason for this discrepancy might be due to the limited number of studies included in the meta-analysis.

Interestingly, active guidance received very little attention from researchers, with only 6% of the studies treating it as a potential predictor of child food consumption. Despite this, research in the domain of parental mediation has found active discussion to be an effective parental socialization technique in influencing desirable child outcomes (Buijzen, 2009). The meta-analysis results suggest that these effects might translate well into the child food consumption context, as there was a small to medium, positive, and significant relationship between active guidance and child *health* food consumption. One reason for the modest findings could be that the existing measures are inadequate in capturing the concept of active guidance in its entirety. Existing concepts that were used as proxies for active guidance in this study were *teaching about nutrition* and *encouragement through rationale* (Melbye et al., 2015; Vereecken et al., 2004). These constructs are more closely related to *factual* parental guidance, as opposed to *evaluative* parental guidance. *Factual* active guidance refers to informing children with technical knowledge. Such techniques have been found to be ineffective in mitigating negative media effects on children (Nathanson, 2004; Nathanson & Yang, 2003). *Evaluative* active mediation, on the other hand, reflects parents' attempts to provide either positive or negative opinions about a topic, and are considered to be a more effective strategy (Nathanson, 2004). Examining the influence of evaluative, rather than factual parental guidance, might yield stronger associations. A

second reason could be that there were insufficient studies examining the effect of active guidance on older children. My age-stratified systematic review analysis found that the beneficial effects of active guidance were more pronounced in studies involving older children in COS, as compared to those in POS. However, only 3 studies out of the 88 unique studies examined active guidance among children older than 7.

From the systematic review, I identified several gaps in the study of parental communication and child food consumption. First, although some parental communication practices were consistently linked with child food consumption outcomes (e.g., modeling and availability), many of the other parental communication practices show mixed results (e.g., restrictive guidance) and some are severely understudied (e.g., active guidance). More research needs to be conducted in these areas to ascertain the relationships between parental communication and child food consumption behavior. Second, the concept of active guidance is currently underdeveloped and understudied. Although active discussions have been shown to be an effective parental communication strategy in socializing children to more desirable outcomes in other contexts (Buijzen, 2009), there remains a lack of understanding of how parents' active verbal discussions with children apply in the food consumption context. Specifically, there has been a lack of conceptual explication of parental guidance in the food consumption context, with existing studies not taking into account the different facets of parental guidance. Existing studies have examined active parental guidance from the perspective of factual guidance (e.g., teaching about nutritional facts). As previous studies have found factual guidance to be less effective than evaluative guidance, future

studies should attempt to examine evaluative guidance as a correlate. Third, theoretically-driven studies of parental communication on child food consumption, which takes into account psychosocial mediating variables, are severely lacking. The systematic review found that only five studies attempted to understand child food consumption from such a perspective. Without considering the social psychological processes of the child, it is difficult to ascertain the pathways through which certain parental practices are influencing child food consumption behavior. Finally, only 10% of the studies examined the moderating effect of general parenting styles on context-specific parenting practices. The importance of general parenting styles as “overarching” emotional climates that can amplify or reduce the effect of parenting practices on child behavior outcomes have been stressed by some researchers (Darling & Steinberg, 1993). This systematic review supported this theoretical proposition, with eight out of nine studies examining the moderating influence of parenting styles finding significant effects. Overall, these research gaps mean that current understanding of parental communication on child food consumption is incomplete.

There are several limitations of this study that should be taken into account when drawing conclusions from the results. First, the review was conducted using a non-exhaustive list of studies. Although effort was made to be comprehensive in the retrieval of articles by searching through four major databases and hand-searching relevant articles, there could have been some studies that were missed out on. To minimize this, I hand-searched the reference list of every selected study, which helped ensure greater comprehensiveness in the systematic review. Despite this, it is important to note

that the conclusions are drawn from overall trends across studies, rather than from singular studies, rendering a small number of missed articles less consequential. Second, most of the studies were limited to populations in the west. As nuances in parent-child relationships might exist across cultures, the findings might not generalize across to cultures outside of the west. Lastly, there is a lack of uniformity in measuring a number of these parental variables. Despite this, efforts to synthesize and categorize the variables have yielded strong agreement rate between two coders. Nonetheless, it is important to note that in several of these studies, there is strong heterogeneity in terms of operationalizing some of these variables, limiting their comparability.

CHAPTER IV

Study Two

THE DEVELOPMENT AND VALIDATION OF THE PARENTAL ACTIVE AND RESTRICTIVE FOOD GUIDANCE QUESTIONNAIRE (PARQ)

4.1 Background

Chapter III highlighted the importance of structural parental factors such as modelling and availability in children eating a healthier diet. However, of most interest to health communication researchers are the main research gaps uncovered from the review and meta-analysis. I aim to address some of these gaps relating to the conceptual clarification and operationalization of active and restrictive guidance in Study Two. First, active guidance such as nutrition education has been mooted as an important parenting practice. Specifically, it was found that active guidance (in the form of nutrition education or encouragement using rationale) is currently understudied, even though it has been shown to have an overall association with child healthy food consumption. Interestingly, two recent studies echo the findings of the meta-analysis. Lwin et al. (2017) found that active guidance of food consumption was related to the higher consumption of healthy foods, mediated through attitude towards consuming healthy foods. Likewise, Vaughn et al. (2017) found that nutrition education was related to higher consumption of fruits and vegetables, and lower consumption of sweets. Despite its potential importance, there have been little conceptual development of the construct, leading to conceptual ambiguity between active guidance, nutrition education, reasoning, and encouragement,

resulting in potentially problematic operationalization (Lwin et al., 2017; Vaughn et al., 2016).

Second, restrictive guidance have been found to show mixed results in two different contexts. An overall significant correlation was found between restrictive guidance and child unhealthy food consumption, but not healthy food consumption. As discussed in the preceding chapter, a possible reason for this could be that restrictive guidance was often operationalized as rule-setting *regarding* unhealthy foods, and not healthy foods, and hence the associations were found for unhealthy but not healthy food consumption. In other words, when researchers measure restrictive guidance, rules often reflect rules about unhealthy foods, and not about healthy foods (Amy van Grieken, Wang, van de Gaar, Jansen, & Raat, 2018; Vaughn et al., 2016). In addition, conceptual ambiguity exists as there is strong conceptual overlap between *restriction*, *rules* and *limits*, and *restrictive guidance*.

This aim of this study is to explicate the concepts of active and restrictive guidance of food consumption, and to operationalize the constructs using a variety of item-generation and scale validation techniques, so that it can offer some clarity into their effects on child food consumption. The overarching objective is to develop and validate a scale that accurately captures the concepts of active and restrictive guidance, which researchers can utilize in future studies.

4.1.1 Active and Restrictive Guidance of Food Consumption

In the previous chapter, I defined active guidance as “*the degree to which parents actively discuss, verbally interact, and instruct their child with regards to food*” (Yee et al., 2017). This is a broad definition that includes a

variety of proactive verbal communication about food that parents employ with regards to food. As a result, it encompasses several related constructs such as nutrition education, reasoning, teachable moments, and communicating health beliefs, that has been studied by other researchers in the past. The purpose of conceptualizing active guidance as a unique construct that comprise these myriad actions is because they are theoretically similar and that the hypothesized effects likely arise out of similar communication processes. Vaughn et al. (2016) conceptualized nutrition education and reasoning as distinct constructs, but admitted strong overlaps between them. For instance, nutrition education was defined as “*parents’ attempts to pass along information and skills to help their children make informed choices about the foods they eat*” (p,108), while reasoning was defined as “*ways in which a parent uses logic to persuade children to change their eating behavior*” (p.110).

Since both constructs involve talking about a food item’s positive or negative features, both rely on proactive verbal communication from parents that appeals to the child’s thought process when it comes to food, and both involves the transmission of both factual and evaluative information about foods, it would be more parsimonious to conceptualize these action under a single conceptual term. Investigating the operationalization of previous researchers who have used these constructs offer a look at how such a classification leads to a more parsimonious concept of the communicative actions purported to reflect nutrition education and reasoning (Musher-Eizenman & Holub, 2007; Papaioannou et al., 2013; Van Lippevelde et al., 2013; Vaughn et al., 2017; Vereecken et al., 2004). Table 7 depicts the operationalization of related constructs by other authors which I have classified

under active guidance. All the measures purported to measure distinct constructs points to a central theme of verbal communication about a food item's value to the child eating it, involving a transmission of evaluative and factual information from the parent to the child. The concept of active guidance aims to incorporate these actions into a singular construct.

On the other hand, restrictive guidance is defined as the “*frequency with which parents set limits, rules, or restrictions regarding food consumption*” (Yee et al., 2017). Where active guidance is aimed at changing behavior through persuasive argument and information, restrictive guidance aims to change behavior through an appeal to rules set by parents. Vaughn et al. (2016) conceptualized *rules and limits* as distinct from *restriction*. According to them, rules and limits reflect the “what, when, where, and how much” (p.105) foods can be eaten by the child. In contrast, restriction refers to “*parent-centered, authoritarian-type limits on a child's access to foods or opportunities to consume those foods*” (p.100). It was further argued that restriction reflected coercive practices that involve no reasoning, and can manifest in threats and punishments. Vaughn et al. (2016) suggested that the inconsistent findings for the influence of rule-setting on child food consumption was possibly due to the lack of clear conceptual separation between *rules and limits* and *restriction*.

Table 7. Operationalization of constructs related to active guidance among previous researchers

Study	Construct	Operationalization
Musher-Eizenman & Holub (2007)	Teaching about nutrition	<ol style="list-style-type: none"> 1. I discuss with my child why it's important to eat healthy foods 2. I discuss with my child the nutritional value of foods 3. I tell my child what to eat and what not to eat without explanation (R)
Papaioannou et al (2013)	Teachable moments	<ol style="list-style-type: none"> 1. To tell your child that eating fruits and vegetables will make them strong and healthy 2. To use mealtimes to teach your child about healthy eating 3. To ask your child to help you with food preparation 4. To tell your child they have to try at least a couple of bites but don't have to eat it all 5. To tell your child what will happen to them if they eat too many bad foods
Van Lippevelde et al (2013)	Communicating health beliefs	<ol style="list-style-type: none"> 1. How often do you tell your child that fruit juice/soft drinks are not good for him/her? 2. How often do you tell your child that fruit juice/soft drinks can make him/her fat? 3. How often do you tell your child that fruit juice/soft drinks are bad for his/her teeth?
Vaughn et al (2017)	Reasoning	<ol style="list-style-type: none"> 1. How often do you have to encourage your child to eat things he or she does not like (because those foods are good for him or her)? 2. How often do you encourage vegetable consumption by making a game of eating vegetables or telling a story around eating a vegetable? 3. I reason with my child to get him or her to eat 4. I negotiate with my child how much he or she can leave on his or her plate
	Nutrition Education	<ol style="list-style-type: none"> 1. How often do you try to make foods more familiar to your child by telling him or her where it came from? 2. How often do you try to make foods more familiar to your child by telling him or her where it came from? 3. I discuss with my child the nutritional value of foods 4. Do you give your child reasons for the rules you make about food and eating?
Vereecken et al (2004)	Encouragement through rationale	<p>How often do you tell your child:</p> <ol style="list-style-type: none"> 1. Fruits/vegetables are good for you 2. By eating fruits/vegetables, you will get bigger 3. Fruits/vegetables taste good 4. Fruits/vegetables are healthy
	Discouragement through rationale	<ol style="list-style-type: none"> 1. Sweets/soft drinks are unhealthy 2. Sweets/soft drinks are bad for the teeth 3. Sweets/soft drinks don't taste good 4. Sweets/soft drinks can make you fat 5. If you eat/drink too much sweets/soft drinks, you will get ill

Although this is a possible reason, Vaughn et al.'s (2016) concept of *restriction* as a parenting practice is problematic in some ways. First, it conflates parenting practices with parenting style. Conceptualizing restriction as “authoritarian” in nature, while rules and limits are conceptualized as independent of that authoritarianism, runs the risk of missing the potential moderating role that parenting style can act between rules and child food consumption outcomes. Based on Vaughn's definition, the difference between *restriction* and *rules and limits*, is that restriction involves rules that are stylistically implemented in an authoritarian manner. Parenting researchers have argued that parenting practices are context-specific behaviors and that parenting styles can serve as important moderating variables in the relation between those context-specific behaviors and hypothesized outcomes (Darling & Steinberg, 1993). In other words, parenting practices targeted at specific behaviors can have different effects when employed by parents who exhibit a different parenting style (Koerner & Fitzpatrick, 2006). This thesis takes the position of conceptually delineating parenting styles from parenting practices, so that the moderating effects of an overall parenting style can be parsed out to better understand its influence across a variety of parenting practices. As such, restrictive guidance refers specifically to rules and limits regarding food consumption, and does not reflect any stylistic facets regarding the implementation of those rules.

In order to operationalize active and restrictive guidance of food consumption, I utilized a number of techniques that lead to the development and validation of the parental active and restrictive guidance questionnaire (PARQ). The scale development procedure follows three main phases: (1) the

substantive validity phase, where I define the concept and develop an item pool, (2) the structural validity phase, where I collected data from a sample of 246 children and psychometrically evaluate the data to explore the factor structure that underlies active and restrictive guidance, and (3) the external validity phase, where I explore the scale's validity in relation to related constructs (Simms, 2008). Following the process, a second sample of children was utilized to conduct confirmatory factor analysis (CFA).

4.2 Method

4.2.1 Item Pool Development

To develop the scale, I followed the best practices laid out in Carpenter's (2018) guide to scale development for communication researchers. To build an item pool, I first collated all the studies highlighted in Study One which reflected facets of active and restrictive guidance. Following that, I extracted all the relevant items that were categorized under either active or restrictive guidance from each study that were identified to have measured these two variables. These included sub-scales from established scales such as the teaching nutrition sub-scale, and the restriction for health and weight sub-scales in the Comprehensive Feeding Practices Questionnaire (Musher-Eizenman & Holub, 2007). In total, 118 items reflecting either active or restrictive guidance was extracted from all the identified studies.

As most previous studies on parenting practices were conducted in the West and not in Asia, I conducted semi-structured face-to-face in-depth interviews with 14 parents in Singapore to bolster the item pool, and to consider potential culturally-specific food parenting practices (See *Appendix A* for the Interview Guide). In total, 9 mothers and 5 fathers who had children between the

ages of 9 and 18 took part in the interview. After obtaining approval from the university's ethics board (IRB-2017-01-037), the sample of Singaporean parents were obtained through convenient sampling, and each interview lasted between thirty minutes and one-hour thirty minutes and was conducted in a mix of English and Mandarin. Following data collection, the interviews were then translated when necessary, transcribed, analyzed, and coded line-by-line. In total, 10 additional items that were dissimilar to the 118 items previously extracted were included in the item pool¹⁵. Following that, there were a total of 128 items in the item pool.

In order to minimize the burden on participants during data collection, a sorting procedure to reduce the number of items in the item pool was conducted with six participants. Participants were given the definitions of active and

¹⁵ In order to develop the items from the interviews, each transcript was coded line-by-line using the R package RQDA (Ronggui, 2016). In total, 17 overarching codes for food parenting practices were found from all 14 transcripts. These included “educating with examples”, “sneaking food”, “nutrition education”, “praise”, and “rules and limits” among others. Following that, I looked through the lines organized under codes that reflect verbal promotion or prevention of foods (e.g. “educating with examples”) and codes that reflect restrictive guidance (e.g. “rules and limits”) to identify unique practices that can be classified as active or restrictive guidance (e.g. parents using stories to show why eating fruits and vegetables is good for children) that were not represented in the existing 118 items. This was achieved through constant comparison of each identified practice with the 118 existing items. This means that each coded line that detailed a parenting practice was compared with all 118 existing items to examine if it had already been captured in an existing item. As many of the parenting practices had already been captured in previous measures, only 7 additional items (I apologize for the error where I stated 10 items were generated, as 3 were found to be duplicative of existing measures) were yielded. These 7 items were: “My parents would use stories to show why eating fruits and vegetables is good for me”; “My parents explain to me that nutrient in healthy foods help prevent me from falling sick”; “My parents explain to me that sweet foods/drinks serve no purpose to my health”; “My parents tell me my teeth will look bad if I take too much sweet foods/drinks”; “If ate too much of one thing in the past few days, my parents will tell me to eat avoid that food”; and “My parents won’t punish me if I take sweets without permission”.

restrictive guidance, and told to categorize the 128 items as either active or restrictive. A third category labelled “does not fit” was used to categorize items that they do not feel fell neatly under the two categories. During the sorting procedure, two categories of sorted items emerged. The first category included items that had 100% agreement among all six participants. The second category consisted of items that did not have 100% agreement among the six participants. For items that fell in different categories (e.g. classified as active guidance by some, and restrictive guidance by others), a majority rule was imposed where the item was assigned to the overarching concept where 3 or more participants agreed. No items had an equal split of participants assigning them to different categories. In total, 56 items were categorized under active guidance, while 48 items were categorized under restrictive guidance, indicating that 24 items were discarded. The final item pool of 104 items was included in a survey that was used to evaluate its psychometric properties and validity.

4.2.2 Participants and Procedures

In order to collect the data necessary to evaluate the factor structure of the collated item pool, a convenience sample of 246 children and adolescents aged between 9 and 18 ($M = 13.15$, $SD = 2.28$) was recruited to take part in a self-administered survey. 35.4% of the sample were primary school children (12 and below), while 64.6% of the sample were secondary school students (13 and above). The sample had slightly more girls (56.9%) than boys (43.1%), and an ethnic distribution of 78.9% Chinese, 11.4% Malay, 4.5% Indian, and 5.3% of other races, roughly reflecting the ethnic distribution of the population of Singapore (Department of Statistics, 2010). Approval from the university’s ethics board (IRB-2017-10-015), along with informed parental consent, and child

assent, was obtained before administering the survey with the participants. The participants were recruited through a variety of mediums, from posting on online platforms where parents frequent, such as parent groups on Facebook, through personal networks, and through street interception in public parks where children frequent. The informed consent forms clearly stated that participants do not have an obligation to complete the survey, and are free to leave the study at any point in time without any repercussions. Participants were given a choice to fill out the survey through Qualtrics, or through a paper-and-pencil survey that was delivered to them. In total, 50 participants chose to complete the survey online, and 196 completed a paper-and-pencil survey, with each survey lasting between 40 minutes to an hour.

4.2.3 Measures

The survey consisted of 104 items from the item pool, as well as measures representing variables that would be used for validity checks. These include attitude, perceived social norms, perceived behavioral control, intention, and consumption of fruits, vegetables, and SSB to determine criterion validity. Scales and sub-scales theoretically related to active and restrictive guidance, such as the teaching about nutrition sub-scale from the Comprehensive Feeding Practices Questionnaire (CFPQ) (Musher-Eizenman & Holub, 2007), were measured to evaluate convergent validity.

Active and restrictive guidance of food consumption were measured using the 104 items from the item pool. As some of the items were obtained from scales intended to be administered to parents, wording on some items were adapted to cater to child participants. For example, the item “I discuss why it’s important to eat healthy foods” was changed to “My parents discuss why

it's important to eat healthy foods". All items were measured on five-point scales, asking participants how much they agree to each statement, with 1 being "Strongly Disagree" and 5 being "Strongly Agree".

Attitude towards consuming fruits/vegetables/SSB were measured by asking children to rate how much they agree with statements indicating how positive or negative they felt about fruits, vegetables, and SSB, on five-point scales, with 1 being "Strongly Disagree" and 5 being "Strongly Agree". Five statements per food category were utilized to measure their attitude towards consuming each respective food category. One example of a statement would be "It is enjoyable to eat/drink fruits/vegetables/SSB at least once a day". The scale was developed according to guidelines by Fishbein & Ajzen (2010).

Perceived norms toward consuming fruits/vegetables/SSB were measured by asking children to rate how much they agree with statements reflecting both descriptive norms (e.g. "Most people like me eat/drink fruits/vegetables/SSB once a day") and injunctive norms (e.g. "It is expected of me that I eat/drink fruits/vegetables/SSB once a day) regarding the consumption of fruits, vegetables, and SSB. Three statements measuring descriptive norms and two statements measuring injunctive norms on five-point scales, with 1 being "Strongly Disagree" and 5 being "Strongly Agree", were utilized in this study. The scale was developed according to guidelines by Fishbein & Ajzen (2010).

Perceived behavioral control towards consuming fruits/vegetables/SSB was measured by asking children to rate how much control they think they have, on five-point scales (with 1 being "Strongly Disagree" and 5 being "Strongly Agree"), over their consumption of fruits, vegetables, and SSB. Four

items per food category were utilized to measure their perceived behavioral control towards each respective food category. Likewise, the scale was developed according to guidelines by Fishbein & Ajzen (2010).

Intention to consume fruits/vegetables/SSB was measured by asking children how much they agreed with three statements concerning their intention to consume fruits/vegetables/SSB at least once a day in the following month, on 5-point scales ranging from “strongly disagree” (1) to “strongly agree” (5). The scale was developed according to guidelines by Fishbein & Ajzen (2010).

Fruit consumption was measured using a customized food frequency questionnaire (FFQ) that asks how often children consume 7 categories of fruits (apples and pears, berries and cherries, kiwis and grapes, stonefruits, citrus fruits, tropical fruits, and tomatoes and brinjal). The food categories were based on the categorization of fruits by FairPrice, Singapore’s biggest supermarket brand with the highest percentage of market share in the country. Since many families purchase their groceries there, the categorizations would be more familiar to children than those from other FFQs. To further aid children in their identification of the food items, a picture is placed alongside the food category in question. The response categories range from 1 being none at all, to 6 being “3 or more times a day”.

Vegetables consumption was measured using a customized food frequency questionnaire (FFQ) that asks how often children consume 7 categories of vegetables (broccoli and cauliflower, asparagus and sprouts, green leafy vegetables, beans and peas, carrots and roots, celeries, cabbages, and lettuces, and squashes). The food categories were based on the categorization of fruits by FairPrice, Singapore’s biggest supermarket brand with the highest

percentage of market share in the country. Since many families purchase their groceries there, the categorizations would be more familiar to children than those from other FFQs. To further aid children in their identification of the food items, a picture is placed alongside the food category in question. The response categories range from 1 being none at all, to 6 being “3 or more times a day”.

SSB consumption was measured using a customized food frequency questionnaire (FFQ) that asks how often children consume 7 categories of SSB (soft drinks, fruit teas, bubble tea, fruit juice, malted drinks, traditional brewed drinks, and isotonic drinks). To further aid children in their identification of the food items, a picture is placed alongside the SSB category in question. The response categories range from 1 being none at all, to 6 being “3 or more times a day”.

Teaching about nutrition, a sub-scale from the CFPQ (Musher-Eizenman & Holub, 2007) was measured by asking children how much they agreed to three different statements on the teaching about nutrition sub-scale (e.g. “My parents discuss with me why it's important to eat healthy foods”), on a five-point scale ranging “strongly disagree” (1) to “strongly agree” (5).

