PATCH

(PARENTING AND TEACHING CHILDREN HEALTHY HABITS)

Jacqueline Peters

Bachelor of Psychology (Hons)

A thesis submitted for the Degree of

Doctor of Philosophy

School of Health Sciences

Division of Health Sciences

University of South Australia

TABLE OF CONTENTS

List of Figures vi
List of Tables vii
Glossary & Abbreviations viii
Summary x
Statement of Authorship xiii
Acknowledgments xiv
List of publications arising from this thesis xv
Conference presentations xvi
Chapter 1 Introduction to thesis 1
1.2 References 9
Chapter 2 Parental influences on the diets of 2-5 year old children: systematic review of interventions 11
2.1 Abstract 12
2.2 Introduction 13
2.2.1 Parenting styles 14
2.2.2 Parent feeding practices 15
2.2.3 Parent knowledge of diet and nutrtion 17
2.3 Methodology 18
2.3.1 Search strategies 18
2.3.2 Data extraction and assessment of methodological quality 22
2.4 Results 22
2.4.1 Pre-school/childcare setting 25
2.4.2 Home-based settings 30
2.4.3 Group-based interventions 33
2.4.4 Mixed-setting interventions 36
2.4.5 Family-based interventions 38
2.4.6 Community-based interventions 39
2.5 Discussion 40

2.6 Acknowledgements 47
2.7 References 48
Chapter 3 Parental influences on the diets of 2–5 year old children: systematic review of qualitative research 57
3.1 Abstract 58
3.2 Introduction 59
3.2.1 Parent feeding practices 60
3.2.2 Parent knowledge of diet and nutrition 63
3.2.3 Informing research 63
3.3 Methodology 65
3.3.1 Search strategies 65
3.4 Results 71
3.4.1 Pre-school/childcare setting 71
3.4.2 Community based setting 78
3.4.3 Pediatric practice setting 79
3.4.3 Mixed setting 80
3.5 Discussion 81
3.6 References 89
Chapter 4 General nutrition knowledge as a mediator of parental influences on the diets of 2-5 year old children: Systematic search results and research report 97
4.1 Abstract 98
4.2 Introduction 100
4.2.1 Review methodology 103
4.2.2 Review results 107
4.3 Methodology 113
4.3.1 Recruitment 113
4.3.2 Participants 113
4.3.3 Power 114
4.4 Measures 114
4.4.1 Demographics/family environment 114

4.4.2 BMI and BMI z-scores 115
4.4.3 Children's Dietary Questionnaire (CDQ) 115
4.4.4 Parental feeding practices – Child Feeding Questionnaire (CFQ) 116
4.4.5 Parenting Scale (PS) 117
4.4.6 Parental Authority Questionnaire-Revised (PAQ-R) 118
4.4.7 General Nutrition Knowledge Questionnaire (GNKQ) 118
4.5 Research Design & Analysis 119
4.6 Results 120
4.6.1 Descriptive 120
4.6.2 Preparation for data analysis 125
4.6.3 Mediation analyses 126
4.7 Discussion 128
4.8 References 135
Chapter 5 A comparison of parental views of their pre-school children's 'healthy' versus 'unhealthy' diets: A qualitative study 152
5.1 Abstract 153
5.2 Introduction 154
5.3 Method 156
5.3.1 Sample selection 156
5.3.2 Data collection 158
5.3.3 Data analysis 159
5.4 Results 160
5.4.1 Themes 163
5.5 Discussion 173
5.6 Conclusion 178
5.7 References 180
Chapter 6 General Discussion 186
6.1 Overview 186
6.2 Summary of the Findings 186
6.2.1 Systematic review of interventions 186

6.2.2 Systematic review of qualitative research 188
6.2.3 General nutrition knowledge as a mediator of parental influences on the diets of 2-5 year old children: Systematic search results and research report 189
6.2.4 Similarities and differences between parents of pre-school aged children with 'healthy' versus 'unhealthy' diets 191
6.3 Conclusions and implications for future research 193
6.4 References 201
Appendix A: Statement of author contributions for publication 204
Appendix B: Data extraction tool for interventions 205
Appendix C: Quality assessment tool and dictionary 210
Appendix D: Published article 215
Appendix E: Statement of author contributions for publication 239
Appendix F: Qualitative studies extraction tool 240
Appendix G: Cross-sectional/observational studies extraction tool 242
Appendix H: Statement of author contributions for publication 244
Appendix I: Recruitment Materials 245
I.0 Recruitment details 246
I.1 Information posted on community boards 248
I.2 Information letter sent to child care facilities 250
I.3 Information flyer for parents 252
I.4 Letter to parents 254
I.5 Questionnaire 256
I.6 Information sheets & instructions 272
I.7 Movie address form 276
I.8 Consent form to contact for future research 278
I.9 Thank you letter 280

LIST OF FIGURES

Figure 1.1: Ecological systems theory model of predictors of childhood overweight.....3

Figure 2.1: Flow chart of systematic review 20

Figure 3.1: Flow chart of systematic review 68

Figure 4.1: GNK (general nutrition knowledge) mediates the relationship between PS (parenting style) variables and CD (child diet) 120

LIST OF TABLES

Table 2.1. Concept table of keyword search terms 21
Table 2.2. Number of search hits for each database 21
Table 2.3. Summary of quantitative studies 24
Table 3.1. Concept table of keyword search terms. 66
Table 3.2. Number of search hits for each database. 66
Table 3.3. Summary of qualitative studies 69
Table 4.1. Characteristics of studies included in the review. 105
Table 4.2. Summary of demographics, lifestyle characteristics and nutrition knowledge scores for parents and children. 121
Table 4.3. Regression weights in final models for predictor variables (parenting styles) and child diet (fruit/vegetables and non-core foods), with demographic and family environment variables as covariates and general nutrition knowledge (GNK) as mediating variable. 123
Table 4.4. Descriptive data for IV's (independent variables) and DV's (dependent variables). 126
Table 4.5. Regression coefficients in final models for predictor variables (parenting styles and feeding practices) of child diet (fruit/vegetables and non-core foods), with demographic and family environment variables as covariates 127
Table 5.1. Parent and child descriptives. 162
Table 5.2. Concepts and themes. 163
Table 5.3. Similarities in responses and concerns for child diet and influencing factors. 165
Table 5.4. Differences between group responses. 166

GLOSSARY & ABBREVIATIONS

Affirming communication: supportive, caring and calm communication.

Authoritarian parenting: high demands and low responsiveness to children, considered controlling and absolute with little interaction.

Authoritative parenting: high demands and high responsiveness to children with clearly set boundaries while encouraging autonomy.

BMI: Body mass index.

BMIz: Body mass index z-score.

CD: Child diet.

CDQ: Child dietary questionnaire.

CFPQ: Comprehensive feeding practices questionnaire.

CFQ: Child feeding questionnaire.

CFSQ: Caregivers feeding style questionnaire.

Demandingness: Behavioural expectations of the child.

DHKS: Diet health knowledge survey.

Disaccharides: Consists of two sugars units.

DV: Dependent variable.

FFQ: Food frequency questionnaire.

FP: feeding practices.

FPSCI: Family problem solving questionnaire.

GNK: General nutrition knowledge.

GNKQ: General nutrition knowledge questionnaire-revised.

Incendiary communication: Aggressive communication that tends to exacerbate stressful situations.

IV: Dependent variable.

Laxness: Permissive discipline.

Mono-saccharides: Consists of simple or single sugar unit.

Non-core food: discretionary food (unhealthy food).

Overreactivity: Reflecting mistakes as displays of anger, irritability and meanness.

PA: Physical activity.

PAQ: Parental authority questionnaire.

PAQ-R: Parental authority questionnaire.

Parenting practices: Domain specific parenting practices.

PDI: Parenting dimensions inventory.

Permissive parenting: low demands and low responsiveness, desires to be liked by the child and usually allows the child to do whatever they want.

PFQ: Pre-schooler feeding questionnaire.

PFSQ: Parental feeding style questionnaire.

PS: Parenting styles.

Responsiveness: Warmth and supportiveness for the child.

RMSEA: Root mean square error of approximation.

SEIFA: Socio-economic index for areas.

SES: Socio-economic status.

Uninvolved/neglectful parenting: low demands low responsiveness, may provide the basics necessities but uninvolved in the child's life, usually disengaged.

Verbosity: lengthy verbal answers, over explanation, more words than necessary.

SUMMARY

This thesis explores the influential roles of parenting styles and practices, and parental nutrition knowledge, on the diets of 2-5 year old children. Classic parenting styles include authoritative, authoritarian, permissive and neglectful/uninvolved parenting which are characterised by levels of demandingness and responsiveness. These parenting styles generally remain consistent across domains. Authoritative parenting (high demandingness and responsiveness) has been associated generally with healthier behaviours in children. Parent practices refer to the practices within specific domains; in this case, feeding.

Firstly, a systematic review of the literature was conducted to investigate the influence of parental nutrition knowledge, parenting styles and feeding practices on pre-school aged child diet. This review was organised into the categories of Interventions (n = 17); Qualitative research (n = 9) and Observational research (n = 69). Two subsequent studies (cross-sectional and qualitative) were conducted to further explore parental influence in this area.

The 17 reviewed interventions identified a lack in good quality studies with parents of this age group. Few studies sought to evaluate healthy child diet and specific parenting styles, feeding practices or general nutrition knowledge (GNK). The nine qualitative studies also highlighted a lack of qualitative research meeting the specific search criteria. Analyses of these studies highlighted the need for studies that addressed culturally specific programs, common barriers to providing healthy foods, the use of food to shape behaviour, and the common misconceptions that a heavier child is healthier and/or that children will naturally outgrow excess weight.

These reviews led to a cross-sectional study with parents (n = 269) of 2-5 year old children in metropolitan South Australia which aimed to further explore the influence of parenting styles and feeding practices on aspects of child diet and the degree to which GNK may mediate these influences. Fruit/vegetable consumption was predicted by lower lax, overreactive and restrictive parenting as well as higher authoritative parenting. Lax and overreactive parent factors are described as being consistent with the permissive and authoritarian styles of parenting where lax and permissive parenting is associated with behaviour problems. For instance parents who give in to persistent badgering may be teaching the child to be persistent in this behaviour. The authoritarian parent is described as using punitive and forceful measures similar to the overreactive parent who models aggressive, angry and/or insulting behaviour. Dining together as a family was also found to be predictive. Parental GNK did not mediate these predictors. Non-core food consumption was predicted by higher lax and overreactive parenting, child age, takeaway food consumption, television viewing and parental GNK, which only had a small mediating effect on authoritative parenting. A subset of these parents participated in focus group discussions. Based on their child's fruit and vegetable consumption parents were allocated to either 'healthy' or 'unhealthy' groups where similarities and differences in responses were compared and contrasted. Parents across both groups had the intention to provide healthy foods for their child with most families dining together for the evening meal. Main points of difference included parents in the 'healthy' group having more partner support in relation to child diet and they set more consistent boundaries around food consumption, whereas a majority of parents in the 'unhealthy' group attempted to disguise vegetables and

healthy foods for their child and reported experiencing increased levels of stress and food struggles when providing food for their child.

Collectively, these findings identify the need to further investigate and promote positive parenting styles and feeding practices to parents of young children. Future research should consider combining effective parenting skills and practices with nutrition education, which appears to be necessary but not sufficient. Further insights will come from the use of broader and effective measurement tools with longitudinal research to evaluate and promote sustainability of healthy eating behaviours in young children.

STATEMENT OF AUTHORSHIP

I declare that this thesis does not incorporate any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge it does not contain any materials previously published or written by another person except where due reference is made in the text.

Signed …….  ……..……Date…6-6-12……

Jacqueline Peters

I support the above statement of authorship and certify that the thesis is well presented and worthy of examination, and that the work has been conducted in an ethical manner.

Signed ……  …….Date…6-6-12……

Dr Natalie Parletta (formerly Sinn), Principal Supervisor

ACKNOWLEDGEMENTS

First and foremost I would like to thank my son, Conor, for his maturity and patience throughout this journey and acknowledge the many sacrifices he has made (willingly☺) in order for me to complete this PhD Thesis. He is wise beyond his years. I would like to express sincere gratitude to my mother Dawn for all her support and endless pick-me-ups, and pick Conor ups from school; this would not have been possible without her continued support and confidence in me. I would also like to thank my dear friends Belinda, Dot, Shelley and Lisa who have all been a shoulder and an ear, a support and a distraction, who have laughed and commiserated, and encouraged various liquids with perfect timing.

Thank you to my supervisors, Dr Natalie Parletta, Dr Karen Campbell and Prof John Lynch with special thanks to Dr Jim Dollman as an early supervisor in the project development and for support throughout the research, and to John Petkov for his help and patience. Nat, thank you for your encouragement, guidance and tireless editing and feedback, and not to mention the odd glass of wine to celebrate milestones. To Karen and John, thank you both for your valuable contribution and pearls of wisdom along the way.

Lastly, recognition and sincere thanks is due to the all the parents who gave up their valuable time to complete the extensive questionnaires, with particular thanks to those parents who also volunteered their time to participate in the focus group discussions.

Dedicated to Conor

&

In loving memory of Marjorie Dell Stapleton

(Nan)

LIST OF PUBLICATIONS ARISING FROM THIS THESIS

Published or in press

Peters J, Sinn N, Campbell K, Lynch J. Parental influences on the diets of 2–5 year-old children: systematic review of interventions. Early Child Development and Care. 2011:1-21. DOI:10.1080/03004430.2011.586698

Parletta N, **Peters J**, Owen A, Tsiros MD, Brennan L. (in press). Parenting styles, communication and child/adolescent diets and weight status: let's talk about it. Early Child Development and Care - Special issue: Parental influences on childhood obesity. Accepted 11-01-12

Peters J, Parletta N, Campbell K, Lynch J. (in press). Parental influences on the diets of 2-5 year old children: systematic review of qualitative research. Journal of Early Childhood Research. Accepted on 17-04-12.

Under review

Peters J, Parletta N, Campbell K, Lynch J. A comparison of parental views of their pre-school children's 'healthy' versus 'unhealthy' diets: A qualitative study. Submitted to Child: Care, Health & Development on 08-08-11.

Peters J, Parletta N, Dollman J, Petkov J. General nutrition knowledge as a mediator of parental influences on the diets of 2-5 year old children: Systematic search results and research report. Submitted to Public Health Nutrition on 22-11-11.

CONFERENCE PRESENTATIONS

Oral presentations

Peters J, Sinn N, Campbell K, Lynch J. Parental influences on the diets of 2-5 year old children: systematic review of qualitative research. 2011 Annual Meeting of the International Society for Behavioral Nutrition and Physical Activity, Melbourne, Victoria; 17th June, 2011.

Peters J, Sinn N, Campbell K, Lynch J. A comparison of parental views of their pre-school children's 'healthy' versus 'unhealthy' diets: A qualitative study. The Australian and New Zealand Obesity Society's Annual Scientific Meeting 2011, Adelaide, South Australia, 21st October, 2011.

Peters J, Sinn N, Dollman J, Petkov J. General nutrition knowledge as a mediator of parental influences on the diets of 2-5 year old children: Systematic review results and research report. Joint Annual Scientific Meeting of the Nutrition Society of New Zealand 2011, Queenstown, New Zealand, 29th November, 2011.

Poster presentations

Peters J, Sinn N, Dollman J, Parental influences on young children's food choices. The Australian Society for Medical Research (SA Division) Annual Scientific Meeting, Adelaide, South Australia, 4th June, 2008.

Peters J, Sinn N, Campbell K, Lynch J. Parental influences on the diets of 2–5-year-old children: systematic review of interventions. Annual Meeting of the International Society for Behavioral Nutrition and Physical Activity, Melbourne, Victoria, 17th June, 2011.

Peters J, Parletta N, Dollman J, Petkov J. General nutrition knowledge as a mediator of parental influences on the diets of 2-5 year old children: Systematic search results and research report. Annual Meeting of the International Society for Behavioural Nutrition and Physical Activity, Austin, Texas, 23rd May, 2012

CHAPTER 1
INTRODUCTION TO THESIS

This thesis is concerned with parental influences on young children's diets before they enter school. The overall aim is to explore the roles of parenting styles, feeding practices and parental general nutrition knowledge (GNK) with parents of children aged 2 – 5 years to evaluate how these factors may influence their fruit, vegetable and non-core food consumption. Specifically, do parenting styles, feeding practices and/or GNK influence child fruit, vegetable and/or non-core food consumption?

Ecological Systems Theory (EST; figure 1; Bronfenbrennner, 1986) refers to the various environmental contexts that interact with and influence the ecology of human development. The model of predictors of childhood overweight (Davison & Birch, 2001) see the context of child weight immersed within several other contexts. These contexts include *child characteristics and child risk factors* (including gender, age, and familial susceptibility to weight gain, dietary intake, sedentary behaviours and physical activity); *parenting styles and family characteristics* (including family TV viewing, [and monitoring], parent preferences and modelling of behaviours, parent weight, dietary intake and nutrition knowledge, home food availability and child feeding practices); and *community, demographic and societal characteristics* (including ethnicity, socioeconomic status, neighbourhood safety, school programs, leisure time, work hours and accessibility of restaurants/fast food outlets and recreational facilities) (Bronfenbrenner, 1986; Davison & Birch, 2001). In using the EST model as a framework this research proposes to investigate

influencing factors that contribute to childhood dietary intake (fruit, vegetable and non-core food consumption) with particular emphasis on the EST parenting styles context as conceptualised by Baumrind (1966), and parent feeding practices and parental nutrition knowledge, while considering other influencing factors within the home environment such as food availability and accessibility, and television viewing. The EST model is particularly relevant to this research as it displays interactions between the environmental factors within and between contexts, for instance, television viewing may influence physical activity which may then influence child weight status. Another example could be that child weight may influence child feeding practices which may in turn influence dietary intake.

With the current climate of obesity research placing emphasis on prevention and treatment strategies to change children's behaviour prior to reaching adulthood, the key could lie in preventative strategies with parents of young children by identifying predictors of inappropriate influences and educating parents. This approach may aid the in the habitualisation of healthy behaviours early in life. Therefore, the primary hypothesis of this thesis is that parenting styles will influence child fruit, vegetable and non-core food consumption and that parental nutrition knowledge will to some degree mediate this influence. The view of this research is to collect evidence that may influence the development of future parenting programs to aid in the prevention of child, and subsequent adult, overweight, obesity and health related problems.

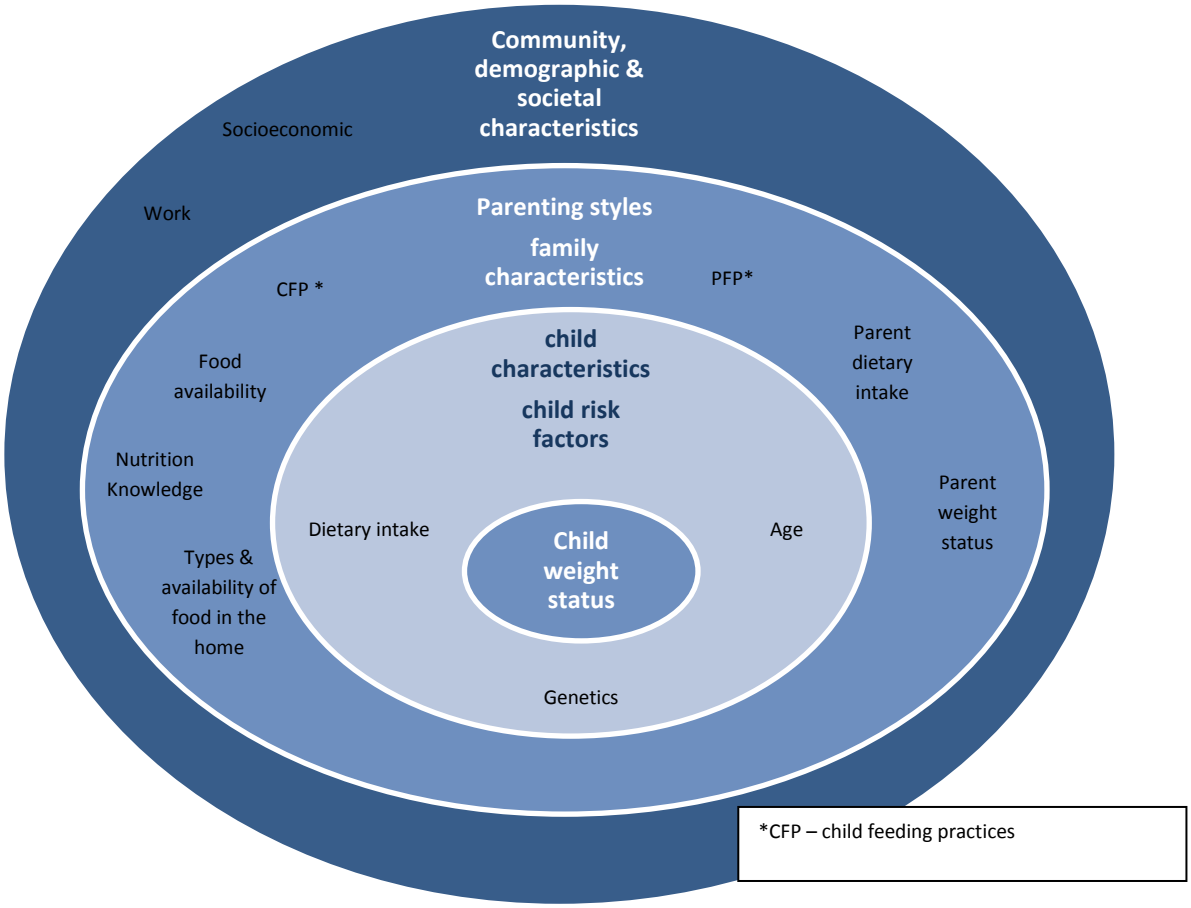


Figure 1.1 Adapted from the Ecological model of predictors of childhood overweight **(Davison & Birch, 2001)**.

Researchers often use the terms parenting styles and parenting practices interchangeably which creates confusion in relation to correct terminology and definition. To clarify this point parenting style is defined as a typology of attitudes and behaviours in relation to parent-child interactions, and is considered to be the emotional climate in which parents raise and socialise their children in normal parenting situations (Darling & Steinberg, 1993). Parenting styles as thus defined generally remain consistent across all domains of

parenting (Kremers, Brug, de Vries, & Engels, 2003). Three styles of parenting were first proposed by Baumrind (1966) and a fourth style later evolved with research conducted by Maccoby and Martin (1983). These four classic parenting styles include authoritative, authoritarian, permissive and neglectful/uninvolved parenting styles which are characterised by either high or low demandingness (behavioural expectations of the child) with high or low responsiveness (warmth and supportiveness for the child; Baumrind, 1966; Maccoby & Martin, 1983). Authoritative parenting is characterised by high demandingness and responsiveness to children within set boundaries while still encouraging autonomy. This preferred style of parenting has been associated with healthier behaviours in children (Ventura & Birch, 2008). Authoritarian parenting is characterised by high demands and low responsiveness and considered to be restrictive, controlling and arbitrary with no explanations given. This is often reflected in feeding practices with the parent dictating what a child will eat and not allow them to leave the table until they have 'cleaned their plate'. The permissive parent is characterised by low demands with high responsiveness whereas the neglectful/uninvolved parent is characterised by low demands with low responsiveness. Both styles involve allowing the child to do as he/she pleases and is reflected in feeding practices by allowing the child to consume whatever the child desires to either carry favour with the child (permissive) or because they are disinterested (neglectful; Hughes, Power, Fisher, Mueller, & Nicklas, 2005).

Parenting practices are considered the application of parenting styles in response to specific child behaviours that are generally goal directed and are both domain and content

specific (Darling & Steinberg, 1993). Therefore, parenting practices are considered contextual and can change over time and between domains depending on such things as child age, gender and parent's perceived threat to a goal (Ventura & Birch, 2008; Hughes, et al., 2005). Hence, these practices may influence the development of a child's attitudes and preferences around food and eating, which in turn may be influenced by the child's weight, age or dietary habits etc. Parenting styles may moderate this effect of parenting practices via their influence on the effectiveness of specific practices (Ventura & Birch). Parent feeding practices are therefore, the application of parenting styles in the feeding domain of parenting practices, for example, a parent will be responsible for providing the child with preferred options of what, when and where to eat and the child can determine how much, commonly known as "parent provide child decide" model of feeding (Satter, 2011).

Parent nutrition knowledge has also been associated with child diet. Higher scores of maternal nutrition knowledge have been associated with child diet that is more nutritionally rich (Gibson, Wardle & Watts, 1998), and low levels of parent nutrition knowledge have been associated with the availability of unhealthy foods in the home environment (Birch & Davison, 2001) and increased consumption of these foods (Boshoff, Dollman, & Magarey, 2007; Hearn et al., 1998). Therefore, it is possible that inadequate nutrition knowledge could be associated with increased availability and consumption of energy dense foods principally because parents may not be aware of the associations between quality and quantity of energy dense foods with potential and/or ongoing weight and health problems (Birch & Davison, 2001). However nutrition knowledge may not be sufficient on its own – i.e. a parent may

know which food is healthy but lack the parenting skills to encourage healthy food behaviours and preferences.

A child's diet and nutrition are formed by the interaction of both *child characteristics* and *risk factors* with *family characteristics* and *parenting styles* (EST model; figure 1). The General Nutrition Knowledge Questionnaire (GNKQ) is an assessment of a parent's general knowledge of a range of nutrition concepts which includes terminology, current dietary recommendations, disease-diet relationships, food source knowledge and dietary information necessary to make healthy choices (Hendrie, Cox & Coveney, 2008). This questionnaire was originally developed in the UK (Parmenter & Wardle, 1999) and subsequently validated for use with an Australian population (Hendrie, Cox & Coveney).

Pre-school aged children are primarily influenced by parents and the family environment, and dietary habits formed at this age can have a lasting influence on later dietary habits and preferences (Skinner, Carruth, Bounds, & Ziegler, 2002). However, previous research does not appear to have evaluated the interaction of parenting styles or practices together with parent GNK for children of this age group. The pre-school years may well be a critical time in which we can identify and promote effective parental influences on children's diets. This in turn may influence obesity prevalence and health consequences related to poor diet. Therefore, to evaluate these components, outlined in the EST model (figure 1.1), this thesis is comprised of three Sections and six main Chapters. It contains four papers, one of which has been published, one in press, and, two of which are under review.

The first section of this thesis includes chapters 1, 2 and 3. Chapter 1 provides a brief description of individual chapter content by way of an introduction to the thesis; Chapter 2 discusses the parental influences on the diets of 2-5 year old children, and presents a systematic review of interventions (published) concerned with parenting styles, feeding practices or parent GNK on child diet and/or weight. Chapter 3 discusses parental influences on the diets of 2-5 year old children and presents a systematic review of qualitative research in this domain. These two review chapters explore published literature conducted with parents of children aged 2-5 years focussing on parent nutrition knowledge, parenting styles and/or parental feeding practices in association with children's diet (from 1 January 1996 to 10 September 2009), identifying strengths and weaknesses, discussing facilitators and barriers, and highlighting gaps and future directions.

Section two of the thesis presents subsequent unique research conducted to further explore the area of parental influence on pre-school aged child diet. In Chapter 4 GNK is examined as a mediator of parental influences on the diets of 2-5 year old children, following an outline of results from the 69 observational studies extracted from the systematic search, described in Section one of the thesis. This paper then reports the findings of the subsequent cross sectional research conducted with 269 parents of 2-5 year old children who completed extensive questionnaires. The purpose of this study was to investigate predictors of child diet quality (fruit/vegetable and non-core food consumption based on number of serves per day), focusing primarily on parenting styles and feeding practices and considering other components outlined in the EST model (such as availability and accessibility, and television

viewing), with parent GNK as mediator, while controlling for demographic variables and family environment.

Chapter 5 reports findings from parents who participated in focus group discussions in relation to their child's diet. Parents were invited to take part in these groups based on their child's fruit and vegetable consumption as recorded in Section A of the Children's Dietary Questionnaire of Chapter 4. The aim of this research was to compare and contrast responses from parents of children with 'healthy' diets and those with parents of children with 'unhealthy' diets based on number of serves of fruit and vegetable consumed per day. Qualitative results report similarities and differences in the parent group responses to providing healthy food options including facilitators and barriers, partner support and disguising food to encourage consumption.

Section three (Chapter 6) of the thesis discusses and summarises findings from the four research Chapters (2-5). This final chapter highlights unique findings from this research and discusses how these results might inform future research to promote healthy child diet and aid in the prevention of overweight, obesity and subsequent health related problems.

1.2 References

Baumrind, D. (1966). Effects of authoritative parental control on child behavior. *Child Development, 37,* 887-907.

Birch, L. L., & Davison, K. (2001). Family environmental factors influencing the developing behavioral controls of food intake and childhood overweight. *Childhood and Adolescent Obesity, 48*(4), 893-907.

Boshoff, K., Dollman, J., & Magarey, A. (2007). An investigation into the protective factors for overwieght among low socio-economic status children. *Health Promotion Journal of Australia, 18*(2), 135-142.

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: research perspectives. *Developmental Psychology, 22*(6), 723-742.