Encouragement and discouragement through rationale (Vereecken et al., 2004) was measured by asking children how much they agreed to four statements per food category (fruits, vegetable and SSB) about whether their parents encourage or discourage them to consume certain foods on a five-point scale (e.g. “My parents tell me eating vegetables will make me bigger”) ranging “strongly disagree” (1) to “strongly agree” (5).

Active encouragement (De Bourdeaudhuij et al., 2005) was measured by asking children how much they agreed to the statement “My parents encourage

me to eat fruits everyday” on a five-point scale ranging “strongly disagree” (1) to “strongly agree” (5).

Parental support for healthy eating (Cutler, Flood, Hannan, & Neumark-Sztainer, 2011) was measured by asking children how much they agreed with two statements about whether their parents show a concern and offer substantial encouragement to eat healthily (e.g. “My parents care about eating healthy food). These were measured on a five-point scale ranging “strongly disagree” (1) to “strongly agree” (5).

Encouraging balance and variety, a sub-scale from the CFPQ (Musher-Eizenman & Holub, 2007) was measured by asking children how much they agreed to five statements on the encouraging balance and variety sub-scale (e.g. “My parents encourage me to eat a variety of foods”), on a five-point scale ranging “strongly disagree” (1) to “strongly agree” (5).

Overt control, a sub-scale from the parental control scale developed by Ogden (2006) was measured by asking children how much they agreed to three statements on how firm their parents are about what, when, where, and how much they eat (e.g. “My parents are firm about what I should eat”), measured on a five-point scale ranging “strongly disagree” (1) to “strongly agree” (5).

Demand family rule (De Bourdeaudhuij et al., 2008) was measured by asking children how much they agreed to two statements indicating that their parents demanded them to eat certain foods (e.g. “My parents demand that I eat vegetables every day”), measured on a five-point scale ranging “strongly disagree” (1) to “strongly agree” (5).

Restriction, a sub-scale from the Child Feeding Questionnaire (CFQ) (Birch et al., 2001), was measured by asking children how much they agreed to

four statements on the restriction sub-scale of the CFQ (e.g. “My parents make sure that I do not eat too many sweets (candy, icecream, cake, or pastries)”), on a five-point scale ranging “strongly disagree” (1) to “strongly agree” (5).

4.2.4 Analytical Approach

In order to assess the underlying factor structure of the 104 items in the item pool, I conducted exploratory factor analysis (EFA) on SPSS 22, adopting several key best practices as recommended by Carpenter (2018). First, I examined the data quality and addressed missing data using the expectation-maximization algorithm, a recommended maximum likelihood estimation-based method of replacing missing values without losing statistical power (Dong & Peng, 2013). Next, I assessed the factorability of the data using both the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett’s Test of Sphericity. Following that, I selected principal axis factoring (PAF) as the extraction method to extract latent variables from observed variables, as it is the most robust extraction method and is recommended for use with small sample sizes (Carpenter, 2018). Next, I determined the number of factors to be extracted using parallel analysis through the SPSS macro developed by (O’Connor, 2000). Parallel analysis involves the comparison of eigenvalues from one’s data with eigenvalues from random datasets, and is considered to be more robust in determining the correct number of factors when compared to the eigenvalue greater than one rule and the Scree test (Humphreys & Montanelli Jr., 1975; Watkins, 2005; Zwick & Velicer, 1982). Once the number of factors was determined by parallel analysis, I fixed the number of factors according to the parallel analysis results and conducted PAF using an oblique (Promax) rotation, as some correlations among factors were expected (Costello &

Osborne, 2005). Following the initial EFA, I analyzed the pattern matrix and deleted items that theoretically did not belong in the same factor, had a loading below .50, and cross-loaded items with a difference equal or above .20. After the deletion of items, the entire process from parallel analysis to EFA was repeated. This process was repeated until clean factors with items that had loadings above .50 on a single factor, no cross-loadings, and were theoretically sound, were identified.

Following EFA, convergent validity and criterion validity was evaluated based on the correlation of factors with related constructs. Lastly, data was collected from a separate sample of 1,113 children and adolescents to confirm the factor structure through confirmatory factor analysis (CFA), executed with the package *lavaan* in *R* (Rosseel, 2012). In accordance with best practices in scale development (Costello & Osborne, 2005; Henson & Roberts, 2006; Worthington & Whittaker, 2006), the CFA was conducted with a separate sample in order to test whether the factor structure holds across samples. The maximum likelihood procedure was used to estimate the unknown parameters in the model. The goodness of fit of the model was evaluated on the basis of the comparative fit index (CFI) of .95 or greater, the non-normed fit index (NNFI) of .95 or greater, root mean square error of approximation (RMSEA) less than or equal to .05, and the standardized root mean square residual (SRMR) less than or equal to .05 (Bentler & Bonett, 1980; Browne, Cudeck, & Chudeck, 1993; Hu & Bentler, 1999).

4.3 Results

4.3.1 Scale Construction and Exploratory Factor Analysis

First, the factorability of the 104 items was examined. The Kaiser-Meyer-Olkin measure of sampling adequacy was .92, while Bartlett's test of sphericity was statistically significant ($\chi^2(5356) = 22383.65, p < .001$), indicating that the data is highly suitable for factor analysis. The initial parallel analysis revealed that 8 factors underlie the 104 items. An initial EFA with Promax rotation was conducted with the number of factors fixed to 8. Following the initial EFA, 33 items were removed as they either cross-loaded or indicated factor loadings below .50. The parallel analysis and EFA procedure was repeated six times before a clean factor solution of 6 factors explaining 62.04% of the variance was found. As only four factors were found to be theoretically meaningful, items from the other 2 factors were dropped, resulting in a final factor solution of 4, with a total of 30 items that explained 65.91% of the variance. Table 8 shows the final factor solution of the 30 item PARQ, with all items indicating satisfactory factor loadings above .50 (Hair, Black, Babin, & Anderson, 2014). Factor 1 consists of 9 items reflecting active parental guidance of food consumption ($\alpha = .93$). Factor 2 consists of 7 items reflecting general discussion about food consumption ($\alpha = .89$). Factor 3 consists of 8 items that measures prevention-focused restrictive guidance of food consumption ($\alpha = .93$), while Factor 4 consists of 6 items measuring promotion-focused restrictive guidance of food consumption ($\alpha = .90$).

Table 8. PARQ = items and factor loadings

How much do you agree with the following statements?	Loading
Factor 1 – Active Parental Guidance of Food Consumption	
<i>APG1</i> My parents discuss with me why it's important to eat healthy foods	.74
<i>APG2</i> My parents discuss with me the nutritional value of foods	.71
<i>APG3</i> My parents explain to me why I should eat more or less of a particular food	.75
<i>APG4</i> My parents discuss with me about the health benefits of a food	.85
<i>APG5</i> My parents discuss with me the importance of eating a variety of foods	.72
<i>APG6</i> My parents explain to me the effects of different nutrients (e.g. Vitamin C, calcium)	.77
<i>APG7</i> My parents explain to me why nutrients in healthy foods prevent me from falling sick	.78
<i>APG8</i> My parents explain to me why some foods like sweet foods/drinks serve no purpose to my body	.64
<i>APG9</i> My parents explain to me why it is important to have a balanced diet	.80
Factor 2 – General Discussion About Food Consumption	
<i>GPG1</i> My parents talk to me about the food I eat during recess	.58
<i>GPG2</i> My parents reason with me to get me to eat	.62
<i>GPG3</i> My parents give me reasons for the rules they make about food and eating	.61
<i>GPG4</i> My parents try to make foods more familiar by telling me where it came from	.76
<i>GPG5</i> My parents tend to talk more often about foods they would like me to eat	.69
<i>GPG6</i> My parents advise me what I should eat during recess	.71
<i>GPG7</i> My parents try to talk more often about foods they would like me to eat	.77
Factor 3 – Restrictive Guidance of Food Consumption (Preventive)	
<i>RPGe1</i> If I had some sweet drinks already, my parents would tell me I can't have it anymore.	.71
<i>RPGe2</i> My parents sets limits to how much sweet drinks I can drink	.75
<i>RPGe3</i> When my parents give me a sweet drink, they tell me I can only have one today	.82
<i>RPGe4</i> My parents set limits to how much sweet drinks I can drink everyday	.86
<i>RPGe5</i> My parents limit the amount of sweet drinks I drink	.84
<i>RPGe6</i> My parents limit opportunities for me to drink sweet drinks	.75
<i>RPGe7</i> My parents limit how often sweet drinks are in the home	.74
<i>RPGe8</i> My parents tell me which sweet drinks I am allowed to consume	.72
Factor 4 – Restrictive Guidance of Food Consumption (Promotive)	
<i>RPGo1</i> My parents insist that I must eat vegetables during meals with them	.74
<i>RPGo2</i> My parents give me fruits and makes me eat them	.85
<i>RPGo3</i> My parents give me vegetables during meals and makes me eat them	.80
<i>RPGo4</i> My parents insist I must finish my vegetables	.76
<i>RPGo5</i> My parents demand that I eat fruit every day	.56
<i>RPGo6</i> My parents demand that I eat vegetables every day	.69

4.3.2 Convergent Validity

In order to assess the convergent validity of the scales, *a priori* predictions regarding its correlation with other related measures found in the literature was made. Active parental guidance and general discussion about food consumption was predicted to correlate with the teaching about nutrition and encourage balance and variety subscales in the CPFQ (Musher-Eizenman & Holub, 2007), encouragement and discouragement through rationale scales (Vereecken et al., 2004), active encouragement (De Bourdeaudhuij et al., 2005), and parental support for healthy eating (Cutler et al., 2011). As illustrated in Table 9, active guidance and general discussion were significantly correlated with all the related measures suggesting good convergent validity.

Table 9. Correlations between factor 1 and 2 with related scales and sub-scales

Variable	AG	GD
1. Active guidance (PARQ)	1	
2. General discussion (PARQ)	.65***	1
3. Teaching about nutrition (CPFQ)	.86***	.64***
4. Balance and variety (CPFQ)	.66***	.47***
5. Encourage rationale fruits	.56***	.45***
6. Encourage rationale veg	.58***	.47***
7. Discourage rationale SSB	.62***	.61***
8. Active encouragement	.55***	.35***
9. Parental support of healthy eating	.52***	.32***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Table 10. Correlations between factor 3 and 4 with related scales and sub-scales

Variable	RGpre	RGpro
1. Restrictive guidance (Prevention) (PARQ)	1	
2. Restrictive guidance (Promotion) (PARQ)	.60***	1
3. Restriction (CFQ)	.71***	.53***
4. Demand family rule	.53***	.85***
5. Overt control	.48***	.48***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

On the other hand, both prevention- and promotion-focused restrictive guidance was predicted to correlate with the restriction subscale in the CFQ (Birch et al., 2001), the demand family rule measure (De Bourdeaudhuij et al., 2005), and the parental overt control subscale (Ogden, Reynolds, & Smith, 2006). As illustrated in Table 10, both prevention- and promotion-focused restrictive guidance were significantly associated with the theoretically related scales and sub-scales, suggesting good convergent validity.

4.3.3 Criterion Validity

To assess criterion validity, I examined the correlations between the scales and potential hypothesized outcomes. Specifically, active guidance was significantly correlated with fruit consumption ($r = .29, p < .001$) and vegetables consumption ($r = .29, p < .001$). In the same vein, active guidance was significantly correlated with attitude towards fruit ($r = .22, p < .001$), perceived norms regarding fruit consumption ($r = .42, p < .001$), intention to consume fruits ($r = .22, p < .01$), but not perceived behavioral control towards fruit consumption ($r = .08, p = .20$). Active guidance was also significantly correlated with attitude towards vegetables ($r = .32, p < .001$), perceived norms towards vegetables consumption ($r = .31, p < .001$), perceived behavioral control towards vegetables consumption ($r = .18, p < .01$), and intention to consume vegetables ($r = .23, p < .001$). Although active guidance was not correlated with SSB consumption ($r = .05, p = .48$), it was negatively correlated with attitude towards SSB ($r = -.21, p < .01$), perceived norms towards SSB ($r = -.17, p < .01$), and perceived behavioral control towards SSB consumption ($r = -.25, p < .001$).

General discussion was significantly correlated with fruit consumption ($r = .19, p < .01$) and vegetables consumption ($r = .18, p < .01$). There was no correlation between general discussion and attitude towards fruits ($r = .01, p = .89$), as well as perceived behavioral control towards fruit consumption ($r = .00, p = .96$). However, it was significantly associated with perceived norms regarding fruit consumption ($r = .42, p < .001$) and intention to consume fruits ($r = .14, p < .05$). General discussion was significantly correlated with attitude towards vegetables ($r = .18, p < .01$), perceived norms towards vegetables consumption ($r = .29, p < .001$), perceived behavioral control towards vegetables consumption ($r = .20, p < .01$), and intention to consume vegetables ($r = .22, p < .01$). Regarding the relationship between general discussion and SSB consumption, only perceived behavioral control had a significant correlation ($r = -.17, p < .05$).

Prevention-focused restrictive guidance was correlated with attitude towards SSB ($r = -.16, p < .01$), perceived norms towards SSB consumption ($r = -.35, p < .001$), and perceived behavioral control towards SSB consumption ($r = -.40, p < .001$), but not with intention to consume SSB ($r = -.09, p = .17$) and SSB consumption ($r = -.11, p = .09$). Promotion-focused restrictive guidance was associated with fruit consumption ($r = .25, p < .001$) and vegetables consumption ($r = .30, p < .001$). In the same vein, promotion-focused restrictive guidance was significantly correlated with attitude towards fruit ($r = .21, p < .01$), perceived norms regarding fruit consumption ($r = .45, p < .001$), intention to consume fruits ($r = .25, p < .001$), but not perceived behavioral control towards fruit consumption ($r = .09, p = .18$). Promotion-focused restrictive guidance was also significantly correlated with attitude towards vegetables ($r =$

.26, $p < .001$), perceived norms towards vegetables consumption ($r = .45$, $p < .001$), perceived behavioral control towards vegetables consumption ($r = .30$, $p < .001$), and intention to consume vegetables ($r = .32$, $p < .001$).

4.3.4 Confirmatory Factor Analysis

In order to conduct the CFA, I administered computer-assisted self-administered surveys in person with a large-scale nationally representative sample of 1,113 children and adolescents aged between 9 and 18 ($M = 12.56$, $SD = 1.77$). 47.3% of the sample were primary school children, while 52.7% of the sample were secondary school students. The sample had slightly more girls (53.7%) than boys (46.3%), and an ethnic distribution of 77.4% Chinese, 11.4% Malay, 5.3% Indian, and 5.9% of other races, roughly reflecting the ethnic distribution of the population of Singapore (Department of Statistics, 2010).

Prior to the survey, approval from the university's ethics board (IRB-2017-11-012), along with approval from the Ministry of Education (EDUN N32-07-005) was obtained. Following that, I utilized multi-stage cluster sampling in order to obtain a random sample of child and adolescent participants. First, a list of public schools was obtained from Singapore's Ministry of Education that divided schools into four different regional zones (north, south, east, and west). I randomly selected one primary school and one secondary school from each zone, and sent out invites to the principals and heads of department (physical education) of each school to request for their participation in the study. If the request was turned down, another school (either primary or secondary depending on which school rejected) from the zone would be invited to take part in the study. The invitation process would continue until one primary school and one secondary school per regional zone had agreed to

take part in the study. Once permission was granted from the principals of those schools to conduct the survey, informed parental consent forms were sent to the parents of four classes (approximately 160 students) of students. If the parents consented to the survey, the child will be invited to complete the survey in his or her respective school's computer lab during a physical education lesson, assembly, or a free period, in the presence of a teacher and a researcher. Using Foy's (1989) method of calculating response rates¹⁶, the combined response rate for the primary sampling unit (schools) is 5.7%, while the combined response rate for the secondary sampling unit (students) is 69.8%. Each questionnaire took about 30 minutes to complete.

After collecting the data, CFA was conducted through the lavaan package using the statistical program *R* (Rosseel, 2012). The four-factor model with the original 30 items from the PARQ provided a decent, but not excellent, fit for the data ($\chi^2(399) = 1539.16, p < .000$; CFI = .93; NNFI = .93; RMSEA = .06, SRMR = .04). Consulting the modification indices highlighted five problematic items that were detrimental to the model fit. These problematic items were identified by their high modification indices value (in this case, above 80 in total for each item). As a result, APG3, APG7, RPGe4, RPGo5, and RPGo6 were dropped. This new 25 item four-factor model provided good fit for the data ($\chi^2(246) = 763.31, p < .000$; CFI = .97; NNFI = .97; RMSEA = .04, SRMR = .04). All parameter estimates were significant at $p < .001$, and all factor loadings on latent variables were above .60, indicating unidimensionality

¹⁶ Response rate was calculated by dividing the total number of participating schools/students by the total number of schools/students invited, multiplied by 100.

(Hair et al., 2014). Figure 3 illustrates the CFA results conducted with the 25 item four-factor model of the PARQ.

Figure 3. Confirmatory factor analysis of the 25 item four-factor PARQ model. $\chi^2(246) = 763.31, p < .000$; CFI = .97; NNFI = .97; RMSEA = .04, SRMR = .04. * $p < .05$. ** $p < .01$. *** $p < .001$.

4.4 Discussion

In this study, I attempted to develop a scale to assess parental active and restrictive guidance using recommended methods of scale development and validation. I found 25 items falling into four distinct factors. Some of the factors are similar to parenting practices conceived by other researchers, such as teaching about nutrition, nutrition education, restriction, and rules and limits (Kaur et al., 2006; Musher-Eizenman & Holub, 2007; Vaughn et al., 2017; Vereecken et al., 2004). Despite this, the study has some important contributions to the field. First, I found that active guidance is more than just factual nutrition education, but communication that also involves *evaluative* information about food that parents transmit to children. Second, general discussion about food reflects a less persuasive and less informative approach to talking about food from parents. Such a practice have yet to be discussed or explored by researchers in the field. Last, I found a distinct difference between rules that are meant to promote healthier food consumption, and rules that are meant to prevent the consumption of unhealthy foods. The PARQ showed good convergent and criterion validity, and a CFA has shown that the factors are robust with good model fit using a separate sample of children.

One important contribution of Study Two is that it clarified the concept of active parental guidance about food consumption. Based on the robust 7-item sub-scale, we can see that the earlier definition of active guidance as “*the degree with which parents actively discuss, verbally interact, and instruct their child with regards to food*” (Yee et al., 2017) needs to be redefined. According to the results, one core feature is that there is an *evaluative* slant to the discussions about food by parents who employ active guidance. Active

guidance involves more than the transmission of facts, but also parents' values and judgements about food. It can convey information about whether certain foods are "approved" by parents, and have the potential to shape children's attitudes and norms regarding food consumption. In research on parental mediation on media consumption, researchers have distinguished between *factual* and *evaluative* mediation (Austin, Bolls, Fujioka, & Engelbertson, 1999; Austin, Pinkleton, & Fujioka, 2000; Nathanson, 2001, 2004; Rasmussen, 2013). In this conceptualization, *factual* active mediation refers to children being informed about the technical aspects of television content, and has been found to be ineffectual in alleviating undesirable media effects on children (Nathanson, 2004; Nathanson & Yang, 2003). On the other hand, *evaluative* active mediation reflect parents' attempts to create evaluations of television content in children's minds by providing positively- or negatively-valenced opinions, and are considered to be more effective (Nathanson, 2004). Researchers who are hoping to find effective active guidance or nutrition education parental practices should take this into account when conducting future studies on the role active guidance play in shaping children's food preferences. In other words, active guidance requires parents to actively interpret facts and communicate the meanings of those facts about food to children, in order for it to be effective.

Next, the EFA revealed a second factor that reflects a more general form of discussion about food, and provides some insight into the complexity and nuance of parental discussion about food. The general discussion sub-scale consists of 6 items that reflect a less informative and less persuasive way of talking about food, and the criterion validity tests showed that it was not as

strong a predictor of food consumption outcomes when compared to active guidance. In other words, it reflects a feature of what parents do, but its socialization effects on children requires further research to clarify. Chapter V will attempt to explore if general discussion plays an important role in socializing children to a healthier diet.

Table 11. Final validated 25-item PARQ

How much do you agree with the following statements?
Active Parental Guidance of Food Consumption <i>APG1</i> My parents discuss with me why it's important to eat healthy foods <i>APG3</i> My parents explain to me why I should eat more or less of a particular food <i>APG4</i> My parents discuss with me about the health benefits of a food <i>APG5</i> My parents discuss with me the importance of eating a variety of foods <i>APG6</i> My parents explain to me the effects of different nutrients (e.g. Vitamin C, calcium) <i>APG8</i> My parents explain to me why some foods like sweet foods/drinks serve no purpose to my body <i>APG9</i> My parents explain to me why it is important to have a balanced diet
General Discussion About Food Consumption <i>GPG1</i> My parents talk to me about the food I eat during recess <i>GPG2</i> My parents reason with me to get me to eat <i>GPG3</i> My parents give me reasons for the rules they make about food and eating <i>GPG4</i> My parents try to make foods more familiar by telling me where it came from <i>GPG5</i> My parents tend to talk more often about foods they would like me to eat <i>GPG6</i> My parents advise me what I should eat during recess <i>GPG7</i> My parents try to talk more often about foods they would like me to eat
Restrictive Guidance of Food Consumption (Preventive) <i>RPGe1</i> If I had some sweet drinks already, my parents would tell me I can't have it anymore. <i>RPGe2</i> My parents sets limits to how much sweet drinks I can drink <i>RPGe3</i> When my parents give me a sweet drink, they tell me I can only have one today <i>RPGe5</i> My parents limit the amount of sweet drinks I drink <i>RPGe6</i> My parents limit opportunities for me to drink sweet drinks <i>RPGe7</i> My parents limit how often sweet drinks are in the home <i>RPGe8</i> My parents tell me which sweet drinks I am allowed to consume
Restrictive Guidance of Food Consumption (Promotive) <i>RPGo1</i> My parents insist that I must eat vegetables during meals with them <i>RPGo2</i> My parents give me fruits and makes me eat them <i>RPGo3</i> My parents give me vegetables during meals and makes me eat them <i>RPGo4</i> My parents insist I must finish my vegetables

Last, I found that restrictive guidance, or rules and limits, is context-driven, where restrictive guidance regarding the eating of healthy foods (promotive) is distinctly different from restrictive guidance regarding the eating of less healthy foods (preventive). In Chapter III, other researchers and myself have noted that restrictive guidance, or rules and limits, often saw mixed results in terms of whether it is associated with less unhealthy food consumption (Vaughn et al., 2016). By separating rules into eating contexts, it might be possible to find more consistent results that are context-dependent.

There are some limitations to this study. As the initial study was conducted with a convenience sample of children, the data might represent the views of only a subset of children in Singapore if the profile of the sample is skewed. Despite this, efforts to prevent this was taken, by reaching out to as broad a group of participants as possible. This included advertising on public online platforms and intercepting strangers in public areas in addition to reaching out to immediate contacts for respondents. Moreover, a second nationally-representative sample was utilized to confirm the factor structure, suggesting that the factor solution offered by the initial sample was robust. In spite of its limitations, this study has provided some clarification into the concepts of active, general, and restrictive guidance of children's food consumption, highlighting theoretical nuances that can affect their effectiveness to shape children's food choices. It offers a tool for researchers to build on in the future, and a conceptual framework to better understand how the communicative actions taken by parents can shape the food consumption of children.

CHAPTER V

Study Three (A)

INTEGRATING PARENTAL GUIDANCE AND THE THEORY OF PLANNED BEHAVIOR

5.1 Background

While the role of parental guidance has been clarified in Chapter IV, one important research gap identified in Chapters I, II, and III is that even though parental guidance is a communicative action, the communication process of *why* and *how* it influences behavior is often understudied. As I had discussed earlier, although there is a growing amount of research examining the influence of parents on child food consumption behaviors, most of the studies have looked at direct relationships between parenting practices and child food consumption behavior, neglecting to examine the cognitively mediated pathways with which child food consumption is influenced. Since parents serve as primary socialization agents in children's lives, they are influential in helping children form beliefs about what constitutes good and appropriate food choices (Dotson & Hyatt, 2005; Pedersen et al., 2012). In other words, they potentially represent the levers of change that can influence the behavioral, normative, and control beliefs identified by the theory of planned behavior (Ajzen, 2011).

One way to understand the parental socialization of food consumption process is to view social agents in the interpersonal sphere as antecedents to the cognitive drivers of behavior in the intrapersonal sphere. This serves to fill a gap in the research on the theory of planned behavior as well. While the theory of planned behavior has been shown to be predictive in the context of food consumption (Armitage & Conner, 1999, 2001), it does not specify how

cognitions change, making it limited in its utility (Sniehotta et al., 2014). In other words, the theory of planned behavior identifies which levers to pull for behavioral change, but does not indicate how they can be shifted. Some scholars have suggested that, one way researchers can build on the theory of plan behavior is to identify behavior change techniques that might influence the three proximal predictor variables in the theory of planned behavior (Conner, 2015).

As such, I propose to merge these two lines of research such that the theory of planned behavior is extended with parental guidance as antecedents. This addresses gaps in the two lines of research, allowing for the development of a parental model of behavioral change that identifies meaningful change mechanisms on the interpersonal-level. Figure 4 depicts the conceptual approach taken to integrate parental guidance with the theory of planned behavior.

Figure 4. Conceptual framework depicting how parental guidance influences food consumption

There are two central assumptions that guide this theoretical integration. First, as I had discussed in Chapter II (which I will re-emphasize here), is that the proximal predictors of the theory of planned behavior – attitude, perceived

norms, and perceived behavioral control –, are beliefs that are products of communication. For example, attitudes refer to a general evaluation of an object, but is shaped by the frequency, recency, and importance of a belief about a behavior, which is in turn shaped by the communication surrounding the behavior in question (Ajzen, 2001). Likewise, perceived norms are social beliefs, and are shaped by significant others through communicative actions (Lapinski & Rimal, 2005). Perceived behavioral control is also shaped by beliefs that are in turn communicated to an individual through the social environment. As we can see, communication is at the heart of shaping the beliefs that are central to the theory of planned behavior.

Second, as I had also earlier discussed in Chapter II, is that parental guidance is at its root a communication phenomenon that involves the transmission of information, values, attitudes, normative beliefs, and control beliefs to children. The content of parental communication shapes those beliefs, and ultimately, the behavior of children. For example, parents who communicate frequently and emphatically about why eating or avoiding certain foods are important, can increase the accessibility of beliefs that lead to a child's attitude towards consuming certain foods, shaping the likelihood of them eating or choosing to avoid certain foods (Lwin et al., 2017).

Since active guidance consists of persuasive messages highlighting healthy food as *positive*, it can be argued that active guidance shapes children's food consumption behavior through the building of positive associations about healthy foods, positive normative beliefs about eating healthy foods, and positive perceived behavioral control with regard to eating healthy foods more accessible to the child. The evidence so far offers support for these assertions.

In Chapter IV, Study Two found that active guidance, especially with an evaluative slant, is associated with attitudinal beliefs about healthy and unhealthy foods, normative beliefs about certain foods, behavioral beliefs to consume certain foods. To add to that, Lwin et al. (2017) found that the effect of active guidance on healthy food was positively associated with attitude towards consuming fruits and vegetables, which was in turn associated with higher fruits and vegetables consumption, even though they excluded perceived social norms and perceived behavioral control as a mediator between active guidance and healthy food consumption. In the same vein, as active guidance includes evaluative content about unhealthy foods being *negative*, the reverse effect where active guidance leads to negative attitudinal, normative, and control beliefs, about unhealthy foods will take place, as demonstrated in Study Two.

Likewise, restrictive guidance has the potential to shape children's beliefs about food consumption. Even though rules may lack strong message content, there is an underlying implicit message from parents that certain foods are *good* or *bad* for children based on the rules they set about those foods. Promotive rules indicate children should consume more of a certain food, while preventive rules indicate that parents think the child should consume less of a certain food, implicitly conveying to children the inherent *value* of the foods in question. Parents who communicate rules and restrictions can shape beliefs about what an child believes he or she ought to do in a given behavioral situation, influencing their normative beliefs about a behavior (Ajzen, 2015). In contrast, parents who do not set any rules regarding an undesirable behavior would logically entail children having a greater perception of control over that

behavior. Once more, the evidence so far offers some support for these assertions. One study found that the effect of rules on vegetables intake was mediated through self-efficacy, a similar construct to perceived behavioral control (Melbye et al., 2013). Another study found perceived parental control of sugary drinks and less healthy foods was associated with lower self-efficacy to consume sugary drinks and less healthy foods, which was in turn negatively correlated with sugary drinks and less healthy food consumption (Ma & Hample, 2018b). In other words, restrictive guidance that are promotive in nature can increase children's belief that they have increased control to eat vegetables, because rules indicate parental approval of healthy food consumption, which leads to beliefs that it is easier to consume those foods. With regard to unhealthy food consumption, other researchers have found that restrictive guidance that is preventive in nature is related to greater subjective norms to limit SSB consumption, which in turn is associated with reduced intention to consume SSB (de Bruijn et al., 2007).

Chapter IV identified a fourth facet of parental communication with regard to children's food consumption – general discussion about food. Whilst general discussion of food involves parental advice and rationale when it comes to the food children eat, they are less specific and informative. As there are currently no studies that have examined the associations between parental general discussion, examining its influence on the proximal drivers of food consumption in two contexts can help better understand its usefulness as a construct for future research.

Based on my previous studies and the existing literature, I postulate the following hypotheses and research questions:

H1: *Active* parental guidance of food consumption is positively associated with (a) attitude, (b) subjective norms, and (c) perceived behavioral control towards consuming fruits.

H2: *Restrictive* parental guidance (promotive)¹⁷ of food consumption is positively associated with (a) attitude, (b) subjective norms, (c) perceived behavioral control, and (d) intention to consume fruits.

H3: *Active* parental guidance of food consumption is positively associated with (a) attitude, (b) subjective norms, and (c) perceived behavioral control towards consuming vegetables.

H4: *Restrictive* parental guidance (promotive) of food consumption (promotive) is positively associated with (a) attitude, (b) subjective norms, (c) perceived behavioral control, and (d) intention to consume vegetables.

H5: *Active* parental guidance of food consumption is negatively associated with (a) attitude, (b) subjective norms, and (c) perceived behavioral control towards consuming SSB.

H6: *Restrictive* parental guidance (preventive) of food consumption is negatively associated with (a) attitude, (b) subjective norms, (c) perceived behavioral control, and (d) intention to consume SSB.

RQ1: How will parental general discussion about food be associated with (a) attitude, (b) subjective norms, and (c) perceived behavioral control towards consuming fruits?

¹⁷ For the sake of illustrating the differential effects of promotive and preventive rules on healthy and unhealthy categories of food consumption, both types of restrictive guidance (promotive and preventive) will be included in the models predicting all three food consumption outcomes (fruits, vegetables, and SSB).

RQ2: How will parental general discussion about food be associated with (a) attitude, (b) subjective norms, and (c) perceived behavioral control towards consuming vegetables?

RQ3: How will parental general discussion about food be associated with (a) attitude, (b) subjective norms, and (c) perceived behavioral control towards consuming SSB?

With regard to the theory of planned behavior and its effects on food consumption behavior, I have described the theory's core predictions in Chapter II, and will summarize the key propositions here for the purpose of convenience. The theory of planned behavior views health behavior as being driven directly by one's intention to perform said behavior (Ajzen, 1991). The theory postulates that the performance of a behavior is directly preceded by one's intention to perform a behavior (Ajzen, 1991). Intention is directly preceded by three factors – attitude towards the behavior, subjective norms regarding the behavior, and perceived behavioral control to perform the behavior (Fishbein & Ajzen, 2010). The more positive the attitude, subjective norm, and perceived behavioral control, the more likely an individual will develop a stronger intention to perform a behavior, which is hypothesized to lead to the performance of the behavior (Fishbein & Ajzen, 2010). In addition, perceived behavioral control is hypothesized to lead to behavior directly, as it is argued to contribute to unique variance in the performance of behavior, and can also serve as a proxy for actual behavioral control (Ajzen, 1991).

In general, the theory of planned behavior's core variables have been found to be highly predictive of a range of different health behaviors (Hagger et al., 2016) which includes food consumption choices (Ajzen, 2015). The theory

of planned behavior' has been found to explain a substantial amount of variance in healthy eating, such as the consumption of fruits and vegetables (Conner, Norman, & Bell, 2002; de Bruijn et al., 2007; Kvaavik, Lien, Tell, & Klepp, 2005). The theory of planned behavior's predictive power on food consumption has been found to extend to intervention studies (Kothe et al., 2012), and to samples of young adolescents (Lien et al., 2002). Based on the existing literature on the theory of planned behavior and food consumption, the following hypotheses are postulated:

H7: Attitude towards consuming (a) fruits, (b) vegetables, and (c) SSB is positively associated with intention to consume (a) fruits, (b) vegetables, and (c) SSB.

H8: Subjective norms towards consuming (a) fruits, (b) vegetables, and (c) SSB is positively associated with intention to consume (a) fruits, (b) vegetables, and (c) SSB.

H9: Perceived behavioral control towards consuming (a) fruits, (b) vegetables, and (c) SSB is positively associated with intention to consume (a) fruits, (b) vegetables, and (c) SSB.

To summarize, the purpose of Study Three (A) is to test a model of parental guidance that addresses the communication process with which parental guidance affects child food consumption behavior. This is achieved by conceptualizing the theory of planned behavior's proximal predictors as the intrapersonal mediators shaped by the communicative actions of parents. Using structural equation modelling to test these relationships in three different contexts (fruit consumption, vegetable consumption, and SSB consumption), it

is hoped that the findings will provide a greater understanding regarding the process with which parental guidance shapes children's eating behavior.

5.2 Method

5.2.1 Participants and Procedure

To test the proposed model, the large-scale nationally representative sample of 1,113 students that was utilized in Study 2 for the CFA, was also used for the analyses conducted in this study.

5.2.2 Measures

The computerized questionnaire included measures from the 25-item PARQ, children's attitude, subjective norms, and perceived behavioral control towards consuming fruits, vegetables, and SSB, children's intention to consume fruits, vegetables, and SSB, and children's self-reported consumption of fruits, vegetables, and SSB. Tables 12, 13, 14, and 15 summarize the descriptive statistics for the items and scales used in this study.

5.2.2.1 Exogenous Variables

Active guidance, general discussion, and restrictive guidance of food consumption were measured using the 25-item PARQ detailed in Chapter IV. All items were measured on five-point scales, asking participants how much they agree to each statement, with 1 being "Strongly Disagree" and 5 being "Strongly Agree".

Attitude towards consuming fruits/vegetables/SSB were measured by asking children to rate how much they agree with statements indicating how positive or negative they felt about fruits, vegetables, and SSB, on five-point scales, with 1 being "Strongly Disagree" and 5 being "Strongly Agree". Five statements per food category were utilized to measure their attitude towards

each respective food category. One example of a statement would be “It is enjoyable to eat/drink fruits/vegetables/SSB at least once a day”. The scale was developed according to guidelines by Fishbein & Ajzen (2010).

Perceived norms toward fruits/vegetables/SSB were measured by asking children to rate how much they agree with statements reflecting both descriptive norms (e.g. “Most people like me eat/drink fruits/vegetables/SSB once a day”) and injunctive norms (e.g. “It is expected of me that I eat/drink fruits/vegetables/SSB once a day) regarding the consumption of fruits, vegetables, and SSB. Three statements measuring descriptive norms and two statements measuring injunctive norms on five-point scales, with 1 being “Strongly Disagree” and 5 being “Strongly Agree”, were utilized in this study¹⁸. The scale was developed according to guidelines by Fishbein & Ajzen (2010).

Perceived behavioral control towards consuming fruits/vegetables/SSB was measured by asking children to rate how much control they think they have, on five-point scales (with 1 being “Strongly Disagree” and 5 being “Strongly Agree”), over their consumption of fruits, vegetables, and SSB. Four

¹⁸ There are a number of reasons for combining the two different types of norms into a singular measure of perceived norms. First, Ajzen (2006) stated that measures of subjective norms should include both descriptive and injunctive components. Second, while I acknowledge the theoretical differences between the two types of norms, it is also common that individuals might confuse what *ought* with what *is*, especially for younger participants who might not distinguish between the two. To check that, I conducted a number of analyses. First, the correlations between descriptive norms and injunctive norms (with the sample from Study 3), were very high for fruits (.68***), vegetables (.78***), and SSBs (.72***). Second, when put into linear regression analyses predicting intention, descriptive norms and injunctive norms had variance inflation factors approaching three, suggesting some level multicollinearity. Third, when examining their coefficients with and without each other as predictors, there were clear suppression effects, indicating multicollinearity. Fourth, examination of the measurement models suggested that model fits were good, and all five items showed high factor loadings (above .60) when specified to one latent factor. All these suggested that for this sample of children, descriptive and injunctive norms towards consumption of fruits, vegetables, and SSBs were perceived to be similar.

items per food category were utilized their perceived behavioral control towards each respective food category. Likewise, the scale was developed according to guidelines by Fishbein & Ajzen (2010).

Intention to consume fruits/vegetables/SSB was measured by asking children how much they agreed with three statements concerning their intention to consume fruits/vegetables/SSB at least once a day in the following month, on 5-point scales ranging from “strongly disagree” (1) to “strongly agree” (5). The scale was developed according to guidelines by Fishbein & Ajzen (2010).

Table 12. Descriptive statistics for key variables (Exogenous variables)

	<i>M</i>	<i>SD</i>	<i>α/r</i>
Active parental guidance of food consumption			.92
1. My parents discuss with me why it's important to eat healthy foods	3.39	1.23	
2. My parents explain to me why I should eat more or less of a particular food	3.70	1.09	
3. My parents discuss with me about the health benefits of a food	3.48	1.17	
4. My parents discuss with me the importance of eating a variety of foods	3.45	1.15	
5. My parents explain to me the effects of different nutrients (e.g. Vitamin C, calcium)	3.12	1.21	
6. My parents explain to me why some foods like sweet foods/drinks serve no purpose to my body	3.43	1.24	
7. My parents explain to me why it is important to have a balanced diet	3.51	1.18	
General discussion about food			.84
1. My parents talk to me about the food I eat during recess	2.76	1.25	
2. My parents reason with me to get me to eat	2.85	1.29	
3. My parents give me reasons for the rules they make about food and eating	2.75	1.22	
4. My parents try to make foods more familiar by telling me where it came from	2.67	1.24	
5. My parents tend to talk more often about foods they would like me to eat	2.88	1.28	
6. My parents advise me what I should eat during recess	2.55	1.27	
Restrictive guidance (Preventive)			.92
1. If I had some sweet drinks already, my parents would tell me I can't have it anymore	3.23	1.34	
2. My parents sets limits to how much sweet drinks I can drink	3.32	1.34	
3. When my parents give me a sweet drink, they tell me I can only have one today	2.98	1.35	
4. My parents limit opportunities for me to drink sweet drinks	3.09	1.31	
5. My parents limit how often sweet drinks are in the home	3.16	1.32	
6. My parents tell me which sweet drinks I am allowed to consume	2.79	1.33	
7. My parents limit the amount of sweet drinks I drink	3.16	1.35	
Restrictive guidance (Promotive)			.89
1. My parents insist that I must eat vegetables during meals with them	3.60	1.27	
2. My parents give me fruits and makes me eat them	3.54	1.27	
3. My parents give me vegetables during meals and makes me eat them	3.54	1.27	
4. My parents insist I must finish my vegetables	3.54	1.30	

Table 13. Descriptive statistics for key variables (Endogenous variables – Fruit consumption)

	<i>M</i>	<i>SD</i>	<i>α/r</i>
Attitude towards fruit consumption			.87
1. It is beneficial to eat fruits at least once a day	4.26	.95	
2. It is good to eat fruits at least once a day	4.29	.90	
3. It is valuable to eat fruits at least once a day	4.13	.96	
4. It is enjoyable to eat fruits at least once a day	4.08	1.02	
Perceived norms towards fruit consumption			.86
1. Most people who are important to me eat fruits at least once a day	3.65	1.08	
2. Many people like me eat fruits at least once a day	3.47	1.11	
3. The people whose opinions I value eat fruits at least once a day	3.53	1.05	
4. Most people who are important to me think I should eat fruits at least once a day	3.71	1.06	
5. It is expected of me that I eat fruits at least once a day	3.62	1.17	
Perceived behavioural control towards fruit consumption			.87
1. It is possible for me to eat fruits at least once a day	4.09	1.04	
2. It is easy for me to eat fruits at least once a day	4.05	1.05	
3. If I wanted to, I could eat fruits at least once a day	4.06	1.05	
Intention to consume fruits			.93
1. I intend to eat fruits at least once a day in the next month	3.68	1.20	
2. I will try to eat fruits at least once a day in the next month	3.78	1.18	
3. I plan to eat fruits at least once a day in the next month	3.72	1.21	

Table 14. Descriptive statistics for key variables (Endogenous variables – Veg consumption)

	<i>M</i>	<i>SD</i>	<i>α/r</i>
Attitude towards vegetable consumption			.90
1. It is beneficial to eat vegetables at least once a day	4.17	1.05	
2. It is good to eat vegetables at least once a day	4.15	1.01	
3. It is valuable to eat vegetables at least once a day	4.03	1.06	
4. It is enjoyable to eat vegetables at least once a day	3.75	1.21	
Perceived norms towards vegetable consumption			.90
1. Most people who are important to me eat vegetables at least once a day	3.90	1.05	
2. Many people like me eat vegetables at least once a day	3.70	1.13	
3. The people whose opinions I value eat vegetables at least once a day	3.79	1.03	
4. Most people who are important to me think I should eat vegetables at least once a day	3.87	1.03	
5. It is expected of me that I eat vegetables at least once a day	3.77	1.16	
Perceived behavioural control towards vegetable consumption			.91
1. It is possible for me to eat vegetables at least once a day	3.96	1.12	
2. It is easy for me to eat vegetables at least once a day	3.85	1.21	
3. If I wanted to, I could eat vegetables at least once a day	3.93	1.17	
Intention to consume vegetables			.97
1. I intend to eat vegetables at least once a day in the next month	3.69	1.24	
2. I will try to eat vegetables at least once a day in the next month	3.74	1.22	
3. I plan to eat vegetables at least once a day in the next month	3.71	1.26	

Table 15. Descriptive statistics for key variables (Endogenous variables – SSB consumption)

	<i>M</i>	<i>SD</i>	<i>α/r</i>
Attitude towards SSB consumption			.85
1. It is pleasant to drink sweet drinks at least once a day	3.28	1.36	
2. It is good to drink sweet drinks at least once a day	2.61	1.24	
3. It is valuable to drink sweet drinks at least once a day	2.70	1.26	
4. It is enjoyable to drink sweet drinks at least once a day	3.44	1.28	
Perceived norms towards SSB consumption			.91
1. Most people who are important to me drink sweet drinks at least once a day	2.81	1.24	
2. Many people like me drink sweet drinks at least once a day	2.93	1.25	
3. The people whose opinions I value drink sweet drinks at least once a day	2.79	1.20	
4. Most people who are important to me think I should drink sweet drinks at least once a day	2.47	1.19	
5. It is expected of me that I drink sweet drinks at least once a day	2.42	1.26	
Perceived behavioural control towards SSB consumption			.91
1. It is possible for me to drink sweet drinks at least once a day	3.28	1.28	
2. It is easy for me to drink sweet drinks at least once a day	3.34	1.28	
3. If I wanted to, I could drink sweet drinks at least once a day	3.36	1.29	
Intention to consume SSB			.97
1. I intend to drink sweet drinks at least once a day in the next month	2.65	1.29	
2. I will try to drink sweet drinks at least once a day in the next month	2.62	1.29	
3. I plan to drink sweet drinks at least once a day in the next month	2.64	1.31	

5.3 Results

First, bivariate correlations were calculated for all the variables that will be used in the analyses (See Table 16). Next, I assessed the collinearity diagnostics for the predictors in all three hypothesized models (See Table 17). I found that all tolerance values and variance inflation factors were above .40 and below 3 respectively, indicating that little to no multicollinearity issues (Hair et al., 2014).