Davison, K, & Birch, L. (2001). Childhood overweight: a contextual model and recommendations for futue research. *Obesity, 2*, 159-171.

Darling, N., and Steinberg, L. (1993). Parenting style as context: An integrative model. *Psychological Bulletin, 113*(3), 487-496.

Gibson, E., Wardle, J., & Watts, C. (1998). Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. *Appetite, 31,* 205-228.

Hearn, M. D., Baranowski, T., Baranowski, J., Doyle, C., Smith, M., Lin, L. S., et al. (1998). Environmental influences on dietary behavior among children: availability and accessibility of fruits and vegetables enable consumption. *Journal of Health Education, 29*(1), 26-32.

Hendrie, G., Cox, D., & Coveney, J. (2008). Validation of the General Nutrition Knowledge Questionnaire in an Australian community sample. *Nutrition and Dietitics, 65*(1), 72-77.

Hughes, S., Power, T., Fisher, J., Mueller, S., & Nicklas, T. (2005). Revisiting a neglected construct: parenting styles in a child-feeding context. *Appetite, 44*, 83-92.

Kremers, S., Brug, J., de Vries, H., & Engels, R. (2003). Parenting style and adolescent fruit consumption. *Appetite, 41*, 43-50.

Maccoby, E., & Martin, J. (1983). Socialization in the context of the family: parent-child interaction. In P. Mussen (Ed.), *Handbook of child psychology* (Vol. 4, pp. 1-102). New York: John Wiley & Sons.

Parmenter, K., & Wardle, J. (1999). Development of a general nutrition knowledge questionnaire for adults. *European Journal of Clinical Nutrition, 53*, 298-308.

Satter, E. (2011). *Ellen Satter's Division of Responsibility in Feeding*. Retrieved 21 February 2012 from http://www.ellynsatter.com/ellyn-satters-division-of-responsibility-in-feeding-i-80.html

Skinner, J., Carruth, B., Bounds, W., & Ziegler, P. (2002). Children's food prefernces: a longitudinal analysis. *Journal of American Dietetic Association, 102*(11), 1638-1647.

Ventura, A., & Birch, L. (2008). Does parenting affect children's eating and weight status? *International Journal of Behavioral Nutrition and Physical Activity, 5*(1), 15.

CHAPTER 2
PARENTAL INFLUENCES ON THE DIETS OF 2-5 YEAR OLD CHILDREN: SYSTEMATIC REVIEW OF INTERVENTIONS

This chapter is a co-authored publication. Please refer to Appendix A for a statement of author contributions, Appendix B for data extraction tool specifically designed for this review, Appendix C for Quality assessment tool and dictionary, and Appendix D for copy of published article.

Peters J, Sinn N, Campbell K, Lynch J. Parental influences on the diets of 2-5 year old children: Systematic review of interventions. *Early Child Development and Care.* 2011:1-21. DOI:10.1080/03004430.2011.586698.

This publication provides a review of published interventions investigating the influence of parent feeding practices and/or general nutrition knowledge on the diets or BMI of young children aged 2-5 years from 1st January 1996 to 10th September 2009.

2.1 Abstract

During the early years, parents have a major influence on their children's diets, food choices and development of eating habits. However, research concerning the influence of parental feeding practices on young children's diets is limited. This paper presents a systematic review of intervention studies with parents of preschool children. The aim was to investigate effectiveness of interventions that target parent nutrition knowledge and/or parenting practices with parents of young children aged two to five years in the development of healthy dietary habits. Seventeen studies were identified. Findings highlight the limited number of good quality studies in this age group. Limitations include design consistency and a lack of longitudinal data to evaluate sustainability. Research on parental understanding of healthy diets and specific parenting styles and feeding practices is lacking. Further insights into how parents can positively influence children's diets will come from quality longitudinal research examining both parent feeding practices and nutrition knowledge in this age group.

Key words*:* children, parents, diet, nutrition, prevention

2.2 Introduction

Overweight and obesity result from increased energy intake with decreased energy output. Recent evidence suggests that over half of Australians over 15 years and 21-25 per cent of children aged 2-18 years are overweight or obese (Olds, Tomkinson, Ferrar, & Maher, 2009; Pink, 2008). Some researchers posit that overweight and obesity prevalence has plateaued since 1985; however these high prevalence rates remain of concern (Olds, et al., 2009). The deleterious effects of diets that are energy-dense and poor in essential nutrients are increasingly prominent, both in the impact on obesity prevalence as well as general health and wellness (cognitive and physical performance, and attention) at all ages (Bellisle, 2004). It is also well understood that existing and habitualised behaviours are difficult to change (Edmunds, Walters, & Elliott, 2001) and evidence suggests that both food preference and fruit and vegetable exposure at two and four years of age may predict food preferences at eight years of age (Skinner, Carruth, Bounds, & Ziegler, 2002). Therefore, healthy dietary habits are best developed and encouraged at a young age.

Preschool years are considered formative; a time when parents are generally the primary educators and providers who exert the most influence on their child's environment, including diet (Fisher, Mitchell, Wright, & Birch, 2002). For parents to encourage their children to make healthy food choices they need the skills to create a healthy food environment and to promote healthy eating habits in their children. Style of parenting, parent feeding practices and parent nutrition and/or diet knowledge have been identified as influencing child dietary behaviours and food preferences. Evidence supports the notion that

effective parenting (in line with the authoritative style of parenting) and nutrition knowledge may optimise positive feeding practices and promote healthy diets.

2.2.1 Parenting styles

Parenting style refers to parent-child interactions and behaviour, whereas parenting practice is considered the application of parenting practices within specific domains (Kremers, Brug, de Vries, & Engels, 2003). Three styles of parenting were first proposed by Baumrind (1966) and a fourth style later by Maccoby and Martin (1983). These four styles of parenting are characterised by high or low demandingness and responsiveness.

'Authoritative parenting' is characterised by high demands and high responsiveness to children within a set of clearly communicated boundaries whilst encouraging autonomy. Authoritative parenting can be expressed in positive feeding practices by giving children autonomous choices within healthy food boundaries (e.g. allowing a choice between healthy rather than unhealthy options). Authoritative parenting has been found to predict better child diet (Ventura & Birch, 2008). Conversely, 'authoritarian parenting' is characterised by high demands and low responsiveness. This parent is considered to be controlling and absolute with little interaction and is likely to be associated with restricting and/or controlling children's food intake without encouraging the child to make positive, autonomous choices. 'Permissive' and 'neglectful/uninvolved' parenting is associated with low demands and high or low responsiveness, respectfully. Permissive parenting is usually driven by the parents' desire to be liked by the child, thereby allowing the child to do and have whatever he/she wants, whereas 'neglectful/uninvolved' parents may provide basic necessities but are not

involved in the child's life and are usually disengaged. These two styles are more likely to be associated with indulgent feeding practices, letting children eat whatever they want and/or using food to placate the child (Hughes, Power, Fisher, Mueller, & Nicklas, 2005).

2.2.2 Parent feeding practices

Parent feeding practices refer to parental influence on the development of children's attitudes and preferences around food and eating. This can be conceptualised as a domain-specific application of different parenting styles as described above (Hughes, et al., 2005). There is some evidence of an intrinsic ability in toddlers and infants to self-regulate energy intake to reflect consistent energy density (Fomon, 1993; Johnson, 2000) as they tend to eat smaller amounts more frequently (Skinner, Ziegler, Pac, & Devaney, 2004). Furthermore, while it is common for three-year-old children to respond to internal cues of satiety and stop eating regardless of availability, five-year olds appear to override their natural cues and continue to eat if palatable food is available (Birch & Davison, 2001). This reflects the importance of instilling healthy habits and encouraging ongoing awareness of internal cues early in a child's formative years as opposed to practices such as forcing a child to eat all the food on their plate or to eat when they are not hungry. It has also been suggested that the decline in self-regulation may be attributed to parental use of food as a contingency to shape a child's behaviour, e.g. dessert as a reward for eating vegetables, which could adversely influence child food preferences and consumption (Baughcum, Burklow, Deeks, Powers, & Whitaker, 1998). In other words early parent feeding practices may influence a child's food preferences

as the parent is generally responsible for early food exposure and behavioural responses to the child's diet and consumption. Therefore, if these exposures and responses are not considered desirable in this current feeding behaviours climate they could have negative and lasting influences on the child's future feeding behaviours.

Restrictive feeding practices, i.e., practices that restrict either type (e.g. energy-dense) or quantity of foods, appear to dominate research into parent feeding practices and child diet. These practices have been associated with increased eating in the absence of hunger when restrictions are not in place and/or when the enforcer is no longer in proximity (Fisher & Birch, 1999a; 2002). Restrictive dietary practices are generally associated with an authoritarian style of parenting (Hubbs-Tait, Kennedy, Page, Topham, & Harrist, 2008). This coercive practice requires the child to respond to the parent, thereby ignoring internal cues of hunger or satiety (Birch, 1999; Fisher & Birch, 2002). Restricting foods can be counterproductive (Faith, Scanlon, Birch, Francis, & Sherry, 2004), and foods used as contingencies become less preferable, whereas reward foods become more attractive (Birch, 1999; Newman & Taylor, 1992). These feeding practices also remove the responsibility/opportunity from the child to self-monitor food consumption and/or respond to internal cues (Carnell & Wardle, 2007; Faith, et al., 2004; Fisher & Birch, 2002; Moens, Braet, & Soetens, 2007; Musher-Eizenman & Holub, 2006).

Research into controlling practices has yielded mixed results in relation to their effect on child diet and/or weight status, probably due to differences in the way that controlling practices have been conceptualized (Corsini, Danthiir, Kettler, & Wilson, 2008; Ogden, Reynolds, & Smith, 2006). Some research has associated restrictive practices with increased

child weight (Fisher & Birch, 2002; Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002) and/or increased consumption of energy-dense foods (Fisher & Birch, 1999a; 1999b; 2000; Lee, Mitchell, Smiciklas-Wright, & Birch, 2001). However, recent research has refuted this, associating higher maternal restriction with reduced consumption of energy-dense food and beverages in 4-6-year-old children (Sud, Tamayo, Faith, & Keller, 2010), and showing that restrictive feeding practices were protective against increased zBMI in 5-6-year-old children, although no impact in 10-12-year-old children (Campbell, Crawford, Abbott, McNaughton, & Ball, 2010). Similar associations have been reported in 'pressure to eat', which has been: a) negatively associated with child weight (Birch et al., 2001; Francis, Hofer, & Birch, 2001; Lee, et al., 2001), fat mass (Spruijt-Metz, et al., 2002) and fruit and vegetable consumption and b) positively associated with fat intake (Fisher, et al., 2002), energy-dense food consumption and child weight (Lee, Murry, Brody, & Parker, 2002). These conflicting reports suggest that the effects of controlling practices such as 'restriction' and 'pressure to eat' on child diets are ambiguous and require refined investigation.

2.2.3 Parent knowledge of diet and nutrition

Maternal knowledge of health and nutrition has been positively associated with child diet (Gibson, Wardle, & Watts, 1998), particularly in younger children (Blaylock, Variyam, & Lin, 1999). These associations may be mediated by home food availability (Campbell, et al., 2010). Similarly, inadequate nutrition knowledge appears to contribute to increased availability and accessibility of unhealthy food in the home environment (Birch & Davison,

2001), and has been associated with increased consumption of diets that are energy-dense and nutritionally poor (Boshoff, Dollman, & Magarey, 2007; Hearn et al., 1998).

Therefore, given the importance of the early years in healthy development, the purpose of this paper was to systematically review the effectiveness of interventions targeting parent nutrition knowledge and/or parenting practices with parents of young children aged two to five years in relation to healthy eating habits early in life.

2.3 Methodology

This review included intervention research conducted with parents of children aged two to five years that measured parent nutrition knowledge, parenting styles and/or parental feeding practices in association with children's diets and evaluated changes in child food consumption, diet, and/or body mass index (BMI). Outcome measures were required to include at least one of the following: 1) weight change/status (BMI, per cent fat, etc.); 2) food and/or beverage consumption; 3) parent nutrition/diet knowledge; and/or 4) parent feeding practices or style of parenting in relation to child diet.

2.3.1 Search strategies

At the first stage MEDLINE, PsychINFO, EMBASE, CINAHL and CENTRAL databases were systematically searched to identify published research from 1 January 1996 to 10 September 2009 using various combinations of the keywords shown in Table 2.1.

Specific search criteria produced 352 articles. Exclusion criteria eliminated articles focusing on malnutrition, eating disorders, and primary school based recruitment. Further scanning reduced the total to 133 abstracts for review. JP & NP reviewed abstracts and resolved discrepancies, resulting in 95 articles which were organized into three groups: 1) intervention research (*n* = 17); 2) qualitative research (*n* = 9; Peters, Parletta, Campbell, & Lynch, in press); and 3) observational research (*n* = 69). The purpose of this paper was to review the 17 quantitative intervention studies (Figure 1).

Figure 2.1 *Flow chart of systematic review*

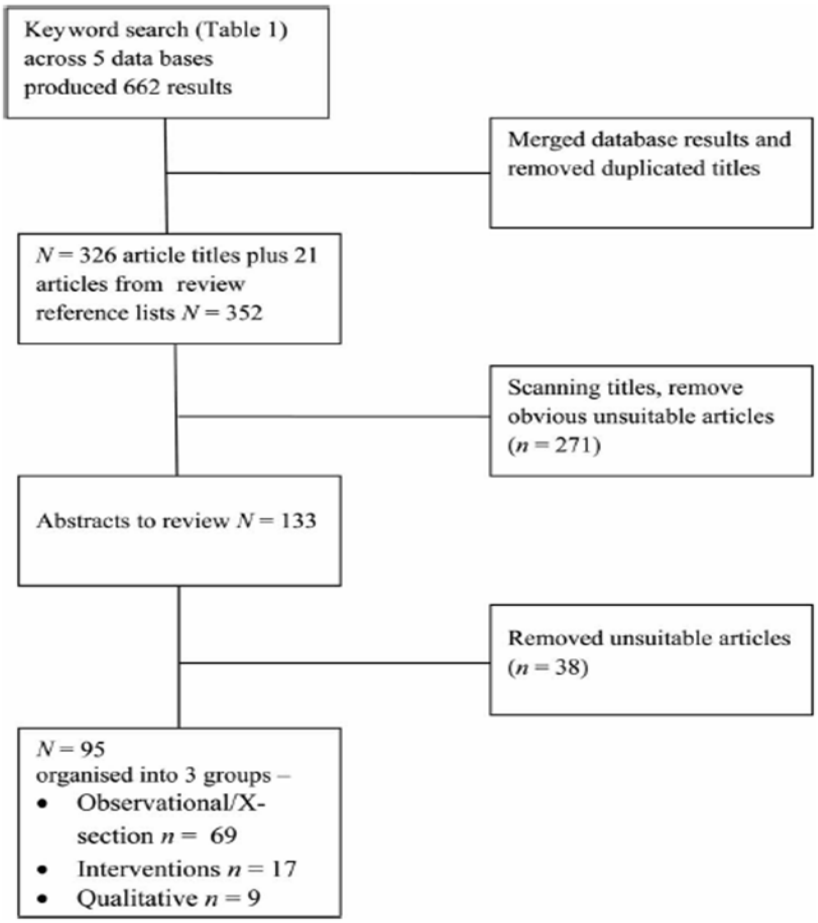


Table 2.1 *Concept table of keyword search terms*

	Child Diet	Parenting	Nutrition	Research
1	Diet	Parent*	Parent	RCT
2	Healthy	Style*	Nutrition	Random*
3	Core food*	Skill*	Maternal	Contol*
4	Beverage	Attitude*	Knowledge	Trial*
5	Vegetable	Practice*	Educat*	Interven*
6	Fruit	Authorita*	Promot*	Cross-section*
7	Consumption	Control*		Observation*
8	Intake	Restrict*		Quasi
9	Child*	Reward*		Associat*
10	Preschool*	Permissive		Follow-up
11	Pre-school*	Neglect*		Prevent*
12	Pediatric*	Indulg*		Evaluat*
13	Paediatric*	Food specific		Compar*
14	Feed*	Diet specific		
15	Eat*	Feeding		
16	Youth	Knowledge		
17	Weight*	Educat*		
18	Overweight			
19	Obes*			
20	BMI			
21	Skin fold			

Refined searches resulted in a total number of 663 references as listed in Table 2.2.

Table 2.2 *Number of search hits for each database*

	Cochrane (few limits Available)	CINAHL (with limits)	PSYCHinfo (with limits)	EMBASE (with limits)	MEDLINE (with limits)	*Totals*
PARENTING	141	26	56	26	73	***322***
GNK	130	22	46	36	107	***341***
	271	***48***	***102***	***62***	***180***	***663***

[1] Parenting – studies involving a parenting component in relation to child diet and/or BMI; GNK – studies involving parent information, understanding or knowledge of nutrition.

2.3.2 Data extraction and assessment of methodological quality

J.P. and N.P. systematically extracted the data using a purpose designed extraction tool. Methodological quality was assessed using a six-component rating scale (Thomas, 2004). This tool assesses selection bias, study design, confounders, assessor and participant blinding, data-collection methods, and dropouts. Each component was given a rating of strong, moderate or weak based on the specified criteria. Where information was not provided, a score of weak was given except for blinding where the component is rated as moderate. A global score of strong, moderate or weak was then recorded. A rating of strong was achieved if the intervention received four or more strong ratings; a moderate rating if there were less than four strong scores and no more than one weak score; and a weak rating if there were two or more weak scores (Thomas, 2004). On completion, scores were reviewed and any discrepancies discussed and resolved.

2.4 Results

The 17 interventions were delivered in a variety of settings: home based (n = 5); childcare/preschool (n = 5); group (n = 3); mixed (n = 2); community (n = 1); and pediatric office (n = 1). Although search criteria dated back to 1995, all included articles were published in 2003 or later. Extracted information including design, methodological rigor, duration, effectiveness and follow-up details varied substantially (Table 2.3).

Although some of the interventions included other components, such as physical activity (PA) or parent weight condition, only information relevant to this review has been summarised. All summaries appear below grouped by setting.

Table 3. Summary of quantitative studies.

Author	Intervention		Outcome measures			Design	$N =$	Incentive	Baseline age	Duration	F-up	O	Q
	PS	GNK	BMI	Diet	PS^2								
Community Setting													
Sacher et al. (2008)	✓	✓	✓	✓		Pre/post	37	?	$m = 2.8$yr	10wk	0	↑	3
Childcare/preschool settings													
Sangster et al. (2003)		✓		✓		Pre/post	351	n	preschool	ongoing	2yr	↑	3
Williams et al. (2004)		✓	✓			CCT	787	?	48mth	2yr	0	↑	1
Fitzgibbon et al. (2005)		✓	✓	✓		RCT	300	$	$m = 48\&50$mth	14wks	1 + 2yr	?	2
Fitzgibbon et al. (2006)		✓	✓	✓		RCT	331	$		14wks	1 + 2yr	0	2
Korwanich et al. (2008)		✓		✓		CCT	219	?	4–5yr	?	9mth	↑	3
Group setting													
McGarvey et al. (2004)		✓	✓	✓	✓	CCT	186	?	2–4yr	12mth	0	?	3
Condrasky et al. (2006)		✓		✓		CCT	29	?	preschool	1wk	0	0	3
Harvey & Coleman (2008)	✓	✓		✓		Pre/Post	24	?	2–5yr	8wk	0	↑	3
Home-based setting													
Harvey-Barino et al. (2003)	✓	✓		✓	✓	RCT - pilot	40	$	$m = 22$mth	16wks	0	↑	2
Wardle et al. (2003)		✓		✓		RCT	126	?	$m = 53.2$mth	2wk	0	↑	2
Worobey et al. (2004)		✓		✓		Pre/post	60	?	$m = 27$mth	6mth	0	↑	3
Cottrell et al. (2005)		✓		✓		RCT-cluster	50	?	4–6yr	4wk	0	?	3
Haire-Joshu et al. (2008)	✓	✓		✓	✓	RCT	1306	$	2–5yr	4 × 60 minutes	0	↑	2
Mixed setting													
Horodynski et al. (2004)	✓	✓		✓	✓	CCT	32	$	12–36mth	3 × 90 minutes	6mth	0	2
Horodynski et al. (2005)	✓	✓		✓	✓	CCT	96	$	11–25mth	4wks	6mth	?	3
Pediatric office setting													
Schwartz et al. (2007)		✓	✓	✓		CCT	29	gc	$m = 4.7$yr	6mth	0	↑	2

Notes: Intervention: PS = style of parenting or feeding practices; GNK = nutrition knowledge or diet discussed. Outcome measures: BMI = body mass index and/or weight of child discussed; Diet = child diet and/or eating habits discussed; PS^2 = measure of parenting style or practice; RCT, randomised control trial. Design: Pre/post = pre-test / post-test analyisis; CCT = Control trial.

N = number of participants. Incentive: ? = not reported or unclear; $ = monetary incentive provided; gc = gift certificate incentive provided. Baseline age: m = mean; mth = month. Duration: yr = year; mth = month; wk = week. F-up = follow-up: yr = year; mth = month. O = outcome; ↑ = intervention was beneficial. Q = quality rating: 1 = strong; 2 = moderate; 3 = weak.

2.4.1 Pre-school/childcare setting

Sangster et al., 2003

The 'Good Food for Children – Food from Home' Project (Sangster, Eccleston, & Stickney, 2003) was developed to implement improvements in policy and practice in Long Day Care Centers where food is provided from home (N = 351; no controls). The intervention aimed to improve the nutrition quality and standard of the food provided by parents. The parent component included the development and distribution of appropriate food-handling resources and nutrition information (including lunch box checklist and newsletters with recommendations on portion size, number of serves, and limiting undesirable food habits). Pre- and post-assessment of food observations revealed significant improvements in average scores of nutrition lunch box quality (71.6% pre-test vs. 79.6% post test; p = 0.0001). Parents reportedly provided higher calcium foods and more foods with a moderate source of iron, and less high fat, energy-dense snacks (p < .05). However, no control group made it difficult to determine if the results could be attributed to the intervention. In addition, despite showing good participant retention (from 279 participants across 21 centers to 351 participants across 15 centers), selection information and data-collection methods were not reported and this study was therefore allocated a weak rating. Nonetheless, this research suggests that the nutritional quality of foods provided to children may improve when parents are supported with information and skills regarding healthy child diet.

Williams et al., 2004

The 'Healthy Start' Project (Williams, Strobino, Bollella, & Brotanek, 2004) was a two-year intervention looking at cardiovascular risk reduction via two different treatment conditions in socioeconomically disadvantaged preschool children aged three to four years at baseline (N = 787). Schools unable to change food service were allocated as controls and the two intervention groups randomly allocated. The first condition involved menu modification aimed at reducing the total saturated fat content in the meals and snacks served to children in care (n = 195). The second condition replicated the first condition and added a nutrition education component delivered to the children, which included reading material for parents and three to four health themed parent meetings each year (n = 242). Results indicated that the education and parent component did not add any value to the intervention; therefore, the groups were combined (n = 350) and compared with the control group. The combined intervention groups produced significant decreases in energy from both total and saturated fats and decreases in total serum cholesterol compared to the control group (mean per cent change: -0.025 and 0.013, respectively, mean difference 0.038; $p < .01$). Although a 'relatively simple intervention', study design and reporting of results were thorough with 91 per cent participant retention at follow-up; it was therefore allocated a strong rating. This study provides evidence that young children's diets and some diet-related cardiovascular risk factors can be improved via food provided in day care settings.

Fitzgibbon et al., 2005

'Hip-Hop to Health Junior' (Fitzgibbon et al., 2005) was a cluster randomised control trial (RCT) aimed at preventing childhood obesity in minority preschool-aged children (three to five years). The identical program was delivered to two separate populations. The first consisted of predominantly African-American participants recruited from 12 Head Start preschools and randomly allocated to an intervention (n = 212) or control group (n = 197). The second included predominantly Latino-American participants and is reported below (Fitzgibbon et al., 2006). The weight control intervention consisted of three weekly 40-minute education sessions (20 minutes of diet and nutrition-related activities and a PA component) over 14 weeks. The intervention aimed to increase fruit and vegetable consumption and decrease fat intake (as well as sedentary and PA behaviours not relevant to this review). Twelve homework assignments were provided for parents and incentives were given to motivate compliance. The control program consisted of weekly 20-minute general, non-specific health education sessions accompanied by weekly newsletters; no homework was allocated. Results indicated reduced BMI increases in the intervention group at both one (0.02kg/m^2 vs 0.64kg/m^2, p = 0.002) and two year follow-ups (0.48 kg/m^2 vs 1.14 kg/m^2, p = 0.008) and reduced per cent of caloric intake from saturated fat at the one year follow-up only (11.6% vs 17.8%, p = 0.002). Eighty-eight per cent of parents reported reading the newsletters and 61 per cent returned at least one piece of homework. Although the intervention did not significantly impact all dietary outcomes, longer-term results were encouraging with reduced BMI. This study showed strengths in design, with good participant retention rate of 73 per cent at two-year follow-up. However, according to

the authors, they were unable to blind the researchers or participants to group allocation. Therefore, this study was allocated a moderate quality rating.

Fitzgibbon et al., 2006

Fitzgibbon's second population from 'Hip Hop to Health Junior' (Fitzgibbon et al., 2006) were predominantly Latino-American parents of preschool aged children (three to five years) recruited from 12 Head Start centers and randomly allocated to the intervention (n = 202) or the control (n = 199) conditions described above (Fitzgibbon et al., 2005). This second group reported a higher baseline BMI z-score (p = .02) in the control group compared to the treatment group, with significantly more Latino participants (89% vs 73%, $p < .001$). However, no significant differences in either BMI or dietary intake were reported post-intervention, nor at one and two-year follow-ups. In contrast to the first cohort (n = 409 baseline; n = 289 one-year follow-up; n = 300 two-year follow-up in 2005), this second cohort showed good retention rates at all post intervention assessments (n = 401; n = 343; n = 341 respectively, in 2006). However, only 54 per cent of parents completed at least one piece of homework and there were no reports in relation to newsletter reading. This study reported no differences observed between groups post-intervention or at one and two-year follow ups. Therefore, while effective in reducing BMI in the African-American cohort, this intervention produced no effect with the Latino population. Similarly to their earlier research (Fitzgibbon et al., 2005), this study showed strengths in design, participation retention rates, and some reporting. However, blinding and data-collection methods were not reported and it was allocated a moderate quality rating.

Korwanich et al., 2008

A quasi-experimental intervention evaluated the effects of implementing a healthy eating policy on dietary practices in predominantly lower socioeconomic status (SES) preschool children (N = 234) from 16 schools in rural Thailand (Korwanich, Sheiham, Srisuphan, & Srisilapanan, 2008). The schools were randomly assigned to one of two groups. The intervention group (8 schools; n = 141) implemented a healthy eating policy, where participants involved in policy development included parents, teachers, education experts, and school board members. Assessment was made via direct observations by trained observers and a three day diet recall of children during school hours (focusing on consumption during scheduled breaks) at baseline and nine months post-intervention. Results from the eight control schools nine months post-intervention indicated a significantly increased daily intake frequency of cariogenic snacks (foods high in refined carbohydrates and other ingredients that promote tooth decay; 1.03 to 1.39 times a day, $p < 0.05$), crispy snacks (0.67 to 1.10 times a day, $p < 0.05$), and non-sugar milk intake (0.98 to 1.0 times/day, $p < 0.05$), whereas the intervention group recorded significantly decreased daily intake frequency of cariogenic snacks (1.12 to 0.84 times/day, $p < 0.05$), fresh fruit (0.10 to 0.07 times/day, $p < 0.05$), Thai desserts (0.23 to 0.13 times/day, $p < 0.05$), and sugary drinks (0.31 to 0.23 times/day, $p < .05$). Although not a large component, material provided to parents included advice regarding healthy school snacks. This information may have contributed to reduced consumption of undesirable snacks and overeating during school snack times with parents reportedly not buying crispy snacks for their child in the mornings. Although this study showed strengths in selection and design, possible

confounders and data-collection methods were not reported; therefore, it was allocated a weak rating.

2.4.2 Home-based settings

Wardle et al., 2003

This RCT (Wardle et al., 2003) aimed to increase consumption of a previously disliked vegetable in children aged two to six years (M = 53.2 months) in an exposure group (n = 50) compared with an information group (n = 48) and a no treatment control group (n = 45). A taste preference test was conducted on all children in their home at baseline and repeated post-intervention. Parents in the information group were given material on the '5-a-day' fruit and vegetable recommendations and a leaflet containing suggestions on how to increase their young children's fruit and vegetable consumption. Children from the exposure group ranked six vegetables in order of preference ranging from one to six. The item ranked three (moderately low) was assigned as the target vegetable. Parents were advised of the target vegetable and were then required to present it to their child for consumption across 14 consecutive days, with a minimum requirement of 10-14 tastings achieved. Post-intervention results showed increased liking of the target vegetable in the exposure group compared with the information ($p < .001$) and control groups ($p < .01$). Sixty-five per cent of children rated the previously disliked item as 'like', with 30 per cent rating the item as preferred. Voluntary consumption of this vegetable increased from 47 per cent pre-intervention to 77 per cent post- intervention, whereas the information group increased from 45 per cent to 60 per cent and the control decreased from 55 to 50 per cent.

Therefore, when compiling nutrition information for parents of young children these results suggest the importance of providing education about the efficacy and benefits of repeated exposure when promoting and introducing healthy food options to their child. Although this study reported positive results, the predominantly high SES sample was not representative of the general population. In addition, poor compliance was reported with only 29 per cent of the exposure group reaching the minimum of 10 of 14 tastings. With a moderate rating, this study provides valuable evidence to parents regarding the importance of persistence when introducing new foods to their child.

Cottrell et al., 2005

'CARDIAC-Kinder' (Cottrell et al., 2005) was a four-week PA and diet RCT (cluster) intervention, recruited via preschool enrolment and delivered in the home. Eligible participants (N = 437) were screened and sent baseline questionnaires, with 203 completed questionnaires returned and only 50 parent child dyads (control n = 26; treatment n = 24) providing complete intervention data. Information provided to both groups included age-appropriate dietary guidelines with treatment group children also receiving dietary recommendations to reduce energy intake if their BMI was $\geq 85^{th}$ percentile. Following the intervention, 94 per cent of parents read the information at least once, 69 per cent claimed to have read the information several times, just under half of parents reported lifestyle changes after reading the information, 89 per cent of parents found the information helpful, and 13 per cent were motivated to seek additional information from a pediatrician. Dietary measures were the average number of foods consumed weekly including fruits, vegetables, meat, bread and sweets. Results showed that the intervention group consumed significantly

fewer sweets per week than the control group (3.1 vs 3.9, $p < .05$) with no significant changes reported in the other relevant food groups. It appears therefore that the information parents received inspired behaviour change in the reduction of energy-dense sweet foods. This study showed strengths in study design; however, less than a quarter of approached participants agreed to participate with approximately one quarter reaching completion, thus limiting generalisibility. However, the most commonly cited barrier for completion was difficulty of recording the PA component and did not appear to be due to the dietary component. Nevertheless, this study was thus allocated a 'weak' rating.

Haire-Joshu et al., 2008

'High 5 for Kids' (Haire-Joshu et al., 2008) was a home-based program designed to evaluate parenting style (coercive or non-coercive) and inform parents of young children (aged two to five years) about nutrition and the importance of fruit and vegetable availability in the home environment. 'High 5 for Kids' also promoted behaviour change in parents' dietary patterns and evaluated whether this was reflected in their child's diet. An RCT compared control parents ($n = 701$) with the High 5 treatment parents ($n = 605$). Results showed parents in the High 5 group had improved fruit and vegetable knowledge (mean change 0.27 vs 0.18, $p = .01$) and availability in the home (mean change 0.45 vs 0.26, $p = .01$) and this predicted positive change in children's fruit and vegetable consumption (+0.50 serves per day, $p = .001$). Normal weight children in the High 5 group showed increased fruit and vegetable consumption (overweight children did not) compared with controls (mean change 0.23 vs -0.10, $p = .02$). Unexpectedly, non-coercive feeding practices decreased in the High 5 group compared to controls (mean change 0.04 vs 0.08, *p*

= .002). This well designed study reported good participant agreement and retention rates and provides evidence regarding the potential positive impact of parental knowledge of nutrition and food availability on child diet. However, the inability to blind sites to assignment resulted in a moderate rating.

2.4.3 Group-based intervention

McGarvey et al., 2004

A parent-focused obesity prevention program 'Fit-WIC' (McGarvey et al., 2004) recruited predominantly low SES participants from local women, infants and children (WIC) clinics. The aim was to assess the feasibility of a non-RCT targeting six key dietary and PA behaviours. The intervention group (n = 185) received six bi-monthly group education sessions and two individual sessions with a WIC nutritionist and health messages promoting key behaviours. These included replacing sweetened beverages with water, daily consumption of five fruit and vegetables, and mealtime monitoring (including togetherness, eating as a family and meal planning). Clinic staff members were also encouraged to attend six 'staff wellness challenges' to promote appropriate targeted behaviours for participants to model. The control group received six non-specific bi-monthly group education sessions and two individual sessions with a nutritionist only. On conclusion of the 12-month intervention, the intervention group reported an increased frequency in offering water over sweetened beverages compared with controls (p = .005). This group also reported observing more healthy behaviours in staff than controls (52% vs 6%, p = .002). The program appeared to be effective in modifying parental behaviour by increased offering of water in

place of sweetened beverages as well as recognising healthy behaviours in others; however, did not significantly affect other targeted behaviours. This study showed strengths in design and participation. However, outcome measures were not validated and participant completion was less than 60 per cent; therefore, it was allocated a weak rating.

Condrasky et al., 2006

In a non-randomised controlled trial 'Cooking with a Chef' (Condrasky, Graham, & Kamp, 2006) evaluated the effectiveness of teaming a chef with a nutrition educator to lead and deliver two-hour intervention sessions between late morning and lunch time. The number of sessions was unclear; however, the aim was to increase the number of daily servings of fruit and vegetables offered to young children. These sessions provided parents and caregivers basic information on nutrition, food selection, and planning, including time saving tips and preparation skills. Session content included menu planning aimed at increasing the consumption of fiber, fruits and vegetables. Participants were selected from two church groups; one for the intervention (n = 15) and one as a control group (n = 14). Pre- and post-test results indicated increased daily fruit servings post-intervention only. Although these results did not reach statistical significance, they were indicative of information and knowledge possibly leading to improved diet. However, many details were not reported and it was therefore allocated a weak rating.

Schwartz et al., 2007

A non-randomised clinical trial was implemented by pediatricians and registered dietitians to evaluate the effectiveness of an office-based obesity prevention program using motivational interviewing (MI) with 91 parent-child patient dyads (Schwartz et al., 2007).

Eligibility included children with a BMI in the 85th-95th percentile and their parent, or children with a normal BMI in the 50th-85th percentile with at least one overweight parent (BMI ≥ 30). Pediatricians and registered dietitians in both intervention groups received MI training to deliver the six-month intervention. Parent-child dyads were allocated to one of three groups: 1) Intensive treatment – two days of MI training from both a pediatrician and registered dietitian, with an extra MI training session at three months; 2) Minimal treatment – parents received one MI session only; and 3) Controls with a standard care physician (no MI training). All groups of children showed an initial reduction in mean BMI, which did not reach significance after adjusting for number of days from follow-up (six-month visit). However, 94 per cent of parents from both treatment groups reported an inspired change in family eating habits. Other behavioural changes included decreased snack and dessert consumption in both minimal and intensive groups; however significance was only reached in the minimal group when compared with controls (M = 2.48 vs 1.76, p = .01). Although not all behaviour change measures reached significance, results indicated a tendency towards improved BMI and it appears that a majority of the parents were motivated toward behaviour change. This study indicates that information and support can produce positive behaviour change. With good design strength, this study showed moderately good participant retention, and although tools were shown to be valid, reliability and blinding were not reported. Therefore, it was allocated a moderate rating.

Harvey & Coleman, 2008

'Raising Healthy Eaters' (Harvey & Coleman, 2008) was a pilot program to assist parents in the promotion of healthy eating habits in their two to five-year-old children (N = 24).

This eight-lesson group intervention included basic nutrition information, parenting skills and advice regarding age-appropriate feeding practices delivered by both paraprofessional and professional educators. Child diet and parent measures were recorded pre- and post-intervention. The limited post-intervention results revealed significantly increased parental knowledge of age-appropriate feeding practices ($p < .05$) and confidence in perceived ability to provide healthy options for their children where they reportedly tried more vegetables and new foods ($p < .05$). Child dietary measures were recorded; however, results were not reported. Although this pilot showed good participant retention of a small sample, accounts of the intervention lacked detail and not all results were reported; it was therefore allocated a weak rating.

2.4.4 Mixed-setting interventions

Horodynski et al., 2004

The 'Nutrition Education Aimed at Toddlers' (NEAT; $N = 32$) (Horodynski, Hoerr, & Coleman, 2004) was a pilot study aimed to improve caregivers' knowledge, attitudes, mealtime practices, and dietary intake. The focus was to teach low-income parents how to identify and respond to verbal and non-verbal mealtime behaviours of their toddlers aged 12-36 months. The intervention ($n = 16$) consisted of three 90-minute group nutrition sessions, which included modelling positive eating behaviours, introducing new foods, parenting skills, and concerns in relation to feeding toddlers. Although no significant differences were found between the intervention and control groups, three-quarters of participants from both groups displayed correct knowledge and most expressed positive

attitudes towards toddler-feeding practices. However, discrepancies were found between caregivers' perceptions about feeding toddlers and the actual reported dietary intakes of dairy, fruit, and vegetables. This study supports the claim that knowledge alone does not always promote behaviour change. Although this study showed good retention rates and design strength, data-collection tools were not validated with low or no reliability, and it was allocated a moderate rating.

Horodynski & Stommel, 2005

This NEAT intervention (Horodynski & Stommel, 2005) was a follow-up to the NEAT 2004 pilot program (Horodynski, et al., 2004). It was similarly designed to improve caregiver-toddler mealtime interactions by teaching low-income parents to identify and respond to verbal and non-verbal mealtime behaviours of their toddlers aged 12-36 months. This intervention (N = 96) consisted of four 90-minute group nutrition sessions, which included modelling positive eating behaviours, introducing new foods, parenting skills, and concerns in relation to feeding toddlers. Additionally, there were 18 individually structured reinforcement sessions over six months, which were delivered during one-on-one weekly home visits. These sessions were designed to meet individual special needs (e.g., toddler feeding, nutrition, parent-child interactions). Data were collected at baseline, four weeks post-intervention and six months post-completion. Repeated-measures evaluation of the intervention group (n = 43 parent/child dyads) for nutrition knowledge, carer self-efficacy in feeding, and child carer mealtime behaviour found significant increases in nutrition knowledge only ($p < .01$), compared with the no-treatment control group (n = 53). Diet recall (24 hour) was collected; however no results were reported. These results support the

notion that knowledge does not necessary translate to behaviour change. Despite a good study design and moderately good retention, reliability testing was not consistent for all measures and consequently this study was allocated a weak rating.

2.4.5 Family-based interventions

Harvey-Berino & Rourke, 2003

This RCT was aimed at overweight Native American mothers (BMI > 25) with young children aged 9-36 months (Harvey-Berino & Rourke, 2003). The focus was to compare differences between a general parenting support program (control; $n = 20$) and a parenting support program specific to improving children's diet and PA (intervention; $n = 20$). Both groups received 16 weekly home visits (one hour each) from an Indigenous peer educator who delivered both programs. Pre- and post-analysis reported decreases in the intervention group in weight-for-height (WFH) z-scores (-0.27 vs 0.31, $p = .06$), total energy intake (-39.2 vs 6.8 kcal/kg-1/day, $p = .06$) and restrictive maternal child feeding practices (-0.22 vs 0.08, $p < .05$). No differences were recorded for child fat intake. This study indicates that specific parenting support on skills advice may promote healthy child-feeding practices. Although promising results, the research was limited by a small sample with no longitudinal follow-up. Additionally, validity and reliability of measures were not reported, and it was allocated a moderate quality rating.

Worobey et al., 2004

This no-control group intervention was conducted with predominantly low-income Hispanic families with children identified with either high lead burden (2/3) or at

psychosocial risk (1/3; Worobey, Pisuk, & Decker, 2004). Participants were 60 families with children under 72 months (M = 27 months at first assessment). An individual needs-based parenting intervention was designed by a public health nurse and delivered during home visits on a weekly or monthly basis depending on individual needs. The relevant variables in the nutrition education program included increasing water and juice consumption, increasing healthy snack consumption and decreasing high-fat snack consumption. Comparison of 24-hour diet recall with eight-month follow-up reported a decrease in total caloric intake only (1698-1411 kcal, $p < .05$); however, not all measures were reported. Despite positive results from providing parenting support and dietary instruction, this study was allocated a low-quality rating due to the difficulty in implying causality with an inconsistent intervention design across the small sample and no control group or longer-term follow-up for comparisons.

2.4.6 Community-based interventions

Sacher et al., 2008

The 'Mini-MEND' project is an existing 'field trial' (Sacher, Wolman, Chadwick, & Swain, 2008) modified for families with young children aged two to four years. The aim of this program is to promote healthy dietary and activity habits from an early age, irrespective of weight. The 10-week program evaluated child eating and drinking practices along with parent-feeding styles and eating behaviours. Although program content and results are not explicitly reported the authors state that BMI z-scores were reduced from 0.6 at baseline to 0.4 post 10-week intervention, although not statistically significant (*p* not reported).

However, 94 per cent of parents (n = 17) reported providing their children with a wider range of fruits and vegetables and 83 per cent (n = 15) reported reducing milk intake and limiting intake of juice and high-energy beverages. This study appeared to produce positive parent feeding practices and had good participant retention; however, there was no longer-term follow-up, and limited reports of intervention details resulted in a weak quality rating.

2.5 Discussion

This paper systematically reviewed and evaluated intervention research conducted with parents of children aged two to five years. Specifically targeting the promotion of healthy habits early in life, the aim was to assess the effectiveness of parenting interventions (nutrition knowledge, parenting styles, and/or feeding practices) designed to improve children's diets and/or feeding practices.

Review criteria included the effect of parenting on child diet with a specific focus on feeding practices and/or nutrition knowledge. All but two of the studies included either diet recall or a food frequency questionnaire (Sangster, et al., 2003; Williams, et al., 2004). Eight studies recorded child weight or BMI (Fitzgibbon, et al., 2005, 2006; McGarvey, et al., 2004; Sacher, et al., 2008; Schwartz, et al., 2007; Williams, et al., 2004) and 15 evaluated child diet and/or consumption (Condrasky, et al., 2006; Cottrell, et al., 2005; Fitzgibbon, et al., 2005, 2006; Haire-Joshu, et al., 2008; Harvey-Berino & Rourke, 2003; Horodynski, et al., 2004; Horodynski & Stommel, 2005; Korwanich, et al., 2008; McGarvey, et al., 2004; Sacher, et al., 2008; Sangster, et al., 2003; Schwartz, et al., 2007; Wardle, et al., 2003; Worobey et al., 2004). Parenting styles and/or feeding practices were

measured in five studies (Haire-Joshu, et al., 2008; Harvey-Berino & Rourke, 2003; Horodynski, et al., 2004; Horodynski & Stommel, 2005; McGarvey, et al., 2004) with four measuring nutrition knowledge/understanding (Haire-Joshu, et al., 2008; Harvey & Coleman, 2008; Horodynski, et al., 2004; Horodynski & Stommel, 2005). The limited number of studies identified within the specified criteria of this review highlights an area of research that requires additional evidence specific to these formative preschool years.

The primary aim of much of this research was the promotion of healthy habits whereas weight loss motivated four of the 17 studies (Cottrell, et al., 2005; Fitzgibbon, et al., 2006; Harvey-Berino & Rourke, 2003; Schwartz, et al., 2007), one of which targeted both weight loss and healthy-habit promotion (Fitzgibbon, et al., 2005). The included studies largely involved lower SES or income groups from various geographic regions (USA [*n* = 13]; UK [*n* = 2]; Australia [*n* = 2]; Thailand [*n* = 1). However, one study included mid to high SES groups (Sangster, et al., 2003); one included all SES groups (Haire-Joshu, et al., 2008); and four did not clarify SES (Condrasky, et al., 2006; Cottrell, et al., 2005; Sacher, et al., 2008; Schwartz, et al., 2007). Follow-up data was recorded in six of the studies; one at two years (Sangster, et al., 2003), two at one and two years (Fitzgibbon, et al., 2005, 2006), one at nine months (Korwanich, et al., 2008) and two at six months (Horodynski, et al., 2004; Horodynski & Stommel, 2005).

While sustainability of intervention effectiveness could be the key to promoting healthy habits and preventing the development of obesity, long-term effectiveness was difficult to ascertain with only three of the studies reporting data at 12 months post-intervention or later. This review also identified that longer-term interventions, delivered

over a minimum of 6 months, produced more positive results than the short-term interventions as indicated by reduced fat and/or energy intake (Wardle, et al., 2003; Williams, et al., 2004) and improved parent feeding practices (McGarvey, et al., 2004; Sangster, et al., 2003; Schwartz, et al., 2007). However, apart from one continuing intervention which has now expanded to 40 sites across the UK (Sacher, et al., 2008), follow-ups were not reported and therefore sustained behaviour change cannot be evaluated. Additionally, due to demographic and cultural differences, predominantly small sample sizes, high dropout rates and the limited detailing of reported findings, only one study was allocated a strong quality rating (Williams, et al., 2004), and only one was considered to have good generalisability (Haire-Joshu, et al., 2008).

In relation to feeding practices, this review was only able to identify five interventions within the specified search criteria. First, the 'High 5 for Kids' intervention included instruction to parents on the use of non-coercive feeding practices. Contrary to expectations non-coercive practices decreased compared to controls (Haire-Joshu, et al., 2008). The second was a pilot study comparing a 'parenting skills' only group with an 'obesity prevention and parenting skills' group. Results showed significantly lower restriction in the latter group. This group also reported decreased energy intake, whereas the 'parenting skills' only group reportedly increased their energy intake (Harvey-Berino & Rourke, 2003). Therefore, without a comparison group focusing on obesity prevention alone, it is not possible to assess whether parenting skills training added value to this. Thirdly, a brief report was provided on the 'Raising Healthy Eaters' intervention which included age-appropriate feeding practices with parenting skills (Harvey & Coleman,

2008). Although diet recall data were collected, no results were reported on child diet or consumption. Finally, the NEAT program, looking at both feeding practices and nutrition knowledge, (piloted in 2004 [Horodynski, et al., 2004] and refined in 2005 [Horodynski & Stommel, 2005]), originally identified that knowledge alone was not enough to promote change. However, the subsequent intervention reported improvements in nutrition knowledge only. In addition to these studies, Wardle et al. (2003) also provided evidence to inform parent feeding practices by successfully demonstrating that parents' repeated exposure of their young child to a previously disliked vegetable resulted in increased preference, liking and consumption of that vegetable.

Some cross-sectional research has indicated that maternal nutrition knowledge is negatively associated with four to five year old children's total energy and fat intake (Contento et al., 1993) and positively associated with fruit and vegetable consumption in older children (Gibson, et al., 1998). However, evidence regarding the effect of nutrition knowledge on child diet from interventions reviewed here is conflicting. Some of the research indicates that good nutrition knowledge was insufficient to change behaviour (Baughcum, et al., 1998; Horodynski, et al., 2004). Conversely, other studies found information and/or awareness of nutrition and/or dietary requirements to be positively associated with health and dietary intake, although the latter research did not include a control (Sangster, et al., 2003). The quality of some studies reporting significantly improved diet were limited by low levels of parent involvement (Korwanich, et al., 2008) and poor reporting of results (Cottrell, et al., 2005). While this review found little consistency among the interventions, it could be speculated that mixed results from the

nutrition education interventions may indicate that even if parents possess good nutritional knowledge they may lack skills and knowledge of optimal parenting practices that can encourage and develop healthy diets in their children. For instance, the provision of healthy options and allowing the child to choose from these options may promote healthy food choices. Indeed, a recent study conducted with older children (six to eleven years) found that regulating the food environment by providing only healthy choices was beneficial (Golan, Kaufman, & Shahar, 2006). This practice of restricted choices promotes child autonomy and is central to the authoritative style of parenting, which has also been associated with healthier diets in adolescents (Kremers, et al., 2003). However, despite the long-standing focus on 'restrictive' practices in parent feeding styles, only one intervention reviewed here included parent education in this area (Haire-Joshu, et al., 2008). The 14-day vegetable exposure study highlighted the effectiveness of continued exposure to healthy foods in the absence of coercion or restriction, which resulted in greater liking, ranking and consumption of the target food (Wardle, et al., 2003). Before intervention studies include an education component on restrictive feeding practices, the conflicting information that is available needs to clarify the context in which restrictive feeding practices are effective – it may be most effective when parents set boundaries around the food that is available (restriction) but then allow autonomous food choices within those boundaries while encouraging a child to be aware of, and respond to, their internal cues of hunger and satiety. In conjunction with creating a positive food environment, this 'parent provide, child decide' approach is consistent with the authoritative style of parenting.

Another important point to emerge from this review was the small number of high quality studies, with many of the studies neglecting to report reliability and/or validity of tools used. Furthermore, many of the studies were rated as moderate or weak due to response and/or retention rates falling below 60 per cent. As discussed previously, these aspects of a study often fall outside the researcher's control (Hesketh & Campbell, 2010) and may reflect the feasibility of the intervention. Finally, it must be noted that the generalisability of the research is mixed, as different demographic characteristics were targeted such as lower SES groups, higher BMI groups, ethnicity and/or geographic region.

Nonetheless, with claims that almost one-fifth of children are overweight or obese at the age of school entry, and one-quarter are overweight or obese in primary schools, there is a rising consensus that early preventative action is required for optimal effectiveness (Booth et al., 2003; Booth, Dobbins, Okely, Denney-Wilson, & Hardy, 2007; Hesketh, Waters, Green, Salmon, & Williams, 2005). However, this appears to be an undernourished area of research which requires further attention. Moreover, standardised guidelines are available to inform parents of what constitutes a healthy child diet; however, no guidelines are available to inform effective feeding practices. Cross-sectional research has identified effective/ineffective parent feeding practices and qualitative research has identified some issues that need to be addressed or dispelled including cultural differences and misconceptions such as a 'heavier child is considered healthier,' 'food deprivation is tantamount to starvation' or 'children will outgrow weight' (Peters, et al., in press). Additionally, five of the studies identified in this review attempted to include feeding practices; however, only one reported specific intervention content (Harvey-Berino &

Rourke, 2003) while the remaining reported broad concept description (Haire-Joshu, et al., 2008; Horodynski, et al., 2004; Horodynski & Stommel, 2005; McGarvey, et al., 2004) making interpretation of specific component benefit, and therefore development of specific guidelines difficult.

This review clearly highlights a dearth of quality intervention research with parents of preschoolers that attempts to address and promote specific parenting practices and skills that may optimise healthy diets in young children. In particular, intervention design should focus on implementing and evaluating specific parenting practices that may complement nutrition education and empower children to develop and instill healthy eating habits

2.6 Acknowledgements

All authors were involved in the conception of this review. The study data was extracted by J.P. and N.P. J.P. prepared the manuscript and all authors contributed to the editing of the manuscript. J.P. is supported by a PhD scholarship from the University of South Australia. We declare no conflicts of interest.

2.7 Reference

Baughcum, A. E., Burklow, K. A., Deeks, C. M., Powers, S. W., & Whitaker, R. C. (1998). Maternal feeding practices and childhood obesity: a focus group study of low-income mothers. *Archives of Pediatrics & Adolescent Medicine, 152*(10), 1010-1014.

Baumrind, D. (1966). Effects of authoritative parental control on child behavior. [research contrast]. *Child Development, 37*, 887-907.

Bellisle, F. (2004). Effects of diet on behaviour and cognition in children. *British Journal of Nutrition, 92*(2), S227-S232.

Birch, L. L. (1999). Development of food preferences. [review]. *Annual Review of Nutrition, 19*, 41-62.

Birch, L. L., & Davison, K. (2001). Family environmental factors influencing the developing behavioral controls of food intake and childhood overweight. [Review]. *Childhood and Adolescent Obesity, 48*(4), 893-907.

Birch, L. L., Fisher, J. O., Grimm-Thomas, K., Markey, C. N., Sawyer, R., & Johnson, S. L. (2001). Confirmatory factor analysis of the Child Feeding Questionnaire: a measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. *Appetite, 36*(3), 201-210.

Blaylock, J., Variyam, J. N., & Lin, B. (1999). *Maternal nutrition knowledge and children's diet quality and nutrient intakes* (No. Food Assistance and Nutrition Research Report No. 1).

Booth, M. L., Chey, T., Wake, M., Norton, K., Hesketh, K., Dollman, J., et al. (2003). Change in the prevalence of overweight and obesity among young Australians, 1969–1997. *American Journal of Clinical Nutrition, 77*, 29-36.

Booth, M. L., Dobbins, T., Okely, A. D., Denney-Wilson, E., & Hardy, L. L. (2007). Trends in the prevalence of overweight and obesity among young Australians, 1985, 1997, and 2004. *Obesity, 15*(5), 1089-1095.

Boshoff, K., Dollman, J., & Magarey, A. (2007). An investigation into the protective factors for overweight among low socio-economic status children. [Research Methods]. *Health Promotion Journal of Australia, 18*(2), 135-142.

Campbell, K., Crawford, D., Abbott, G., McNaughton, S., & Ball, K. (2010). Home food availability mediates association between maternal nutritiion knowledge and children's food intakes. [Abstract]. *Australasian Medical Journal, 1*(1), 106.

Carnell, S., & Wardle, J. (2007). Associations between multiple measures of parental feeding and children/'s adiposity in United Kingdom preschoolers. *Obesity, 15*(1), 137-144.

Condrasky, M., Graham, K., & Kamp, J. (2006). Cooking with a chef: an innovative program to improve mealtime practices and eating behaviors of caregivers of preschool children. *Journal of Nutrition Education and Behavior, 38*(5), 324-325.

Contento, I. R., Basch, C., Shea, S., Gutin, B., Zybert, P., Michela, J. L., e& Rips, J. (1993). Relationship of mothers' food choice criteria to food intake of preschool children: identification of family subgroups. *Health Education and Behavior, 20*(2), 243-259.

Corsini, N., Danthiir, V., Kettler, L., & Wilson, C. (2008). Factor structure and psychometric properties of the Child Feeding Questionnaire in Australian preschool children. *Appetite, 51*(3), 474-481.

Cottrell, L., Spangler-Murphy, E., Minor, V., Downes, A., Nicholson, P., & Neal, W. (2005). A kindergarten cardiovascular risk surveillance study: CARDIAC-Kinder. *American Journal of Health Behavior, 26*(6), 595-606.

Edmunds, L., Walters, E., & Elliott, E. (2001). Evidence based management of childhood obesity. [clinical review]. *BMJ, 323*, 916-919.

Faith, M., Scanlon, K., Birch, L., Francis, L., & Sherry, B. (2004). Parent-child feeding strategies and their relationships to child eating and weight status. [Review]. *Obesity Research, 12*(11), 1711-1722.

Fisher, J. O., Mitchell, D. C., Wright, H. S., & Birch, L. L. (2002). Parental influences on young girls' fruit and vegetable, micronutrient, and fat intakes. *Journal of the American Dietetic Association, 102*(1), 58-64.

Fisher, J. O., & Birch, L. L. (1999). Restricting access to a palatable food affects children's behavioural response, food selection and intake. *American Journal of Clinical Nutrition, 69,* 1264 - 1272.

Fisher, J. O., & Birch, L. L. (1999). Restricting access to foods and children's eating. *Appetite, 32*(3), 405-419.

Fisher, J. O., & Birch, L. L. (2000). Parents' restrictive feeding practices are associated with young girls' negative self-evaluation of eating. *Journal of the American Dietetic Association, 100*(11), 1341-1346.

Fisher, J. O., & Birch, L. L. (2002). Eating in the absence of hunger and overweight in girls from 5 to 7 y of age. *American Journal of Clinical Nutrtion, 76*, 226 - 231.

Fitzgibbon, M. L., Stolley, M. R., Schiffer, L., Van Horn, L., KauferChristoffel, K., & Dyer, A. (2005). Two-year follow-up results for Hip-Hop to Health Jr: a randomized controlled trial for overweight prevention in preschool minority children. *Journal of Pediatrics, 146*(5), 618-625.

Fitzgibbon, M. L., Stolley, M. R., Schiffer, L., Van Horn, L., KauferChristoffel, K., & Dyer, A. (2006). Hip-Hop to Health Jr. for Latino preschool children. *Obesity, 14*(9), 1616-1625.

Fomon, S. (1993). *Nutrition of normal infants*. Missouri: Mosby-Year Book Incorporated.

Francis, L. A., Hofer, S. M., & Birch, L. L. (2001). Predictors of maternal child-feeding style: maternal and child characteristics. *Appetite, 37*(3), 231-243.

Gibson, E., Wardle, J., & Watts, C. (1998). Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. *Appetite, 31*, 205-228.

Golan, M., Kaufman, V., & Shahar, D. (2006). Childhood obesity treatment: targeting parents exclusively v. parents and children. [Intervention]. *British Journal of Nutrition, 95*, 1008-1015.

Haire-Joshu, D., Elliott, M. B., Caito, N. M., Hessler, K., Nanney, M. S., Hale, N., Brownson, R.C. (2008). High 5 for kids: the impact of a home visiting program on fruit and vegetable intake of parents and their preschool children. *Preventive Medicine, 47*(1), 77-82.

Harvey-Berino, J., & Rourke, J. (2003). Obesity prevention in preschool native-American children: a pilot study using home visiting. *Obesity Research, 11*(5), 606-611.

Harvey, H., & Coleman, G. (2008). Raising healthy eaters: a parenting and nutrition curriculum. *Journal of Nutrition Education & Behavior, 40*(1), 52-53.