Table 16. Zero-order correlations among key variables

Variable	1	2	3	4	5	6	7	8	10	11	12	13	15	16	17
1. A Guide	1														
2. Gen Disc	.56***	1													
3. RG (Prev)	.42***	.49***	1												
4. RG (Pro)	.40***	.40***	.43***	1											
5. Att (Fruits)	.28***	.16***	.14***	.21***	1										
6. S Nrms (F)	.39***	.31***	.30***	.33***	.53***	1									
7. PBC (F)	.24***	.12***	.10**	.13***	.67***	.48***	1								
8. Int (F)	.24***	.19***	.19***	.23***	.53***	.55***	.59***	1							
9. Att (Veg)	.25***	.14***	.12***	.26***	.63***	.39***	.51***	.43***	1						
10.S Norms (V)	.34***	.26***	.24***	.37***	.48***	.61***	.46***	.45***	.65***	1					
11.PBC (V)	.24***	.15***	.16***	.26***	.52***	.40***	.55***	.43***	.73***	.65***	1				
12.Int (V)	.23***	.19***	.21***	.28***	.46***	.41***	.42***	.58***	.67***	.62***	.76***	1			
13.Att (SSB)	-.13***	-.06*	-.14***	-.08*	-.13***	-.16***	-.09**	-.14***	-.16***	-.13***	-.13***	-.15***	1		
14.S Norms (S)	-.10***	-.05	-.11***	-.06	-.11***	-.07*	-.06	-.07*	-.11***	-.10**	-.08**	-.08**	.65***	1	
15.PBC (S)	-.05	-.11***	-.18***	-.05	.02	-.07*	.15***	.02	.01	.00	.06	-.02	.55***	.56***	1
16.Int (S)	-.06*	-.00	-.12***	-.06*	-.18***	-.09**	-.12***	-.11***	-.18***	-.12***	-.14***	-.13***	.62***	.62***	.54***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Table 17. Collinearity diagnostics of the predictors in all three models

Dependent Variable	Fruit Cons		Veg Cons		SSB Cons	
Independent Variable	Tol	VIF	Tol	VIF	Tol	VIF
1. Active Guidance	.60	1.68	.61	1.64	.63	1.60
2. General Discussion	.59	1.69	.59	1.69	.59	1.71
3. Restrictive (Pre)	.67	1.49	.68	1.48	.66	1.51
4. Restrictive (Pro)	.71	1.41	.68	1.47	.74	1.35
5. Attitude	.49	2.03	.41	2.44	.51	1.98
6. D Norms	.49	2.03	.34	2.93	.37	2.68
7. I Norms	.47	2.14	.34	2.91	.45	2.21
8. PBC	.53	1.90	.41	2.46	.59	1.69

To test the measurement model and hypotheses, I used the R package, *lavaan*, to run Structural Equation Modeling (SEM) (Rosseel, 2012). SEM was utilized because it allows for the testing of both the hypothesized measurement model and the hypothesized structural model. This allows the entire analysis for each food consumption context to be tested within one equation or model. First, the measurement models for all three models displayed good fit (Fruits: CFI = .96, RMSEA = .04, SRMR = .03, NNFI = .96; Vegetables: CFI = .96, RMSEA = .04, SRMR = .03, NNFI = .96; SSB: CFI = .96, RMSEA = .04, SRMR = .04, NNFI = .95). In addition, all the items loaded onto the latent variables with factor loadings of .60 and higher, suggesting that the indicators were adequate measures for the latent variables. Next, the structural model is examined for hypotheses testing. The results are presented in Figures 5, 6, and 7.

Finally, the R package, *MeMoBootR*, was used to perform tests of indirect effects assumed in the model (Buchanan, 2018). MeMoBootR uses a product-of-coefficients strategy, similar to the PROCESS macro in SPSS (Hayes, 2017), to test the significance of indirect effects. Bootstrapped confidence intervals (n=5,000) were estimated to avoid statistical power problems caused by asymmetric and non-normal distributions.

5.3.1 Fruit Consumption

In Figure 5, we see that active guidance was significantly associated with attitude ($\beta = .28, p < .001$), perceived norms ($\beta = .30, p < .001$), and perceived behavioral control towards eating fruits ($\beta = .26, p < .001$), offering support for **H1**. With regard to **RQ1**, general discussion was not significantly associated with any of the three proximal predictors in the theory of planned behavior. Surprisingly, prevention-focused restrictive guidance was significantly associated with perceived norms towards eating fruits ($\beta = .10, p < .05$). On the other hand, promotion-focused restrictive guidance was significantly associated with attitude ($\beta = .14, p < .001$) and perceived norms ($\beta = .25, p < .001$), but not perceived behavioral control towards eating fruits, offering partial support for **H2**. With regard to the theory of planned behavior, **H7a** was not supported, as attitude towards eating fruits was surprisingly not associated with intention to consume fruits. However, both perceived norms ($\beta = .30, p < .001$) and perceived behavioral control ($\beta = .43, p < .001$) towards fruits were significantly associated with intention to consume fruits, lending support to **H8a** and **H9a**.

The assumed indirect effects in the model were all found to be significant. Perceived norms mediated the relationships between active guidance (indirect effect = .24, SE = .03, CI = .19-.29), preventive restrictive guidance (indirect effect = .17, SE = .02, CI = .13-.21), promotive restrictive guidance (indirect effect = .17, SE = .02, CI = .13-.22) and intention to consume fruits. Perceived behavioral control also mediated the relationship between active guidance and intention to consume fruits (indirect effect = .16, SE = .03, CI = .11-.21).

Figure 5. SEM showing factors predicting fruit consumption among children. Standardized estimates are shown for paths between latent variables. Variances explained are shown in brackets on the top right of each dependent variable. Attitude, perceived norms, and perceived behavioral control were covaried to account for unexplained shared variance in the model. Age and gender were used as control variables. $\chi^2(570) = 1514.45, p < .000$; CFI = .96; NNFI = .96; RMSEA = .04; SRMR = .03. * $p < .05$. ** $p < .01$. *** $p < .001$.

5.3.2 Vegetables Consumption

Unsurprisingly, the association patterns for the vegetables consumption model is similar to the fruit consumption model. In Figure 6, we see that active guidance was significantly associated with attitude ($\beta = .22, p < .001$), perceived norms ($\beta = .24, p < .001$), and perceived behavioral control towards eating vegetables ($\beta = .18, p < .001$), lending support to **H3**. With regard to **RQ2**, general discussion was not significantly associated with any of the three proximal predictors in the theory of planned behavior. On the other hand, promotion-focused restrictive guidance was significantly associated with attitude ($\beta = .25, p < .001$), perceived norms ($\beta = .27, p < .001$), and perceived behavioral control towards eating fruits ($\beta = .24, p < .001$), supporting **H4**. With regard to the theory of planned behavior, attitude ($\beta = .10, p < .05$), perceived norms ($\beta = .11, p < .01$) and perceived behavioral control ($\beta = .66, p < .001$) towards vegetables were significantly associated with intention to consume vegetables, supporting **H7b**, **H8b**, and **H9b**.

The assumed indirect effects in the model were all found to be significant. Active guidance had significant indirect effects on intention to consume vegetables through attitude (indirect effect = .20, SE = .03, CI = .14-.26), perceived norms (indirect effect = .26, SE = .03, CI = .20-.32), and perceived behavioral control (indirect effect = .22, SE = .03, CI = .16-.28). Likewise, promotive restrictive guidance had significant indirect effects on intention to consume vegetables through attitude (indirect effect = .18, SE = .02, CI = .13-.23), perceived norms (indirect effect = .24, SE = .02, CI = .19-.28), and perceived behavioral control (indirect effect = .21, SE = .03, CI = .16-.26).

Figure 6. SEM showing factors predicting vegetables consumption among children. Standardized estimates are shown for paths between latent variables. Variances explained are shown in brackets on the top right of each dependent variable. Attitude, perceived norms, and perceived behavioral control were covaried to account for unexplained shared variance in the model. Age and gender were used as control variables. $\chi^2(716) = 1978.62, p < .000$; CFI = .96; NNFI = .96; RMSEA = .04; SRMR = .03. * $p < .05$. ** $p < .01$. *** $p < .001$.

5.3.3 SSB Consumption

The relationships appear slightly different for SSB consumption. In Figure 7, we see that active guidance was significantly and negatively associated with attitude ($\beta = -.13, p < .01$), but not perceived norms and perceived behavioral control, partially supporting **H5**. With regard to **RQ3**, general discussion was significantly associated with attitude to consume SSB ($\beta = .12, p < .05$). Prevention-focused restrictive guidance was significantly and negatively associated with attitude ($\beta = -.17, p < .001$), perceived norms ($\beta = -.12, p < .01$), and perceived behavioral control ($\beta = -.19, p < .001$) towards consuming SSB, supporting **H6**. With regard to the theory of planned behavior, attitude ($\beta = .34, p < .001$), perceived norms ($\beta = .32, p < .001$) and perceived behavioral control ($\beta = .18, p < .001$) towards SSB were significantly associated with intention to consume SSB, supporting **H7c**, **H8c**, and **H9c**.

Finally, attitude mediated the relationship between active parental guidance (indirect effect = $-.10$, $SE = .03$, $CI = -.16-.05$) and intention. Perceived norms did not mediate the relationship between general discussion and intention to consume SSB. Last, preventive restrictive guidance had significant indirect effects on intention to consume SSB through attitude (indirect effect = $-.10$, $SE = .03$, $CI = -.15-.05$), perceived norms (indirect effect = $-.08$, $SE = .02$, $CI = -.13-.03$), and perceived behavioral control (indirect effect = $-.11$, $SE = .02$, $CI = -.15-.07$).

Figure 7. SEM showing factors predicting SSB consumption among children. Standardized estimates are shown for paths between latent variables. Variances explained are shown in brackets on the top right of each dependent variable. Attitude, perceived norms, and perceived behavioral control were covaried to account for unexplained shared variance in the model. Age and gender were used as control variables. $\chi^2(678) = 2086.02, p < .000$; CFI = .96; NNFI = .95; RMSEA = .04; SRMR = .04. * $p < .05$. ** $p < .01$. *** $p < .001$.

5.4 Discussion

The purpose of this study was to test a model of parental guidance that addresses the communication process with which parental guidance affects child food consumption behavior in two different contexts – healthy foods and unhealthy foods. The findings support the notion that the communicative effects of parental guidance influence food consumption through psychosocial mediators, with some context-dependent differences.

Most notably, active guidance has been shown to be relatively powerful in influencing all three proximal predictors of fruits and vegetables consumption, but is less effective in predicting the three proximal predictors of SSB consumption, highlighting that active guidance is perhaps more useful as a promotive strategy. As found in Study 2, restrictive guidance appears to be effective only when it reflects the context parental rules are set for. Restrictive guidance that is promotive in nature can predict greater attitude, perceived norms, and perceived behavioral control toward consuming fruits and vegetables, but not toward consuming SSB. Meanwhile, restrictive guidance that is preventive in nature can predict lower attitude, perceived norms, and perceived behavioral control toward consuming SSB, but not toward consuming fruits and vegetable. As such, rules themselves are highly context-dependent, even if the rules are set in relation to similar behaviors.

5.4.1 Effects of Active Guidance More Pronounced in Promotive Contexts

First, active guidance was found to be positively associated with all three proximal predictors of intention within the theory of planned behavior when it comes to fruits and vegetables consumption. This suggests that parents' verbal instruction and education can be an effective tool to promote healthier

diets in children. Since parents are the principal socialization agents of children (Moschis, 1985), and children might consider parents as authorities with regards to food, active parental guidance in relation to food might be viewed as authoritative and credible. This might help children develop positive and accessible mental associations with foods that parents promote, such as fruits and vegetables, leading to more positive attitude towards them. In the same manner, as parents are the primary “gatekeepers” of foods at home, their advocacy for healthy foods might lead to the impression that the foods they promote is one that is both eaten by the people around them (descriptive norms), and one that people expect they should eat (injunctive norms). Lastly, verbal interactions and nutrition education, especially about healthy foods, can give children the impression that their parents are more willing to prepare or purchase healthy foods for them. In other words, parents are expected to practice what they preach, and greater verbal instruction with regards to foods, could potentially signal to children that parents are more willing to buy them healthy foods when asked, leading to greater perceived behavioral control. These findings corroborate existing research that have found active parental guidance to be associated with fruits and vegetables consumption (Lwin et al., 2017; Melbye & Hansen, 2015; Vereecken et al., 2004).

In contrast, active guidance was negatively associated with attitude and perceived norms towards drinking SSB, but not perceived behavioral control. This suggests active parental guidance, while it can shape dispositional beliefs and normative beliefs of children, might not be an effective tool to change control beliefs. One reason could be that active parental guidance is more effective as a promotive tool that affects healthy food consumption more, as the

communicative content extols the virtues of a healthy diet more than it discredits unhealthy diets. A review of the items measuring active guidance reveals that only APG3 and APG8 characterizes unhealthy foods as something negative. This could mean that active guidance, measured in its current form in the PARQ, might not be convincing enough to shift control beliefs of children regarding drinking SSB.

5.4.2 Limited Effects of General Discussion

In Chapter IV, we discussed the development of a novel facet of parental guidance, general discussion, which reflects a less persuasive and less informative form of communicating about food. This study found that general discussion was not significantly associated with all three proximal determinants of behavior in the theory of planned behavior for fruits and vegetables consumption. This means that, although the measurement model suggests that general discussion about food is something which parents do, the structural model suggests that it has little to no effect on children's thoughts and feelings about fruits and vegetables. To compound matters, it was found that general discussion had a positive association with attitude to consume SSB. It is possible that merely talking and discussing about food without an *evaluative* facet to the messages can provide the impression to children that their parents approve of whatever they are consuming. The findings suggest that the lack of a strong message that accompanies familial discussions about food might backfire and send the wrong message. This is consistent with children and media researchers, who have noted that *evaluative* active mediation reflect parents' attempts to create evaluations of media content in children's minds and

are more effective than when discussions are factual and neutral (Nathanson, 2004).

5.4.3 The Importance of Content in Rules

Having found that there are two facets of restrictive guidance, this study found support for the idea that restrictive guidance is only effective when applied in a target behavior's context. Promotion-focused restrictive guidance was found to be positively associated with attitude, perceived norms, and perceived behavioral control to consume fruits and vegetables, but not SSB. In contrast, prevention-focused restrictive guidance was found to be negatively associated with attitude, perceived norms, and perceived behavioral control to consume SSB. This suggests that rules are communicative in nature, and have the ability to shape children's cognitions about certain foods, rather than merely preventing access to foods. Rules can convey *evaluative* messages about what parents think is *good* or *bad* for the child, and children will pick up on that. They also strongly convey whether certain foods ought to be eaten or not, shaping children's perceived norms. Lastly, they directly influence the perception of control for children, as rules either obstruct (in the case of limits on unhealthy foods) the consumption of the food or, in the case of rules about eating healthy foods, increase the actual and perceived ability for children to consume those foods. In general, the findings suggest that predictive health behavior change models that intend to use restrictive guidance as an independent variable have to take into account the context in which the rules are set, and avoid conflation between prevention- and promotion-focused rules.

5.4.4 Replicating the Theory of Planned Behavior

Overall, intrapersonal factors explained a large amount of variance in children's intention to consume fruits, vegetables, and SSB. Attitude, perceived norms, and perceived behavioral control were found to be positively associated with intention to consume vegetables and SSB. This is in line with previous studies examining the theory of planned behavior in the context of healthy eating (e.g. Hagger et al., 2016; McDermott et al., 2015). Interestingly, attitude was not significantly associated with intention to consume fruits. This could be due to the fact that the attitude variable for fruit consumption is exhibiting a ceiling effect (Blanchard et al., 2009). The data appears to support this, as attitude towards fruit consumption has the highest mean score and the lowest standard deviation ($M = 4.19$, $SD = .81$) out of all the hypothesized mediating variables.

5.4.5 Theoretical Contributions

There are a number of theoretical contributions from this study. First, this study helps us to understand *why* and *how* parental guidance influences child food consumption, by identifying the theoretical pathways with which these effects take place. Specifically, the theory of planned behavior's proximal predictors of behaviors offer a theoretically sound framework to examine how parental communication can influence behavior by changing children and adolescents' cognition about various food choices. Second, an important finding was that parental guidance of food consumption is highly context dependent. One such finding was that active parental guidance facilitates better internalization of favorable cognitions regarding healthy foods compared to unhealthy foods like SSB. This is somewhat consistent with the initial meta-

analysis in Chapter III, which found a positive association between active guidance and healthy food consumption, but not unhealthy food consumption.

Importantly, this study also found that the influence of parental restrictive guidance, or rules, is highly context-dependent. The findings suggest that the mixed findings in relation to restrictive guidance might potentially be due to misalignments in terms of the behavioral contexts the rules are set in – healthy or unhealthy eating. Rules are not only preventive in nature, but are also used to promote eating behaviors. It is important to note that my conceptualization of restrictive guidance is more limited in that it clearly views restrictive guidance as rule-making *without* a coercive slant, lending support for Vaughn et al.'s (2016) suggestion that rules and limits can have positive effects if they are not made in a coercive manner. For example, it is possible that the *style* and *context* in which rules are set can influence child behavior differentially, as we shall explore in Chapter VI.

Overall, the findings from this study suggests the importance of the content of parental communication in successful socialization of children towards parenting goals in the context of food consumption. Food consumption behaviors that parents want to *promote* are better served by specific and evaluative forms of communication. Even rules ought to be made in the context where the communication of rules reflects an evaluative opinion on a distinct target behavior. Meanwhile, even though the study found significant relationships between active guidance and attitude towards consuming SSB, the magnitude and variance explained is far smaller than in promotive contexts like consuming fruits and vegetables. Similarly, while preventive forms of restrictive guidance might be effective in preventive contexts, the variance

explained, as shown in this study, are smaller than that of parental communication's influence in promotive contexts. This has important theoretical implications for research on child health promotion. Perhaps, the evolutionary preference for sweet foods is profoundly strong (Breslin, 2013), limiting the effect of parental communication to serve a preventive function. More research needs to be conducted to determine if this is true, especially in other types of food choices that requires preventive interventions, such as foods high in salt and fat (Birch & Fisher, 1998).

There are a number of theoretical contributions research on the theory of planned behavior. First, this study provides further empirical support for the theory of planned behavior, as the proximal predictors significantly predicted intention to consume foods that were both healthy and unhealthy. Moreover, this was conducted with a child and adolescent sample, providing support that the theory of planned behavior is predictive with non-adult samples. Second, and more importantly, this study responded to Conner's (2015) call to build on the theory of planned behavior's solid theoretical foundations by identifying distal change mechanisms in the background that drive the proximal predictors in the theory of planned behavior. This study identifies parental communication as a potentially important component in behavior change research focused on children. Future research can utilize the theoretical insights gleaned from this study and apply parental communication to other parenting socialization goals that can be examined from a theory of planned behavior perspective, from smoking, to safe sex, and physical exercise. These health contexts can also be delineated as promotive and preventive in nature, and the findings from this

study can offer potential theoretical and empirical justifications for future studies.

5.4.6 Limitations

There are some limitations in this study that needs to be highlighted. First, although my conceptual framework implies causality, the cross-sectional nature of my study design means that the causal claims of my model remain untested. Even though I had strong theoretical reasons for hypothesizing the causal order, future research should consider adopting either a longitudinal design, an intervention, or an experiment to manipulate the change mechanisms identified, in order to test the causal claim of my model. For example, researchers can design an intervention targeting parents to either administer greater food-related rules or greater food-related verbal interaction, or examine its effects on the theory of planned behavior variables. Relatedly, the socialization process is also not always unidirectional. Children's behaviors and communication perceived by their parents can also influence the way parents communicate about food to their children. Future research should seek to identify in what ways children's behaviors influence parental communication. Second, the theory of planned behavior is a motivational model of human behavior, where intentions might not translate into behavior. This is especially true of difficult-to-change health behaviors such as eating, where the performance of the behavior is potentially automatic. Future research should look to build on the existing model with volitional aspects of behavior such as implementation intentions (Chapman, Armitage, & Norman, 2009; Gollwitzer, 1999; Heckhausen & Gollwitzer, 1987), or consider dual-systems theories such as the reflective-impulsive model of social behavior (Strack & Deutsch, 2004),

to see if they improve the predictive power of the model. A potential way is to integrate these theoretical perspectives at the intrapersonal level (e.g. Hagger & Chatzisarantis, 2014), to identify potentially unique mechanisms of change that the interpersonal level can target to change. Third, this study was conducted with children and not parents, and might reflect only a child's view of parental guidance. Data from a parent-child sample would help provide greater understanding on whether the measurement and structural model hold for parents as well as children. Future research should test the model with a parent sample in order to ascertain its universality across samples. Despite these limitations, this study has made several important contributions to research in understanding parental guidance and child food consumption. The extended theory of planned behavior model was empirically supported, and demonstrated that the identification of interpersonal antecedents such as parental guidance, can improve its utility.

CHAPTER VI

Study Three (B)

THE MODERATING ROLE OF GENERAL PARENTING STYLES

6.1 Background

Chapter V provided an important contribution to the field by examining the influence of context-specific parental guidance on the proximal psychological drivers of food consumption among children. Despite this, and as I had stressed in the preceding chapters, it is widely acknowledged that context-specific parenting behaviors belong in a wider gamut of parenting behaviors that can potentially influence the effectiveness of specific parenting behaviors (Darling & Steinberg, 1993). This chapter aims to examine how general parenting styles, which reflect an overarching emotional climate, can moderate the influence of parental guidance on child food consumption outcomes. I aim to achieve this by conducting a secondary analysis of the data collected in Study Three (A).

As with parenting practices, the concept of general styles of parenting has been extensively used to examine the influence of parents on child socialization (Darling & Steinberg, 1993). These more general constructs of parenting and parental communication tend to refer to the broader socio-emotional climate of parent-child interactions, which are perceived as distinct from context-specific parenting practices.

In its essence, parenting style is defined as “a constellation of attitudes toward the child that are communicated to the child and that, taken together, create an emotional climate in which the parent’s behaviors are expressed (Darling & Steinberg, 1993, p. 488). According to the contextual model of

parenting, parenting styles are hypothesized to moderate the effect of behavior-specific (or context-specific) parenting practices on socialization outcomes (Spera, 2005). As we have discussed in Chapter II, parenting styles are theorized to consist of two dimensions: responsiveness and demandingness (Baumrind, 1991; Maccoby & Martin, 1983). Responsiveness broadly refers to how warm, involved, open, emotionally supportive, and autonomy granting parents are, manifesting in parental behaviors that are conducive for the healthy development of self-regulation and individuality. Meanwhile, demandingness refers to parents' level of maturity demands for the child. These dimensions are then combined to reflect four types of parenting styles: authoritative (parents are high in both responsiveness and demandingness), authoritarian (parents high in demandingness but low in responsiveness), indulgent (parents moderate to high in their responsiveness, but low in demandingness), and neglectful (parents low in both responsiveness and demandingness, disengaged from their child's life) (Maccoby & Martin, 1983).

In line with Baumrind's (1967) initial observations about authoritative parenting and desirable socialization outcomes, authoritative parenting has been found to be associated with more desirable child eating behaviors, while high levels of control and demandingness without responsiveness has been found to lead to negative child eating behaviors. Theoretically, emotional climates that are harsh and controlling such as those fostered by authoritarian parents, can lead to poorer emotional and behavioral regulation in children (Barber et al., 2005; Morris et al., 2007). Subsequently, poor regulation of emotions and behavior can lead to poor dietary habits such as emotional and disinhibited eating (Goossens et al., 2007; Harrist et al., 2013; Scholten et al., 2014; Tan &

Holub, 2011). Studies that examine the influence of parenting style directly on child eating behaviors have found that authoritative parenting can lead to a child healthy eating compared to other types of parenting styles (Hughes & Papaioannou, 2018b; Kremers et al., 2003; Lopez et al., 2018b). In Hong Kong, authoritative parenting style was significantly associated with children meeting fruit recommendation (Chan, Yeung, Leung, Lo, & Tsang, 2018).