Hearn, M. D., Baranowski, T., Baranowski, J., Doyle, C., Smith, M., Lin, L. S., & Resnicow, K.A. (1998). Environmental influences on dietary behavior among children: availability and accessibility of fruits and vegetables enable consumption. *Journal of Health Education, 29*(1), 26-32.

Hesketh, K., Waters, E., Green, J., Salmon, L., & Williams, J. (2005). Healthy eating, activity and obesity prevention: a qualitative study of parent and child perceptions in Australia. *Health Promototion International, 20*(1), 19-26.

Hesketh, K. D., & Campbell, K. J. (2010). Interventions to prevent obesity in 0-5 year olds: an updated systematic review of the literature. *Obesity, 18*(n1s), S27-S35.

Horodynski, M. A., Hoerr, S., & Coleman, G. (2004). Nutrition education aimed at toddlers: a pilot program for rural, low-income families. *Family & Community Health, 27*(2), 103-113.

Horodynski, M. A., & Stommel, M. (2005). Nutrition education aimed at toddlers: an intervention study. [Intervention]. *Pediatric Nursing, 31*(5), 367-372.

Hubbs-Tait, L., Kennedy, T. S., Page, M. C., Topham, G. L., & Harrist, A. W. (2008). Parental feeding practices predict authoritative, authoritarian, and permissive parenting styles. *Journal of the American Dietetic Association, 108*(7), 1154-1161.

Hughes, S., Power, T., Fisher, J., Mueller, s., & Nicklas, T. (2005). Revisiting a neglected construct: parenting styles in a child-feeding context. [Research Report]. *Appetite, 44*, 83-92.

Johnson, S. L. (2000). Improving preschoolers' self-regulation of energy intake. *Pediatrics, 106*(6), 1429-1435.

Korwanich, K., Sheiham, A., Srisuphan, W., & Srisilapanan, P. (2008). Promoting healthy eating in nursery schoolchildren: a quasi-experimental intervention study. *Health Education Journal, 67*(1), 16-30.

Kremers, S., Brug, J., de Vries, H., & Engels, R. (2003). Parenting style and adolescent fruit consumption. [Research Report]. *Appetite, 41*, 43-50.

Lee, E. J., Murry, V. M., Brody, G., & Parker, V. (2002). Maternal resources, parenting, and dietary patterns among rural African American children in single-parent families. *Public Health Nursing, 19*(2), 104-111.

Lee, Y., Mitchell, D. C., Smiciklas-Wright, H., & Birch, L. L. (2001). Diet quality, nutrient intake, weight status, and feeding environments of girls meeting or exceeding recommendations for total dietary fat of the American Academy of Pediatrics. *Pediatrics, 107*(6), e95-.

Maccoby, E., & Martin, J. (1983). Socialization in the context of the family: parent-child interaction. In P. Mussen (Ed.), *Handbook of child psychology* (Vol. 4, pp. 1-102). New York: John Wiley & Sons.

McGarvey, E., Keller, A., Forrester, M., Williams, E., Seward, D., & Suttle, D. E. (2004). Feasibility and benefits of a parent-focused preschool child obesity intervention. *American Journal of Public Health, 94*(9), 1490-1495.

Moens, E., Braet, C., & Soetens, B. (2007). Observation of family functioning at mealtime: a comparison between families of children with and without overweight. [Research]. *Journal of Pediatric Psychology, 32*(1), 52-63.

Musher-Eizenman, D., & Holub, S. (2006). Children's eating in the absence of hunger: the role of restrictive feeding practices. In R. Flamenbaum (Ed.), *Childhood Obesity and Health Research* (pp. 135-156). New York: Nova Science Publishers.

Newman, J., & Taylor, A. (1992). Effect of a means-end contingency on young children's food preferences. *Journal of Experimental Child Psychology, 53*, 200 - 216.

Ogden, J., Reynolds, R., & Smith, A. (2006). Expanding the concept of parental control: a role for overt and covert control in children's snacking behaviour? *Appetite, 47*(1), 100-106.

Olds, T. S., Tomkinson, G. R., Ferrar, K. E., & Maher, C. A. (2009). Trends in the prevalence of childhood overweight and obesity in Australia between 1985 and 2008. *Intnational Journal of Obesity, 34*(1), 57-66.

Peters, J., Parletta, N., Campbell, K., & Lynch, J. (in press). Parental influences on the diets of 2-5 year old children: systematic review of qualitative research. *Journal of Early Childhood Reasearch*.

Pink, B. (2008). *Year Book Australia*. Retrieved from http://www.abs.gov.au/AUSSTATS/abs@.nsf/7d12b0f6763c78caca257061001cc588/2710da48a1baf1a9ca2573d200107562!OpenDocument.

Sacher, P. M., Wolman, J., Chadwick, P., & Swain, C. (2008). Mini-MEND: MEND's early years healthy lifestyle programme for 2–4 year olds and their families. *Nutrition Bulletin, 33*(4), 364-367.

Sangster, J., Eccleston, P., & Stickney, B. (2003). Improving what's in the lunchbox in child care centres. *Health Promotion Journal of Australia, 14*(3), 171-174.

Schwartz, R. P., Hamre, R., Dietz, W. H., Wasserman, R. C., Slora, E. J., Myers, E. F., & Resnicow, K.A. (2007). Office-based motivational interviewing to prevent childhood obesity: a feasibility study. *Archivies of Pediatric & Adolescent Medicine, 161*(5), 495-501.

Skinner, J., Carruth, B., Bounds, W., & Ziegler, P. (2002). Children's food preferences: a longitudinal analysis. *Journal of American Dietetic Association, 102*(11), 1638-1647.

Skinner, J., Ziegler, P., Pac, S., & Devaney, B. (2004). Meal and snack patterns of infants and toddlers. *Journal of American Dietetic Association, 104*(1), S65-S70.

Spruijt-Metz, D., Lindquist, C. H., Birch, L. L., Fisher, J. O., & Goran, M. I. (2002). Relation between mothers' child-feeding practices and children's adiposity. *American Journal of Clinical Nutrtion, 75*(3), 581-586.

Sud, S., Tamayo, N. C., Faith, M. S., & Keller, K. L. (2010). Increased restrictive feeding practices are associated with reduced energy density in 4-6-year-old, multi-ethnic children at ad libitum laboratory test-meals. *Appetite, 55*(2), 201-207.

Thomas, H. (2004). *Quality assessment tool for quantitative studies: Effective Public Health Practice Project.*

Ventura, A., & Birch, L. (2008). Does parenting affect children's eating and weight status? [Review]. *International Journal of Behavioral Nutrition and Physical Activity, tba*(tba), tba.

Wardle, J., Cooke, L. J., Gibson, L., Sapochnik, M., Sheiham, A., & Lawson, M. (2003). Increasing children's acceptance of vegetables: a randomized trial of parent-led exposure. *Appetite, 40*(2), 155-162.

Williams, C. L., Strobino, B. A., Bollella, M., & Brotanek, J. (2004). Cardiovascular risk reduction in preschool children: the "Healthy Start" project. *Journal of the American College of Nutrition, 23*(2), 117-123.

Worobey, J., Pisuk, J., & Decker, K. (2004). Diet and behavior in at-risk children: evaluation of an early intervention program. *Public Health Nursing, 21*(2), 122-127.

CHAPTER 3
PARENTAL INFLUENCES ON THE DIETS OF 2–5 YEAR OLD CHILDREN: SYSTEMATIC REVIEW OF QUALITATIVE RESEARCH

This chapter is a co-authored publication. Please refer to Appendix E for a statement of author contributions and Appendix F for the data extraction tool specifically developed for this review.

Peters J, Parletta N, Campbell K, Lynch J. Parental influences on the diets of 2-5 year old children: Systematic review of qualitative research (in press). Journal of Early Childhood Research.

This manuscript provides a review of published qualitative research involving parents of 2–5 year old children, discussing the influence of parent feeding practices, parent nutrition knowledge, child diet and food intake or body mass index (BMI) from 1st January 1996 to 10th September 2009.

J. Peters and N. Parletta devised the idea for this manuscript. J. Peters prepared and edited the manuscript. N. Parletta, K. Campbell and J. Lynch edited the manuscript.

3.1 Abstract

Parents have a major influence on young children's diets, food choices and habit formation. However, research concerning parental influence on children's diets is limited. Qualitative research informs quantitative research with a narrative of 'what works', and is a valuable tool to inform intervention design and practice. This paper presents a systematic review of qualitative research with parents of pre-school children and their influence on their child's diet. Nine studies were identified. Findings highlight the need to promote culturally specific programs, address common barriers to providing healthy foods, use of food to shape behaviour and misconceptions that a heavier child is healthier, children will grow out of excess weight and depriving a child's food request could result in starvation. Research on parental understanding of healthy diets and feeding practices is lacking. Further insights into how to positively influence children's diets will come from research examining parent feeding practices and nutrition knowledge.

Keywords: children, parents, diet, nutrition, prevention

3.2 Introduction

In Australia, the 2004-05 National Health Survey classified over half (53 per cent) of people aged 15 years or older as overweight or obese (Pink, 2008). Although recent reports indicate that overweight and obesity has plateaued in Australia in recent times, 21-25 per cent of children aged 2-18 years were recorded as overweight or obese in 2008 (Olds et al., 2009) and increased risk in the 2 – 5 year old Australian populations compared internationally (Magarey and Daniels, 2001; Magarey et al., 2001).

A healthy diet is best developed and encouraged at a very young age as it is well understood that existing dietary practices are more difficult to change, particularly once they have become habitualised (Jager, 2003). The first five years of a child's life are considered formative years when parents are primary educators and role models in the family environment and therefore have a major influence on their child's diet (Fisher et al., 2002). Theoretically, in order for parents to encourage their children to make healthy food choices, they need to be well informed about both the positive and negative outcomes of healthy versus unhealthy food choices and dietary habits (Scaglioni, Salvioni, & Galimberti, 2008). Parents also need the skills to create an optimal environment for children to develop healthy eating habits.

Style of parenting, parental feeding practices and parent nutrition knowledge are among a list of factors identified as having an influence on child dietary behaviours and food preferences. As defined and discussed in the introductory chapter, parenting styles are a typology of attitudes and behaviours in relation to parent-child interactions considered the

emotional climate in which parents raise and socialise their child/ren in a normal parenting situation. These styles are considered to remain consistent across all domains of parenting (Darling & Steinberg, 1993). Parenting practices are considered the application of parenting styles in response to specific child behaviours and are generally goal directed and therefore can change over time and between domains (Ventura & Birch 2008; Hughes, et al., 2005; Darling & Steinberg, 1993) Accordingly, a growing number of researchers are recognising the importance of early intervention and the role of effective parent feeding practices in promoting healthy diets (Birch, 2006). The years prior to school admission could be an optimal time for parents to intervene with the promotion and formation of healthy habits. For this review we have focused on children who are 2-5 years old and starting to learn to make their own decisions and choices while still under the primary influence of parental guidance and family environment.

3.2.1 Parent feeding practices

There is some quantitative evidence indicating that infants and toddlers have an innate ability to self-regulate energy intake (Johnson, 2000), and this has been identified in babies as early as six weeks old (Fomon, 1993). Similarly to breast-feeding on demand, infants and toddlers need to eat small amounts of food more frequently (Skinner et al., 2004). Children at age three have been reported to stop eating when they were satiated despite food availability, whereas the older children at five years reportedly consumed more if it was available, regardless of hunger (Birch and Davison, 2001). Qualitative research posits that this decline in self-regulation of food intake with age not only influences

subsequent intake, but may also be a reflection of parents using food to shape their child's behaviour (Baughcum et al., 1998), such as reinforcing appropriate behaviours with 'treat' foods or calming/placating young children with foods under the misguided perception that the child is unsettled because he/she is hungry. These practices could influence the child's intake via their parent's misguided attitudes towards food; and child feeding practices that are implemented and habitualised early may track later in life (Magarey, Daniels, Boulton, & Cockington, 2003)

Much of the research on parent feeding practices and children's diet has focused on restrictive feeding practices. Practices that display higher levels of control tend to be associated with an authoritarian style of parenting (Hughes et al., 2005). The authoritarian parent controls the choice whereas the authoritative parent sets boundaries around the choices, while allowing the child the autonomy to make the final decision. The authoritarian practice removes choice and consequently the responsibility from the child to learn to monitor their energy intake and/or their ability to respond to internal cues (Birch, 1999, Fisher and Birch, 2002). Responding to environmental triggers is an eating habit that could then persist into their adult years and contribute towards overeating and potentially overweight (Carnell and Wardle, 2007, Faith et al., 2004a, Fisher and Birch, 2002, Moens et al., 2007, Musher-Eizenman and Holub, 2006).

Research suggests that tactics used to limit a child's consumption of undesirable (unhealthy) food items can be counterproductive (Faith et al., 2004b). Food used as contingency for reward may predict a decreased preference for that food, whereas restricted; reward foods may become more attractive (Birch et al., 1984). Therefore,

instrumental or contingency feeding may have negative results, which is particularly relevant if the contingency food is a healthy food item exchanged for an energy dense unhealthy option (e.g. 'eat your vegetables and then you can have dessert'; (Newman and Taylor, 1992). However, research in this area has not consistently associated restriction with excess consumption or weight (Campbell et al., 2006, Carnell and Wardle, 2007, Haycraft and Blissett, 2008, Powers et al., 2006).

More recent research considers differing types of parental restriction and control such as 'overt' and 'covert' control. 'Overt' control describes when a child is aware of the restriction and the food is available in the home, whereas 'covert' control pertains to when the child is not aware of the restriction and the food is not available in the home. 'Overt' control has been shown to predict increased intake of healthy snacks whereas 'covert' control appeared to predict decreased intake of unhealthy snacks (Ogden et al., 2006).

Restriction for weight control or for health reasons are two differing types of restriction that could also contribute to the nature of parent feeding practices and child diet (Musher-Eizenman and Holub, 2007). Restriction for weight appears to predict externally motivated eating, for example, eating in the absence of hunger (consumption of palatable foods consumed due to availability and not hunger, usually measured post meal times) during unrestricted times, whereas restriction for health reasons does not appear to predict these behaviours (Musher-Eizenman and Holub, 2006). This has been seen longitudinally with children aged 5-6 years and older children aged 10-12 years (Campbell et al., 2010a).

A recent review of interventions looking at parental influences on child diet identified five studies that attempted to include parent feeding practices. Despite only one

of the studies reporting specific intervention content, there appeared to be positive results in child diet when parents were informed of appropriate feeding practices (Peters et al.,). However, research in this area of health promotion and removing unhealthy options from the younger child's environment is limited.

3.2.2 Parent knowledge of diet and nutrition

In addition to parenting and feeding practices increased nutrition knowledge in mothers has been associated with healthier diets (lower in fat and higher in fresh fruits and vegetables (Gibson et al., 1998). These positive associations may be mediated by home food availability (Campbell et al., 2010b). Home fruit and vegetable availability at two and four years of age is reported to predict food preference at eight years of age suggesting that early exposures to food may mould later food preferences (Skinner et al., 2002). This further supports the claim that 'the more a mother knows about health and nutrition the better is the overall quality of her child's diet, for pre-schoolers more so than older children' (Blaylock et al., 1999). Therefore, promoting this to parents of young children could be pivotal to the child's future health and the prevention of overweight.

3.2.3 Informing Research

Quantitative research is designed to generate an evidence-based statistical account of intervention effectiveness and significant associations of relevance. However, quantitative research does not consistently identify specific elements of parenting programs or nutrition information provided in interventions. Therefore, interpretation of specific

components that may encourage behaviour change is difficult. In fact, our recent review identified only one study with a feeding practice component that detailed individual intervention sessions whereas the other four studies included in the review provided a broad concept only (Peters et al.,). However, there appeared to be positive results in child diet when parents were informed of appropriate feeding practices. Therefore, qualitative research can inform intervention design with a narrative regarding the content and delivery of what does and/or doesn't work. Therefore, due to the complexity and flexibility of qualitative analysis this textual research is a valuable tool to inform intervention development by way of focus group discussion, one-on-one interviews and observations. Examples of this include evaluation and understanding of food safety policies and general nutrition knowledge (Sangster et al., 2003); apprising of concepts, opinions and consensus in relation to child diet and behaviour in order to further inform policy and intervention development (Kaiser et al., 2001, Korwanich et al., 2008); understanding of language used for different cultural groups (Hughes et al., 2005, Hughes et al., 2006); and post intervention research to discuss perceived relevance and content evaluation (Condrasky et al., 2006, Haire-Joshu et al., 2008, Horodynski et al., 2004, McGarvey et al., 2004, Schwartz et al., 2007, Wardle et al., 2003). This process enables the identification of discrepancies and misunderstandings which can then be rectified to produce a refined, more easily understood culturally relevant and appropriate program (Hughes et al., 2006, Kasemsup and Reicks, 2006).

The purpose of this paper is to systematically review qualitative research concerned with parenting practices, parent's nutrition knowledge and child diet. Common themes about these practices will be identified.

3.3 Methodology

This review specifically targeted qualitative research conducted with parents of children aged 2-5 years discussing parental feeding practices, parent knowledge of nutrition and/or child diet, child food intake and body mass index (BMI). Qualitative research that mainly involved the 2 -5 year age range but started at 12 months or concluded at up to and including 7 years of age was not excluded.

3.3.1 Search strategies

At the first stage MEDLINE, PsycINFO, EMBASE, CINAHL and CENTRAL databases were systematically searched to identify published research from 1996 to 10 September 2009 using various combinations of the keywords displayed in Table 3.1.

Table 3.1 *Concept table of keyword search terms*

	Child Diet	Parenting	Nutrition	Research
1	Diet	Parent*	Parent	RCT
2	Healthy	Style*	Nutrition	Random*
3	Core food*	Skill*	Maternal	Contol*
4	Beverage	Attitude*	Knowledge	Trial*
5	Vegetable	Practice*	Educat*	Interven*
6	Fruit	Authorita*	Promot*	Cross-section*
7	Consumption	Control*		Observation*
8	Intake	Restrict*		Quasi
9	Child*	Reward*		Associat*
10	Preschool*	Permissive		Follow-up
11	Pre-school*	Neglect*		Prevent*
12	Pediatric*	Indulg*		Evaluat*
13	Paediatric*	Food specific		Compar*
14	Feed*	Diet specific		
15	Eat*	Feeding		
16	Youth	Knowledge		
17	Weight*	Educat*		
18	Overweight			
19	Obes*			
20	BMI			
21	Skin fold			

Refined searches resulted in a total number of 663 references as listed in Table 3.2.

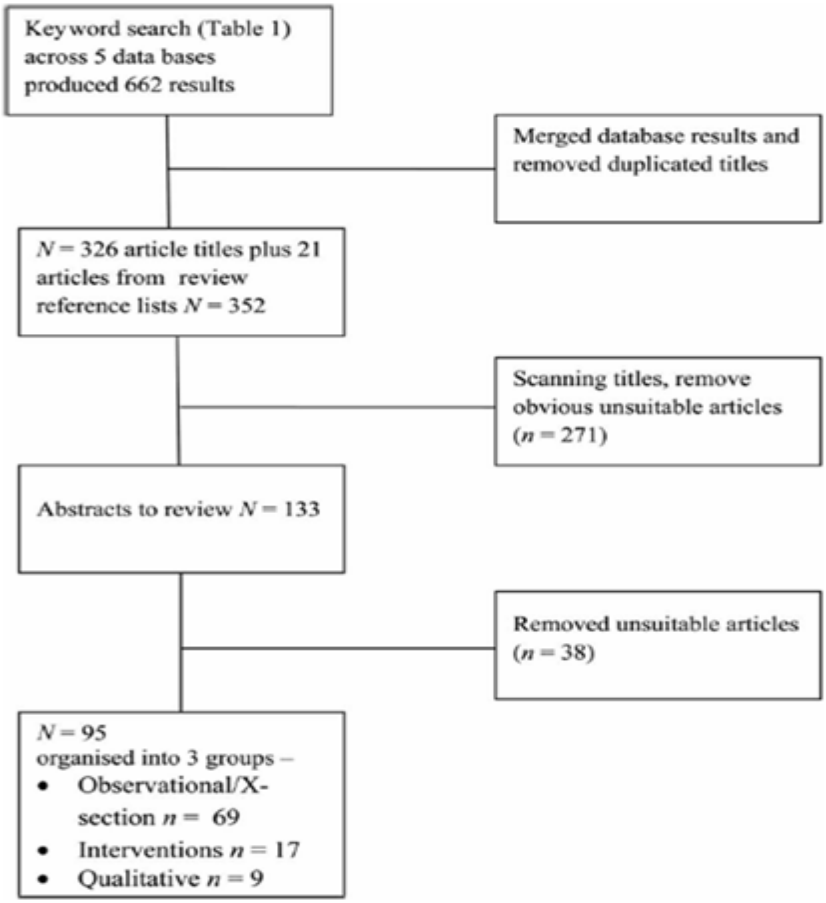
Table 3.2 *Number of search hits for each database*

	Cochrane (few limits Available)	CINAHL (with limits)	PSYCHinfo (with limits)	EMBASE (with limits)	MEDLINE (with limits)	*Totals*
PARENTING	141	26	56	26	73	***322***
GNK	130	22	46	36	107	***341***
	271	***48***	***102***	***62***	***180***	***663***

[1] Parenting – studies involving a parenting component in relation to child diet and/or BMI; GNK – studies involving parent information, understanding or knowledge of nutrition.

Specific search criteria produced a total of 352 articles. Exclusion criteria eliminated articles focusing on malnutrition, eating disorders, and primary school based recruitment. Further scanning reduced the total to 133 abstracts for review. JP & NP reviewed abstracts and resolved discrepancies, resulting in a total of 95 articles which were organized into three groups: 1) intervention research (n = 17; Peters et al., under review); 2) qualitative research (*n* = 9); and 3) observational research (*n* = 69). The purpose of this paper was to review the nine qualitative articles (Figure 3.1).

Figure 3.1 *Flow chart of literature search and article selection*



No quality assessments of these qualitative studies were conducted because 'precisely how 'weak' qualitative findings should be attenuated or excluded in any synthesis is not yet clear' (Dixon-Woods et al., 2006). Consequently no further articles were omitted from the list and the final review was based on the nine identified qualitative articles. An extraction tool was developed to systematically obtain research specifics and identify methods used for each project. Extracted information is compiled in a quick reference table (Table 3.3).

Table 3.3 *Summary of qualitative studies*

Author	[1] sample details			Set	CM	[2] Research Focus				[3] Design	[4] $	[5] C-Age	[6] P-Age	[7] SES
	N=	#G	min			PS	GNK	BMI	Diet					
Pre-school/childcare settings														
Haerens et al., 2009	155c 189p	20c 36p	120	I	A	✔			✔	FG	NR	2-4 yrs & 6-8 yrs	*m* = 36	L M H
Horodynski et al., 2009	27	2	90	EHS	A & SN	✔	✔		✔	SS FG	$25	1-3 yrs	19-50yrs (*m* = 30)	L
Mc Garvey et al., 2006	25	4	NR	WIC	A	✔	✔		✔	FG	$30	NR -	NR	L
Crawford et al., 2004	43	8	120	WIC	A	✔			✔	SS FG	$25orGC	2-5yrs	18-54yrs (*m* = 32)	L
Sherry et al., 2004	101	12	90	WIC	A	✔	✔		✔	FG	$35	2-5yrs	20-35 yrs	L M
Jain et al., 2001	18	3	60	WIC	A	✔		✔	✔	FG	$50	2-5yrs	17-38yrs (*m* = 25)	L

Community settings														
Adams et al., 2008	42	3 sites	60-90	WP	A & SN	✔	✔		✔	FG PO	Food cash	5 - 8 yrs	3/4's u/30yrs	L
Pediatric practice														
Bolling et al., 2009	23p 21c	4	90	pp	AV	✔		✔	✔	FG	$20 GC	3.2 - 6 yrs (*m* = 4.6)	28.6 -45.1 (*m* = 37.1)	M
Mixed settings														
Baughcum et al., 1998	14m 15d	4	NR	WIC	AV	✔		✔	✔	FG	$10	1-3 yrs	NR	L

[1] **Sample details:** N= number of participants; c = children; p = parents; m = mother; d = pediatricians; #G = number of groups; Min = durations of each session in minutes; NR = not reported or unclear; Set = Set = setting where participants were obtained; pp = pediatric practice; I = IDEFICS; WIC = Women, Children and infant centres; WP = Wings Project; CM = collection method; A = audio recording only; AV = audio & video recordings; SN = supplementary notes;
[2] **Research Focus:** PS = style of parenting or feeding practices; GNK = nutrition knowledge or diet discussed; BMI = body mass index and/or weight of child discussed; Diet = child diet and/or eating habits discussed;
[3] **Design**: FG = focus groups; SS = semi structured; PO = preliminary observations;
[4] $= incentive provided to participate; GC = gift certificate;
[5] C-Age = age of children;
[6] P-Age = age of parent; *m* = mean;
[7] SES = socio-economic status obtained; H= high; M= middle; L = low

3.4 Results

Search criteria targeted qualitative research conducted with parents of children aged 2-5 years; however results produced some studies that extended this range to include children from 12 months to 8 years. The nine included studies examined a variety of settings: childcare/pre-school (*n* = 6); community (*n* = 1); paediatric practice (*n* = 1) and a mixed setting (*n* = 1). The pre-school/childcare setting consistently appears to be the most commonly targeted setting for data collection (Hesketh & Campbell, 2010; Peters et al., 2011). Although some of the interventions included other components, such as physical activity or parent's weight, only information relevant to this review will be summarised. Group and project details, and discussion content, varied substantially (see Appendix 1). All summaries appear below, grouped by setting.

3.4.1 Pre-school/childcare setting

Haerens et al., 2009

'Identification and Prevention of Dietary-and Lifestyle-induced Health Effects in Children and Infants" (IDEFICS) is a standardised healthy eating community intervention aimed to increase the likelihood of behaviour change. To inform the development of this program focus group research was conducted across eight different European countries and touted to be 'the first international study' of this calibre. Involving three groups: 1) children aged 6-8 years (*n* = 155); 2) parents of children aged 2-4 years (*n* = 106); and 3) parents of children aged 6-8 years (*n* = 83), each location received a protocol manual outlining

requirements and methodology to ensure standardization. Results relevant to this review included a recognized difficulty for young children to prepare fruit provided for snacks when they are outside of the home environment (e.g., school, pre-school) and parental concern that the child could be stigmatized for being the only one with healthy snacks.

Parents generally had a positive attitude about the food policies and the ability of kindergartens to facilitate healthy eating habits in their children. However, they commonly identified barriers of healthy feeding practices as time constraints with healthy food taking longer to prepare; children's unhealthy food preferences; high cost of fresh healthy food products; high availability of unhealthy foods in the home; and difficulty reading food labels. Facilitators of healthy eating habits were identified as parents actively modelling healthy eating behaviours; offering healthy snacks that appeal to children; availability of healthy foods; and not having unhealthy foods in the home environment. Low socioeconomic status (SES) groups were less likely to restrict unhealthy foods, and mid to high SES groups were influenced by quality rather than quantity. This research suggests that intervention strategies need to recognise that priorities and influences are likely to differ between SES groups and should aim to promote environments in which 'healthy eating behaviours are the easiest choice' (Haerens et al., 2009).

Horodynski et al., 2009

This research evaluated the maternal feeding practices of 27 African-American low-income mothers of toddlers aged 12-36 months recruited from two Early Head Start centres in the United States. The first of four main themes to emerge was in relation to maternal perception of a healthy child, which included eating well and being active and happy. The

second theme pertained to child food choices and revealed limitations in offering fruits and vegetables due to perceived child preference. Thirdly, expectation of the child's autonomy and self-regulation led some parents to use encouragement to eat. The last theme involved mealtime context and interaction, which included mealtime duration, location and the role of family socialisation at meals. Concerns included maternal fear that children who were picky eaters were at risk of malnutrition and appeared to prompt authoritarian style practices such as force-feeding. One mother explained her deliberation between buying a smaller quantity of healthy fresh food or purchasing a larger quantity of energy dense, unhealthy food for the same cost which she believed was better value for money and more likely to satiate her child. This research identified the important challenges faced by lower income families such as cost, convenience and quality verses quantity in food choices (Horodynski et al., 2009).

McGarvey et al., 2006

To identify cross-cultural differences and further inform a childhood obesity intervention, 25 mothers were allocated to one of four focus groups. There was one focus group per ethnic group, and each was conducted in the native language of the participants: white (n = 8); African-American (n = 6); Hispanic (n = 6); and Vietnamese (n = 5). No child age range could be ascertained from the report, although all children attending the Women, Infant and Children (WIC) centres are 5 years or younger. However, this research does refer to 'older' children as well. Group discussions targeted prevention strategies, specifically with parent perceptions, attitudes, knowledge, beliefs and barriers in reference to child feeding practices and behaviour (including physical activity). In relation to

influences on child feeding practices and dietary intake, comments were made in both the African-American and white groups that their own mother's knowledge would be out-dated whereas the Vietnamese group considered it a traditional influence dating back thousands of years. Apart from the Vietnamese group who trusted a child's claim to have eaten enough, all other groups expressed a broad range of views in relation to children's inability to determine if she/he has eaten enough and admitted to incidences of overriding child display of satiation.

White and Hispanic women were concerned about overweight once a child started school due to stigmatization and health issues; however African American and Vietnamese women were more concerned with underweight. A common perception was that if a child experienced overweight at 3 or 4 years of age, they would outgrow it. All groups reported using food to shape behaviour (as a contingency and/or reward), and many parents believed child feeding problems to mostly originate outside of the home environment (e.g., child care, pre-school, grandparents) (McGarvey et al., 2006). Despite no perceived connection between pre-schooler obesity and adverse health, the key information gathered from this research was used in the development of Fit WIC, a pre-school child obesity prevention program.

Crawford et al., 2004

Accessing five WIC sites across California, semi-structured focus groups were used to further inform and update nutrition education methods by evaluating the attitudes and beliefs of 43 Latino mothers towards their 2-5 year old child's diets. All participants attended a two hour session wherein fifteen main themes emerged across four domains.

The first domain pertained to parent health beliefs in relation to child weight. Heavier children were perceived to be healthier whereas thinner children were perceived as unhealthy. Parents did not believe that 'extra weight' on children was unhealthy if the child felt good about themselves and appeared happy in the family environment. The second domain reflected beliefs about the causes and effects of childhood overweight. These mothers predominantly believed that childhood overweight was a result of genetics or a condition their child would outgrow. However, they also recognised that being overweight caused children to be inactive and lethargic provoking negative stigmatization from their peers. The third domain included themes regarding the impact of life values and concerns. These included how money, time constraints and convenience foods threaten cultural beliefs and compromise a parent's capacity to offer nutritious food to their children. Finally, the fourth domain spoke to strategies that parents used to instigate changes to children's dietary (and physical activity) behaviours. Parents strongly believed modelling to be a key strategy in child behaviour change. There was also a preference for facilitated group discussion to inform mothers of necessary nutrition information and provide a setting where they could share ideas and experiences with each other, rather than continue with traditional teaching methods (Crawford et al., 2004). This research project highlighted the need for consideration of cultural differences and beliefs in prevention program design as well as focusing on a positive message of healthy eating rather than weight loss.

Jain et al., 2001

Three focus groups of six mother/child pairs who were predominantly overweight or obese were recruited mainly from WIC centres. The project assessed maternal perceptions

in determining weight and overweight, why children become overweight, and barriers to preventing or managing overweight. Results indicated that the mothers did not accept the health professional classification of overweight in children and generally believed that the height and weight charts were not relevant for their child. Parents only considered weight to be a concern if they were purchasing clothing too frequently, if the excess weight impaired the child's ability to be physically active or if weight was a point of stigmatization/teasing from peers. Low self-esteem and physical inactivity appeared to be the two most critical points considered by these mothers. However, some believed that excess weight caused inactivity, and not vice versa.

Although some mothers accepted that parental role modelling could influence a child's behaviour, most believed their child's weight to be biologically predetermined or that the child would grow into their weight. In relation to weight management, difficulty in limiting food was expressed. Mothers derived pleasure and emotional reward in nourishing their child and believed denying a perpetually hungry child of food was tantamount to starving the child. It was also revealed that due to their own childhood weight history, mothers were more inclined to protect the child's mental health and promote buffers against being teased rather than address their physical health by preventing or treating a weight condition (Jain et al., 2001). This research identified that although neither health professionals nor mothers agreed on the definition of overweight, they did agree that children should have healthy diets, and thus that promoting health should be the focus of future research rather than labelling weight status.

Sherry et al., 2004

Twelve diverse groups of mothers with children aged between 2 and 5 years were recruited to examine the impact of SES and culture on attitudes, concerns, and practices with child feeding, and perception of child weight. Nine groups were of low SES, three of which were white-American (n = 22); three African-American (n = 24); and three Hispanic (n = 27). The remaining three groups were white-American middle income earners (n = 28). Six key themes were identified: 1) Goals and beliefs, which encompassed what constituted good nutrition, included encouraging children to eat more nutritious food, less sweet processed and high-fat foods, plus increasing availability of healthy foods while decreasing availability of unhealthy foods; 2) Determinants of food availability, encompassing cost, was key in 6/9 low SES and all the middle SES groups, whereas Hispanic groups were concerned that 'what the child needed' was nutritious, preferable and convenient; 3) Mealtime environment and promoting consumption in young children, which encompassed food preparation, mealtime structure, conflicts regarding food, food preferences, and portion size; 4) Strategies to persuade children to eat, which encompassed preparing preferred foods, actively encouraging eating, use of food bribes and rewards for eating, and using desirable foods and beverages as rewards; 5) Reactions to child claims of satiation with mothers' interpretation of a child's expressions of fullness revealing little confidence in a child's innate capacity to regulate food intake with most mothers interpreting 'fullness' as boredom. Consequently, mothers actively encouraged or pressured their child to eat; 6) The last category was in relation to concerns and beliefs about child weight with most groups expressing a belief that underweight was cause for concern, whereas others believed overweight to be an indicator of wellness. The African-American groups all believed the

child would outgrow excess weight, while other groups (3 low SES, 3 mid SES & 1 African-American) believed both genetics and environment determined child weight (Sherry et al., 2004). This research identified the need to verify cultural and income differences in concerns, attitudes and practices in relation to child feeding and perceptions of child weight.

3.4.2 Community based setting

Adams et al., 2008

Three different American-Indian (AI) communities participated in focus group research which aimed to describe parental perspectives regarding child health, diet and physical activity. Participants were parents (n = 42) of 5-8 year old children and were recruited from the Wisconsin Nutrition and Growth Study. Ten to twelve interviews and observations were conducted at each location. Six main themes emerged from the two constructs of 1) Environment, which mainly involved discussions in relation to physical activity, also included family support with time consuming chores such as food preparation and cleaning up; and 2) Health, which pertained to risk and child safety (physical activity oriented), parental views and perceptions of child health and beliefs about parenting. The research highlighted that some parents did not want to control their children or dictate food choices, which was particularly so if the parent had also been controlled as a child. Other parents communicated having no control over their child's diet.

Interestingly, parents wanted their child to eat healthier foods but did not provide the right environment to facilitate this, displaying incongruence between intention and

behaviour. There was also a 'leniency' in parents who appeared to be focused on the immediate outcomes of the 'here and now' of child diet, rather than considering the longer term outcomes. An explanation for this could be that the main priority for families in these communities was survival in the present 'just living for now'. Therefore, this research highlights the influence of the AI culture on parent's values, beliefs and priorities. Information obtained from this research was subsequently used to 'design a family-based healthy lifestyles intervention for families of 2-5 year old AI children' (Adams et al., 2008).

3.4.3 Pediatric practice setting

Bolling et al., 2009

Parents of children aged 2-6 years were recruited from private pediatric practices in suburban, rural and urban areas. Focus groups ranged from three to seven participants per group with duration of approximately 90 minutes, or until responses to themes reached saturation. Specific areas of interest to this review were 1) identifying health risks that motivate parental behaviour change; 2) perceived barriers to modifying dietary behaviour; and 3) general recommendations for pediatricians to help modify the feeding practices of parents with overweight pre-school aged children.

Many of these parents shared the common misconception that fruit juice consumption was the equivalent of whole fruit consumption and were reluctant to restrict it. Therefore, this was identified as the main dietary barrier in providing a healthful diet. Another common barrier to providing a healthful diet was increasing fruit and vegetable consumption to five serves a day. Children reportedly did not like vegetables and 'would go

hungry' rather than eat them. This often resulted in a struggle that contributed toward parent child conflict and child tantrums. Parents also expressed a desire to have pediatricians give advice on appropriate nutrition requirements to both parent and child, with a general consensus that early intervention to address child weight concerns would be advantageous (Bolling et al., 2009).

3.4.3 Mixed setting

Baughcum et al., 1998

With an aim to gain perspectives from both dietitians and lower SES mothers about beliefs and practices associated with childhood obesity, this research consisted of three groups of mothers and one group of nutritional professionals. The professional group (n = 15) consisted of only WIC dietitians, two groups (n = 3 each) consisted of mothers who were recruited from one particular practice, and one group (total n = 8) consisted of all teenage white-American mothers (n = 3) and African-American mothers (n = 5) who were recruited during post natal home visits. A major theme was the perception (misconception) that a heavier infant was healthier and considered to be indicative of successful feeding practices and parenting skills in general. These mothers often attributed their child's overweight condition to family genetics. The second theme related to the concern that the child was not eating enough. A consequence of this concern was the likely introduction of solid foods at very young ages. Mothers reported this as more convenient than preparing separate meals for individual family members, which were also considered to be cost effective when family members all ate the same foods. However, this rationale led to

feeding the child the same ‘table foods’ as the adult and as frequently. Mothers from these groups set few limits on their child’s intake, allowing them to eat what they wanted, when they wanted. Therefore, they believed, despite health professional advice, that depriving a child a requested food item that had already been introduced into their diet was tantamount to ‘starving’ the child. The last theme related to using food as reinforcement or as a coercive tool to shape behaviour or to placate an unsettled child rather than to satiate hunger.

Despite the small sample of mothers in this study, consistent beliefs and practices regarding child feeding practices were found between groups. These themes were confirmed by the perceptions of the Dietitian group in relation to their experience with client concerns. This research identified the common misconception that a bigger child is a healthier child. There was also fear among these mothers of underfeeding their child, resulting in early introduction of solid foods. Additionally, mothers admitted to using food to reward and shape behaviour or placate an unsettled child (Baughcum et al., 1998).

3.5 Discussion

This paper evaluated peer reviewed qualitative literature conducted with parents of children aged 2-5 years discussing parental feeding practices, and/or parent knowledge of nutrition with child diet, and/or BMI, published from 1996 to mid-September 2009. Despite the increased attention obesity prevention and management research has gained over the years, this review identified only nine qualitative studies that met the inclusion criteria. Therefore, it would appear that this area of research demands further attention, particularly

with reference to young children in the areas of parental nutrition knowledge, parent perceptions of child weight and cultural sensitivity in intervention design.

All qualitative reports reviewed in this paper included a focus group component. Apart from one research project that did not report number of sessions (Baughcum et al., 1998) or two that did not report the time frame (Baughcum et al., 1998, McGarvey et al., 2006), focus groups were conducted over one session ranging from 60-120 minutes. Despite group diversity, all groups discussed a parenting component in relation to child diet. However, only four of the groups included a nutrition knowledge component (Adams et al., 2008, Horodynski et al., 2009, McGarvey et al., 2006, Sherry et al., 2004) with just three groups either recording or discussing child BMI and/or weight status (Baughcum et al., 1998, Bolling et al., 2009, Jain et al., 2001). A majority of the research reviewed here focused on low SES groups; one included middle SES groups (Sherry et al., 2004); one included all SES groups (Haerens et al., 2009) with one considering middle SES only (Bolling et al., 2009). Limitations and/or problematic areas of the research were discussed in seven of the nine studies (Baughcum et al., 1998, Crawford et al., 2004). However, all of the research appeared to be clearly conducted with appropriate questions and analysis, which further contributes to an existing body of research.

When evaluating perceived barriers, a common theme expressed among low and middle SES groups regarding the provision of healthy foods to children included the perceived/real barrier that this involved increased cost. Unhealthy food products were perceived as cheaper, tastier and/or more readily available (Baughcum et al., 1998, Haerens et al., 2009, Horodynski et al., 2009, Sherry et al., 2004). Many parents believed that

healthy food was more expensive and less satiating; therefore the more expensive healthy items were not considered to be value for money. Additionally, these items were considered to be more time consuming to prepare whereas the energy dense options were often pre-prepared and convenient (Adams et al., 2008, Bolling et al., 2009, Crawford et al., 2004, Haerens et al., 2009, Horodynski et al., 2009, Sherry et al., 2004). Interestingly, this barrier was mentioned across all SES groups and is in line with previous research looking at perceived environmental determinants of fruit and vegetable consumption (Kamphius et al., 2007).

Another barrier to be identified was cultural differences in attitudes, perceptions and concerns regarding the promotion of a healthy child diet (Adams et al., 2008, Crawford et al., 2004, Horodynski et al., 2009, McGarvey et al., 2006, Sherry et al., 2004). Inconsistencies among parents of the different cultural and SES groups such as variations in both the definitions and interpretations of 'health' highlight a need to promote culturally specific programs with operationalised definitions. A further example is differing values and beliefs surrounding food, such as displayed in the American Indian communities who, despite having knowledge to the contrary, were influenced by the priority of day to day survival (Adams et al., 2008). Therefore, successful programs would need to account for these differences and endeavor to understand cultural priorities as these differing values may contribute to excess weight (Adams et al., 2008, Crawford et al., 2004).

Common themes across different cultural and SES groups included the inability of many parents to correctly identify their child as overweight or obese. Many did not believe weight and/or overweight to be a concern in the pre-school years with the common

misconception that a heavier child was a healthier child and indicative of good parenting (Baughcum et al., 1998, Crawford et al., 2004, McGarvey et al., 2006, Sherry et al., 2004). There was also a tendency for parents to believe their child had a genetic predisposition to excess weight and/or that their child would outgrow the condition (Baughcum et al., 1998, Crawford et al., 2004, Jain et al., 2001, McGarvey et al., 2006, Sherry et al., 2004).

Some parents expressed concern that their child was a picky eater and/or would not eat enough, revealing that child food preferences often directed food availability in the home (Baughcum et al., 1998, Haerens et al., 2009, Horodynski et al., 2009). These parents were compelled to respond to the child's preferred food demands, thereby providing the child with energy dense nutrition poor foods. Many parents were under the misconception that denying their child a specific food request was the equivalent to starving the child (Baughcum et al., 1998, Jain et al., 2001) or could lead to malnutrition (Horodynski et al., 2009). Food was also used to shape behaviour in the form of reward, as a contingency or to placate the child (Baughcum et al., 1998, McGarvey et al., 2006, Sherry et al., 2004). These are all misconceptions that could be addressed with the provision of appropriate information to parents while children are still young.

The importance of promoting positive behaviours and messages regarding healthy eating, rather than negative messages of weight loss or restriction, was discussed in two of the studies (Adams et al., 2008, Crawford et al., 2004). Lower SES Latino participants believed promoting positive messages and identifying positive eating behaviours would be more inclined to motivate change as opposed to focusing on negative behaviours and labeling child weight (Crawford et al., 2004). However, the lower SES American Indian

participants displayed incongruence between intention and behaviour (Adams et al., 2008). Although this group appeared to have the knowledge regarding healthy food requirements for young children, and understood the importance of promoting these behaviours, this was not considered the priority and therefore, not reflected in their child feeding practices.

A major theme to emerge from this review is the need to tailor interventions to specific groups in order to maximise opportunities that will motivate and facilitate long term behaviour change. For instance, participants across this review had differing levels of education, were from different cultures and varied in SES grouping, displaying different needs, perceptions and priorities (Baughcum et al., 1998, Crawford et al., 2004). These antithetical reports support Birch's summary that

> *contrasting parental evaluations of childhood overweight among racial, ethnic, and income groups highlight the need for qualitative and quantitative research in these groups to address links between cultural beliefs and parental goals and beliefs regarding children's eating and weight status and to determine how parenting practices influence or are influenced by children's weight status* (Birch et al., 2003).

Much of the qualitative work reviewed in this paper has subsequently informed intervention development and design. The inclusion of understanding regarding community needs, cultural perspectives and the social and physical realities faced by parents when feeding children, seems likely to improve the capacity of achieving behaviour change and/ or preventative action (Adams et al., 2008, Haerens et al., 2009, McGarvey et al., 2006).

Therefore, it is clear that despite conflicting opinion surrounding the importance and validity of qualitative research methods, many intervention studies appear to involve and value a level of qualitative analysis to help inform and/or evaluate ongoing research.

Although limited in number, all of the studies in this qualitative review discussed parenting styles, practices or behaviours in relation to child feeding. However, there appears to be little research that also includes general parental nutrition knowledge and an understanding of what constitutes a nutritious and healthy diet for children aged 2-5 years. For example, four of the projects discussed nutrition, noting a preference for their child to have 'good' versus 'bad' nutrition, but did not consider what this 'good' nutrition would be (Sherry et al., 2004). McGarvey and colleagues looked at what infants and children up to the age of three years should and do eat and they observed both parent/child behavioural responses with feeding children up to 5 years of age, but not what 3-5 year old children should eat (McGarvey et al., 2006). Horodynski and colleagues on the other hand only considered children up to the age of 36 months (2009). Furthermore, none of the studies appeared to discuss child nutrition and diet in relation to parenting styles and/or practices with parents of these children. Therefore, qualitative studies would be well placed to further explore the quantitative and experimental findings previously identified between parenting styles and parental feeding practices (Blissett and Haycraft, 2008, Hubbs-Tait et al., 2008).

In addition a majority of this research evaluated lower SES groups who were predominantly Hispanic/Latino and/or African-American. However, childhood overweight is a concern irrespective of culture and/or SES grouping. There was also a major focus on discussions around weight loss or food restriction, which appeared to promote a negative

feeling of denial or deprival. None of the researchers spoke with mothers of healthy weight children who displayed healthy nutritious diets with a view to understanding what facilitates healthy eating and how these parents behave and interact with their children in the home food environment. There also appears to be a lack of in-depth discussion about ways to overcome the expressed difficulty in encouraging positive attitudes towards healthy foods in children, particularly fruit and vegetables. This may be related to parental attitudes towards healthy foods and role modelling of healthy diets to their children. Therefore, barriers and facilitators of this could be further explored.

Finally, given that this systematic review of qualitative research included only nine studies, of which only four included the nutrition knowledge/information component, it is clear that this area of research has not reached saturation and is in need of further attention. It is evident that by addressing all the major themes to emerge from this review, future focus group research could be conducted to further discuss 1) parent perceptions of effective feeding practices; 2) parental views on the influences of home food availability and accessibility; 3) parent perceptions of what constitutes healthy versus unhealthy child diet (including attitudes towards diet); and 4) facilitators and barriers to providing healthy foods to children. Valuable information could also be gained by comparing this information between groups of parents with children who display a healthy diet and groups of parents with children who do not. This information would be constructive to further inform future intervention design and delivery. Comparisons could also be made with actual child food intake to gain a more direct understanding of the interaction of knowledge and practice and how these factors could manifest in child diet. As stated by Bolling et al., ‘by soliciting

parent perspectives, focus groups can help identify unforeseen obstacles to behaviour change and generate alternative methods of improving nutrition' (2009). Although focus group research is not statistically representative it is purposively and/or theoretically sampled, has theoretical generalizability and is information rich. This information could then inform intervention development and programs that are aimed at addressing these key areas and thereby promoting healthy child feeding practices before unhealthy eating habits have been formed.

Establishing a useful understanding of the contributing factors that can influence the development of child diet requires systematic inquiry. Although all of the studies reported here were focus group interviews which cannot be standardized, this review illustrates the capacity of qualitative research to deepen our understandings across social and ethnic groups, and of likely facilitators and barriers to parents' capacity to promote healthy eating in children. However, the identification of only nine studies that meet the inclusion criteria highlights an obvious lack in this area of qualitative research. Therefore, future research is required to bridge this gap and aid in promotion of healthy eating behaviours in young children.

3.6 References

Adams AK, Harvey H and Brown D (2008) Constructs of health and environment inform child obesity prevention in American Indian communities. *Obesity* 16**:** 311-7.

Baughcum AE, Burklow KA, Deeks CM, Powers SW and Whitaker RC (1998) Maternal feeding practices and childhood obesity: a focus group study of low-income mothers. *Archives of Pediatrics & Adolescent Medicine* 152**:** 1010-4.

Birch LL (1999) Development of food preferences. *Annual Review of Nutrition* 19**:** 41-62.

Birch LL (2006) Child feeding practices and the etiology of obesity. *Obesity* 14**:** 343-344.

Birch LL, Davison K (2001) Family environmental factors influencing the developing behavioral controls of food intake and childhood overweight. *Childhood and Adolescent Obesity* 48**:** 893-907.

Birch LL, Fisher JO and Davison KK (2003) Learning to overeat: maternal use of restrictive feeding practices promotes girls' eating in the absence of hunger. *American Journal of Clinical Nutrition* 78**:** 215-220.

Birch LL, Marlin DW and Rotter J (1984) Eating as the 'means' activity in a contingency: effects on young children's food preference. *Child Development* 55**:** 431.

Blaylock J, Variyam JN and Lin B (1999) Maternal nutrition knowledge and children's diet quality and nutrient intakes.

Blissett J, Haycraft E (2008) Are parenting style and controlling feeding practices related? *Appetite* 50**:** 477-85.

Bolling C, Crosby L, Boles R and Stark L (2009) How pediatricians can improve diet and activity for overweight preschoolers: a qualitative study of parental attitudes. *Academic pediatrics* 9**:** 172-8.

Campbell K, Andrianopoulos N, Hesketh K, Ball K, Crawford D, Brennan L, Corsini N and Timperio A (2010a) Parental use of restrictive feeding practices and child BMI z-score. a 3-year prospective cohort study. *Appetite* 55**:** 84-88.

Campbell K, Crawford D, Abbott G, Mcnaughton S and Ball K (2010b) Home food availability mediates association between maternal nutritiion knowledge and children's food intakes. *Australasian Medical Journal* 1**:** 106.

Campbell KJ, Crawford DA and Ball K (2006) Family food environment and dietary behaviors likely to promote fatness in 5-6 year-old children. *International Journal of Obesity* 30**:** 1272-1280.

Carnell S, Wardle J (2007) Associations between multiple measures of parental feeding and children/'s adiposity in United Kingdom preschoolers. *Obesity* 15**:** 137-144.

Condrasky M, Graham K and Kamp J (2006) Cooking with a chef: an innovative program to improve mealtime practices and eating behaviors of caregivers of preschool children. *Journal of Nutrition Education and Behavior* 38**:** 324-325.

Crawford PB, Gosliner W, Anderson C, Strode P, Becerra-Jones Y, Samuels S, Carroll AM and Ritchie LD (2004) Counseling Latina mothers of preschool children about weight issues: suggestions for a new framework. *Journal of the American Dietetic Association* 104**:** 387-94.

Darling N, and Steinberg L (1993) Parenting style as context: An integrative model. *Psychological Bulletin 113(3*): 487-496.

Dixon-Woods M, Bonas S, Booth A, Jones DR, Miller T, Sutton AJ, Shaw RL, Smith JA and Young B (2006) How can systematic reviews incorporate qualitative research? A critical perspective. *Qualitative Research* 6**:** 27-44.

Faith M, Scanlon K, Birch L, Francis L and Sherry B (2004a) Parent-child feeding strategies and their relationships to child eating and weight status. *Obesity Research* 12**:** 1711-1722.

Faith MS, Berkowitz RI, Stallings VA, Kerns J, Storey M and Stunkard AJ (2004b) Parental feeding attitudes and styles and child body mass index: prospective analysis of a gene-environment interaction. *Pediatrics* 114**:** e429-e436.

Fisher J, Mitchell DC, Wright HS and Birch LL (2002) Parental influences on young girls' fruit and vegetable, micronutrient, and fat intakes. *Journal of the American Dietetic Association* 102**:** 58-64.

Fisher JO, Birch LL (2002) Eating in the absence of hunger and overweight in girls from 5 to 7 y of age. *American Journal of Clinical Nutrtion* 76**:** 226-231.

Fomon S (1993) *Nutrition of normal infants*, Missouri, Mosby-Year Book Incorporated.

Gibson E, Wardle J and Watts C (1998) Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. *Appetite* 31**:** 205-228.

Haerens L, De Bourdeaudhuij I, Barba G, Eiben G, Fernandez J, Hebestreit A, Kovãcs E, Lasn H, Regber S, Shiakou M and De Henauw S (2009) Developing the IDEFICS community-based intervention program to enhance eating behaviors in 2- to 8-year-

old children: findings from focus groups with children and parents. *Health Education Research* 24**:** 381-393.

Haire-Joshu D, Elliott MB, Caito NM, Hessler K, Nanney MS, Hale N, Boehmer TK, Kreuter M and Brownson RC (2008) High 5 for kids: the impact of a home visiting program on fruit and vegetable intake of parents and their preschool children. *Preventive Medicine* 47**:** 77-82.

Haycraft EL, Blissett JM (2008) Maternal and paternal controlling feeding practices: reliability and relationships with BMI. *Obesity* 16**:** 1552-1558.

Hesketh KD, & Campbell KJ, (2010). Interventions to prevent obesity in 0-5 year olds: an updated systematic review of the literature. *Obesity*, 18(n1s) S27-S35.

Horodynski MA, Brophy-Herb H, Henry M, Smith KA and Weatherspoon L (2009) Toddler feeding: expectations and experiences of low-income African American mothers. *Health Education Journal* 68**:** 14-25.

Horodynski MA, Hoerr S and Coleman G (2004) Nutrition education aimed at toddlers: a pilot program for rural, low-income families. *Family & Community Health* 27**:** 103-113.

Hubbs-Tait L, Kennedy TS, Page MC, Topham GL and Harrist AW (2008) Parental feeding practices predict authoritative, authoritarian, and permissive parenting styles. *Journal of the American Dietetic Association* 108**:** 1154-1161.

Hughes S, Power T, Fisher J, Mueller S and Nicklas T (2005) Revisiting a neglected construct: parenting styles in a child-feeding context. *Appetite* 44**:** 83-92.

Hughes SO, Anderson CB, Power TG, Micheli N, Jaramillo S and Nicklas T (2006) Measuring feeding in low-income African-American and Hispanic parents. *Appetite* 46**:** 215-223.

Jager W (2003) Breaking 'bad habits': a dynamical perspective on habit formation and change. In*:* HENDRICKX, L, JAGER, W and STEG, L (eds.) *Human Decision making and Environmental Perception. Understanding and Assisting Human Decision Making in Real-life Settings.* Libor Amicorum for Charles Vlek, Groningen: University of Groningen.

Jain A, Sherman SN, Chamberlin LA, Carter Y, Powers SW and Whitaker RC (2001) Why don't low-income mothers worry about their preschoolers being overweight? *Pediatrics* 107**:** 1138-46.

Johnson SL (2000) Improving preschoolers' self-regulation of energy intake. *Pediatrics* 106**:** 1429-1435.

Kaiser LL, Melgar-Quinonez HR, Lamp CL, Johns MC and Harwood JO (2001) Acculturation of Mexican-American mothers influences child feeding strategies. *Journal of the American Dietetic Association* 101**:** 542-7.

Kamphuis CBM, Van Lenthe FJ, Giskes K, Brug J, and Mackenbach JP (2007) Perceived environmental determinants of physical activity and fruit and vegetable consumption among high and low socioeconomic groups in the Netherlands. *Health Place* 2007; 13:493–503.

Kasemsup R, Reicks M (2006) The relationship between maternal child-feeding practices and overweight in Hmong preschool children. *Ethnicity & Disease* 16.

Korwanich K, Sheiham A, Srisuphan W and Srisilapanan P (2008) Promoting healthy eating in nursery schoolchildren: a quasi-experimental intervention study. *Health Education Journal* 67**:** 16-30.

Magarey A, and Daniels L (2001) Comparison of Australian and US data on overweight and obesity in children and adolescents. *Medical Journal Australia, 175:* 500-501.

Magarey A, Daniels L, and Boulton T (2001) Prevalence of overweight and obesity in Australian children and adolescents. assessment of 1985 and 1995 data against new standard worldwide definitions. *Medical Journal Australia, 174:* 561-564.

Magarey, A, Daniels, L, Boulton, T, and Cockington, R A (2003) Predicting obesity in early adulthood from childhood and parental obesity. *International Journal of Obesity and Related Metabolic Disorders*, 27: 505-513.

Mcgarvey E, Collie K, Fraser G, Shufflebarger C, Lloyd B and Oliver M (2006) Using focus group results to inform preschool childhood obesity prevention programming. *Ethnicity and Health* 11**:** 265-285.

Mcgarvey E, Keller A, Forrester M, Williams E, Seward D and Suttle DE (2004) Feasibility and benefits of a parent-focused preschool child obesity intervention. *American Journal of Public Health* 94**:** 1490-5.

Moens E, Braet C and Soetens B (2007) Observation of family functioning at mealtime: a comparison between families of children with and without overweight. *Journal of Pediatric Psychology* 32**:** 52-63.

Musher-Eizenman D, Holub S (2006) Children's eating in the absence of hunger: the role of restrictive feeding practices. In*:* FLAMENBAUM, R (ed.) *Childhood Obesity and Health Research.* New York: Nova Science Publishers.

Musher-Eizenman D, Holub S (2007) Comprehensive feeding practices questionnaire: validation of a new measure of parental feeding practices. *Journal of Pediatric Psychology* 32**:** 960-972.

Newman J, Taylor A (1992) Effect of a means-end contingency on young children's food preferences. *Journal of Experimental Child Psychology* 53**:** 200-216.

Ogden J, Reynolds R and Smith A (2006) Expanding the concept of parental control: a role for overt and covert control in children's snacking behaviour? *Appetite* 47**:** 100-6.

Olds TS, Tomkinson GR, Ferrar KE and Maher CA (2009) Trends in the prevalence of childhood overweight and obesity in Australia between 1985 and 2008. *Intnational Journal of Obesity* 34**:** 57-66.