Socialization researchers have distinguished between three conceptually distinct constructs in examining the effects of parental socialization on children: socialization goals (e.g. encouraging a healthier diet), parenting practices parents use to guide children (e.g. active guidance of food consumption), and perceived parenting style (or emotional climate in which the practices take place) (Darling & Steinberg, 1993). While context-specific parenting practices are related to a specific socialization goals, parenting styles are aspects of parenting behavior that are not goal-directed. Since parenting style is not constrained to a particular behavioral context, it conveys parents' emotional attitude toward the child, rather than toward the behavior of the child. Terming this the contextual model of parenting style, Darling and Steinberg (1993) argued that while parenting practices are direct mechanisms of influence on child socialization outcomes, parenting style "alters the parents' capacity to socialize children by changing the effectiveness of their parenting practices (p.493)." In other words, parenting style can be understood as a moderating variable that interacts with context-specific parenting behaviors in influencing child behavior (Spera, 2005). As Koerner and Fitzpatrick (2006) puts it, "behavior that is functional in the context of one family type might be dysfunctional in the context of another family type, and vice versa (p. 59)."

There are a number of proposed theoretical reasons for this. First, it is argued that parenting style transforms the nature of the interaction between parent and child, such that parenting practices employed by authoritative parents are qualitatively different from those employed by other types of parents (Darling & Steinberg, 1993). One example is that control is qualitatively different between authoritative and authoritarian parents. While both authoritative and authoritarian are highly demanding, researchers have argued that their demandingness is qualitatively different in that authoritative parents exhibit behavioral control, while authoritarian parents exhibit psychological control (Barber, 1996; Baumrind, 1989; Steinberg et al., 1989). Psychological control is characterized by the withdrawal of affection, appeals to pride and guilt, personal attacks, and shaming, leading to the manipulation of the relationship between parent and child in order to exert control over the child's thought processes and behavior (Barber, 1996). Meanwhile, behavioral control refers to pressures to conform to rules and regulations. This can manifest in the style in which parenting practices are employed by parents. For example, in the context of this study, psychologically controlling restrictive guidance might include parents saying that a child is too fat, and hence need to cut down in sugary drink consumption. If a child breaks those rules, a psychologically controlling parent might withdraw affection and induce guilt. Meanwhile, restrictive guidance absent of psychological control might involve parents appealing to the rules that have been set, and focus on how it is important to follow the rules that have been set. Hence, while psychological control can facilitate negative outcomes, behavioral control can help children achieve certain socialization goals (Darling & Steinberg, 1993).

Second, it is argued that authoritative parenting helps children become more receptive to parental efforts to transmit their values, beliefs, and attitudes, while less responsive and demanding parents lead to children being less receptive to their parents efforts to socialize them (Darling & Steinberg, 1993). The authoritative parent's respect for the child, comfort in their authority, and their recognition of the child's separateness and capacity to behave autonomously, is posited to positively affect the child's willingness to be socialized by his or her parents. In other words, authoritativeness can increase the effectiveness of parenting practices because children of authoritative parents are more open to the socialization attempts of parents (Darling & Steinberg, 1993).

In the context of food consumption, a small number of studies have shown that food parenting practices are largely more effective when conducted in a generally positive parenting style (Joyce & Zimmer-Gembeck, 2009; Lessard et al., 2010; Ray, Kalland, et al., 2013; Sleddens et al., 2014; Tung & Yeh, 2014; van der Horst et al., 2007). For example, Lessard et al (2010) found that persuasion can have opposite effects depending on whether the parent is perceived to be high or low in parental warmth. Likewise, Ray, Kalland, et al. (2013) found that restrictive guidance had stronger correlations with healthy and unhealthy food consumption when parental warmth is high. In addition, a systematic review investigating the effects of non-responsive parenting practices in Southeast Asia has found that non-responsive parenting practices are related to child overweight and obesity (Lindsay et al., 2017).

Despite its importance, only approximately 10% of the studies from the systematic review examined the moderating influence of parenting styles.

Furthermore, no studies have been conducted examined the moderating effect of parenting styles on the relationship between active guidance and child food consumption outcomes. Consistent with the predictions of Baumrind's (1967) research on authoritative parenting style, and Darling and Steinberg's (1993) contextual model of parenting style, I postulate that the effects of both active and restrictive guidance on child healthy and unhealthy food consumption cognitions (attitude, perceived norms, and perceived behavioral control) are stronger when they are employed by a parent perceived to be authoritative, compared to parents perceived to be authoritarian, indulgent, or neglectful. I present the following hypotheses:

H1: The effect of active parental guidance on (a) attitude, (b) perceived norms, and (c) perceived behavioral control towards consuming fruits is moderated by perceived parenting style, such that their effects will be more pronounced among children who perceived an authoritative parenting style compared to children who perceived an authoritarian, indulgent, or neglectful parenting style

H2: The effect of restrictive parental guidance on (a) attitude, (b) perceived norms, and (c) perceived behavioral control towards consuming fruits is moderated by perceived parenting style, such that their effects will be more pronounced among children who perceived an authoritative parenting style compared to children who perceived an authoritarian, indulgent, or neglectful parenting style

H3: The effect of active parental guidance on (a) attitude, (b) perceived norms, and (c) perceived behavioral control towards consuming vegetables is moderated by perceived parenting style, such that their effects will be more

pronounced among children who perceived an authoritative parenting style compared to children who perceived an authoritarian, indulgent, or neglectful parenting style

H4: The effect of restrictive parental guidance on (a) attitude, (b) perceived norms, and (c) perceived behavioral control towards consuming vegetables is moderated by perceived parenting style, such that their effects will be more pronounced among children who perceived an authoritative parenting style compared to children who perceived an authoritarian, indulgent, or neglectful parenting style

H5: The effect of active parental guidance on (a) attitude, (b) perceived norms, and (c) perceived behavioral control towards consuming SSB is moderated by perceived parenting style, such that their effects will be more pronounced among children who perceived an authoritative parenting style compared to children who perceived an authoritarian, indulgent, or neglectful parenting style

H6: The effect of restrictive parental guidance on (a) attitude, (b) perceived norms, and (c) perceived behavioral control towards consuming SSB is moderated by perceived parenting style, such that their effects will be more pronounced among children who perceived an authoritative parenting style compared to children who perceived an authoritarian, indulgent, or neglectful parenting style

6.2 Method

The participant characteristics and procedures are detailed in the preceding chapter on Study Three (A). The only addition to Study Three (B) is

the use of the Authoritative Parenting Index (API; Jackson, Henriksen, & Foshee, 1998) as a measure of perceived parenting style.

6.2.1 Measures

Measures from the 25-item PARQ, children's attitude, subjective norms, and perceived behavioral control towards consuming fruits, vegetables, and SSB are detailed in the preceding chapter.

Perceived parenting style was measured using the 17-item API (Jackson et al., 1998), an established measure of perceived parenting style among children as young as fourth-grade. 9 items measured *parental responsiveness* on five-point scales, which asked participants how much they agree to statements describing how responsive (or non-responsive) their parents are to them across various general contexts, with 1 being "Strongly Disagree" and 5 being "Strongly Agree". 7 items measured *parental demandingness* on five-point scales, which asked participants how much they agree to statements describing how demanding (or non-demanding) their parents are to them across various general contexts, with 1 being "Strongly Disagree" and 5 being "Strongly Agree". Table 16 details the descriptive statistics from the API. To assign participants to the four different parenting types, I utilized Jackson et al.'s (1998) and Steinberg et al.'s (1994) tertile placement method. This involved trichotomizing both the responsiveness and demandingness scores, and then assigning participants to the four different parenting types based on their tertile placements on both these dimensions. I labelled children who placed in the upper tertile on both responsiveness and demandingness as being under authoritative parents. Children who placed in the upper tertile on responsiveness but in the lower tertile on demandingness were assigned as

being under indulgent parents. Likewise, children who placed in the lower tertile on responsiveness but in the upper tertile on demandingness were assigned as being under authoritarian parents, while children who placed in the lower tertile on both dimensions were assigned as being under neglectful parents. The tertile placement method resulted in half of the sample being excluded, resulting in a total sample of 520 children and adolescents (Authoritative = 193, Indulgent = 98, Authoritarian = 92, Neglectful = 137).

6.2.2 Analytical Approach

To explore the moderating effects of parenting styles as indicated in the RQs above, I utilized the R package, MeMoBootR, to (1) run moderation analyses based on hierarchical multiple regression, and (2) further probe moderation effects with simple slopes analyses when interaction terms were statistically significant (Buchanan, 2018). As parenting styles is a four-level multi-categorical moderating variable, it was dummy coded, resulting in three dummy variables, with authoritative parenting being used as the reference category. Last, I plotted significant interaction effects using the R package, ggplot2, to visually examine the significant moderation effects identified (Wickham, 2016).

Table 18. Descriptive statistics for the Authoritative Parenting Index

	<i>M</i>	<i>SD</i>	<i>α/r</i>
Parental responsiveness			.80
1. My parents are always telling me what to do (R)	2.59	1.04	
2. My parents make rules without asking what I think (R)	3.14	1.29	
3. My parents make me feel better when I am upset	3.47	1.20	
4. My parents are too busy to talk to me (R)	3.54	1.16	
5. My parents listen to what I have to say	3.43	1.10	
6. My parents like me just the way I am	3.71	1.12	
7. My parents tell me when I do a good job on things	3.68	1.11	
8. My parents want to hear about my problems	3.53	1.18	
9. My parents are pleased with how I behave	3.14	1.08	
Parental demandingness			.73
10. My parents have rules that I must follow	3.52	1.18	
11. My parents tell me the time I must come home	3.30	1.32	
12. My parents make sure I tell them where I am going	4.03	1.10	
13. My parents make sure I go to bed on time	3.40	1.25	
14. My parents ask me what I do with friends	3.40	1.23	
15. My parents know where I am after school	3.61	1.23	
16. My parents check to see if I do my homework	2.99	1.32	

6.3 Results

First, bivariate correlations between parenting styles and the four latent constructs in the PARQ were calculated (See Table 17). Next, I assessed the collinearity diagnostics for the hypothesized predictors (See Table 18). I found that all tolerance values and variance inflation factors were above .50 and below 2 respectively, indicating that little to no multicollinearity issues (Hair et al., 2014).

Table 19. Zero-order correlations between parenting style and the PARQ constructs

Variable	1	2	3	4	5	6	7
1. Authoritative	1						
2. Indulgent	-.14***	1					
3. Authoritarian	-.14***	.09**	1				
4. Neglectful	-.17***	.12***	-.11***	1			
5. Active Guid	.31***	.03	-.06*	-.27***	1		
6. General D	.30***	-.05	-.02	-.25***	.56***	1	
7. Restrict (Pre)	.20***	-.06	.06	-.17***	.42***	.49***	1
8. Restrict (Pro)	.15***	-.08**	.10**	-.17***	.40***	.40***	.43***

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Table 20. Collinearity diagnostics between parenting style and the PARQ constructs

Variable	Tolerance	VIF
1. Authoritative	.83	1.21
2. Indulgent	.93	1.08
3. Authoritarian	.93	1.08
4. Neglectful	.87	1.15
5. Active Guidance	.60	1.67
6. General Discussion	.58	1.73
7. Restrictive (Pre)	.68	1.48
8. Restrictive (Pro)	.73	1.37

6.3.1 Fruit Consumption

To test **H1**, active parental guidance, parenting styles (as three dummy variables), and their interaction terms (three different interaction terms), were included in a hierarchical multiple regression to predict fruit consumption attitudes, perceived norms, and perceived behavioral control. The variables accounted for 12.36% of the variance in attitude towards consuming fruits ($F(7, 512) = 10.31, p < .001$), 22.43% of the variance in perceived norms towards consuming fruits ($F(7, 512) = 21.15, p < .001$), and 9.42% of the variance in perceived behavioral control towards consuming fruits ($F(7, 512) = 7.61, p < .001$). Significant main effects were found for active parental guidance and attitude towards consuming fruits ($b = .27, p < .001$), perceived norms towards

consuming fruits ($b = .55, p < .001$), and perceived behavioral control towards fruits ($b = .29, p < .001$). Neglectful parenting style was also significantly related to attitude towards consuming fruits ($b = -.22, p < .05$). No interaction terms were significantly correlated with attitude and perceived behavioral control towards consuming fruits. However, for perceived norms towards consuming fruits, active guidance by authoritarian versus authoritative ($b = -.29, p < .05$), and active guidance by neglectful versus authoritative parenting styles ($b = -.21, p < .05$), were significant. Simple slopes analysis revealed that active guidance was more predictive of perceived norms towards consuming fruits among children under authoritative parents ($b = .55, p < .001$) compared to those under authoritarian ($b = .26, p < .01$) and neglectful parents ($b = .34, p < .001$). In examining Figure 8, we can see that active guidance had a stronger effect among children with authoritative parents than those with authoritarian and neglectful parents, partially supporting **H1**. Interestingly, we can also see that lower active guidance among children with authoritative parents is related to lower perceived norms toward consuming fruits when compared to those with authoritarian and neglectful parents.

Figure 8. Interaction plot depicting the moderating effect of active guidance and parenting style on perceived social norms towards consuming fruits

To test **H2**, promotion-focused restrictive parental guidance, parenting styles (as three dummy variables), and their interaction terms (three different interaction terms), were included in a hierarchical multiple regression predicting fruit consumption attitudes, perceived norms, and perceived behavioral control. The variables accounted for 9.68% of the variance in attitude towards consuming fruits ($F(7, 512) = 7.84, p < .001$), 16.98% of the variance in perceived norms towards consuming fruits ($F(7, 512) = 14.96, p < .001$), and 5.85% of the variance in perceived behavioral control towards consuming fruits ($F(7, 512) = 4.54, p < .001$). No significant main effects were found between promotion-focused restrictive guidance and attitude, as well as perceived behavioral control towards consuming fruits. However, there were significant main effects for the relationship between promotion-focused

restrictive guidance and perceived norms towards consuming fruits ($b = .25, p < .001$). Neglectful parenting style was significantly related to attitude ($b = -.41, p < .001$) and perceived behavioral control ($b = -.34, p < .01$) towards consuming fruits when compared with authoritative parenting style. Indulgent ($b = -.26, p < .05$), authoritarian ($b = -.27, p < .05$), and neglectful ($b = -.43, p < .001$) parenting styles were all significantly and negatively related to perceived norms to consume fruits when compared to authoritative parenting. No interaction terms were significantly correlated with attitude towards consuming fruits. However, for perceived norms and perceived behavioral control towards consuming fruits, promotion-focused restrictive guidance by authoritarian versus authoritative parenting styles were significant ($b = -.22, p < .05$; $b = -.22, p < .05$). Simple slopes analysis revealed that promotion-focused restrictive guidance was significantly related to perceived norms ($b = .25, p < .001$) for children under an authoritative parenting style, but not for those with a perceived authoritarian parenting style. This partially supports **H2**. In examining Figure 9, we can see that promotion-focused restrictive guidance has a positive correlation with perceived norms towards consuming fruits among children under an authoritative parenting style, but not for children under an authoritarian parenting style.

Figure 9. Interaction plot depicting the moderating effect of promotion-focused restrictive guidance and parenting style on perceived social norms towards consuming fruits

On the other hand, despite the statistically significant interaction term, promotion-focused restrictive guidance was not significantly related to perceived behavioral control towards consuming fruits ($b = .09, p = .08$). Likewise, promotion-focused restrictive guidance was not significantly related to perceived behavioral control ($b = -.13, p = .13$). Examining the interaction plot in Figure 10 shows that the statistically significant interaction was likely due to the contradicting effect promotion-focused restrictive guidance have on perceived behavioral control. While promotion-focused restrictive guidance has a positive correlation with perceived behavioral control towards consuming fruits among children with an authoritative perceived parenting style, those under an authoritarian parenting style saw a negative direction of effect, adding support for **H2**.

Figure 10. Interaction plot depicting the moderating effect of promotion-focused restrictive guidance and parenting style on perceived behavioral control towards consuming fruits

6.3.2 Vegetable Consumption

To address **H3**, active parental guidance, parenting styles (as three dummy variables), and their interaction terms (three different interaction terms), were included in a hierarchical multiple regression to predict vegetable consumption attitudes, perceived norms, and perceived behavioral control. The variables accounted for 8.59% of the variance in attitude towards consuming vegetables ($F(7, 512) = 6.54, p < .001$), 17.95% of the variance in perceived norms towards consuming vegetables ($F(7, 512) = 16.00, p < .001$), and 9.67% of the variance in perceived behavioral control towards consuming vegetables ($F(7, 512) = 7.83, p < .001$). Significant main effects were found for active

parental guidance and attitude ($b = .21, p < .01$), perceived norms ($b = .39, p < .001$), and perceived behavioral control ($b = .26, p < .01$) towards consuming vegetables. Neglectful parenting style was also significantly related to attitude ($b = -.43, p < .001$), perceived norms ($b = -.47, p < .001$), and perceived behavioral control ($b = -.39, p < .001$) towards consuming vegetables, when compared to authoritative parenting. No interaction terms were significantly correlated with attitude and perceived behavioral control towards consuming vegetables. However, for perceived norms, active guidance by neglectful versus authoritative parenting styles was statistically significant ($b = -.28, p < .01$). Simple slopes analysis revealed that active guidance was significantly related to perceived norms ($b = .40, p < .001$) for children under an authoritative parenting style, but not for those with a perceived neglectful parenting style. In examining the interaction plot (Figure 11), we can see that active guidance had a stronger effect on perceived norms towards vegetable consumption among children with authoritative parents than those with authoritarian and neglectful parents, partially supporting **H3**.

Figure 11. Interaction plot depicting the moderating effect of active guidance and parenting style on perceived norms towards consuming vegetables

To address **H4**, promotion-focused restrictive parental guidance, parenting styles (as three dummy variables), and their interaction terms (three different interaction terms), were included in a hierarchical multiple regression predicting fruit consumption attitudes, perceived norms, and perceived behavioral control. The variables accounted for 9.39% of the variance in attitude towards consuming vegetables ($F(7, 512) = 7.58, p < .001$), 20.39% of the variance in perceived norms towards consuming fruits ($F(7, 512) = 18.74, p < .001$), and 11.66% of the variance in perceived behavioral control towards consuming fruits ($F(7, 512) = 9.65, p < .001$). Significant positive main effects were found between promotion-focused restrictive guidance and attitude ($b = .19, p < .001$), perceived norms ($b = .31, p < .001$), and perceived behavioral control ($b = .21, p < .01$) towards consuming vegetables. Neglectful parenting

style was significantly and negatively related to attitude ($b = -.46, p < .001$), perceived norms ($b = -.57, p < .001$), and perceived behavioral control ($b = -.48, p < .001$) towards consuming vegetables when compared with authoritative parenting. No interaction terms were significantly correlated with perceived norms and perceived behavioral control towards consuming vegetables. However, for attitude towards consuming vegetables, promotion-focused restrictive guidance by authoritarian versus authoritative parenting styles was statistically significant ($b = -.23, p < .05$). Simple slopes analysis revealed that promotion-focused restrictive guidance was significantly related to attitude ($b = .19, p < .001$) for children under an authoritative parenting style, but not for those with a perceived neglectful, indulgent, or authoritarian parenting style. While promotion-focused restrictive guidance has a positive correlation with attitude towards consuming vegetables among children with an authoritative perceived parenting style, those under an authoritarian parenting style saw no effect, partially supporting **H4**.

Figure 12. Interaction plot depicting the moderating effect of promotion-focused restrictive guidance and parenting style on attitude towards consuming vegetables

6.3.3 SSB Consumption

To address **H5**, active parental guidance, parenting styles (as three dummy variables), and their interaction terms (three different interaction terms), were included in a hierarchical multiple regression to predict SSB consumption attitudes, perceived norms, and perceived behavioral control. The variables accounted for 4.37% of the variance in attitude towards consuming SSB ($F(7, 512) = 3.34, p < .01$), 3.48% of the variance in perceived norms towards consuming SSB ($F(7, 512) = 2.63, p < .05$), and 3.20% of the variance in perceived behavioral control towards consuming SSB ($F(7, 512) = 2.42, p < .05$). Significant main effects were found for active parental guidance and attitude ($b = -.24, p < .01$) and perceived norms towards consuming SSB ($b = -.24, p < .01$). There were no significant main effects for active guidance on

perceived behavioral control towards fruits. Meanwhile, indulgent parenting style positively and significantly predicted perceived behavioral control towards consuming SSB ($b = .34, p < .05$). No interaction terms were significantly correlated with perceived norms towards consuming SSB. However, for attitude and perceived behavioral control towards consuming SSB, active guidance by neglectful parenting style versus authoritative parenting style were significant ($b = .28, p < .05$; $b = .35, p < .05$). Simple slopes analysis revealed that active guidance was predictive of attitude towards consuming SSB among children under authoritative parents ($b = -.24, p < .05$) but not for those under indulgent and neglectful parenting styles. Likewise, active guidance was predictive of perceived behavioral control towards consuming SSB among children under an authoritative parenting style ($b = -.24, p < .05$), but not for those under the other parenting styles. In examining the interaction plot (Figure 13), we can see that active guidance had a stronger negative effect attitude towards consuming SSB among children with authoritative parents than those with authoritarian and neglectful parents. In fact, active guidance appears to have no effect on attitude towards consuming SSB among children under a perceived neglectful parenting style.

Figure 13. Interaction plot depicting the moderating effect of active guidance and parenting style on attitude towards consuming SSB

Likewise, in Figure 14, we can see that active guidance had a stronger negative effect on perceived behavioral control towards SSB among children with authoritative parents than those with authoritarian and neglectful parents. In fact, active guidance might have a positive effect on attitude towards consuming SSB among children under a perceived neglectful parenting style. These findings provide substantial support for **H5**.

Figure 14. Interaction plot depicting the moderating effect of active guidance and parenting style on attitude towards consuming SSB

To address **H6**, prevention-focused restrictive parental guidance, parenting styles (as three dummy variables), and their interaction terms (three different interaction terms), were included in a hierarchical multiple regression predicting SSB consumption attitudes, perceived norms, and perceived behavioral control. The variables accounted for 7.09% of the variance in attitude towards consuming vegetables ($F(7, 512) = 5.58, p < .001$), 4.55% of the variance in perceived norms towards consuming fruits ($F(7, 512) = 3.49, p < .01$), and 7.83% of the variance in perceived behavioral control towards consuming fruits ($F(7, 512) = 6.22, p < .001$). Significant negative main effects were found between prevention-focused restrictive guidance and attitude ($b = -.27, p < .001$), perceived norms ($b = -.26, p < .01$), and perceived behavioral control ($b = -.38, p < .001$) towards consuming SSB. Authoritarian parenting style was significant in predicting perceived norms towards consuming SSB

when compared with authoritative parenting ($b = .33, p < .05$). For the interaction effects, prevention-focused restrictive guidance by neglectful parenting style versus authoritative parenting style was significant for attitude ($b = .21, p < .05$), perceived norms ($b = .28, p < .05$), and perceived behavioral control ($b = .44, p < .001$) towards consuming SSB. Simple slopes analysis revealed that prevention-focused restrictive guidance was significantly related to attitude ($b = -.26, p < .001$), perceived norms ($b = -.27, p < .001$), and perceived behavioral control ($b = -.38, p < .001$) towards consuming SSB for children under an authoritative parenting style, but not for those with a perceived neglectful parenting style. The interaction plot (Figure 15) shows us that prevention-focused restrictive guidance is predictive of lower attitude towards consuming SSB only among children under an authoritative parenting style.