Peters J, Sinn N, Campbell K and Lynch J (2011) Parental influences on the diets of 2-5 year old children: Systematic review of interventions. *Early Child Development and Care*: DOI:10.1080/03004430.2011.586698.

Pink B (2008) Year Book Australia. Australian Bureau of Statistics, Canberra.

Powers SW, Chamberlin LA, Van Schaick KB, Sherman SN and Whitaker RC (2006) Maternal feeding strategies, child eating behaviors, and child BMI in Llw-Income African-American preschoolers. *Obesity* 14**:** 2026-2033.

Sangster J, Eccleston P and Stickney B (2003) Improving what's in the lunchbox in child care centres. *Health Promotion Journal of Australia* 14**:** 171-174.

Scaglioni, S, Salvioni, M, & Galimberti, C (2008) Influence of parental attitudes in the development of children eating behaviour. *British Journal of Nutrition*, 99: S22-25.

Schwartz RP, Hamre R, Dietz WH, Wasserman RC, Slora EJ, Myers EF, Sullivan S, Rockett H, Thoma KA, Dumitru G and Resnicow KA (2007) Office-based motivational interviewing to prevent childhood obesity: a feasibility study. *Archivies of Pediatric & Adolescent Medicine* 161**:** 495-501.

Sherry B, Mcdivitt J, Birch LL, Cook FH, Sanders S, Prish JL, Francis LA and Scanlon KS (2004) Attitudes, practices, and concerns about child feeding and child weight status among socioeconomically diverse white, Hispanic, and African-American mothers. *Journal of the American Dietetic Association* 104**:** 215-21.

Skinner J, Carruth B, Bounds W and Ziegler P (2002) Children's food preferences: a longitudinal analysis. *Journal of American Dietetic Association* 102**:** 1638-1647.

Skinner J, Ziegler P, Pac S and Devaney B (2004) Meal and snack patterns of infants and toddlers. *Journal of American Dietetic Association* 104**:** S65-S70.

Ventura A, & Birch L (2008) Does parenting affect children's eating and weight status? *International Journal of Behavioral Nutrition and Physical Activity 5(1*): 15.

Wardle J, Cooke LJ, Gibson L, Sapochnik M, Sheiham A and Lawson M (2003) Increasing children's acceptance of vegetables: a randomized trial of parent-led exposure. *Appetite* 40**:** 155-162.

CHAPTER 4
GENERAL NUTRITION KNOWLEDGE AS A MEDIATOR OF PARENTAL INFLUENCES ON THE DIETS OF 2-5 YEAR OLD CHILDREN: SYSTEMATIC SEARCH RESULTS AND RESEARCH REPORT

This chapter is a co-authored manuscript prepared for publication and submitted to Public Health and Nutrition (under review). Please refer to Appendix G for the data extraction tool specifically developed for this review and Appendix I.0 – I.9 for research materials

Peters J, Parletta N, Dollman J, Petkov J. General nutrition knowledge as a mediator of parental influences on the diets of 2-5 year old children: Systematic search results and research report.

This manuscript provides search results of published observational research involving parents of 2–5 year old children, evaluating the influence of parent feeding practices, parent nutrition knowledge, child diet and food intake or body mass index (BMI) from 1st January 1996 to 10th September 2009.

J. Peters and N. Parletta devised the idea for this manuscript. J. Dollman and J. Petkov assisted with statistical analysis. J. Peters prepared and edited the manuscript. N. Parletta edited the manuscript.

4.1 Abstract

Objective: During the early years, parents have a major influence on children's diets and developing food choices. After conducting a systematic search of observational research with parents of 2-5 year old children we investigated parenting styles as predictors of young children's diets and whether general nutrition knowledge (GNK) mediated those influences.

Design: Cross-sectional research. Self-report questionnaires measured demographic and lifestyle variables, family environment, parenting styles and feeding practices, child diet, and GNK. Regression models were used to test GNK as a mediator of relationships between parenting variables and child diet (fruit/vegetable and non-core food consumption), controlling for confounders and family environment variables.

Setting: Questionnaires were completed by primary caregivers at home.

Subjects: Parents of children aged 2-5 years (N=269).

Results: In the final models, child fruit/vegetable consumption was predicted by lower lax and overreactive parenting and restriction, higher authoritative parenting, and dining together as a family. GNK had a small non-significant effect. Conversely, non-core food consumption was predicted by higher lax and overreactive parenting as well as child age, increased takeaway food consumption and higher television viewing. GNK had a small effect and significantly mediated authoritative parenting on non-core food.

Conclusions: Despite the small contribution of GNK on child fruit, vegetable and non-core food consumption, these findings highlight that young children's diets may be improved by interventions targeting a range of positive and supportive parenting practices in conjunction with nutrition knowledge education for parents of young children. Further insights into how parents can positively influence children's diets will come from closer attention to the role of restrictive feeding practices versus laxness, and longitudinal research.

4.2 Introduction

The Australian Institute of Health and Welfare report that in 2007/8 90 per cent of Australian adults did not eat enough vegetables and 50 per cent were not eating enough fruit and has made associations between these rates of consumption and increased rates of chronic disease such as diabetes, cardiovascular disease, kidney disease and more (www.aihw.gov.au). The recent National Nutrition Survey reported that Australian children are consuming too few fruit and vegetables and excess amounts of non-core food (1). Poor dietary habits and weight-related problems have gained widespread attention with much of the research focusing on the teen and/or adult age groups. However, research has found a greater prevalence of overweight and obesity in Australian 2-5 year old children when compared internationally (2, 3). Furthermore, behaviours contributing to overweight and obesity are likely to have tracked from an earlier age (4-6), and habitualised behaviours are increasingly difficult to change (7). Therefore, more research on the eating behaviours of preschool aged children could prove beneficial in the prevention of child and adult overweight and obesity, and subsequent health related issues such as type II diabetes and heart disease.

Ecological Systems Theory (EST; figure 1; (8) refers to the various environmental contexts that interact with and influence the ecology of human development. The model of predictors of childhood overweight (9) see the context of child weight immersed within several other contexts. These contexts include child characteristics and child risk factors

(including gender, age, and familial susceptibility to weight gain, dietary intake, sedentary behaviours and physical activity); parenting styles and family characteristics (including family TV viewing, [and monitoring], parent preferences and modelling of behaviours, parent weight, dietary intake and nutrition knowledge, home food availability and child feeding practices); and community, demographic and societal characteristics (including ethnicity, socioeconomic status, neighbourhood safety, school programs, leisure time, work hours and accessibility of restaurants/fast food outlets and recreational facilities) (8, 9).

In using the EST model as a framework this research proposes to investigate influencing factors that contribute to childhood dietary intake (fruit, vegetable and non-core food consumption) with particular emphasis on the EST parenting styles context as conceptualised by Baumrind (10), and parent feeding practices and parental nutrition knowledge, while considering other influencing factors within the home environment such as food availability and accessibility, and television viewing. The EST model is particularly relevant to this research as it displays interactions between the environmental factors within and between contexts, for instance, television viewing may influence physical activity which may then influence child weight status. Another example could be that child weight may influence child feeding practices which may in turn influence dietary intake. Nonetheless, predominantly parents are at the helm of early child development; therefore, preventative programs should target this population while children are still subject to this primary influence.

Determinants of child diet quality include a variety of family and social influences. The family determinants refer to the physical environment and include child food preferences; availability and accessibility of food; parenting styles and parent feeding practices (the expression of parenting practices within the feeding domain); television viewing; mealtime structure; etc. The social determinants refer to socioeconomic and cultural factors such as socioeconomic status (parent education; geographic positioning; parent income), ethnicity and culture (11). Target areas of interest in the early years include the home environment. Family environment has established influences on children's diets, such as associations between increased television viewing and higher energy intake (12). Although the influence of parenting styles on child diet has been evaluated in various studies, research gaps remain (13, 14). Additionally, various reviews have been conducted to evaluate parental influence on child weight (15), interventions to prevent obesity in young children (16), family correlates of fruit and vegetable consumption in children and adolescents (17), etc. However, there do not appear to be any reviews looking at parental influence (styles and practices) and parent general nutrition knowledge together on the dietary intake of preschool aged children. Therefore, further investigation into the role of parenting styles on children's diets could provide additional insights when targeting parents of younger children. Additionally, it is likely that parents' knowledge of nutrition and healthy diets would play a role in mediating the effect of general parenting styles on diets.

A systematic search specifically evaluated research on parent nutrition knowledge and/or parent styles and feeding practices with parents of children aged 2-5 years in relation to child diet published from 1 January 1996 to 10 September 2009. The 95 results from the search criteria were organised into three categories: 17 quantitative (13), 9 qualitative (14), and 69 observational studies. The purpose of this paper is to, firstly, briefly summarise the observational research characteristics identified by the search; however methodological bias will not be appraised here. Secondly, this paper will report results of data collected from a cross-sectional survey conducted with parents of children aged 2-5 years to investigate whether parent general nutrition knowledge (GNK) mediates the influence of parenting styles on children's diets, controlling for confounders and family environment.

4.2.1 Review methodology

Outcome measures for the systematic search included at least one of the following: 1) weight change/status (BMI, per cent fat, etc.) and/or 2) food and/or beverage consumption; and be related to 3) parent nutrition/diet knowledge; and/or 4) parent feeding practices or style of parenting in relation to child diet. Further methodological details and results from the qualitative and intervention studies are published elsewhere (13, 14). Inspection of the 69 observational studies identified additional titles (n = 11) not meeting the search criteria leaving a total of 58 articles to be discussed. Data from these studies were extracted via a purpose designed extraction tool (Appendix G) including sample demographics, geographic

region of research, weight collection methods, and whether an incentive was offered to participants (Table 4.1).

Table 4.1 Characteristics of observational studies included in the search: sample size, measurement tools, incentives provided, weight collection method, region of collection

Characteristics	References	No. of studies
Sample size		
<100	(18-32)	15
100-199	(33-39)	7
200-299	(40-54)	15
300-499	(55-58)	4
500-999	(59-70)	12
1000-4999	(71-75)	5
5000+		0
		Total = 58
Region		
USA	(20-26, 28, 29, 31-36, 38, 40, 41, 43, 45, 48-51, 54, 56, 57, 59-61, 64, 65, 67, 69-71, 73, 74)	38
UK		2
Europe	(18, 19, 27, 37, 39, 53, 55, 62, 63, 68)	10
Australia	(30, 46, 72)	3
China	(44, 52, 75)	3
Argentina	(66)	1
US & France	(58)	1
	(42, 47)	2
		Total = 58
Weight collection		
Researcher	(20-26, 28, 29, 31, 33, 34, 36, 37, 39-50, 52-55, 57-61, 64-67, 69-71, 74, 75)	44
Parent report	(18, 19, 27, 32, 62, 72)	6
NR/Unclear	(30, 35, 38, 51, 56, 63, 68, 73)	8
Measures		
Parenting Styles, Practices &/or Attitudes	(18-20, 22-25, 27-30, 32-40, 42-47, 50-55, 59, 61-68, 71, 73-75)	45
GNK		

Parental GNK	(21, 56, 57, 67)	4
Diet		
FFQ	(30, 32, 33, 41, 46, 52, 57, 59, 62-64, 66, 68, 72, 73)	15
Diet Recall		
24 hours	(32, 33, 56, 64, 67)	5
3 days	(37, 69)	2
4 days	(68)	1
7 days	(49, 73)	2
Child outcome		
Diet	(18, 20, 23, 25, 30, 32, 33, 35, 37, 41, 46, 49, 52, 56, 57, 59, 62-64, 66-69, 72, 73)	
BMI/weight status	(18-31, 33, 34, 36, 37, 39-45, 47, 48, 50, 53-55, 57-62, 64-67, 69-72, 74, 75)	
NR/Unclear	(38, 51)	
Incentive Provided		
$5 US	(50)	1
$10 US	(51, 60, 61)	3
$20 US	(59, 73)	2
$25 US	(40)	1
$40 Us	(31)	1
5 euro	(46)	1
Gift Certificate	(65)	1
Unspecified cash	(69)	1
		Total = 11
Longitudinal Data		
12 mths +	(22, 31, 34, 37, 70, 74)	6

Notes: GNK = General Nutrition Knowledge; FFQ = food frequency questionnaire

4.2.2 Review results

A majority of the 58 included studies were conducted in developed countries and therefore not representative of all populations. Weight measurements were professionally collected in 44 studies (6 were reported by parents and 8 were unclear) thereby reducing the possibility of social desirably when these measures are either self-reported or parent-reported. However, the six self or parent reported measures are limited by the risk of maternal overestimation of their preschool aged child's weight (76) and discrepancies have also been recorded between measures that have been parent measured and reported as opposed to parent estimations (77). Only 11 studies offered an incentive ranging from five to forty dollars in cash or certificate. Research indicates that the use of incentives may reduce the risk of a biasing effect by attracting an audience who might otherwise be inclined not to participate, with increased relevance among lower educated samples (78). Food frequency questionnaires were used in 15 studies; whereas diet recall ranging from one to seven days was recorded in 10 studies. Self-report questionnaires are subject to social desirability bias, and diet recall has the added risk of under and/or over reporting if portion size is not appropriately operationalised. Notably, only six studies collected data longitudinally at 12 months or longer (table 4.2). Longitudinal data provides long term evidence based information to families, various practitioners and policy makers to develop programs and environments that will promote healthy habits with young children. As stated in the Longitudinal Study of Australian Child study (LSAC), developmental questions can

be examined such as “is childhood obesity preceded by particular parental expectations or parenting practices in toddlerhood?” (79).

A common outcome from the included studies was parent perception of child weight with many parents of children who were overweight or at risk for overweight perceiving their child to be either underweight or in a normal weight range (28, 40, 41, 48, 58, 60). However, most of these studies were either specifically low-income participants (31, 43) or recruited from Women’s, Infant’s and Children’s (WIC) centres set up to support low income families (51, 61), with predominantly low levels of education recorded in half of these studies (31, 51, 61) and therefore are not indicative of the general population.

Controlling parent feeding practices, such as ‘pressure to eat’ and ‘restriction’, tended to be associated with unhealthy diets, eating habits and/or weight (20, 22-24, 30, 33, 34, 36-38, 44, 46, 50, 52, 55, 59, 64, 66). Some research does not support these findings, however, these studies involved low-income Mexican (31) and Hmong (28) mothers and their children, and as discussed in the Hmong study, perceptions of weight and overweight are influenced by “cultural beliefs of a healthy body size” (28) which may have biased the results. Additionally, other research indicated parental control was not associated with child overweight and/or BMI z-score (N = 96 parents of 48 children) when looking at both parents (18) nor were these variables associated with increased consumption (23). Similarly, a larger study (N = 4,983) support these findings with maternal control, whereas low paternal control (in line with both permissive and disengaged parenting styles) was strongly associated with child overweight and obesity (75). Differences have also been reported between maternal and paternal restriction (27), with paternal restriction being

associated with higher child BMI (18) suggesting weight concerns may be more likely within the father-son and mother-daughter relationships. Other studies found that restrictive behaviours were bi-directional (64) meaning parents of children (N = 2801) who were overweight or at risk were more likely to restrict foods whereas parents of children who were not in this category were less likely to restrict foods; unfavourable child behavioural characteristics such as depressive/oppositional (e.g. "the child's demands must be met immediately" [oppositional behaviour]; and e.g. "the child looks unhappy without good reason" [depressed behaviour]), anxious behaviour (e.g. "the child is afraid to try new things"), and overactive behaviour (e.g. "the child cannot sit still, is restless or hyperactive") were evaluated. Results indicated that favourable characteristics (non-depressive, low anxious and low overactive) combined with restrictive parenting practices were related to decreased consumption of restricted (unhealthy) foods and increased consumption of healthy foods (N = 2,578) as well as lower child BMI (72); maternal feeding practices were found to be domain specific and differed between siblings depending on the child's weight (29); and differences were found in levels of restriction throughout the day (30). In the latter study (N = 60), reduced consumption of restricted sugary foods was reported at breakfast and lunch times and increased consumption in the afternoon when restrictions on these items were reduced. Greater restrictions on these foods were also associated with increased preference for them and suggested increased consumption in the absence of parental control (30). In consideration of these studies, it is suggested that research on restrictive feeding practices in general is limited by the operationalisation and measurement of restriction (13, 80).

Seven of these studies included parenting styles (authoritative, authoritarian, and permissive; 18, 31, 49, 54, 69, 70, 75, 81). Authoritative parenting generally generated associations with positive outcomes, such as increased fruit and vegetable consumption or normal weight status (18, 49, 54, 70, 81), whereas negative results, such as reduced fruit and vegetable consumption or risk of overweight were associated with authoritarian (49, 54, 70) and permissive (31, 69, 70, 75) parenting. None of the studies identified by this review measured both parenting styles and GNK together.

From the studies measuring child diet and/or BMI (weight status), only four measured parental GNK (21, 56, 57, 67). One study (N = 580) developed a healthy eating and exercise questionnaire to detect GNK differences between Latino (70.3% correct) and Black women (70.1% correct); however, results were not meaningful and made no further reference to maternal GNK (67). Nevertheless, this data was self-reported with the possibility of social desirability bias and inaccurate portion sizing.

Colavito and colleagues used the Diet Health Knowledge Survey (DHKS; 26 items) to evaluate relationships between household meal planners' GNK and parent/child fat and fibre intake (56). Results (N = 478) indicated that children of meal planners with more nutrition knowledge ate less fat at home; however results did not reach significance for total fat or fibre intake. Nonetheless these results support the notion of parental nutrition knowledge influencing child diet.

Etelson et al. evaluated parents' knowledge of healthy eating, assessing differences between parents of normal weight (n = 64) and overweight children (n = 23) (21), using two multiple choice questions: how much juice (8 oz. juice boxes) parents thought was

healthy for their child to drink daily and how often they felt it was appropriate to eat at fast food restaurants. Two thirds of parents suggested that children should drink no more than 2 boxes of juice daily (meaning one third believed three boxes or more to be acceptable) and 96 per cent believed fast food should be limited to once a week or less, with no significant difference between the groups.

More recently selected questions from the DHKS were used to assess parents' (N = 447) diet-related knowledge on child BMI and fruit/vegetable intakes, comparing differences between parents of healthy and overweight children (57). No significant differences were reported between groups with most parents aware of the recommended fruit and vegetable servings. Nonetheless, the mean vegetable serves for all children was less than the recommended three serves per day. Overall, 60 per cent consumed ≥ two pieces of fruit/day although 75 per cent of the overweight children consumed <two serves/day. Additionally, there was no correlation between parent's diet related knowledge and attitude with child fruit and vegetable intakes (57). However the authors comment that parents of overweight children (BMI ≥ 95%) were almost twice as likely to disagree with the statement "what you eat makes a difference in your chances of getting disease", thereby suggesting that diet related knowledge and attitudes are not the same in all groups. Therefore, of the four studies to evaluate GNK only one found a relationship between parent's overall measures of GNK and child diet (56). However, three out of four studies implied GNK to influence outcomes.

Although only two of the four abovementioned GNK studies evaluated a parenting component, one (67) looked at parental support and role modelling, which appeared to be in

relation to the intervention and not diet-related (82, 83).The other assessed parental attitudes towards childhood obesity with one question only to evaluate how concerned parents would be about their child's health if their child were overweight where results significantly indicated 78 per cent of parents would be "quite" or "extremely" concerned about this (21). These were the same parents who limited fruit juice consumption to no more than two boxes a day and take away food consumption to no more than once a week. Notably 23 per cent of parents (N = 83) had an overweight child with only two parents correctly perceiving the child as such. Nonetheless, due to this lack of research investigating parental GNK on the diets of children aged 2-5 years, it could be speculated that GNK might be a necessary factor that could mediate parental influences on child diet. Therefore, the purpose of this cross-sectional study was to investigate factors that predict child fruit/vegetable and non-core food consumption including demographic variables such as socioeconomic status (84), parental education and children's BMI/weight status, family environment, parenting styles and parental GNK. It was hypothesised that, controlling for covariates, the variables measuring parenting styles would predict the quality of children's diets (number of serves of fruit, vegetable and non-core-core food) and parent GNK would to some degree mediate these influences.

4.3 Methodology

4.3.1 Recruitment

Parents were recruited via school newsletters, day care centres, kindergartens, out of school hours care, information pamphlets posted on hospital and university information boards, and e-mail distribution lists. The information provided inclusion criteria, briefly outlined the study and the offer of a double movie pass in appreciation for the time taken to complete questionnaires. Interested parents contacted the researcher via telephone or email and survey packages were posted containing information, instructions, the questionnaire and a reply paid envelope (see appendices H0-H9 for recruitment details and tools).

4.3.2 Participants

Two hundred and sixty nine parents were recruited. To be eligible, parents needed to have a child aged 2-5 years and be able to read English to complete the questionnaires. The study included children of all weights, diets and special needs. An emphasis was placed on obtaining responses from a cross-section of SES areas based on the Socio-Economic Index for Areas (SEIFA) according to postcodes organised by Australian Bureau of Statistics census data from 2004 (for income, education attainment and occupation; www.abs.gov.au/), whereby '1' = most disadvantaged and '10' = least disadvantaged socio-economic areas. Therefore, when more responses were received in one area we then targeted more child care centres in the other areas to obtain an even spread.

Ethics approval was obtained from the University of South Australia Human Research Ethics Committee. Consent was implied by completion of the questionnaire. In an additional data collection drive parents signed consent forms to be contacted for focus group research.

4.3.3 Power

Twelve variables included in this mediation results in 52 degrees of freedom. Based on Root Mean Square Error of Approximation (RMSEA; 85), power was set at 80 per cent with an alpha level of .05. With the 269 participants recruited, the sensitivity analysis shows that we have achieved 90 per cent power.

4.4 Measures

The parent questionnaire measured demographic and lifestyle variables, family environment, parenting styles and feeding practices, child diet and GNK.

4.4.1 Demographics/family environment

Residential postcodes, cultural background, employment status, occupation, income and education levels of both parents were derived from the primary carer's responses. Questions about family environment included child's television viewing hours, number of hours in child care, how often the family ate together and number of takeaway meals per week.

4.4.2 BMI and BMI z-scores

Although professionally measured height and weight is considered the gold standard, these methods are very costly. Therefore, parental reports of these measures are often used in evaluative surveys to calculate BMI. Although it is impossible to calculate the accuracy of these reports it is considered to be an acceptable substitute when actual measures are not available (86, 87). This was true for at least six of the studies included in the systematic search section of this paper, however self/parent- reporting was noted as a limitation in all of them (18, 19, 27, 32, 62, 72). Parents provided child's height/weight details which were used to calculate BMI (kg/m²) and BMI z-scores (USDA/ARS Children's Nutrition Research Centre; http://www.bcm.edu/cnrc/bodycomp/bmiz2.html). Height and weight of both parents were self-reported and BMI was calculated (www.cdc.gov/).

4.4.3 Children's Dietary Questionnaire (CDQ)

The CDQ measured diet quality (88). Four scores are derived from 28 items measuring: 1) fruit/vegetable intake; 2) fat from dairy; 3) sweetened beverages; and 4) non-core foods (high fat/sugar). The CDQ is a tool specifically designed to assess children's dietary patterns rather than energy or nutrient intake. Recent research has suggested that parents, who monitor their young child's diet, may substitute core foods (fruit and vegetables) for non-core unhealthy snack foods (89) and inverse associations were reported between core and non-core food consumption of 1-5 years when looking at maternal self-efficacy (90). Reportedly, parental accounts of child diet and food frequency are accurate

enough for use in dietary surveillance (91) and parent-reports of child fruit and vegetable intake has been an acceptable method in many studies with preschool aged children using the CDQ (92-94). Reliability, internal consistency, and validity were established in multiple samples of Australian children aged 4-16 years. The *fruit and vegetable* and *non-core foods* subscales demonstrate acceptable internal consistency (Cronbach's *a* 0.76 and 0.62 respectively) and item total correlations are greater than 0.2. The fruit, vegetable and non-core foods subscales demonstrate acceptable internal consistency (Cronbach's a 0.76 and 0.62 respectively) and item total correlations were greater than 0.2. Both the *fat from dairy* and the *sweetened beverages* subscales showed inconsistencies and therefore were not used in this study. However sweetened beverages were included in the non-core food subscale.

Although the CDQ was not validated with children under 4 years of age it was developed in line with the Australian Dietary Guidelines and validated with an Australian population. The authors state that the high test-retest reliability "suggests that regardless of the time elapsed, dietary patterns appear to be stable" and that the CDQ would be suitable for use "in studies seeking to understand the importance of dietary patterns in the development of childhood obesity" (88).

4.4.4 Parental feeding practices – Child Feeding Questionnaire (CFQ)

The CFQ is a 31-item self-report measure of parental perceptions and practices in relation to child feeding (95). For the purpose of this study we used the three parental feeding subscales: restriction (8 items, e.g. "I offer my child her favourite foods in

exchange for good behaviour"); pressure to eat (4 items, e.g. "My child should always eat all of the food on her plate"); and monitoring (3 items, e.g. "How much do you keep track of the high-fat foods that your child eats?"). Internal consistency (Cronbach's *a*) of original scales range from 0.70 for pressure to eat to 0.92 for monitoring (95). Although the sample ages ranged from 5-11 the CFQ is designed for use with parents of children aged approximately 2-11 years and has been validated among diverse populations (95).

4.4.5 Parenting scale (PS)

The PS is a 30-item self-report measure of dysfunctional parental discipline strategies and has been validated on parents of children aged 18-48 months (96), middle school children (97), and children with attention-deficit/hyperactivity disorder (98). The alpha coefficients for individual factors are reported as .83 for laxness; .82 for overreactivity; .63 for verbosity; and .84 for the total instrument, and test-retest correlations are reported as .83 for laxness; .82 for overreactivity; and .79 for verbosity (96).

Laxness and overreactivity factors are described as being consistent with the permissive and authoritarian styles of parenting originally proposed by Baumrind (99), i.e. associated with behaviour problems where parents who give in to persistent badgering may be reinforcing this behaviour. The authoritarian parent is described as using "punitive and forceful measures" (99), similar to the overreactive parent who models aggressive, angry and/or insulting behaviour, whereas verbose discipline may inadvertently be reinforcing because long reprimands provide attention to negative behaviour (96).

4.4.6 Parental Authority Questionnaire-Revised (PAQ-R; 100)

This 30-item questionnaire (83) is a modified version of Buri's PAQ, designed to measure the extent to which parents' attitudes of parenting are consistent with Baumrind's parenting typologies: authoritativeness (allowing autonomy within clearly defined boundaries whilst displaying warmth and responsiveness), authoritarianism (highly directive, detached, unresponsive), and permissiveness (relatively non-controlling, few demands, no boundaries) (101), differing from the PS which measures dysfunctional parenting practices and the CFQ which measures specific parent feeding practices. Coefficient alpha scores are reported as .72 to .76 across the three subscales and this questionnaire was validated with both clinical and non-clinical parents and children (100).

4.4.7 General Nutrition Knowledge Questionnaire (GNKQ; 102)

The GNKQ (85) is an Australian adaptation of the original GNKQ (103) where there is a maximum score of 113. Overall internal and test-retest reliabilities for this 42-item questionnaire are reported as high (Cronbach's alpha = 0.92; r = 0.87) and testing of the modified version reported it as a valid and reliable measure of GNK for use in a subsample of the Australian population (102).

4.5 Research design & analysis

This study employed a cross-sectional research design. Statistical analyses were conducted using the Statistical Package for the Social Sciences version 18.0 for Windows (SPSS Inc., Chicago IL, USA).

The first three (of four) steps of mediation analysis include the predictor variable/s (PS) being associated with the outcome variable/s (CD); the predictor variables being associated with the mediating variable (GNK); and the mediating variable being associated with the outcome variables. Step four of the mediation analysis requires the predictor variable to significantly predict the outcome in the absence of the mediator variable which should also be associated with both predictor and outcome variables (figure 1). Therefore, zero-order correlations explored associations between potential confounders (demographic) and the outcome variables (fruit/vegetable and non-core food consumption). Those that were associated with the outcome variables were entered into regression models along with the parenting and feeding style variables, controlling for family environment with GNK acting as a mediator between predictor and outcome variables (figure 1). Bootstrapping was employed using 5000 samples for indirect effect, confidence intervals set at 95 per cent (104).

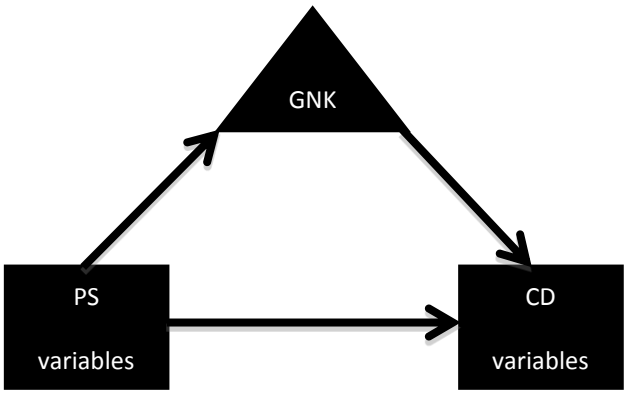


Figure 4.1 – GNK (general nutrition knowledge) mediates the relationship between PS (parenting style) variables and CD (child diet)

4.6 Results

4.6.1 Descriptive

Demographic characteristics are summarised in Table 4.2. A total of 269 parents (75% completion rate) completed surveys on their child's diet (*n* = 128 boys) and parenting. Most children were from two parent households, with an even SEIFA spread (based on Australian Bureau Statistics 2006 index for areas ranging from 1 – most disadvantaged to 10 most advantaged; www.abs.gov.au), and from an Anglo-Saxon cultural background (self-report answer to the question "what is your child's cultural background?"); with normal dietary requirements, where 87 per cent of children were breastfed (a 'yes' or 'no' self-report answer to question "was your child breast-fed?"). Many parents had a university degree and average to overweight BMI (calculated from self-report height and weight measures).

Table 4.2 - Summary of demographics and nutrition knowledge scores for parents and children

Parents (*n* = 269)			Children (*n* = 269)	
	Parent 1	Parent 2		
Age (years)	34.9±5.5	37.6±6.1	Age (years)	3.6±0.9
BMI	25.6±5.6	26.6±4.2	BMIz-score	0.1±1.8
Male	*n* = 29		Male	*n* = 128
Female	*n* = 239		Female	*n* = 141
Number of children	2.2±0.9		Attended childcare (%)	72.6
Two-parent family status (%)	91		Were breastfed (%)	86.7
Socioeconomic status (%)			Special dietary needs (%)	5.9
Very low or low SES (1,2,3)	20.7		Television viewing (%)	
Middle SES (4,5,6,7)	49.2		*2 hours per day or less*	71.6
Very high or high SES (8,9,10)	30.1		Family dine together (%)	
Combined family income			*5 or more times a week*	68.2
$13,000 or less	9.7		Takeaway meals (%)	
$13,001 to $50,000	14.9		*1 meal or less per week*	90.7
$50,001 to $100,000	46.7		Cultural background (%)	
$100,001 to $150,000	19.7		*Australian*	65.2
More than $150,000	9.0		*Indigenous*	0.8
Weekly hours of employment	19.9±17.2	37.2±15.3	*Other*	36.0
Type of employment (%)				
Full time	18.0	77.7		
Part time or casual	50.2	13.0		
Home duties	31.8	9.3		
Education level (%)				
High school	21.6	19.3		
Trade or apprenticeship	1.5	16.5		
Certificate or Diploma	27.9	26.9		
University degree or higher	49.1	37.4		
Parent 1 nutrition knowledge	**73.3±13.1**			

Note: Data presented as mean ± standard deviation or percentage as indicated. Parent 1 denotes parent who completed the questionnaire, parent 2 is the other parent in the family.

Dietary variables of interest were parent-reported dietary intake of combined fruit/vegetables and non-core food. Daily average combined fruit/vegetable consumption (serves/day) was reported for 261 children (M = 5.9, SD = 2.8); non-core food consumption (serves/week) was reported and calculated as a daily average for 255 children (M = 1.8, SD = 1.0).

Complete GNKQs were received from 269 parents (M = 73.3, SD = 13.1). Most questions were consistently answered, however predominantly incorrect answers were recorded for which food contained more saturated fats (vegetable oils, dairy products or both; 70%); polyunsaturated margarine containing the same amount of fat as butter (77%); both margarine and butter containing the same number of kilojoules (73%); which oil contains the most monosaturated fat (61%); which contains most kilojoules for the same weight (sugar, carbohydrate, fibre/roughage and fat; 71%); lower fat cheese option (plain cream cheese, edam, cheddar or brie; 78%); with 58 percent of participants scoring zero out of a possible six points on which vitamins contain antioxidants (A, B complex, C, D, E and K) whereas only five percent of participants scored six points. As expected, higher GNK scores were associated with higher fruit/vegetable consumption (r = .16, p < .01) and lower non-core food consumption (r = -.18, p < .01) by children and although the primary parents level of education (Ed) was associated with GNK it was not associated with the child diet variables (table 4.3).

Table 4.3: Correlation Matrix

	AGE	BMIz	pBMI	SEIFA	Ed	CC	TV	dine	Tway	FVt	nonC	PER	ATN	ATV	LAX	OVR	VRB	EXi	INC	AFF	GNK
AGE	1.00																				
BMIz	-.04	1.00																			
pBMI	≤.01	.12	1.00																		
SEIFA	.04	.11	-.13*	1.00																	
Ed	-.03	-.12	-.21**	.23**	1.00																
CC	.01	.02	.02	-.06	.20**	1.00															
TV	.12	.08	.11	-.23**	-.26**	-.15*	1.00														
DINE	-.02	.05	.11	-.11	-.10	-.16*	-.10	1.00													
T/way	-.14*	.06	.12*	-.14*	-.09	.01	.12	-.01	1.00												
FVt	-.03	.09	.04	≤-.01	.03	-.14	-.08	.21**	-.03	1.00											
nonC	.17**	≤.01	.11	-.11	-.11	-.05	.30**	-.07	.20**	-.17**	1.00										
PER	.02	-.05	.20**	-.09	-.14*	-.03	.19**	-.02	.07	-.12	.10	1.00									
ATN	-.02	-.03	.12	-.15*	-.18**	-.08	.16*	-.07	.12*	-.02	.03	-.20**	1.00								
ATV	.03	-.03	.15*	.02	≤-.01	-.05	-.10	.05	-.01	.14*	-.04	-.06	-.04	1.00							
LAX	.05	-.02	-.07	-.08	-.10	.16*	.27**	-.13	.09	-.26**	.31**	.37**	-.19**	-.16**	1.00						
OVR	.14*	.03	-.04	.03	-.07	.12	.19**	-.09	.15*	-.26**	.34**	.02	.10	-.13*	.40**	1.00					
VRB	.12	-.06	.11	-.08	-.14*	.14	.24**	-.10	.01	-.16**	.24**	.18**	-.03	-.11	.46**	.44**	1.00				
EXi	.03	.06	-.14*	.02	.06	-.02	.05	-.04	.14*	-.10	.08	.14*	-.05	-.04	.32**	.28**	.19**	1.00			
INC	.06	.01	.06	-.15*	-.22**	-.06	.27**	-.09	.12*	-.23**	.28**	.15*	.06	-.21**	.44**	.58**	.41**	.19**	1.00		
AFF	-.03	-.04	-.02	.09	.06	.05	-.20**	.13	-.06	.11	-.17**	-.13*	-.06	.32**	-.32**	-.47**	-.28**	-.16*	-.71**	1.00	
GNK	.05	-.05	-.12*	.26**	.29**	-.07	-.17**	.10	-.16**	.16**	-.18**	-.12*	-.17**	.21**	-.12	-.10	-.16**	-.07	-.18**	.11	1.00

*p<.05, **p<.01. AGE=child age; BMIz=child body mass index z-score; pBMI=parent body mass index; Ed= primary parent level of education; CC=# hrs @ child care p/w; TV=hrs viewed TV p/w; DINE= # of times families dined together p/w; T/way=# of take-away meals p/w; FVt= total fruit & vegetable consumption p/w; non-c=total non-core food consumption p/w; PER=permissive parenting; ATN=authoritarian parenting; ATV=authoritative parenting; LAX= lax parenting; OVR=over-reactive parenting; VRB=verbose parenting; EXi=extra items in parenting scale; INC=incendiary communication; AFF=affirming communication GNK=general nutrition knowledge.

4.6.2 Preparation for data analysis

Of potential confounders (demographic and family environment variables), fruit/vegetable consumption (table 4.3) was significantly associated with eating dinner as a family (r = .21, p = .001) and non-core food with child age (r = .16, p = .012), takeaway food (r = .20, p = .001) and television viewing (r = .30, p < .001).

Despite much research to the contrary, this data displayed good distribution (table 4.4). There were some missing data which would have eliminated 60 participants from analysis. The pattern of missingness was established as missing completely at random using Little's MCAR test (χ^2 = 327.55, df = 315, p = .301). The non-significance gives us no reason to suspect that the data is not missing completely at random. As a result multiple imputation was employed and twenty data sets were imputed using STATA Version 12 and the results were combined using Rubin guidelines (105).

Table 4.4 – Descriptive data for IV's (independent variables) and DV's (dependent variables)

Variables	N	Minimum	Maximum	Mean	S/D	Skewness	
						Statistic	Std error
fruit & vegetable	261	.71	20.29	5.97	2.93	1.13	0.15
Noncore	255	.00	4.86	1.79	0.99	0.76	0.15
Permissive	264	30.00	58.00	43.23	4.48	-0.10	0.15
Authoritarian	266	36.00	66.00	50.18	5.39	0.01	0.15
Authoritative	264	49.00	69.00	60.21	3.71	-0.11	0.15
Laxness	263	11.00	50.00	26.89	8.38	0.41	0.15
Overreactivity	265	10.00	56.00	25.71	7.69	0.45	0.15
Verbosity	265	8.00	39.00	25.35	5.35	-0.42	0.15

N= sample size; S/D = standard deviation; std = standard error.

4.6.3 Mediation analyses

Collinearity was tested by computation of the variance inflation factors (VIF) among the predictors with no sensitivity recorded. Results from the regression analyses are shown in Table 4.5. In the final models, predictors of fruit/vegetable consumption were lower lax and overreactive parenting, lower restriction, higher authoritative parenting and eating dinner together as a family, with the model explaining 19 per cent of the variance. There was a very small non-significant effect for GNK. Conversely, non-core food consumption was predicted by higher lax and overreactive parenting, along with child age, television viewing and eating takeaway food more frequently, with 28 per cent of the variance explained by the model. GNK had a small, significant effect but was only a mediator for authoritative parenting and non-core food (effect = -.0052, SE=.0031; confidence interval = -.0122 -.0001).

Table 4.5 – Regression coefficients in final models for predictor variables (parenting styles and feeding practices) of child diet (fruit/vegetables and non-core foods), with demographic and family environment variables as covariates

Predictors	R^2	*F*	*Coeff*	*S.E.*	*t*	*P*
Dependent variable: Fruit and vegetable consumption						
Model summary	.190	5.486				.000
Permissive parenting			-.307	.266	-1.154	.250
Authoritarian parenting			.102	.221	0.463	.644
Authoritative parenting			.663	.309	2.144	.033
Laxness			-.295	.170	-1.741	.083
Overreactivity			-.386	.168	-2.303	.022
Verbosity			.182	.239	0.762	.447
Monitoring			-.237	.476	-0.498	.619
Pressure to eat			-.107	.309	-0.345	.731
Restriction			-.545	.178	-3.057	.003
Dinner as a family			1.451	.544	2.666	.008
GNK			.126	.086	1.468	.143
Dependent variable: Non-core food consumption						
Model summary	.276	7.466				.000
Permissive parenting			-.002	.013	-0.140	.889
Authoritarian parenting			-.007	.011	-0.659	.511
Authoritative parenting			.009	.015	0.575	.566
Laxness			.019	.008	2.293	.023
Overreactivity			.026	.008	3.149	.002
Verbosity			-.002	.012	-0.129	.897
Monitoring			.000	.023	0.009	.993
Pressure to eat			-.014	.015	-0.932	.353
Restriction			.014	.009	1.533	.126
No. hours television viewed by child			.225	.060	3.747	.000
Takeaway food consumption			.208	.088	2.358	.019
Child's age			.135	.058	2.332	.021
GNK			-.009	.004	-2.031	.043

GNK = General nutrition knowledge (parent)

4.7 Discussion

We hypothesised that parents' GNK would mediate relationships between parenting styles and feeding practices, and child diet, controlling for demographic and family environment variables. In our two models, lax and overreactive parenting were predictive of reduced fruit/vegetable and increased non-core food consumption. In contradiction, restrictive feeding practices were associated with lower fruit/vegetable consumption, although as would be expected, authoritative parenting was associated with higher fruit/vegetable consumption. Parental GNK had a small effect on non-core food consumption and mediated the effect of authoritative parenting on lower non-core food consumption, however, only explained a small percentage of the variance. The other parenting variables were predictors in their own right.

As the review section of this paper highlights, only four studies have previously evaluated the role of GNK with parents of children in the specified age range, and these did not report any associations with child diet. Earlier research found that meal planners' GNK mediated child fat consumption in the home environment; although results for total fat consumption failed to reach significance (56). Another study which included 2-5 year olds, and up to 17 year olds, and was therefore outside our age cut-off, found that a better quality child diet was more likely when coupled with increased maternal knowledge of health and nutrition, particularly in preschool aged children (106). However, our results suggest that these findings need to be placed in the context of parenting styles and practices.

Although maternal education is often cited as a key predictor of child diet (107) we found no associations. In our models, lax and overreactive parenting were strong predictors.

The role of lax parenting in poorer dietary outcomes is supportive of previous research with lax (84) and permissive (20, 58, 59, 64) parenting. Controlling and restrictive feeding practices have yielded mixed results in relation to their effect on child weights status and/or diet (13). Much of the research on restrictive feeding practices has focussed on parent concern about child overweight. Similarly, recent research conducted after our review reported that maternal food restriction was in response to 2-4 year old children's food responsiveness (eating in the absence of hunger), and this was mediated to some degree by parental concern about child overweight (90). However, longitudinal analysis found that restriction did not predict changes in child eating behaviour (91). All in all, the research that has indicated non-beneficial outcomes along with our contradictory finding with restrictive feeding practices is problematic, given that laxness, i.e. allowing children do what they want, is also not likely to encourage healthy behaviours. Overreactive parenting is associated with more aggressive and controlling practices (96), similar to authoritarian parenting. Restriction has received mixed results in previous research and requires further attention. For instance restricting access to less healthy foods has been associated with increased consumption of fruit and vegetables (52), whereas earlier research has found restriction to predict consumption of snack foods (23, 24). Another example of differing types of restriction is 'restriction for health' reasons and 'restriction for weight' reasons (47), where health reasons are more widely acceptable and weight reasons are culturally influenced. Therefore, taken as a whole, our results suggest that restriction in certain contexts, i.e. healthy boundaries in conjunction with positive, supportive and encouraging parenting (a function of authoritative parenting which was associated with higher

fruit/vegetable consumption), may be necessary to assist children to make healthier food choices.

To our knowledge, this is the first study to not only investigate parenting styles along with feeding practices but also to control for family environment variables with parents of pre-schoolers. Our results support the role of parenting in combination with broad spectrum influences within the family environment. Dining together as a family predicted increased fruit/vegetable consumption, supporting previous research with older children showing similar outcomes (108-110). This is also supported by Gregory et al's longitudinal research that found parent modelling of healthy eating predicted lower food fussiness in 2-4 year old children (91). Conversely, eating takeaway food was associated with higher non-core food consumption, as was more hours of television viewing by the child. The relationship between television viewing and increased non-core food consumption has also been found with older children (111). Notably, there is a higher prevalence of confectionary (three times more likely) and fast food (twice as likely) advertising to be broadcast on Australian television during the scheduling of children's programs than during adult viewing (112). The mediating influence of GNK on non-core food consumption points to the importance of targeting nutrition knowledge along with positive parenting practices and family environment – although our results suggest that nutrition knowledge on its own will not be sufficient to help parents improve their children's diets. Additionally, although there are contentious views in relation to the interpretation of statistical significance and effect sizes this research supports the notion "statistical significance is not the same as practical importance" and the stating of any particular threshold declare significance is arbitrary (113).

Although much research has investigated parenting and family functioning (15) in relation to child diet, not many studies appear to have used the Parenting Scale (96), and yet this measure yielded notable results; perhaps tapping into other aspects of the classic parenting styles with regard to their influence on child diet. Inconsistent findings that were highlighted in this review may be attributed to the use of tools that do not measure important aspects of parenting or feeding practices that impact on child diet. There are few tools that measure parent feeding practices (38, 53, 54, 61, 95). Hughes (54) believed the three earlier measures (53, 61, 95) were limited to measuring mostly a subset of feeding practices (114) and subsequently developed a broader 38-item questionnaire, the Caregivers Feeding Style Questionnaire (CFSQ). Convergent validity for the CFSQ was significantly established against subscales from both the CFQ (95) and the Parenting Dimensions Inventory (PDI; 114) and included two new measures of parent feeding. Differences on these two dimensions of demandingness and responsiveness resulted in four feeding styles: authoritative, authoritarian, indulgent and uninvolved (aligned with the parenting styles identified by Maccoby and Martin; 115). However, it should be noted that Maccoby and Martin considered levels of demandingness and responsiveness in relation to general parenting, where demandingness refers to the extent parents show control, maturity, demands, and supervision whereas responsiveness refers to the extent parents show warmth, acceptance, and involvement. Hughes has operationalised demandingness and responsiveness in the feeding domain where "demandingness refers to ***how much*** the parent encourages eating and responsiveness refers to ***how*** the parents encourage eating" (54). Additionally, this is a self-report questionnaire and is inevitably open to desirability bias

where a parent might report what he/she knows is desirable behaviour, and/or under-reporting of behaviour due to personal/cultural beliefs or perceptions.

Carnell and Wardle looked at multiple measures of parental feeding by comparing the scales of the CFQ, PFQ and PFSQ (53, 61, 95) in relation to child adiposity (55). Results indicate that increased encouragement and pressure to eat were more consistently associated with lower child weight whereas no associations were found with other parental feeding styles. However, Musher-Eizenman and Holub (38) state that the emphasis on controlling practices (pressure and/or restriction) as presented by Hughes et al. (43, 54) and Carnell and Wardle (55) "may have hindered other important constructs from being fully explored" (p. 961) and consider the notion that restriction should be a separate construct. Musher-Eizenman also highlights the importance of parental modelling of healthy foods and food exposure as effective feeding practices, yet note that these constructs are not included in self-reported measures of parental feeding (116-118). These researchers acknowledge the work conducted with parent GNK on food choices (119); however comment that current measures do not examine the extent to which parents try to teach children about nutrition.

To develop their tool Musher-Eizenman and Holub (38) included relevant items from the PFQ (120) and the CFQ (95). Additional items were adapted from a measure of adult restraint (i.e., Dutch Eating Behavior Questionnaire: Restrained Eating Scale; 121); items from their own previous work (122); items that emerged from reviewing the literature; and items suggested by parents throughout the research. New scales to be included were 'restriction for health', 'restriction for weight' and 'food to regulate a child's emotions'. This resulted in the development of a 49-item valid and reliable tool with 12

subscales named the Comprehensive Feeding Practices Questionnaire (CFPQ) which has, since the commencement of this research, been validated with an Australian population (123). Notably one of the subscales is 'teaching about nutrition'; however it contains only three items and the researchers themselves note that internal consistency of items on these scales was low (47). This questionnaire could be further developed by the inclusion of broader GNK as our study indicates that nutrition knowledge has some mediating effect on the influence of parenting on child diet. These measures would also benefit from more careful distinction of restrictive feeding practices associated with healthy boundaries and positive parenting as opposed to those associated with controlling, inflammatory parenting styles.

Limitations of this research include the use of the CDQ in a population younger than was validated, however this tool was believed to be appropriate as it was developed in line the National Dietary Guidelines and validated with an Australian population 4 years and older (88). It should also be noted that participation in this study was voluntary and participants may have had a greater interest in child diet and nutrition. However, we minimised this possibility via stratified SEIFA sampling and providing movie passes for completed questionnaires which may have encouraged participation with lower income families. Another possible limitation, as previously discussed, is that self/parent-report questionnaires could be influenced by social desirability, response bias, and diet recall could be either under and/or over reported if portion size is not accurate. Maternal reports of height and weight measure have also been seen to be unreliable with over estimations recorded (76) which may have impacted on our results. Additionally, the discrepant results obtained with restrictive practices could reflect a need to contextualise these feeding

practices more accurately and identify between negative and positive, or covert and overt, restrictions. For instance restrictive practices such as intentionally keeping some foods out of reach or coercing the child with preferred or treat foods generally produce negative outcomes whereas restriction of availability such as having fruits and healthy snacks readily available and not stocking undesirable foods generally produce positive results. Finally, although our model investigated predictive variables, the study is cross-sectional and doesn't necessarily imply causation nor eliminate all potential confounders.

However, the strengths of this study include the large sample size, and the use of validated questionnaires with well distributed data. Future research should pay attention to the development of more comprehensive tools investigating parenting styles and the family environment/functioning specific to feeding practices, with careful attention to operationalisation of restrictive feeding practices versus laxness, i.e. allowing children to eat whatever ever they like, and investigate these influences longitudinally to further aid in intervention and policy design. A greater understanding of these areas will provide a platform for intervention design and behaviour change in the promotion of healthy habit formation in the early years. Future parenting interventions may benefit from encouraging parents to promote positive and supportive feeding practices in line with authoritative parenting, including positive, warm communication and healthy boundary setting around food and television viewing in conjunction with healthy nutrition education.

4.8 References

1. Australia Co, *Australian National Children's Nutrition and Physical Activity Survey: Main Findings*, 2007, University of South Australia: Canberra.
2. Magarey A, Daniels L. Comparison of Australian and US data on overweight and obesity in children and adolescents. Medical Journal Australia, 2001;175:500-501.
3. Magarey AM, Daniels LA, Boulton TJC. Prevalence of overweight and obesity in Australian children and adolescents: reassessment of 1985 and 1995 data against new standard international definitions. Medical Journal of Australia, 2001;174:561 - 564.
4. Serdula MK, Ivery D, Coates RJ, Freedman DS, Williamson DF, Byers T. Do obese children become obese adults? A review of the literature. Preventive Medicine, 1993;22(2):167-177.
5. Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. Predicting Obesity in Young Adulthood from Childhood and Parental Obesity. New England Journal of Medicine, 1997;337(13):869-873.
6. Magarey AM, Daniels LA, Boulton TJ, Cockington RA. Predicting obesity in early adulthood from childhood and parental obesity. Int J Obes Relat Metab Disord, 2003;27(4):505-513.
7. Edumunds L, Walters E, Elliott E. Evidence based management of childhood obesity. BMJ, 2001;323:916-919.

8. Bronfenbrenner U. Ecology of the family as a context for human development: research perspectives. Developmental Psychology, 1986;22(6):723-742.
9. Davison K, Birch L. Childhood overweight: a contextual model and recommendations for futue research. Obesity, 2001;2:159-171.
10. Baumrind D. Effects of authoritative parental control on child behavior. Child Development, 1966;37:887-907.
11. Patrick H, Nicklas TA. A Review of Family and Social Determinants of Children's Eating Patterns and Diet Quality. Journal of the American College of Nutrition, 2005;24(2):83-92.
12. Campbell KJ, Crawford DA, Ball K. Family food environment and dietary behaviors likely to promote fatness in 5-6 year-old children. International Journal of Obesity, 2006;30(8):1272-1280.
13. Peters J, Sinn N, Campbell K, Lynch J. Parental influences on the diets of 2–5-year-old children: systematic review of interventions. Early Child Development and Care, 2011:1-21.
14. Peters J, Parletta N, Campbell K, Lynch J. Parental influences on the diets of 2-5 year old children: systematic review of qualitative research. Journal of Early Childhood Research, in press.
15. Rhee K. Childhood overwight and the relationship between parent behaviors, parenting style & family functioning. The ANNALS of the American Academy of Political and Social Science, 2008;615(11):12-37.

16. Hesketh KD, Campbell KJ. Interventions to prevent obesity in 0-5 year olds: an updated systematic review of the literature. Obesity, 2010;18(n1s):S27-S35.

17. Pearson N, Biddle S, Gorely T. Family correlates of fruit and vegetable consumption in children and adolescents: a systematic review. Public Health Nutrition, 2009;12(2):267 - 283.

18. Blissett J, Haycraft E. Are parenting style and controlling feeding practices related? Appetite, 2008;50(2-3):477-85.

19. Blissett J, Meyer C, Haycraft E. Maternal and paternal controlling feeding practices with male and female children. Appetite, 2006;47(2):212-219.

20. Drucker RR, Hammer LD, Agras WS, Bryson S. Can mothers influence their child's eating behavior? Journal of Developmental & Behavioral Pediatrics, 1999;20(2):88-92.

21. Etelson D, Brand DA, Patrick PA, Shirali A. Childhood obesity: do parents recognize this health risk? Obesity, 2003;11(11):1362-1368.

22. Faith MS, Berkowitz RI, Stallings VA, Kerns J, Storey M, Stunkard AJ. Parental feeding attitudes and styles and child body mass index: prospective analysis of a gene-environment interaction. Pediatrics, 2004;114(4):e429-e436.

23. Fisher JO, Birch LL. Restricting access to foods and children's eating. Appetite, 1999;32(3):405-419.

24. Fisher JO, Birch LL. Restricting access to a palatable food affects children's behavioural response, food selection and intake. American Journal of Clinical Nutrition, 1999;69:1264 - 1272.

25. Galloway AT, Fiorito LM, Francis LA, Birch LL. `Finish your soup': counterproductive effects of pressuring children to eat on intake and affect. Appetite, 2006;46(3):318-323.

26. Hackie M, Bowles CL. Maternal perception of their overweight children. Public Health Nursing, 2007;24(6):538-546.

27. Haycraft EL, Blissett JM. Maternal and paternal controlling feeding practices: reliability and relationships with BMI. Obesity, 2008;16(7):1552-1558.

28. Kasemsup R, Reicks M. The relationship between maternal child-feeding practices and overweight in Hmong preschool children. Ethnicity & Disease, 2006;16(1).

29. Keller KL, Pietrobelli A, Johnson SL, Faith MS. Maternal restriction of children's eating and encouragements to eat as the 'non-shared environment': a pilot study using the Child Feeding Questionnaire. International Journal of Obesity, 2006;30(11):1670-1675.

30. Liem DG, Mars M, De Graaf C. Sweet preferences and sugar consumption of 4- and 5-year-old children: role of parents. Appetite, 2004;43(3):235-245.

31. Olvera N, Power TG. Parenting styles and obesity in Mexican American children: a longitudinal study. Journal of Pediatric Psychology, 2009:jsp071.

32. Brewis A, Gartin M. Biocultural construction of obesogenic ecologies of childhood: parent-feeding versus child-eating strategies. American Journal of Human Biology, 2006;18(2):203-13.

33. Birch LL, Fisher JO. Mothers' child-feeding practices influence daughters' eating and weight. American Journal of Clinical Nutrition, 2000;71(5):1054-1061.

34. Birch LL, Fisher JO, Davison KK. Learning to overeat: maternal use of restrictive feeding practices promotes girls' eating in the absence of hunger. American Journal of Clinical Nutrition, 2003;78(2):215-220.

35. Fisher JO, Birch LL. Parents' restrictive feeding practices are associated with young girls' negative self-evaluation of eating. Journal of the American Dietetic Association, 2000;100(11):1341-1346.

36. Johannsen DL, Johannsen NM, Specker BL. Influence of parents' eating behaviors and child feeding practices on children's weight stuatus. Obesity, 2006;14(3):431-439.

37. Montgomery C, Jackson DM, Kelly LA, Reilly JJ. Parental feeding style, energy intake and weight status in young Scottish children. British Journal of Nutrition, 2006;96(6):1149-53.

38. Musher-Eizenman D, Holub S. Comprehensive feeding practices questionnaire: validation of a new measure of parental feeding practices. Journal of Pediatric Psychology, 2007;32(8):960-972.

39. Saxton J, Carnell S, van Jaarsveld CHM, Wardle J. Maternal education is associated with feeding style. Journal of the American Dietetic Association, 2009;109(5):894-8.

40. Anderson CB, Hughes SO, Fisher JO, Nicklas TA. Cross-cultural equivalence of feeding beliefs and practices: The psychometric properties of the child feeding questionnaire among Blacks and Hispanics. Preventive Medicine, 2005;41(2):521-531.

41. Ariza A, Chen E, Binns H, Christoffel K. Risk factors for overweight firve-to-six year old Hispanic-American children: a pilot study. Journal of Urban Health, 2004;81(1):150-161.

42. de Lauzon-Guillain B, Musher-Eizenman D, Leporc E, Holub S, Charles MA. Parental feeding practices in the United States and in France: relationships with child's characteristics and parent's eating behavior. Journal of the American Dietetic Association, 2009;109(6):1064-9.

43. Hughes SO, Anderson CB, Power TG, Micheli N, Jaramillo S, Nicklas T. Measuring feeding in low-income African-American and Hispanic parents. Appetite, 2006;46(2):215-223.

44. Joyce JL, Zimmer-Gembeck MJ. Parent feeding restriction and child weight. The mediating role of child disinhibited eating and the moderating role of the parenting context. Appetite, 2009;52(3):726-734.

45. Kaiser LL, Melgar-Quinonez HR, Lamp CL, Johns MC, Harwood JO. Acculturation of Mexican-American mothers influences child feeding strategies. Journal of the American Dietetic Association, 2001;101(5):542-7.

46. Kroller K, Warschburger P. Associations between maternal feeding style and food intake of children with a higher risk for overweight. Appetite, 2008;51(1):166-172.

47. Musher-Eizenman DR, de Lauzon-Guillain B, Holub SC, Leporc E, Charles MA. Child and parent characteristics related to parental feeding practices. a cross-cultural examination in the US and France. Appetite, 2009;52(1):89-95.