Figure 15. Interaction plot depicting the moderating effect of prevention-focused restrictive guidance and parenting style on attitude towards consuming SSB

Likewise, Figures 16 and 17 illustrates that prevention-focused restrictive guidance is predictive of lower perceived norms and perceived behavioral control towards consuming SSB only among children under an authoritative parenting style. These findings show that **H6** was supported.

Figure 16. Interaction plot depicting the moderating effect of prevention-focused restrictive guidance and parenting style on perceived norms towards consuming SSB

Figure 17. Interaction plot depicting the moderating effect of prevention-focused restrictive guidance and parenting style on perceived behavioral control towards consuming SSB

6.5 Discussion

The objective of Study Three (B) was to better understand if the emotional climate derived from general parenting styles would moderate the influence of parental guidance on food consumption in both a healthy and unhealthy context. The findings offer support for the theoretical assertion that certain parenting practices can result in more desirable child outcomes when applied in a developmentally healthy emotional climate as reflected in a perceived authoritative parenting styles. Table 21 summarizes the results of this study. It offers substantial empirical support for the *contextual model of parenting style* in the domain of socialization of child food consumption (Baumrind, 1967; Darling & Steinberg, 1993).

First, the results suggest that active guidance is more effective in shaping perceived norms towards fruit consumption when it was practiced within an authoritative parenting style compared to other parenting styles. These patterns were repeated in predicting both perceived norms and perceived behavioral control towards vegetables consumption. Likewise, active guidance was found to be significantly and negatively related to attitude towards consuming SSB only for children under an authoritative parenting style. As one of the first studies that examined the moderating influence of parenting styles on active guidance and child food consumption, my findings suggest that parents' attempts at persuading children to eat healthier through the communication of evaluative messages about both healthy and unhealthy food is more likely to be accepted by children when parents are not only generally supportive, warm, responsive, but also when they show high demands for maturity.

Next, with regard to restrictive guidance, promotion-focused restrictive guidance was related to greater perceived norms towards fruit consumption among children under an authoritative parenting style as compared to those under an authoritarian parenting style. Interestingly, the findings suggest that a boomerang effect for promotion-focused restrictive guidance might occur in the context of perceived behavioral control towards consuming fruits when it was applied within an authoritarian parenting style. In other words, rules can lead to lower perceived behavioral control to consume fruits when it was applied in a demanding but non-responsive and cold emotional climate. This might be due to the possibility that children brought up in an authoritarian (or controlling) manner might feel that they lack the autonomy to consume fruits if they wanted

to. The further setting of context-specific rules might exacerbate their belief, leading to reduced perceived behavioral control. In the same manner, the findings suggest that promotion-focused restrictive guidance was related to more positive attitude towards consuming vegetables when applied within an authoritative parenting style compared to an authoritarian parenting style. These patterns hold when the context switches to SSB consumption, where prevention-focused restrictive guidance was related to lower attitude, perceived norms, and perceived behavioral control towards consuming SSB. These findings corroborate existing research which have found that when parents are warm and responsive, and not overly controlling, parental guidance may lead to lower unhealthy and greater healthy food consumption (Papaioannou et al., 2013; Ray, Kalland, et al., 2013; Rodenburg, Kremers, Oenema, & van de Mheen, 2014; Sleddens et al., 2014; van der Horst et al., 2007).

Overall, my findings suggest that parental communication that attempt to motivate children to consume a healthier diet is more effective (and sometimes *only* effective) when children perceive an authoritative parenting style. According to Darling and Steinberg (1993), parenting style reflects parents' overarching attitude toward their child, and authoritativeness nurtures children to be more open and receptive to parents' socialization goals and attempts. Furthermore, it is possible that parenting practices enacted by authoritative parents are stylistically more effective with children compared to parents who are authoritarian, indulgent, or neglectful. My findings offer support for this hypothesis, and suggests that a healthy emotional climate is necessary for parental guidance to be effective in achieving socialization goals, such as helping children develop and maintain a healthy diet.

Table 21. Summary of interaction effects found the study

IV	DV	Interaction	Effects
AG	Attitude (Fruits)	N.S.	-
	P Norms (Fruits)	Significant	Authoritative > Authoritarian/Neglectful
	PBC (Fruits)	N.S.	-
RG (Pro)	Attitude (Fruits)	N.S.	-
	P Norms (Fruits)	Significant	Authoritative > Authoritarian
	PBC (Fruits)	Significant	Authoritative > Authoritarian
AG	Attitude (Veg)	N.S.	-
	P Norms (Veg)	Significant	Authoritative > Neglectful
	PBC (Veg)	N.S.	-
RG (Pro)	Attitude (Veg)	Significant	Authoritative > All Others
	P Norms (Veg)	N.S.	-
	PBC (Veg)	N.S.	-
AG	Attitude (SSB)	Significant	Authoritative > Indulgent/Neglectful
	P Norms (SSB)	N.S.	-
	PBC (SSB)	Significant	Authoritative > All Others
RG (Prev)	Attitude (SSB)	Significant	Authoritative > Neglectful
	P Norms (SSB)	Significant	Authoritative > Neglectful
	PBC (SSB)	Significant	Authoritative > Neglectful

As was the case in Study 3(A), the findings from this study found that parental communication, even when taking into account overall parenting style, explained more variance in child food consumption cognitions in a promotive context. Even though I found significant main and interaction effects on attitude, perceived norms, and perceived behavioral control towards consuming SSB, the magnitude and variance explained is far smaller than in promotive contexts like consuming fruits and vegetables. This suggests that parental communication's effects on unhealthy food consumption is significant but limited. This suggests that in addition to communication, parents ought to persist with tweaking availability and modelling, in order to maximize their influence over children's unhealthy food consumption. Future research should

examine if other parenting practices such as modelling and availability significantly increase the variance explained in children's unhealthy food consumption cognitions.

This study helps clarify how parenting practices can differentially influence child food consumption outcomes depending on the parenting styles children find themselves in. Most importantly, it highlights the notion that researchers looking to examine the influence of parenting practices on food consumption (and indeed other socialization outcomes) have to take into account perceived parenting style as a moderating variable. As I have demonstrated in Chapter III, there are currently insufficient studies that have examined parenting styles as a moderating factor. Doing so offers a richer understanding on the effects of parenting practices on health behavior.

There are some limitations in my study that needs to be highlighted. As in Study Three (A), although my research questions presumes causality, the cross-sectional nature of my study design means that causal claims cannot be made with regard to the findings of the study. Even though I had strong theoretical justifications, future research should consider adopting a longitudinal design in order to test the causal assumptions implicit in this study. Next, in utilizing the tertile placement method for assigning cases to parenting styles, more than half the sample was lost, resulting in a loss of statistical power that might contribute to Type I error. In fact, it is possible that due to the lower sample size, some of the interaction effects were not statistically significant. A post-hoc analysis revealed that for some interaction terms such as active guidance by indulgent parenting style on perceived norms to consume fruits, active guidance by neglectful parenting style on attitude toward vegetables,

restrictive guidance by authoritarian parenting style on perceived norms to consume vegetables, restrictive guidance by authoritarian parenting style on perceived behavioral control to consume vegetables, and others, there was a relatively large beta coefficient and a p value below .10. Future research attempting to study the moderating effects of parenting styles should collect a large enough sample size to ensure sufficient statistical power to detect hypothesized effects.

Finally, this study did not take into account potential cultural differences in perceived parenting style. Although some researchers have found support for the generalizability of authoritative parenting's positive effects on socialization outcomes to Asian populations (Chan & Chan, 2007; Kim & Chung, 2003), there have also been research highlighting cultural differences in the effects of perceived parenting style on non-White populations. The biggest issue revolves around the effects of authoritarian parenting style (low warmth, high demandingness) among Asian children. Among White American children, parental authoritativeness clearly has a stronger positive influence on child outcomes (especially academic outcomes) compared to children under an authoritarian parenting style. This relationship is less certain for African-American, Asian, and Hispanic children, as some studies have found that authoritarianism is sometimes positively associated with academic achievement within these other cultures (Spera, 2005).

Several researchers interested in the phenomena of authoritarianism and its possible positive effects among Asian cultures have posited that some parental behaviors considered to be controlling is not negatively perceived among Asian children, as Asian parents sometimes show affection in ways that

may appear controlling. Several approaches have been adopted to provide a better understanding of this discrepancy. First, some researchers have chosen to examine parenting styles as a reflection of the culture, describing culturally-specific parenting styles that are applicable specifically to a target culture. For example, some researchers have developed culturally-specific parenting styles, such as Chinese notions of *chiao shun*, *guan*, and *qin* (Chao, 1994; Wu & Chao, 2011), and the Korean-specific parenting of *ga-jung-kyo-yuk* (Choi, Kim, Kim, & Park, 2013). Some researchers have handled it by conceptualizing another parenting style in addition to authoritative, authoritarian, indulgent, and neglectful parenting styles, postulating an Ethnic Minority parenting style that is responsive to children's needs but not to children's interests (Huang & Gove, 2015). Research in Singapore have found that while the hypothesis that authoritative parenting can yield better socialization outcomes is supported, authoritarian parenting can sometimes have positive effects (Ang, 2006). Further research have found that authoritarian parenting can result in either well-adjusted or maladjusted children, suggesting that authoritarian parenting might have a different cultural meaning compared to children from the West (Ang & Goh, 2006).

Having said that, this study's purpose was not to disentangle how Asian children perceive authoritarian parenting. It was conducted to test Darling and Steinberg's (1993) contextual model of parenting style in a food consumption context. The study offers support, along with previous research in Singapore (Ang, 2006), that authoritative parenting is indeed an optimal parenting style for maximizing the socialization effects of parenting practices. Nevertheless, future research ought to further explicate, delineate, and examine the meaning

of authoritarian parenting among Asian children. Doing so while help provide a more nuanced understanding of parenting styles' effects on Asian children.

Despite these limitations, this study has made several important contributions to research in clarifying the role of parenting style and parenting practices in the socialization of child food consumption outcomes. The parenting style-as-context integrative model posited by Darling and Steinberg (1993) was supported in the domain of child food consumption and it demonstrated that the inclusion of parenting styles as a moderating variable can provide greater insight into the effectiveness of parenting practices for children to lead healthier lives.

CHAPTER VII

IMPLICATIONS, CAVEATS, & CONTRIBUTIONS

7.1 Theoretical Contributions

Overall, there are several theoretical contributions from the series of studies in my thesis. Initially, the systematic review and meta-analysis highlighted the lack of research exploring the construct of active guidance, the mediating role of cognitive variables, and the moderating role of overarching parenting styles. These gaps meant that the theoretical processes and conditions that underlie parental communication's effects on child food consumption is poorly understood. In other words, the *how* and *why* of parental communication's effect on child food consumption had been overlooked.

Studies Two, Three (A), and Three (B) attempted to fill those knowledge gaps. First, Study Two revealed that active guidance is more than just factual nutrition education, but communication that also involves *evaluative* information about food that parents transmit to children. Next, the study highlighted the distinct difference between rules that are meant to promote healthier food consumption, and rules that are meant to prevent the consumption of unhealthy foods. This offers some clarification into the heterogeneous findings in both active guidance and its related constructs (e.g. nutrition education), and restrictive guidance (or rules), on child food consumption behavior. More importantly, the development of a validated measurement scale, the PARQ, offers a methodological tool for future researchers who want to examine the communicative effects of parental guidance on other child food consumption contexts.

Study Three (A) sought to understand *why* and *how* parental guidance influences child food consumption, by identifying the theoretical pathways with which these effects take place. The study suggests that there might be theoretically different effects of active versus restrictive guidance depending on the food consumption context (e.g. fruits and vegetables versus SSB). Specifically, it is possible that active parental guidance facilitates better internalization of favorable cognitions about healthy foods compared to unfavorable cognitions about unhealthy foods. This suggests that active parental guidance is more effective as a promotive tool that affects healthy food consumption more, as the communicative content extols the virtues of a healthy diet more than it discredits unhealthy diets. Meanwhile, the study found that the influence of parental restrictive guidance, or rules, are highly context-dependent. The study suggest that the mixed findings in relation to restrictive guidance might potentially be due to misalignments in terms of the behavioral contexts the rules are set in – healthy or unhealthy eating. In other words, rules are not only preventive in nature, but are also used to promote certain food consumption.

Study Three (A) also contributed to the theory of planned behavior, by identifying two communicative change mechanisms that reside in the most powerful socialization forces of a child's life – parents. Following the recommendation by Conner (2015), the findings showed that identifying key background factors can help to improve the utility of the theory of planned behavior. It illustrates the importance of parental communication in the formation of attitudinal beliefs, normative beliefs, and control beliefs from a young age.

Finally, Study Three (B) helps clarify how parenting practices can differentially influence child food consumption outcomes depending on the parenting styles children find themselves in. Most importantly, it highlights the notion that researchers looking to examine the influence of parenting practices on food consumption (and indeed other socialization outcomes) have to take into account perceived parenting style as a moderating variable. The parenting style-as-context integrative model posited by Darling and Steinberg (1993) was supported in the domain of child food consumption and it demonstrated that the inclusion of parenting styles as a moderating variable can provide greater insight into the effectiveness of parenting practices for children to develop healthier eating attitudes. Some researchers have conceptualized certain parenting practices as autonomy-supportive, including the use of reason, praise, and an “authoritative” feeding style, and that these autonomy-supportive practices are associated with child healthy eating (Tovar et al., 2018). While those findings support those in this study, delineating the stylistic features of parenting style and specific parenting practices as postulated in the contextual model of parenting style allows us to not conflate the effects of these two distinct dimensions of parenting, and helps tease out the individual and combined effects of parenting style and practices.

Researchers examining the effect of parental influence on other types of socialization outcomes should also consider including parenting styles as a moderating variable, as the emotional climate perceived by a child can strongly influence the effects of behavior-specific parenting practices. This is because the theoretical effects of authoritative parenting is hypothesized to transcend behavioral contexts. One area where the contextual model of parenting style can

be applied to is media consumption. While there are no known research on the moderating effects of parenting style on media consumption, recent advances in the study of parental mediation (in itself can be conceptualized as a parenting practice in the context of media consumption) have found that the style of communicating active or restrictive mediation can have differing effects on child outcomes from media consumption (Valkenburg, Piotrowski, Hermanns, & de Leeuw, 2013). Specifically, autonomy-supportive styles of active and restrictive mediation was hypothesized and found to alleviate media-related violence and aggression, compared to controlling and inconsistent styles of active and restrictive mediation (Fikkers, Piotrowski, & Valkenburg, 2017). While Valkenburg et al. (2013) utilized self-determination theory to construct the stylistic facets of parental mediation (autonomy-supporting, controlling, and inconsistent), there are many conceptual overlaps between autonomy-supportive styles of parental mediation and parenting practices employed under a perceived authoritative parenting style. In both situations, the stylistic facets of communication is proposed to have an impact on whether a parenting practice (e.g. active or restrictive mediation/guidance) would be effective. Likewise, in both situations, the communicative style which is most effective involves respect for the child and which doesn't involve psychological control. In other words, the moderating effect of parenting style would theoretically translate to the media context without complications. Future research on socialization should continue to explore and test how stylistic facets can impact the effectiveness of different parenting practices on a variety of child outcomes.

7.2 Practical Implications

There are a number of practical implications for motivated parents and caregivers of children who want to help their children adopt a healthier diet. First, the systematic review and meta-analysis highlighted the importance of availability and modelling in helping children eat healthier. Parents have to make available fruits and vegetables, and resist making available SSB in the home. Moreover, parents who hope their children develop healthy eating habits should lead the way by changing their own behaviors first, in order to act as role models for their children.

Second, Studies Two through Three (B) illustrated the importance of effective communication in order for parents to change children's attitudinal, normative, and control beliefs about food. Providing guidance, explanation, and education with an *evaluative* slant, and setting *context-specific rules* are important to help children learn about food in a healthy way. It also highlights the idea that "half-hearted" ways of communicating with children about food, in the form of general discussion, will have no impact on their healthy eating behavior. In fact, it might even backfire and lead to increased unhealthier eating due to children receiving those seemingly neutral messages from parents as implicit approvals of their food consumption choices (if they are currently not eating healthily).

Third, parents hoping to achieve their socialization goals with regard to food consumption have to reject a simplistic solution of "getting" children to eat better. Tactics such as parental guidance (and possibly other practices such as modelling and availability) are only effective when the broader context of developing a warm, responsive, supportive, and yet demanding, emotional

climate is conveyed to a child. Since an overall parenting style cannot be observed on a day-to-day basis, as it is theoretically an accumulation of all parenting behaviors towards a child, parents should be conscious of how each individual action or behavior they transmit to a child shapes his or her emotional climate. Health behavior change, or indeed behavior change as a whole, requires a long-term and holistic approach. Attempting to socialize children into having a healthier diet should likewise require a long-term and holistic approach from parents.

7.3 Policy Implications

To build on that, the findings from this thesis can be used by health promotion professionals and health policymakers hoping to improve children's diet. These studies show that parents play a vital role in shaping children's food consumption behaviors, serving as (1) gatekeepers, (2) role models, and (3) health educators. Tackling childhood obesity requires a multi-pronged approach, and in addition to policy measures such as sugar taxes (e.g. Trigg, 2018), programs aiming to educate parents on nutrition, their role, and what they can do to help their children develop healthier eating habits need to be more seriously considered.

First, policymakers and health promotion professionals have to attempt to help parents develop their nutrition education, so that they can make available and model the desired behaviors to their children. Nutritionally questionable food products for children have been found to use nutritional and health claims to target parents, potentially leading unaware parents to purchase these food products for their children (Emond, Smith, Mathur, Sargent, & Gilbert-Diamond, 2015). Greater nutrition education and awareness can help to

mitigate the effects of misleading food product advertising, and lead parents to make available and model the desired food consumption behaviors for children. Public health campaigns that target parents' nutrition literacy can help to achieve this.

Second, insights gleaned from this thesis can be used to shape health promotion programs that involve parents as health promoters at home. For example, in addition to educating parents about nutrition and exercise, such as the "Eat Right, Get Moving – A Healthier Start" parent engagement program by Singapore's Health Promotion Board (Health Promotion Board, 2017), future content built on these studies can be developed to help parents understand the different facets of parental guidance in the area of food consumption. Parents should be made aware to the promotive effects of *evaluative* active guidance, the impotency of factual and general discussion about food, the importance of context-specific rules about food consumption, and how "other" parenting behaviors affect their children's receptivity to these efforts, emphasizing the long-term and holistic approach necessary to effect change in their children's diet.

Last, policymakers should look to educate parents on their role in developing their children's food consumption habits. When it comes to food consumption, parents are not separate individuals from their children. Children's food consumption is strongly influenced by their parents' food purchases, consumption, and communication. Policymakers should look to build awareness among parents that their words and actions regarding food, whether intentional or not, can have lasting effects in the well-being of their children.

7.4 Overall Limitations

Overall, the four studies in my thesis sought to understand how the communicative actions of parents shape children's thoughts about food consumption in three food consumption contexts. While the specific limitations of each study has been discussed in the relevant chapters, there are some overarching limitations of this thesis that need to be addressed.

First, these studies focused on the role parents play in shaping children's food consumption. Food consumption is a complex behavior that is a product of various genetic and environmental factors (Birch, 1999; Scaglioni et al., 2018), and the studies presented in my thesis did not focus on them. In fact, among environmental factors alone, siblings, teachers, peers, the obesogenic food environment, the media environment, and the school environment, have been found to have some effects on child food consumption (Andreyeva, Kelly, & Harris, 2011; Boyland et al., 2016; Boyland, Kavanagh-Safran, & Halford, 2015; Houldcroft, Haycraft, & Farrow, 2013; Meller et al., 2017; Scaglioni et al., 2018; Vargas, Jimenez-Cruz, & Bacardi-Gascon, 2013). Research and practice aimed at improving children's dietary habits must take into account the totality of research in this specific context, and tackle this issue with a holistic approach, such as in engaging parents, tackling the obesogenic food environment with children-first policies, and encouraging healthier offerings in school lunches. This can also manifest in future research examining the impact of other socialization forces – such as media and technology, as well as teachers and other aspects of the school environment – that have significant influence over children and adolescents' beliefs about food, as they spend extended amounts of time with them in their lives. Research in those areas (for example,

in examining effective communication and educational strategies teachers can exert an influence on child food consumption) will provide greater understanding of how other socialization forces can shape children's food consumption preferences.

Next, while this thesis examined how parental communication can shape the three proximal predictors of food consumption behavior in the theory of planned behavior, it did not examine how parental communication themselves are shaped. Sometimes, parents might have the intention to project an authoritative parenting style, or to employ effective parenting practices (such as active guidance), but they do not translate those intentions into behavior. Future research should examine how these parenting behaviors are developed and enacted, so that these behaviors can be targeted to indirectly improve children's dietary behaviors. Some researchers have proposed a dual-process framework in which to understand how food parenting intentions translate to food parenting behaviors, which offers a promising new avenue of research to examine how and why parents enact more positive food parenting practices (Larsen et al., 2018).

Finally, the studies in this thesis, barring Study 1, were conducted with a sample of Singaporean children and adolescents. As discussed in Chapter VI, while the parenting practices and styles I examined were theorized to be universal in its effects, the studies have provided support for the hypothesized effects only in one cultural context – Singapore. Aspects of parental communication and parent-child relationship that might reflect cultural differences were not investigated in this thesis. As such, the generalizability of

the findings across cultures might be limited. Future research should examine if these findings would replicate in other cultural settings.

CONCLUSION

At the start of this dissertation, the overarching objective was to understand what types of communicative actions that parents engage in can influence the food consumption choices of children. The journey began with a survey of the landscape of research in the field of parenting practices and child food consumption that identified the most powerful ways parents influence their children's food consumption – modelling and making food available. More importantly, some areas of research were conflicting and lacking, specifically in the area of active communication and rule-setting. There was also a dearth of research seeking to understand the processes and conditions of how facets of parental communication influence behavior through the shaping of internal cognitions that drive children's behaviors.

By drawing from multiple disciplinary traditions, but approaching the task with a communication perspective, I have attempted to clarify the concepts of parental active guidance and restrictive guidance. Using rigorous measurement development techniques, Study Two detailed the development and validation of a scale measuring different facets of parental guidance in the context of food consumption,

Next, with a large-scale sample of children, I have managed to identify and parse out the theoretical pathways with which parental guidance impacts children, offering greater clarity into the effects of parental communication on the inner voices of children. These voices guide children to act in ways that can potentially influence the how they eat and live, contributing to their mental and physical well-being throughout their lives.

Finally, I identified and explored the role of the broader socio-environmental setting of a child and its influence on the receptiveness of a child to parents' persuasive attempts at achieving socialization goals such as developing healthier eating habits. The overall finding was that parental guidance and its various forms were most effective when applied in a healthy emotional climate, characterized by warmth, supportiveness, responsiveness, but also with strong maturity demands. Attempts to "get" children to eat healthier needs to take into account helping parents understand the way in which they project their attitude towards their children, as it can greatly affect the effectiveness of socialization strategies.

With these studies, I believe that a contribution to the research in this domain has been made – one of clarification about the facets of parental guidance and the theoretical processes and conditions with which they influence children's behavior. It is hoped that given the appropriate engagement with the right stakeholders, the findings of the study can offer motivated parents, policymakers, and health promotion professionals evidence-based ways to shape the way they communicate about food with children. And that, even if it affects only one child, has the potential to help gain a net positive in the well-being of children across the world.

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Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/ Mediators/ Comments
1	Alsharairi & Somerset	2015	Ecology of Food and Nutrition	Longitudinal survey	4,310	Australian children aged 4 to 9	Authoritarian parenting style Maternal demandingness Paternal Responsiveness Permissive father Authoritative fathers Authoritative mothers	F&V intake F&V intake F&V intake F&V intake F&V intake F&V intake F&V intake	- - + + (later) + (later) + (later; girls)	
2	Amuta et al	2015	Food and Exercise in Rural Areas	Cross-sectional survey	298	Predominantly mothers living in rural areas in the US, elementary school children, child age not available	Restrictive guidance (during mealtime)	F&V intake	0	
3	Arredondo et al	2006	Health Education Research	Cross-sectional survey	812	Predominantly Latino mothers in the US, with child mean age of 6 (<i>SD</i> = 0.94)	Reward (with praise) Pressure to eat Restrictive Guidance	Healthy eating Unhealthy eating Healthy eating Unhealthy eating Healthy eating Unhealthy eating	+ - 0 + 0 0	Gender moderated some of the effects
4	Bante et al	2008	Journal of Nutrition Education and Behavior	Cross-sectional survey	1,555	US parents with child aged 2 to 5 living in rural areas	Reward Pressure	F&V preference F&V intake F&V preference F&V intake	- + - -	
5	Berge et al	2010	Journal of Adolescent Health	Longitudinal survey	2,516	US children with a mean age of 12.8 (<i>SD</i> = 0.8) at beginning of study	Permissive Father	F&V intake	+ (later; girls)	
6	Boots et al	2015	Appetite	Cross-sectional survey	611	Australian parents of children aged 2 to 7 years old	(Control of) availability Restrictive guidance Demandingness Responsiveness	Healthy snack intake Unhealthy snack intake Healthy snack intake Unhealthy snack intake Healthy snack intake Unhealthy snack intake Healthy snack intake Unhealthy snack intake	+ - - + + - 0 +	

Table 1. Summary of all studies that were selected for analysis in the systematic review

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/ Mediators/ Comments
7	Brown et al	2008	Appetite	Cross-sectional survey	518	English parents with children aged 4 to 7	Restrictive guidance	Healthy snack intake Unhealthy snack intake	0 0	
							(Control of) availability	F&V intake Healthy snack intake Unhealthy snack intake	+ 0 -	
							Pressure to eat	F&V intake Healthy snack intake Unhealthy snack intake F&V intake	+ 0 + -	
8	Brown & Ogden	2004	Health Education Research	Cross-sectional survey	112	British parent-child matched dyads with children aged 9 to 13	Modeling	Healthy snack intake Unhealthy snack intake	+ +	
9	Brug et al	2008	British Journal of Nutrition	Cross-sectional survey	13,305	European children aged 8 to 14	Availability	F&V intake	+	
10	Campbell et al	2006	International Journal of Obesity	Cross-sectional survey	560	Australian parents with children aged 5 to 6	Modeling	F&V intake Snack intake High-energy drink intake	+ 0 0	
							Pressure to eat	F&V intake Snack intake High-energy drink intake	0 + +	
							Restrictive guidance	F&V intake Snack intake High-energy drink intake	0 0 0	
11	Cooke et al	2011	Psychological Science	Pre-test-post-test experimental design	422	British children aged 4 to 6	Reward	Vegetable liking Vegetable intake	+ +	
				3 treatment groups (exposure of food + non-food reward, exposure of food + social reward, exposure alone), 1 control group			Reward (with praise)	Vegetable liking Vegetable intake	+ +	
12	Cooke et al	2004	Public Health Nutrition	Cross-sectional survey	564	British parents of children aged 2 to 6	Modeling	F&V intake	+	

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/ Mediators/ Comments
13	Birch et al	1984	Child Development	3 (reward, praise, control) x 2 (single portion, double portion) experimental design	45	US children aged 3 to 5	Reward Reward (with praise)	Milk beverage preference Milk beverage preference	- -	
14	Birch et al	1980	Child Development	4 (Food as reward, Food given without condition, food given in non-social context, food given during snack time) conditions over 4 time points	64	US children aged 3 to 6	Food as reward	Snack preference	+	
15	Campbell et al	2007	Obesity	Cross-sectional survey	347	Predominantly Australian mothers with children aged 12 to 13 years old	Modeling Pressure to eat Reward (with praise) Authoritarian parenting style Availability	High-energy drink intake Sweet snack intake Savory snack intake High-energy drink intake Sweet snack intake Savory snack intake High-energy drink intake Sweet snack intake High-energy drink intake Sweet snack intake Savory snack	+ 0 + (boys) 0 + (boys) + + (boys) 0 + (girls) + (girls) +	
16	Corsini et al	2013	Public Health Nutrition	Pre-test-post-test experimental design 2 treatment groups (exposure of food + reward, Exposure only), 1 control group	185	British children aged 4 to 6	Reward	Vegetable liking Vegetable intake	+ +	
17	Cutler et al	2011	Journal of the American Dietetic Association	Longitudinal survey	4,746	US children aged 12 to 16	Availability	F&V intake Snack intake	+ +	

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/Mediators/Comments
18	Couch et al	2014	Journal of the Academy of Nutrition and Dietetics	Cross-sectional survey	699	US parent-child dyads with children aged 6 to 11	Modeling (2/5 items)	F&V intake High-calorie beverages Snacks	+ 0 0	
							Restrictive guidance	F&V intake High-calorie beverages Snacks	0 0 0	
							Pressure to eat	F&V intake High-calorie beverages Snacks	0 0 0	
							Availability	F&V intake High-calorie beverages Snacks	0 0 +	
19	Cullen et al	2001	Health Education Research	Cross-sectional survey	230	US children aged 9 to 12	Availability Modeling	F&V intake F&V and juice intake	+ +	
20	De Bourdeaudhuij et al	2005	Public Health Nutrition	Cross-sectional survey	326	European children aged 10 to 11	Modeling Restrictive guidance	Fruits intake Vegetables intake Fruits intake Vegetables intake	+ + + +	
21	De Bourdeaudhuij et al	2009	Public Health Nutrition	Cross-sectional survey	4,555	European children aged 11	Parenting styles	F&V intake	0	Parenting styles moderated the impact of encouragement and restrictive guidance on fruit consumption and the impact of availability on fruits and vegetables
22	De Bourdeaudhuij et al	2008	European Journal of Clinical Nutrition	Cross-sectional survey	13,305	European children aged 11	Modeling Availability	Fruits intake Vegetables intake Fruits intake Vegetables intake	+ + 0 +	Some differences across countries
23	de Bruijn et al	2007	Health Education Research	Longitudinal survey	208	Dutch adolescent girls between 12 and 18	Restrictive guidance	SSB intake SSB subjective norms (to limit) SSB attitudes	- + 0	Girls with moderate levels of agreeableness saw the most pronounced restrictive guidance effect on SSB consumption

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/Mediators/Comments
24	Dickens & Ogden	2014	Appetite	Longitudinal survey	93	British parent-child dyads with children aged 17 and 18 at first wave (predominantly mothers)	Modeling	Unhealthy snacks Unhealthy meals Healthy foods consumption	+ 0 0	Note: children were living alone at follow-up
							Restrictive guidance	Unhealthy snacks Unhealthy meals Healthy foods consumption	0 0 0	
							Availability	Unhealthy snacks Unhealthy meals Healthy foods consumption	0 0 0	
							Pressure to eat	Unhealthy snacks Unhealthy meals Healthy foods consumption	0 0 0	
25	Durao et al	2015	Appetite	Cross-sectional survey	4,122	Portuguese parents of children aged 4	Restrictive guidance	F&V intake (adequacy) Snacks (over recommended)	+ -	
							(Control of) Availability	F&V intake (adequacy) Snacks (over recommended)	+ -	
							Pressure to eat	F&V intake (adequacy) Snacks (over recommended)	+ +	
26	Eisenberg et al	2012	Journal of Nutrition Education and Behavior	Cross-sectional survey	541	US parents of children aged 5 to 8	Restrictive guidance and pressure to eat	Total fat consumption	+	
27	Elfhag et al	2008	Public Health Nutrition	Cross-sectional survey	1441	Swedish parent-child dyads with children aged 12	Modeling	F&V intake SSB intake	+ +	
28	Fisher & Birch	2000	Journal of the American Dietetic Association	Quasi-experimental	197	US parent-child dyads with girls aged 4 to 6	Restrictive guidance and availability	Snacks intake	+	
29	Fisher & Birch	1999	Appetite	Quasi-experimental	71	US parent-child dyads with children aged 3 to 5	Restrictive guidance and availability	Snacks intake	+ (for girls) 0 (for boys)	
30	Fisher & Birch	1999	American Journal of Clinical Nutrition	Quasi-experimental	40	US parent-child dyads with children aged 3 to 6	Restrictive guidance and availability	Snacks intake	+	

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/Mediators/Comments
31	Fisher et al	2002	Journal of the American Dietetic Association	Longitudinal survey	191	US parent-child dyads with girls aged 5	Pressure to eat Modeling	F&V intake F&V intake	- +	
32	Gevers et al	2015	Appetite	Cross-sectional survey	329	Dutch children aged 11 to 15	Restrictive guidance	Snack intake	-	
33	Gibson et al	1998	Appetite	Cross-sectional survey	92	British mother-child dyads with children aged 9 to 11	Modeling	Fruits intake Vegetables intake Confectionary intake	+ 0 0	
34	Entin et al	2014	Journal of the American College of Nutrition	Longitudinal survey	63	Israeli parent-child dyads with children aged 5 to 6; predominantly low SES	Availability Modeling Food as reward Pressure to eat Restrictive guidance	Vegetable intake Fruits intake Sweets & junk food intake Vegetable intake Fruits intake Sweets & junk food intake Vegetable intake Fruits intake Sweets & junk food intake Vegetable intake Fruits intake Sweets & junk food intake Vegetable intake Fruits intake Sweets & junk food intake	0 0 + + 0 0 0 + (junk only) 0 0 + 0 0 + 0 0 +	
35	Goldman et al	2012	Journal of Public Health Research	Cross-sectional survey	229	US parent-child dyads with children aged 2 to 5	Modeling Availability Accessibility	F&V intake F&V intake F&V intake	+ + 0	
36	Gross et al	2010	Journal of Nutrition Education and Behavior	Cross-sectional survey	93	US parent-child dyads predominantly mothers, with children aged 9 to 11	Modeling	F&V intake	0	
37	Gubbels et al	2009	Appetite	Cross-sectional survey	2,578	Dutch mothers with children aged 2	Restrictive guidance	Snacks, sweets and soft drinks F&V intake	- +	

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/ Mediators/Comments
38	Gregory et al	2011	Appetite	Longitudinal survey	60	Australian mothers of children aged 2 to 4	Restrictive guidance	Fruit consumption Vegetables consumption Sweets consumption	0 0 0	Results are controlled for consumption at first wave of study; correlational analysis at baseline revealed greater number significant findings
							Pressure to eat	Fruit consumption Vegetables consumption Sweets consumption	- - 0	
							Modeling	Fruit consumption Vegetables consumption Sweets consumption	0 + 0	
							Availability	Fruit consumption Vegetables consumption Sweets consumption	0 0 0	
39	Harris & Ramsey	2015	Appetite	Cross-sectional survey	102	US African American fathers with children aged 3 to 13	Modeling	F&V intake SSB intake	+ +	
							Availability of healthy food	F&V intake SSB intake	0 -	
40	Hendy et al	2009	Appetite	Cross-sectional survey	1499	US mothers with children aged 6 to 11	Restrictive guidance	Snacks intake	0	
							Availability of fruits and veg	F&V intake	+	
							Reward	Snacks intake F&V intake	0 0	
							Pressure to eat	Snacks intake F&V intake	0 0	
							Modeling (of snacks)	Snacks intake	+	

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/Mediators/Comments
41	Hennessy et al	2012	Journal of the American Dietetic Association	Cross-sectional survey	99	US parent-child dyads with children aged 6 to 11 living in rural areas; predominantly mothers	Authoritarian parental <i>feeding</i> style Uninvolved parental <i>feeding</i> style Permissive parental <i>feeding</i> style Restrictive guidance Pressure to eat	Low-nutrient-dense foods intake (LNDF) LNDF intake LNDF intake LNDF intake LNDF intake	0 0 + 0 0	Moderating effect of feeding styles on restrictive guidance was found; specifically, restrictive guidance led to lower intake of LNDF among unpermissive parents Other moderating effects of parental feeding styles were not found
42	Hoerr et al	2009	International Journal of Behavioral Nutrition and Physical Activity	Cross-sectional survey	715	US parent-child dyads with children aged 3 to 5; predominantly mothers, and low-income households	Authoritarian parental <i>feeding</i> styles	Fruits, juice and vegetables intake	-	In comparison to permissive parental <i>feeding</i> styles
43	Jansen et al	2007	Appetite	Pre-test-post-test experimental design 2 (prohibition/no prohibition)x2 (phase1/phase2)	74	European children aged 5 to 6	Restrictive guidance (of experimenter) Restrictive guidance (of parents)	Snacks desire Snacks intake Snacks intake	+ + (larger proportion consumed) Curvilinear	Children with parents of low restrictive guidance and high restrictive guidance consumed more food than those with moderate restrictive guidance
44	Johnson et al	2011	British Journal of Nutrition	Cross-sectional survey	342	UK parent-child sample of twins aged 11	Maternal Modeling Paternal Modeling Availability Restrictive guidance Pressure to eat	Core food intake Non-core food intake Core food intake Non-core food intake Core food intake Non-core food intake Core food intake Non-core food intake	+ + 0 0 0 + 0 0 0 0	
45	Kiefner-Burmeister et al	2014	Appetite	Cross-sectional survey	171	US mothers of children aged 3 to 6	Food as reward, as emotion regulation, and restrictive guidance (measured in reverse)	F&V intake Snack, sweets, and SSB intake	- +	The latent variable of “negative feeding practices” combined these different dimensions of parenting practices

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/Mediators/Comments
46	Koui & Jago	2008	Public Health Nutrition	Cross-sectional survey	167	Greek children aged 10 to 12	Availability	F&V intake	+	
47	Kremers, Brug, de Vries, & Engels	2003	Appetite	Cross-sectional survey	643	Dutch children aged 16 to 17	Authoritative parenting style	Fruits attitude Fruits subjective norm Fruit intention to eat Fruits intake Fruits attitude	+ + + + +	Analyses based on ANOVA and evidence of effects are based on mean comparison with children classified under other parenting styles
						Indulgent parenting style				
48	Kröller & Warschburger	2009	International Journal of Behavioral Nutrition and Physical Activity	Cross-sectional survey	556	German mothers of children aged 1 to 10	Restrictive guidance	Unhealthy food intake Healthy food intake	0 0	
						Pressure to eat	Unhealthy food intake Healthy food intake	0 0		
						Food as reward	Unhealthy food intake Healthy food intake	+ 0		
						Modeling (as intentional act of eating healthy in front of children)	Unhealthy food intake Healthy food intake	- +		
49	Lee & Keller	2012	Journal of the Academy of Nutrition and Dietetics	Cross-sectional design with lab-based measure of food consumption	68	US children aged 4 to 6	Pressure to eat (measured outside of lab)	Mac and cheese intake Vegetables intake Fruits intake Milk intake SSB intake Chocolate pudding intake	- + 0 + 0 -	
50	Lo et al	2015	PLoS ONE	Cross-sectional survey	4,553	Hong Kong parents of children aged 2 to 5	Food as reward	High energy-density food Fruits intake Vegetables intake	+ 0 -	
						Encouragement and rewarding with praise	High energy-density food Fruits intake Vegetables intake	0 + +		
						Restrictive guidance	High energy-density food Fruits intake Vegetables intake	- 0 +		

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/ Mediators/Comments
51	Lopez et al	2012	Journal of the Academy of Nutrition and Dietetics	Cross-sectional survey	541	US parents of children aged 5 to 8	Restrictive guidance	SSB intake	0	
52	Loth et al	2016	Appetite	Cross-sectional survey	2383	US parent-child dyads with children with a mean age of 14.4 (<i>SD</i> = 2.0)	Availability and accessibility of healthy food Healthy food modeling Restrictive guidance	F&V intake Snacks intake SSB intake F&V intake Snacks intake SSB intake F&V intake Snacks intake SSB intake	+ - - + - - + + 0	
53	McGowan et al	2012	European Journal of Clinical Nutrition	Cross-sectional survey	434	UK primary caregivers of children aged 2 to 5	Modeling Availability	F&V intake Snacks intake Non-core drinks intake F&V intake Snacks intake Non-core drinks intake	+ + + 0 + 0	
54	Monge-Rojas et al	2010	Appetite	Cross-sectional survey	133	Costa Rican children aged 14 to 18	Restrictive guidance	Fruits intake Vegetables intake Fast food intake	0 0 -	
55	Østbye et al	2013	International Journal of Obesity	Cross-sectional study	208	US mothers of children aged 2 to 5	Availability (of junk food) Modeling (of healthy eating)	Junk food intake Healthy food intake Junk food intake Healthy food intake	+ - - +	
56	Nickelson et al	2012	Journal of Nutrition Education and Behavior	Cross-sectional survey	4,049	US children aged 11 to 14	Restrictive guidance	SSB purchase and intake	-	

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/Mediators/Comments
57	McPhie et al	2012	Early Child Development and Care	Longitudinal survey	117	Australian parents with children aged 2 to 4	Restrictive guidance	Fruits intake Vegetables intake Unhealthy food intake	+	DVs are collected at second wave of data collection
							Pressure to eat	F&V intake Unhealthy food intake	0 0	
							Maternal warmth	F&V intake Unhealthy food intake	0 -	
								F&V intake	0	
							Maternal control	Unhealthy food intake	0	
58	Melbye & Hansen	2015	BioMed Research International	Cross-sectional survey	796	Norwegian parent-child dyads with children aged 10 to 12	Active guidance	Vegetables intake SSB intake	+	Self-efficacy mediated the relationship between restrictive guidance and vegetables intake
							Availability of healthy food	Vegetables intake SSB intake	- -	
59	Melbye et al	2013	Appetite	Cross-sectional survey (dataset corresponds with previous study)	796	Norwegian parent-child dyads with children aged 10 to 12	Availability of healthy foods	Vegetables intake	+	
							Restrictive guidance	Vegetables intake	-	
							Active guidance	Vegetables intake	0	
							Modeling	Vegetables intake	0	Differences in results with Study 60 is a consequence of different analytical procedure used (this study utilized regressions, while Study 60 utilized correlations)
							Food as reward	Vegetables intake	0	
60	Palfreyman et al	2014	Maternal and Child Nutrition	Cross-sectional survey	484	British mothers with children aged 18 months to 8 years old	Modeling (analyzed as 3 dimensions)	F&V intake Sweet snacks intake Savory snacks intake Rice, potatoes, pasta intake Salads intake Fresh fruit juice intake	+	Modeling is conceptualized as having 3 dimensions in this study. The effects listed here assume any one dimension's impact on consumption behavior as indicative of a significant modeling effect.
									0	
									+	
									0	
									+	
									0	

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/ Mediators/Comments
61	Papaioannou et al	2013	Journal of Nutrition Education and Behavior	Cross-sectional survey	667	Predominantly US mothers with children with a mean age of 4.4 (<i>SD</i> = 0.6)	Active guidance Restrictive guidance Practical methods (includes reward, food as reward, reward with praise) Availability (of healthy food)	F&V Intake F&V Intake F&V Intake	0 0 0	Indulgent parental <i>feeding</i> style moderated the effect of restrictive guidance on fruit and vegetable intake; among indulgent parents, restrictive guidance saw stronger associations with fruits and vegetables intake
62	Patrick et al	2005	Appetite	Cross-sectional survey	231	US caregivers of children aged 3 to 5; predominantly women	Authoritative feeding style Authoritarian feeding style	Fruits intake Vegetables intake Dairy intake Fruits intake Vegetables intake Dairy intake	0 + + 0 - 0	
63	Pearson et al	2009	Public Health Nutrition	Cross-sectional study	328	British children aged 12 to 16	Authoritative parenting	Fruits intake Unhealthy snacks intake Vegetables intake	+ - 0	
64	Peters et al.	2013	Public Health Nutrition	Cross-sectional study	269	Australian parents with children aged 2 to 5	Parenting styles Pressure to eat Restrictive guidance	F&V intake Non-core foods intake F&V intake Non-core foods intake F&V intake Non-core foods intake	0 0 0 0 - 0	
65	Ray et al	2013	Journal of Nutrition Education and Behavior	Cross-sectional study	805	Finnish parent-child dyads with children aged 10 to 11	Restrictive guidance (only 1 out 3 items in their measure is indicative of our construct; however, this study was added as it is an illustration of a moderating effect of parenting styles)	Nutrient-dense foods intake Energy-dense foods intake	+ -	Parental warmth moderates the association between restrictive guidance and nutrient-dense and energy-dense foods intake, such that there are stronger associations with nutrient-dense foods intake when parental warmth is high, while there are stronger associations with energy-dense foods when parental warmth is low

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/ Mediators/Comments
66	Ray et al	2013	Public Health Nutrition	Cross-sectional study	8,736	European children aged 10 to 12	Modeling	Fruits intake	+	
							Vegetables intake	+		
						Accessibility	Fruits intake	+		
							Vegetables intake	+		
67	Reinaerts et al	2007	Appetite	Cross-sectional survey	1,739	Dutch parents of children aged 4 to 12	Modeling	Fruits intake	+	
							Vegetables intake	+		
						Accessibility	Fruits intake	0		
						Availability	Fruits intake	+		
							Vegetables intake	0		
68	Rodenburg et al	2014	Public Health Nutrition	Longitudinal survey	1,275	Dutch parent-child dyads with children aged 9	Food as reward	Fruits intake	-	Psychological and behavioral control moderated the effects of food as reward on fruit intake (high = significant association), the effects of availability (of healthy food) on snacking (low = significant association), and the effects of restrictive guidance on SSB intake (low = significant association)
							Snacks intake	+		
							SSB intake	0		
						Restrictive guidance	Fruits intake	0		
							Snacks intake	-		
							SSB intake	-		
						Availability (of healthy food)	Fruits intake	+		
							Snacks intake	-		
							SSB intake	-		
69	Rodenburg et al	2012	Appetite	Cross-sectional survey	1,762	Dutch parent-child dyads with children aged 8	Modeling	Fruits intake	+	Psychological and behavioral control moderated the effects of modeling. High control parent-child relationship displayed strongest associations between modeling and child intake
70	Schwartz et al	2015	Childhood Obesity	Longitudinal survey	480	US children aged 11 to 12 at first wave of data collection, predominantly low-income, black, and Latino.	Authoritative parenting	SSB intake	-	Television in child's room moderates the influence of authoritative parenting on SSB intake by weakening its association
71	Sdrali et al	2010	International Journal of Consumer Studies	Cross-sectional survey	149	Greek children aged 13 to 16	Availability, accessibility, modeling, injunctive and descriptive norms	SSB intake	+	

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/ Mediators/Comments	
72	Sleddens et al	2010	Appetite	Cross-sectional survey	135	Dutch parents of children aged 6 to 7	Food as reward	Snacks intake Fruits intake SSB intake	0 0 0		
							Restrictive guidance	Snacks intake Fruits intake SSB intake	0 0 0		
73	Sleddens et al	2014	Appetite	Longitudinal survey	1654	Dutch parents of children aged 6 at first time point, and 8 at second time point	Food as reward	Snacks intake SSB intake Water intake Fruits intake	0 0 0 -	General parenting styles as measured by the Comprehensive General Parenting Questionnaire moderated the effects of some parenting practices on eating. Manipulating availability and restrictive guidance had stronger effects on children in a positive (less overprotection and controlling) parenting context.	
						Restrictive guidance	Snacks intake SSB intake Water intake Fruits intake	0 - + 0			
						Availability (healthy foods)	Snacks intake SSB intake Water intake Fruits intake	- - + +			
						Pressure to eat	Snacks intake SSB intake Water intake Fruits intake	+ + 0 0			
74	van Ansem et al	2014	British Journal of Nutrition	Cross-sectional survey	1428	Dutch parents of children aged 8 to 12	Modeling	SSB intake	+		
						Restrictive guidance	SSB intake	0			
						Availability	SSB intake	+			
75	van Grieken et al	2015	Pediatric Obesity	Longitudinal survey	2047	Dutch parent-child dyads with children aged 5 at first wave; 7 at second wave	Restrictive guidance	SSB intake	-		
						Availability (healthy foods)	SSB intake	-			
76	Van Lippevelde et al	2013	Appetite	Cross-sectional survey	6512	European parent-child dyads with children with a mean age of 11.7 (<i>SD</i> = 0.8)	Active guidance	SSB intake Juice intake	0 0		
						Availability	SSB intake Juice intake	+ +			
						Modeling	SSB intake Juice intake	+ +			
						Food as reward	SSB intake Juice intake	0 0			

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/ Mediators/Comments
77	Taylor et al	2011	Appetite	Cross-sectional survey	175	Australian caregivers of children with a mean age of 9.21 (<i>SD</i> = 1.09)	Parent-report parenting style	F&V intake Non-core food intake Attitude (veg) Attitude (fruit) Attitude (non-core food)	0 0 0 0 0	Parenting styles did not interact with parenting practices in predicting food consumption-related variables
							Child-reported responsiveness	F&V intake Non-core food intake Attitude (veg) Attitude (fruit) Attitude (non-core food)	0 0 0 + -	
							Child-reported demandingness	F&V intake Non-core food intake Attitude (veg) Attitude (fruit) Attitude (non-core food)	0 0 0 + 0	
							Restrictive guidance	F&V intake Non-core food intake Attitude (veg) Attitude (fruit) Attitude (non-core food)	0 0 0 0 0	
							Pressure to eat	F&V intake Non-core food intake Attitude (veg) Attitude (fruit) Attitude (non-core food)	0 0 0 0 0	
78	van der Horst et al	2007	Health Education Research	Cross-sectional survey	383	Dutch children aged 12 to 17	Restrictive guidance and availability (with availability reverse-coded)	SSB intake	-	Attitude, self-efficacy, habit strength mediated the relationship between restrictive guidance + availability on SSB intake
							Modeling	SSB intake	+	

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/ Mediators/Comments
79	Van Strien et al	2009	Appetite	Cross-sectional survey	943	Dutch children aged 7 to 12	Restrictive guidance Pressure to eat	Snacking Fruits intake Snacking Fruits intake	- + 0 0	Bivariate correlations showed more significant correlations
80	Vereecken et al	2004	Appetite	Cross-sectional survey	346	Dutch mothers of children aged 2 to 7	Restrictive guidance Active guidance Pressure to eat Reward Reward with praise Avoid negative modeling Modeling	Fruits intake Vegetables intake SSB intake Sweets intake Fruits intake Vegetables intake SSB intake Sweets intake Fruits intake Vegetables intake SSB intake Sweets intake Fruits intake Vegetables intake SSB intake Sweets intake Fruits intake Vegetables intake SSB intake Sweets intake	0 0 - - 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 +	
81	Wardle et al	2005	Journal of the American Dietetic Association	Cross-sectional survey	564	British parents of children aged 2 to 6	Pressure to eat Modeling	F&V intake F&V intake	- +	

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/Mediators/Comments
82	Vereecken et al	2010	Public Health Nutrition	Longitudinal study	609	Belgian mother-child dyads with children aged 9 to 11 at first wave	Restrictive guidance	F&V intake SSB and snacks intake	0 -	Bivariate correlations showed more significant correlations
							Pressure to eat	F&V intake SSB and snacks intake	0 0	
							Reward	F&V intake SSB and snacks intake	0 0	
							Reward with praise	F&V intake SSB and snacks intake	0 0	
							Availability (of unhealthy food)	F&V intake SSB and snacks intake	- +	
							Avoid negative modeling	F&V intake SSB and snacks intake	0 0	
							Modeling	F&V intake SSB and snacks intake	+ +	
83	Vereecken et al	2009	American Journal of Health Promotion	Cross-sectional study	1614	Belgian parent-child dyads with children aged 11 to 12	Restrictive guidance	Fruits intake Vegetables intake SSB intake Sweets intake	+ + - -	
							Pressure to eat	Fruits intake Vegetables intake SSB intake Sweets intake	- 0 0 +	
							Reward	Fruits intake Vegetables intake SSB intake Sweets intake	0 0 0 0	
							Reward with praise	Fruits intake Vegetables intake SSB intake Sweets intake	0 0 0 0	
							Avoid negative modeling	Fruits intake Vegetables intake SSB intake Sweets intake	0 0 0 0	
							Parenting styles	Fruits intake Vegetables intake SSB intake Sweets intake	0 0 0 0	
84	Vereecken et al	2010	Appetite	Cross-sectional study	755	Belgian parents of children with a mean age of 3.5	Modeling Parenting styles (laxness, support, overreactivity)	F&V intake F&V intake	+ 0	

Table 1 (Continued)

Study	Author(s)	Year	Outlet	Design	N	Participants	Independent Variable(s)	Dependent Variable (s)	Evidence of Effect	Moderators/Mediators/Comments
85	Wyse et al	2011	BMC Public Health	Cross-sectional survey	396	Australian parents of children aged 3 to 5	Modeling Pressure to eat Availability Accessibility Food as reward Restrictive guidance	F&V intake F&V intake F&V intake F&V intake F&V intake F&V intake	+ 0 + + 0 0	
86	Xu et al	2013	Appetite	Cross-sectional survey	242	Australian mother with children aged 2	Parental warmth Parental hostility	Fruits intake Vegetables intake SSB intake Snacks intake Fruits intake Vegetables intake SSB intake Snacks intake	0 + 0 0 - 0 + +	
87	Young et al	2004	Journal of Nutrition Education and Behavior	Cross sectional survey	366	US children aged 12 to 16	Authoritative parenting Restrictive guidance Modeling Availability	F&V intake F&V intake F&V intake F&V intake	0 0 + +	Self-efficacy partially mediated the effect of modeling on F&V intake Availability moderated the effect of modeling on F&V intake such that the effect of modeling is stronger when there is higher availability of F&V
88	Zahra et al	2014	Chid: Care, Health and Development	Cross-sectional survey	10,645	British children aged 12 to 16	Authoritative parenting	Junk food intake	-	

Table 1 (Continued)

APPENDIX A

INTERVIEWER GUIDE FOR PARQ ITEM DEVELOPMENT

Introduction

Good afternoon/evening. Thank you for agreeing to take part in today's interview. My name is _____ from Nanyang Technological University and we are conducting an academic research project focused on understanding the role parents play in children's development of food consumption preferences and choices. Please feel free to provide your opinions in detail. As mentioned in the information sheets, we will also be audio-recording the session because we do not want to miss anything you have said. Everything you share with me in this session will be kept strictly confidential.

Opening Questions (5 minutes)

1. To begin, could you tell me a little bit about yourself? (*INTERVIEWER DO NOT READ: If interviewee has difficulty answering, probe for their name, age, and occupation.*)
2. What are the names and ages of your children? Could you describe what they are like in terms of personality?

Key Questions (60 to 80 minutes)

3. What are your child's/children's favourite food? How often do they consume them?
4. How do you feel about these choices? (*INTERVIEWER DO NOT READ: If interviewee has difficulty answering, probe if they feel that they are happy with their child's choices, or if they'd rather their child not consume their favourite food.*)
5. Do you have certain foods that you wish your child/children ate more of? What are they?
6. What are some of the ways in which you use to encourage your child/children to eat (*INSERT FOOD TYPE*)?
7. How have they been effective or ineffective?
8. Do you have certain foods that you wish your child/children ate less of? What are they?
9. What are some of the ways in which you use to discourage your child/children to eat (*INSERT FOOD TYPE*)?
10. How have they been effective or ineffective?

11. (*INTERVIEWER DO NOT READ: Show summary sheet and describe the 9 different types of parental practices identified in the literature, then ask the question.*) Based on what we know, these are some of the ways parents encourage and discourage child food choices, do you think there are any other ways that are not on this list? Can you explain?

Ending Question (5 minutes)

12. (*INTERVIEWER DO NOT READ: Sum up all the main points discussed today before asking the question*) Is there anything else you would like to add to what we have discussed?

Closing Remarks

Thank you. We have come to the end of today's interview session. Your inputs have been invaluable and they will be extremely useful in finding out how we can help children develop healthier eating preferences. Please just sign on this sheet before I pass you your \$25 incentive.

Once again, thank you very much and have a nice day!

APPENDIX B
ABRIDGED QUESTIONNAIRE (STUDY 3A and 3B)

Student Assent Form

Hello, we are doing this survey to learn about the ways mothers and fathers encourage children to eat. We are asking you to help because we don't know very much about how children your age react to what parents do.

If you agree to be in our study, we are going to ask you some questions about your parents and what they do. For example, we will ask if your parents limit the amount of sweet drinks you can drink.

If you decide not to finish, you can stop. However, please try and finish the survey, as it will help us very very much.

The questions we will ask are only about what you think. There are no right and wrong answers because this is not a test.

If you click next, it means that you have read this and that you want to be in the study. If you don't want to be in the study, please don't click next. Being in the study is up to you, and no one will be upset if you don't click next or if you change your mind later.

For the purposes of this survey, **sweet drinks refer to all drinks that have sugar in them.**
These include the following:

Fruit juice (eg. apple, orange, watermelon juice)

Soft drinks (eg. Coca-Cola, root beer, 7UP, Pepsi, Sprite, Fanta)

Fruit teas (eg. lemon, apple, passionfruit, peach tea)

Bubble tea

Traditional brewed drinks (eg. barley, water chestnut, chrysanthemum tea, longan red date, sweetened green tea, sweetened soya bean)

Malted drinks (eg. Milo, Ovaltine, Horlicks)

Isotonic drinks (eg. 100plus, H2O, Gatorade, Pocari Sweat)

INSTRUCTION: Please circle your responses unless indicated otherwise

Section A

Your **main caregiver** is someone who looks after you the most. He/she cooks for you, makes you do your homework, and spends time with you. Other children have said that their main caregivers can be their **parents, grandparents, brother, sister, or their helper/maid**.

I. Who is your main caregiver? Circle your response (you can circle more than one)

Mother	Father	Grandfather	Grandmother	Brother
Sister	Helper	Aunt	Uncle	Other

Section B

INSTRUCTION: Please **tick** your responses

I. How **OFTEN** do you...

		None	1-3 times a week	4-6 times a week	Once a day	Twice a day	3 or more times a day
1	...eat apples/pears?
2	...eat berries/cherries?
3	...eat kiwis/grapes?
4	...eat stonefruits (eg. peaches, plums, apricots, avocado)?
5	...eat citrus fruits (eg. oranges)?
6	...eat tropical fruits (eg. papayas, watermelons, bananas, pineapples)?
7	...eat tomatoes/brinjals?

II. How **OFTEN** do you...

		None	1-3 times a week	4-6 times a week	Once a day	Twice a day	3 or more times a day
1	...eat broccoli/cauliflower?
2	...eat asparagus and sprouts (eg. tou gay, dou miao)?
3	...eat green leafy vegetables (eg. kailan, xiao bai chye, spinach, etc)?
4	...eat beans and peas (eg. long bean, snowpea, edamame)?
5	...eat carrots and roots (eg. yam, radish, beetroot)?
6	...eat celeries, cabbages, and lettuces?
7	...eat squashes (eg. pumpkin, butternut squash, zucchini)?

III. How **OFTEN** do you...

		None	1-3 times a week	4-6 times a week	Once a day	Twice a day	3 or more times a day
1	...drink soft drinks (eg. Coca-Cola, root beer, 7UP, Pepsi, Sprite, Fanta)?
2	...drink fruit teas (eg. lemon, apple, passionfruit, peach tea)?
3	...drink bubble tea?
4	...drink fruit juice (eg. apple, orange, watermelon juice)?
5	...drink malted drinks (eg. Milo, Ovaltine, Horlicks)?
6	...drink traditional brewed drinks (eg. barley, water chestnut, chrysanthemum tea, longan red date, sweetened green tea, sweetened soya bean)?
7	...drink isotonic drinks (eg. 100plus, H2O, Gatorade, Pocari Sweat)?

Section C

IV. How much do you agree with the following statements?

		Strongly Disagree			Strongly Agree	
		1	2	3	4	5
1	My parents discuss with me why it's important to eat healthy foods	1	2	3	4	5
2	My parents discuss with me the nutritional value of foods	1	2	3	4	5
3	My parents explain to me why I should eat more or less of a particular food	1	2	3	4	5
4	My parents discuss with me about the health benefits of a food	1	2	3	4	5
5	My parents discuss with me the importance of eating a variety of foods	1	2	3	4	5
6	My parents explain to me the effects of different nutrients (e.g. Vitamin C, calcium)	1	2	3	4	5
7	My parents explain to me why nutrients in healthy foods prevent me from falling sick	1	2	3	4	5
8	My parents explain to me why some foods like sweet foods/drinks serve no purpose to my body	1	2	3	4	5
9	My parents tell me my teeth would look bad if I take too much sweet foods/drinks	1	2	3	4	5
10	My parents explain to me why it is important to have a balanced diet	1	2	3	4	5
11	My parents talk to me about the food I eat during recess	1	2	3	4	5
12	My parents reason with me to get me to eat	1	2	3	4	5
13	My parents give me reasons for the rules they make about food and eating	1	2	3	4	5
14	My parents try to make foods more familiar by telling me where it came from	1	2	3	4	5
15	My parents tend to talk more often about foods they would like me to eat	1	2	3	4	5
16	My parents advise me what I should eat during recess	1	2	3	4	5
17	My parents try to talk more often about foods they would like me to eat	1	2	3	4	5

V. How much do you agree with the following statements?

		Strongly Disagree				Strongly Agree
1	If I had some sweet drinks already, my parents would tell me I can't have it anymore.	1	2	3	4	5
2	My parents sets limits to how much sweet drinks I can drink	1	2	3	4	5
3	When my parents give me a sweet drink, they tell me I can only have one today	1	2	3	4	5
4	My parents set limits to how much sweet drinks I can drink everyday	1	2	3	4	5
5	My parents limit the amount of sweet drinks I drink	1	2	3	4	5
6	My parents limit opportunities for me to drink sweet drinks	1	2	3	4	5
7	My parents limit how often sweet drinks are in the home	1	2	3	4	5
8	My parents tell me which sweet drinks I am allowed to consume	1	2	3	4	5
9	My parents insist that I must eat vegetables during meals with them	1	2	3	4	5
10	My parents give me fruits and makes me eat them	1	2	3	4	5
11	My parents give me vegetables during meals and makes me eat them	1	2	3	4	5
12	My parents insist I must finish my vegetables	1	2	3	4	5
13	My parents demand that I eat fruit every day	1	2	3	4	5
14	My parents demand that I eat vegetables every day	1	2	3	4	5

Section D

VI. How much do you agree with the following statements?

		Strongly Disagree			Strongly Agree	
1	It is pleasant to eat fruits at least once a day	1	2	3	4	5
2	It is unpleasant to eat fruits at least once a day	1	2	3	4	5
3	It is good to eat fruits at least once a day	1	2	3	4	5
4	It is beneficial to eat fruits at least once a day	1	2	3	4	5
5	It is enjoyable to eat fruits at least once a day	1	2	3	4	5
		Strongly Disagree			Strongly Agree	
6	Most people who are important to me eat fruits at least once a day	1	2	3	4	5
7	Many people like me eat fruits at least once a day	1	2	3	4	5
8	The people whose opinions I value eat fruits at least once a day	1	2	3	4	5
9	Most people who are important to me think I should eat fruits at least once a day	1	2	3	4	5
10	It is expected of me that I eat fruits at least once a day	1	2	3	4	5
11	The people in my life whose opinions I value would disapprove of me eating fruits at least once a day	1	2	3	4	5
		Strongly Disagree			Strongly Agree	
12	It is possible for me to eat fruits at least once a day	1	2	3	4	5
13	It is easy for me to eat fruits at least once a day	1	2	3	4	5
14	If I wanted to, I could eat fruits at least once a day	1	2	3	4	5
15	It is mostly up to me whether or not I eat fruits at least once a day	1	2	3	4	5
		Strongly Disagree			Strongly Agree	
16	I intend to eat fruits at least once a day in the next month	1	2	3	4	5
17	I will try to eat fruits at least once a day in the next month	1	2	3	4	5
18	I plan to eat fruits at least once a day in the next month	1	2	3	4	5

VII. How much do you agree with the following statements?

		Strongly Disagree			Strongly Agree	
1	It is pleasant to eat vegetables at least once a day	1	2	3	4	5
2	It is unpleasant to eat vegetables at least once a day	1	2	3	4	5
3	It is good to eat vegetables at least once a day	1	2	3	4	5
4	It is beneficial to eat vegetables at least once a day	1	2	3	4	5
5	It is enjoyable to eat vegetables at least once a day	1	2	3	4	5
		Strongly Disagree			Strongly Agree	
6	Most people who are important to me eat vegetables at least once a day	1	2	3	4	5
7	Many people like me eat vegetables at least once a day	1	2	3	4	5
8	The people whose opinions I value eat vegetables at least once a day	1	2	3	4	5
9	Most people who are important to me think I should eat vegetables at least once a day	1	2	3	4	5
10	It is expected of me that I eat vegetables at least once a day	1	2	3	4	5
11	The people in my life whose opinions I value would disapprove of me eating vegetables at least once a day	1	2	3	4	5
		Strongly Disagree			Strongly Agree	
12	It is possible for me to eat vegetables at least once a day	1	2	3	4	5
13	It is easy for me to eat vegetables at least once a day	1	2	3	4	5
14	If I wanted to, I could eat vegetables at least once a day	1	2	3	4	5
15	It is mostly up to me whether or not I eat vegetables at least once a day	1	2	3	4	5
		Strongly Disagree			Strongly Agree	
16	I intend to eat vegetables at least once a day in the next month	1	2	3	4	5
17	I will try to eat vegetables at least once a day in the next month	1	2	3	4	5
18	I plan to eat vegetables at least once a day in the next month	1	2	3	4	5

VIII. How much do you agree with the following statements?

		Strongly Disagree			Strongly Agree	
1	It is pleasant to drink sweet drinks at least once a day	1	2	3	4	5
2	It is not beneficial to drink sweet drinks at least once a day	1	2	3	4	5
3	It is good to drink sweet drinks at least once a day	1	2	3	4	5
4	It is valuable to drink sweet drinks at least once a day	1	2	3	4	5
5	It is enjoyable to drink sweet drinks at least once a day	1	2	3	4	5
		Strongly Disagree			Strongly Agree	
6	Most people who are important to me drink sweet drinks at least once a day	1	2	3	4	5
7	Many people like me drink sweet drinks at least once a day	1	2	3	4	5
8	The people whose opinions I value drink sweet drinks at least once a day	1	2	3	4	5
9	Most people who are important to me think I should drink sweet drinks at least once a day	1	2	3	4	5
10	It is expected of me that I drink sweet drinks at least once a day	1	2	3	4	5
11	The people in my life whose opinions I value would disapprove of me drinking sweet drinks at least once a day	1	2	3	4	5
		Strongly Disagree			Strongly Agree	
12	It is possible for me to drink sweet drinks at least once a day	1	2	3	4	5
13	It is easy for me to drink sweet drinks at least once a day	1	2	3	4	5
14	If I wanted to, I could drink sweet drinks at least once a day	1	2	3	4	5
15	It is mostly up to me whether or not I drink sweet drinks at least once a day	1	2	3	4	5
		Strongly Disagree			Strongly Agree	
16	I intend to drink sweet drinks at least once a day in the next month	1	2	3	4	5
17	I will try to drink sweet drinks at least once a day in the next month	1	2	3	4	5
18	I plan to drink sweet drinks at least once a day in the next month	1	2	3	4	5

Section E

IX. How much do you agree with the following statements?

		Strongly Disagree			Strongly Agree	
		1	2	3	4	5
1	My parents are always telling me what to do	1	2	3	4	5
2	My parents make rules without asking what I think	1	2	3	4	5
3	My parents make me feel better when I am upset	1	2	3	4	5
4	My parents are too busy to talk to me	1	2	3	4	5
5	My parents listen to what I have to say	1	2	3	4	5
6	My parents like me just the way I am	1	2	3	4	5
7	My parents tell me when I do a good job on things	1	2	3	4	5
8	My parents want to hear about my problems	1	2	3	4	5
9	My parents are pleased with how I behave	1	2	3	4	5
10	My parents have rules that I must follow	1	2	3	4	5
11	My parents tell me the time I must come home	1	2	3	4	5
12	My parents make sure I tell them where I am going	1	2	3	4	5
13	My parents make sure I go to bed on time	1	2	3	4	5
14	My parents ask me what I do with friends	1	2	3	4	5
15	My parents know where I am after school	1	2	3	4	5
16	My parents check to see if I do my homework	1	2	3	4	5

Section F

INSTRUCTION: Please **tick** your responses where appropriate

Participant Details

1. What is your full name? _____
2. How old are you? _____
3. What is your gender? ☐ Boy ☐ Girl
4. What is your race? ☐ Chinese ☐ Malay ☐ Indian ☐ Others
5. How much pocket money
do you receive per day? _____
6. Are you a vegetarian? ☐ No ☐ Yes

Thank you very much for participating in our survey.