48. Myers S, Vargas Z. Parental perceptions of the preschool obese child. Pediatric Nursing, 2000;26(1):23.

49. Patrick H, Nicklas TA, Hughes SO, Morales M. The benefits of authoritative feeding style: caregiver feeding styles and children's food consumption patterns. Appetite, 2005;44(2):243-249.

50. Powers SW, Chamberlin LA, van Schaick KB, Sherman SN, Whitaker RC. Maternal feeding strategies, child eating behaviors, and child BMI in Llw-Income African-American preschoolers. Obesity, 2006;14(11):2026-2033.

51. Seth JG, Evans AE, Harris KK, Loyo JJ, Ray TC, Spaulding C, Gottlieb NH. Preschooler feeding practices and beliefs: differences among Spanish- and English-speaking WIC clients. Family & Community Health, 2007;30(3):257-70.

52. Spurrier NJ, Magarey AA, Golley R, Curnow F, Sawyer MG. Relationships between the home environment and physical activity and dietary patterns of preschool children: a cross-sectional study. International Journal of Behavioral Nutrition and Physical Activity, 2008;5(31).

53. Wardle J, Sanderson S, Guthrie CA, Rapoport L, Plomin R. Parental feeding style and the inter-generational transmission of obesity risk. Obesity Research, 2002;10(6):453-62.

54. Hughes S, Power T, Fisher J, Mueller s, Nicklas T. Revisiting a neglected construct: parenting styles in a child-feeding context. Appetite, 2005;44:83-92.

55. Carnell S, Wardle J. Associations between multiple measures of parental feeding and children/'s adiposity in United Kingdom preschoolers. Obesity, 2007;15(1):137-144.

56. Colavito EA, Guthrie JF, Hertzler AA, Webb RE. Relationship of diet-health attitudes and nutrition knowledge of household meal planners to the fat and fiber intakes of meal planners and preschoolers. Journal of Nutrition Education, 1996;28(6):321-328.

57. Hudson C, Craig Stotts R, Pruett J, Cowan P. Parents' diet-related attitudes and knowledge, family fast food dollars spent, and the relation to BMI and fruit and vegetable intake of their preschool children. Southern Online Journal of Nursing Research, 2005;6(5):1-23.

58. Hirschler V, Gonzalez C, Talgham S, Jadzinsky M. Do mothers of overweight Argentinean preschool children perceive them as such? Pediatric Diabetes, 2006;7(4):201-204.

59. Arredondo EM, Elder JP, Ayala GX, Campbell N, Baquero B, Duerksen S. Is parenting style related to children's healthy eating and physical activity in Latino families? Health Education Research, 2006;21(6):862-871.

60. Baughcum AE, Chamberlin LA, Deeks CM, Powers SW, Whitaker RC. Maternal perceptions of overweight preschool children. Pediatrics, 2000;106(6):1380-1386.

61. Baughcum AEMS, Powers SWPD, Johnson SBPD, Chamberlin LAMERD, Deeks CMMERD, Jain AMD, Whitaker RCMDMPH. Maternal feeding practices and

beliefs and their relationships to overweight in early childhood. Journal of Developmental & Behavioral Pediatrics, 2001;22(6):391-408.

62. Brown K, Ogden J, Vogele C, E. Leigh G. The role of parental control practices in explaining children's diet and BMI. Appetite, 2008;50:252-259.

63. Cooke LJ, Wardle J, Gibson EL, Sapochnik M, Sheiham A, Lawson M. Demographic, familial and trait predictors of fruit and vegetable consumption by pre-school children. Public Health Nutrition, 2003;7(2):295-302.

64. Faith MS, Dennison BA, Edmunds LS, Stratton HH. Fruit juice intake predicts increased adiposity gain in children from low-income families: weight status-by-environment interaction. Pediatrics, 2006;118(5):2066-75.

65. Hughes SO, Shewchuk RM, Baskin ML, Nicklas TA, Qu H. Indulgent feeding style and children's weight status in preschool. Journal of Developmental and Behavioral Pediatrics, 2008;29(5):403-410.

66. Jiang J, Rosenqvist U, Wang H, Greiner T, Ma Y, Toschke AM. Risk factors for overweight in 2- to 6-year-old children in Beijing, China. International Journal of Pediatric Obesity, 2006;1(2):103-108.

67. Stolley MR, Fitzgibbon ML, Dyer A, Van Horn L, KauferChristoffel K, Schiffer L. Hip-Hop to Health Jr., an obesity prevention program for minority preschool children: baseline characteristics of participants. Preventive Medicine, 2003;36(3):320-9.

68. Wardle J, Carnell S, Cooke L. Parental control over feeding and children's fruit and vegetable intake: how are they related? Journal of the American Dietetic Association, 2005;105(2):227-32.

69. Hoerr S, Hughes S, Fisher J, Nicklas T, Liu Y, Shewchuk R. Associations among parental feeding styles and children's food intake in families with limited incomes. International Journal of Behavioral Nutrition and Physical Activity, 2009;6(1):55.

70. Rhee K, Lumeng J, Appulgliese D, Kaciroti N, Bradley R. Parenting styles and overweight status in first grade. Pediatrics, 2006;117(6):2047-2054.

71. Faith MS, Heshka S, Keller KL, Sherry B, Matz PE, Pietrobelli A, Allison DB. Maternal-child feeding patterns and child body weight: findings from a population-based sample. Archives of Pediatrics & Adolescent Medicine, 2003;157(9):926-932.

72. Gubbels JS, Kremers SPJ, Stafleu A, Dagnelie PC, Goldbohm RA, de Vries NK, Thijs C. Diet-related restrictive parenting practices. Impact on dietary intake of 2-year-old children and interactions with child characteristics. Appetite, 2009;52(2):423-429.

73. Nanney MS, Johnson S, Elliott M, Haire-Joshu D. Frequency of eating homegrown produce is associated with higher intake among parents and their preschool-aged children in rural Missouri. Journal of the American Dietetic Association, 2007;107(4):577-84.

74. Strauss RS, Knight J. Influence of the home environment on the development of obesity in children. Pediatrics, 1999;103(6):e85.

75. Wake M, Nicholson J, Hardy P, Smith K. Preschooler obesity and parenting styles of mothers and fathers: Australian national population study. Pediatrics, 2006;120:1520-1527.

76. Dubois L, Girad M. Accuracy of maternal reports of pre-schoolers' weights and heights as estimates of BMI values. International Journal of Epidemiology, 2007;36(1):132-138.

77. Huybrechts I, Himes J, Ottevaere C, De Vriendt T, De Keyzer W, Cox B, Van Trimpont I, De Bacquer D, De Henauw S. Validity of parent-reported weight and height of preschool children measured at home or estimated without home measurement: a validation study. BMC Pediatrics, 2011;11(1):63.

78. Guyll M, Spoth R, Redmond C. The effects of incentives and research requirements on participation rates for a community-based preventive intervention research study. Journal of Primary Prevention, 2003;24(1):25-41.

79. Sanson A, Nicholson J, Ungerer J, Zubrick S, Wilson K, Ainley J, Berthelsen D, Bittman M, Broom D, Harrison L, Rodgers B, M, Silburn S, Strazdins L, Vimpani G, Wake M, *Introducing the Longitudinal Study of Australian Children.LSAC discussion paper no. 1.*, 2002, Australian Institute of Family Studies: Melbourne.

80. Corsini N, Danthiir V, Kettler L, Wilson C. Factor structure and psychometric properties of the Child Feeding Questionnaire in Australian preschool children. Appetite, 2008;51(3):474-481.

81. Ayala GX, Rogers M, Arredondo EM, Campbell NR, Baquero B, Duerksen SC, Elder JP. Away-from-home food intake and risk for obesity: examining the influence of context. Obesity, 2008;16(5):1002-1008.

82. Perry C, Stone E, Parcel G, Ellison R, Nader P, Webber L, Luipker R. School-based cardiovascular health promotion: the Child and Adolescent Trial for Cardiovascular Health (CATCH). Journal of School Health, 1990;60(8):406-413.

83. Luepker R, Perry C, McKinlay S, Nader P, Parcel G, Stone E, Webber L, Elder J, Feldman H, Johnson C, Kelder S, Wu M. Outcomes of a field trial to improve children's dietary patterns and physical activity. Journal of the American Medical Association, 1996;275(10):768-776.

84. Weber TK, Speridiao PdGL, Sdepanian VL, Neto UF, de Morais MB. The performance of parents of children receiving cow's milk free diets at identification of commercial food products with and without cow's milk. Jornal de Pediatria, 2007;83(5):459-64.

85. MacCallum RC, Browne MW, Sugawara HM. Power analysis and determination of sample size for covariance structure modeling. Psychological Methods, 1996;1(2):130-149.

86. Variyam JN. Overweight children: is parental nutrition knowledge a factor? Food Review, 2001;24(2):18.

87. Goodman E, Hinden BR, Khandelwal S. Accuracy of teen and parental reports of obesity and body mass index. Pediatrics, 2000;106(1):52.

88. Magarey A, Golley R, Spurrier N, Goodwin E, Ong F. Reliability and validity of the Children's Dietary Questionnaire: a new tool to measure children's dietary patterns. International Journal of Pediatric Obesity, 2009;4(4):257-265.

89. McGowan L, Croker H, Wardle J, Cooke LJ. Environmental and individual determinants of core and non-core food and drink intake in preschool-aged children in the United Kingdom. European Journal of Clinical Nutrition, 2012.

90. Campbell K, Hesketh K, Silverii A, Abbott G. Maternal self-efficacy regarding children's eating and sedentary behaviours in the early years: Associations with children's food intake and sedentary behaviours. International Journal of Pediatric Obesity, 2010;5(6):501-508.

91. Byers T, Treiber F, Gunter E, Coates R, Sowell A, Leonard S, Mokdad A, Jewell S, Miller D, Serdula M, Strong W. The accuracy of parental reports of their children's intake of fruits and vegetables: validation of a food frequency questionnaire with serum levels of carotenoids and vitamins C, A, and E. Epidemiology, 1993;4(4):350-355.

92. Wyse R, Campbell E, Nathan N, Wolfenden L. Associations between characteristics of the home food environment and fruit and vegetable intake in preschool children: A cross-sectional study. BMC Public Health, 2011;11(1):938.

93. Wyse R, Wolfenden L, Campbell E, Brennan L, Campbell K, Fletcher A, Bowman J, Heard T, Wiggers J. A cluster randomised trial of a telephone-based intervention for parents to increase fruit and vegetable consumption in their 3- to 5-year-old children: study protocol. BMC Public Health, 2010;10(1):216.

94. Wyse R, Wolfenden L, Campbell E, Campbell K, Brennan L, Fletcher A, Bowman J, Heard T, Wiggers J. A pilot study of a telephone-based parental intervention to increase fruit and vegetable consumption in 3–5-year-old children. Public Health Nutrition, 2011;14(12):2245-2253.

95. Birch LL, Fisher JO, Grimm-Thomas K, Markey CN, Sawyer R, Johnson SL. Confirmatory factor analysis of the Child Feeding Questionnaire: a measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. Appetite, 2001;36(3):201-210.

96. Arnold DS, O'leary SG, Wolff LS, Acker MM. The parenting scale: a measure of dysfuncitonal parenting in discipline situations. Psychological Assessment, 1993;5(2):137-144.

97. Irvine A, Blair, Biglan A, Smolkowski K, Ary D. The value of the Parenting Scale for measuring the discipline practices of parents of middle school children. Behaviour Research and Therapy, 1999;37:127-142.

98. Harvey E, Danforth JS, Ulaszek WR, Eberhardt TL. Validity of the parenting scale for parents of children with attention-deficit/hyperactivity disorder. Behaviour Research and Therapy, 2001;39(6):731-743.

99. Baumrind D. Authoritarian vs. authoritative parental control. Adolescence, 1968;3:255-272.

100. Reitman D, Rhode P, Hupp S, Altobello C. Development and validation of the Parentalo Authority Questionnaire - Revised. Journal of Psychopathology and Behavioural Assessment, 2002;24(2):119-127.

101. Buri JR. Parental Authority Questionnaire. Journal of Personality Assessment, 1991;57(1):110.

102. Hendrie G, Cox D, Coveney J. Validation of the General Nutrition Knowledge Questionnaire in an Australian community sample. Nutrition and Dietitics, 2008;65(1):72-77.

103. Parmenter, Wardle J. Development of a general nutrition knowledge questionnaire for adults. European Journal of Clinical Nutrition, 1999;53:298-308.

104. Efron B. Nonparametric estimates of standard error: The jackknife, the bootstrap and other methods. Biometrika, 1981;68(3):589-599.

105. Schafer J, *Analysis of Incomplete Multivariate Data*1997, London: Chapman & Hall.

106. Blaylock J, Variyam JN, Lin B, *Maternal nutrition knowledge and children's diet quality and nutrient intakes*, 1999.

107. Variyam JN, Blaylock J, Lin B-H, Ralston K, Smallwood D. Mother's nutrition knowledge and children's dietary intakes. American Journal of Agricultural Economics, 1999;81(2):373-384.

108. Gillman MW, Rifas-Shiman SL, Frazier AL, Rockett HRH, Camargo CA, Jr., Field AE, Berkey CS, Colditz GA. Family dinner and diet quality among older children and adolescents. Archives of Family Medicine, 2000;9(3):235-240.

109. Neumark-Sztainer D, Hannan PJ, Story M, Croll J, Perry C. Family meal patterns: Associations with sociodemographic characteristics and improved dietary intake

among adolescents. Journal of the American Dietetic Association, 2003;103(3):317-322.

110. Videon TM, Manning CK. Influences on adolescent eating patterns: the importance of family meals. Journal of Adolescent Health, 2003;32(5):365-373.

111. Salmon J, Campbell K, Crawford D. Television viewing habits associated with obesity risk factors: a survey of Melbourne schoolchildren. Medical Journal Australia, 2006;184(2):64-67.

112. Neville L, Thomas M, Bauman A. Food advertising on Australian television: the extent of children's exposure. Health Promotion International, 2005;20(2):105-112.

113. Gellman A, Stern H. The difference between "Significant" and "Not Significant" is not itself statistically significant. American Statisticial Association, 2006;60(4):328-331.

114. Power T, *Parenting dimensions inventory (PDI-S): a research manual* in *Unpublished manuscript*2002: Washington State University.

115. Maccoby E, Martin J, *Socialization in the context of the family: parent-child interaction*, in *Handbook of child psychology*, P. Mussen, Editor 1983, John Wiley & Sons: New York. p. 1-102.

116. Wardle J, Cooke LJ, Gibson L, Sapochnik M, Sheiham A, Lawson M. Increasing children's acceptance of vegetables: a randomized trial of parent-led exposure. Appetite, 2003;40(2):155-162.

117. Hendy HM, Raudenbush B. Effectiveness of teacher modeling to encourage food acceptance in preschool children. Appetite, 2000;34:61 - 76.

118. Lee Y, Birch L. Diet quality, nutrient intake, weight status, and feeding environments of girls meeting or exceeding the American Academy of Pediatrics recommendations for total dietary fat. Minerva Pediatrica, 2002;54:179-186.

119. Gibson E, Wardle J, Watts C. Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. Appetite, 1998;31:205-228.

120. Baughcum AE, Burklow KA, Deeks CM, Powers SW, Whitaker RC. Maternal feeding practices and childhood obesity: a focus group study of low-income mothers. Archives of Pediatrics & Adolescent Medicine, 1998;152(10):1010-4.

121. van Strien T, Frijters JER, Bergers GPA, Defares PB. The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional and external eating behavior. International Journal of Eating Disorders, 1986;5:747 - 755.

122. Musher-Eizenman D, Holub S, *Children's eating in the absence of hunger: the role of restrictive feeding practices,* in *Childhood Obesity and health Research*, R. Flamenbaum, Editor 2006, Nova Science Publishers: New York. p. 135-156.

123. Kiernan M, *Construct validation of the Comprehensive Feeding Practices Questionnaire (CFPQ) in an Australian sample*, in *ACSPRI Conference 2010*2010: North America.

CHAPTER 5
A COMPARISON OF PARENTAL VIEWS OF THEIR PRE-SCHOOL CHILDREN'S 'HEALTHY' VERSUS 'UNHEALTHY' DIETS: A QUALITATIVE STUDY

This chapter is a co-authored manuscript prepared for publication and submitted to the Child: Care, Health & Development on 08-08-11. Please refer to Appendix H for author contributions

Peters J, Parletta N, Campbell K, Lynch J. A comparison of parental views of their preschool children's 'healthy' versus 'unhealthy diets: A qualitative study (under review).

This manuscript provides an account of discussion group sessions involving parents of 2–5 year old children, discussing the influence of parent feeding practices, and parent nutrition knowledge, on child diet and food intake or weight. Comparisons are made between parents of children with higher fruit and vegetable intakes and those of children with lower fruit and vegetable intakes.

All authors devised the idea for this manuscript. J Peters and N Parletta conducted the focus groups and J Peters analysed the data. J. Peters prepared and edited the manuscript; N. Parletta, K. Campbell and J. Lynch edited the manuscript.

.

5.1 Abstract

Despite recommended dietary guidelines, recent population surveys have recorded low fruit and vegetable and high non-core food consumption by Australian children. Young children rely largely on parents/primary carers to provide their diets. Therefore, pre-school age could be an optimal time to promote and encourage healthy child eating behaviours.

Contributing factors that influence a child's eating behaviour and diet in the home environment include parenting style, parent feeding practices and attitudes, parent general nutrition knowledge, and home food availability. The aim of this qualitative research was to explore perceptions, perceived influences, facilitators and barriers when providing healthy foods for young children via focus groups with parents of children with 'healthy' versus 'unhealthy' diets.

Similarities across both groups included the intention to provide healthy food for their children with most parents involving their child in some level of meal preparation and most families dining together for the evening meal. Main points of difference included parents in the 'healthy' group having more partner support in relation to child diet; many parents in the 'healthy' group considered their child's daily physical activity when deciding on appropriate food options; and a majority of parents in the 'unhealthy' group attempted to disguise vegetables and healthy foods for their child and reported experiencing increased levels of stress regarding their child's fussy eating.

Key words: parenting, child diet, nutrition knowledge

5.2 Introduction

The deleterious effects of diets that are energy-dense and poor in essential nutrients are increasingly prominent, both in the impact on obesity prevalence as well as general health and wellness (cognitive and physical performance and attention) at all ages (Bellisle, 2004). Results from the Australian National Nutrition Survey recently recorded low intakes of fruit and vegetable and high intakes of non-core (discretionary) foods in children (Commonwealth of Australia, 2007) in contrast to recommended dietary guidelines. Higher prevalence of overweight and obesity in 2-5 year olds has also be recorded in Australia when compared internationally (Magarey & Daniels, 2001; Magarey, et al., 2001) .

Evidence suggests that early food exposure may predict food preferences in adolescence (Skinner, et al., 2002) with increased prevalence of poor dietary habits tracking from early childhood into adulthood (Gunnell, et al., 1998; Ritchie et al., 2001). It is also well understood that existing and habitualised behaviours are generally difficult to change (Jager, 2003). An expanding body of research suggests the importance of both early intervention (Wen, De Domenico, et al., 2009; Worobey, et al., 2004) and the role of effective parent feeding practices in promoting healthy diets (Birch, 2006; Ventura & Birch, 2008). Therefore, healthy eating behaviours should be encouraged and nurtured early in life.

Young children primarily rely on parents or primary carers to provide for their diets (family food environment; Campbell & Crawford, 2001). Accordingly, the optimal time to promote and encourage healthy child eating behaviours is via parents during the formative

pre-school years (Fisher, et al., 2002). Contributing factors that influence a child's home food environment, and subsequently diet, include style of parenting, parent feeding practices and attitudes, parent general nutrition knowledge, parent role-modelling of eating behaviour, and food availability (Blaylock, et al., 1999; Campbell, et al., 2010; Fisher & Birch, 2002; Gibson, et al., 1998; Hubbs-Tait, et al., 2008; Hughes, et al., 2005). Some evidence supports the notion that effective parenting and nutrition knowledge may optimise positive feeding practices and promote healthy diets. For example, limiting consumption of specific foods may be counterproductive (Campbell et al., 2010); food used as a contingency for reward has been associated with reduced preference for the contingency food whereas the restricted or reward food has been associated with increased preference (Birch, et al., 1984; Newman & Taylor, 1992).

Our own review of interventions looking at parental influence on diets of two-five year old children found that while 17 interventions seeking to improve child diet and/or BMI have focussed on parents of this age group, very few of these were ranked as high quality studies. This and other research suggests that more work needs to be done to identify effective strategies for parents to encourage healthy eating in their young children (Hesketh, et al., 2005; Peters, et al, 2011). A concurrent review of qualitative research also evaluated parenting practices; parent's nutrition knowledge and child diet, and identified common barriers to providing healthy diets for young children (Peters, et al., in press). These barriers included the availability of fast food options that were considered to be satiating and value for money, compared to a common perception of healthier foods costing

more and not satisfying the appetite; cultural differences in attitudes, perceptions and concerns regarding the promotion of a healthy child diet; variations in the interpretation and definition of 'health'; misconceptions that a heavier child is a healthier child and therefore indicative of good parenting; that the child is predisposed to overweight/obesity and/or would outgrow the condition; that picky eaters would not eat enough, and that denying a request for food is tantamount to starving the child.

Additionally, the abovementioned review (Peters et al., in press) identified a lack of qualitative research with parents of young children evaluating parental influences on children's diets. Therefore, the aim of this study was to explore this via semi-structured focus group interviews with parents of children aged 2-5 years, contrasting and comparing responses from parents of children identified as having 'healthy' and 'unhealthy' diets, and included discussion on 1) parent perceptions of effective feeding practices; 2) parental views on the influences of home food availability and accessibility; 3) understanding of healthy child diet; and 4) facilitators and barriers to providing healthy foods for young children.

5.3 Method

5.3.1 Sample selection

The target group was parents of 2-5 year old children. Purposive sampling techniques were used to recruit a subset of parents who consented to future contact in a previous research project (Chapter 4, under review). Parents were selected based on their child's fruit

and vegetable consumption recorded in Section A of the Children's Dietary Questionnaire (Magarey, et al., 2009) and based on Australian dietary guidelines (National Health and Medical Research Council, 2003; Smith, et al., 1998). The fruit and vegetable subscale is deemed to be both reliable and valid in a wide range of settings (Magarey et al., 2009) and was completed by parents in the original study. Parents of children who recorded high scores in fruit (*M*=3.4) and vegetable (*M*=5) consumption were designated as the 'healthy' group and parents of children who recorded low scores in fruit (*M*=1.4) and vegetable (*M*=1.6) consumption as the 'unhealthy' group. This methodology was based on the notion of what can be learnt by comparing good versus poor programs (Patton, 2005). We wanted to ascertain influencing factors with parents of children who consumed more fruit and vegetables per day compared with parents of children who consumed less.

Other information of interest from the original study was parental scores on the General Nutrition Knowledge Questionnaire (GNKQ; Hendrie, et al., 2008). This tool is an Australian adaptation of the original GNKQ (Parmenter & Wardle, 1999), with high overall internal reliability of the questionnaire items (Cronbach's alpha = 0.92) and test-retest reliability (r = 0.87). The modified version of the questionnaire showed good reliability and validity in an Australian context (Hendrie et al., 2008, p. 72).

Invitation to participate was by e-mail or postal mail and the package included information regarding group facilitation, availability time sheet, written consent to record sessions, and an offer of a double movie pass as a token of appreciation for the time involved. Interested parents either contacted the researcher or were contacted during follow-up calls at which time three sessions each were scheduled for the 'healthy' diet

group (*n*=10) and the 'unhealthy' diet group (*n*=10). Ethics approval was obtained from the University of South Australia's Human Research Ethics Committee.

5.3.2 Data collection

The semi-structured focus group qualitative technique enabled the researchers (JP & NP) to comprehensively explore parental perception of a healthy diet and factors that influenced the provision of healthy food for their young children (2-5 years). Primary researcher (JP) injected the initial discussion topic with secondary/supervisory researcher (NP) prompting discussion.

Discussion topics and question guides were developed and trialled in two mock sessions, conducted with university staff who had children aged 2-5 (n = 5), to evaluate comprehension and suitability of discussion topics and probing techniques. The group discussions sought to identify perceived facilitators and/or barriers to providing what participants perceived to be a healthy diet for 2-5 year old children. Each session employed a semi-structured format based on predetermined areas of exploration and discussion prompters.

All group sessions opened with round table introductions followed by the primary researcher commencing the interview with the generic question 'how important is nutrition to you when preparing or providing food for your child?' With no set question order discussions were encouraged to evolve and many topics were covered without prompting. However, if discussion ceased prompts were used to generate further input such as 'what is

their reaction to this?' and 'what do you do if she doesn't eat what you give her?' Once a topic ended and did not naturally evolve into another area of discussion, open ended questions were inserted into the conversation such as: 1) 'What do you think constitutes a healthy diet for your child?'; 2) 'How do you know when your child is hungry or has had enough to eat?'; 3) 'What sort of snack foods do you have available [for the child]?; 4) 'Where does your main source of nutrition information come from?'; and 5) 'What do you think would be the biggest hurdle or barrier when providing healthy foods if you think there is one?'. Prompts in relation to feeding practices included 1) 'Do you use food to shape the behaviour of your child (as a reward, to placate or bribe etc.?)'; 2) Do you encourage your child to eat everything on their plate at mealtimes?'; and 3) 'How much choice do you give your child and what sort of choices are they?'. When all discussion topics had been exhausted an opportunity was provided for participants to add any other relevant information.

All sessions were conducted by the same researchers (JP & NP). Participant numbers in each group ranged from 2-5 and lasted between 45-85 minutes. Focus groups were recorded and transcribed verbatim. Participating parents received a double movie pass and a copy of 'The Australian Guide to Healthy Eating' on completion.

5.3.3 Data analysis

NVivo 9 qualitative data analysis software ("NVivo qualitative data analysis software," 2010) was used to identify, organize and code the data according to an open

coding method of thematic analysis where both pre-determined and emerging concepts and themes are ‘induced’ from the transcripts (Ezzy, 2002, p. p. 88). Focus group transcripts were systematically scrutinized for key concepts and themes by JP and verified by NP with any discrepancies discussed and resolved.

5.4 Results

A total of 20 parents (17 mothers and 3 fathers) participated, as detailed in Table 5.1. The ‘healthy’ group consisted of 8 mothers and 2 fathers whereas the ‘unhealthy’ group consisted of 9 mothers and 1 father. Participant ages ranged from 31 to 41 years in the ‘healthy’ group and 24 to 54 years in the ‘unhealthy’ group; household annual incomes were on average $10,000 higher in the ‘healthy’ group ($92,740) with nine families in the ‘unhealthy’ group and all ten in the ‘healthy’ group having at least one parent with a university degree. Based on post group allocation analysis, parents in the ‘healthy’ group scored an average of 4 points higher on the general nutrition knowledge questionnaire (79), and their child’s average fruit and vegetable intakes were both markedly higher (3.4 serves fruit/day and 5 serves veg/day) when compared with the ‘unhealthy’ group (1.4 serves fruit/day and 1.6 serves veg/day). Parents provided child’s height/weight details which were used to calculate BMI (kg/m²) and BMI z-scores (USDA/ARS Children's Nutrition Research Centre; http://www.bcm.edu/cnrc/bodycomp/bmiz2.html). Height and weight of both parents were self-reported and BMI was calculated (www.cdc.gov/). The mean BMI for participating parents and their children’s BMI z-scores were also both higher in the ‘unhealthy’ groups. Based on Australian Bureau Statistics 2006 index for areas ranging

from 1 – most disadvantaged to 10 most advantaged all but one participant was from either high or middle SES (www.abs.gov.au).

Table 5.1 *Parent and child descriptives*

Parent gender	Child gender	Child age	Child BMIz	*Parent age		*Parent Ed		*Parent BMI		SES	Combined Income	Fruit av	Veg av	GNK
Healthy														
Female	Female	4.0	-0.62	39	38	5	6	22.2	24.3	9	110,000	3.57	5.14	86
Female	Male	3.0	2.60	41	45	2	7	27.5	27.8	7	150,000	4.71	7.00	69
Female	Female	3.5	1.24	39	42	7	5	19.5	27.0	8	170,000	3.29	4.43	73
Female	Female	2.0	-0.60	35	31	7	5	19.7	33.2	7	62,000	2.14	4.00	76
Female	Male	3.6	2.00	31	31	7	7	18.6	19.7	9	14,400	3.43	6.71	71
Male	Male	3.0	0.16	38	33	6	7	20.4	20.4	7	40,000	3.43	5.00	91
Male	Male	3.5	-0.25	33	32	7	6	22.2	17.7	6	25,000	2.86	3.14	81
Female	Female	2.0	-3.13	38	40	6	2	30.0	25.7	7	76,000	4.00	8.00	89
Female	Female	3.5	-0.41	38	52	7	7	24.8	22.6	9	145,000	5.14	3.71	75
Female	Female	3.0	-0.21	32	35	5	7	26.4	26.7	5	135,000	3.29	3.43	76
Female	Female	5.0	-1.46	32	35	5	7	26.4	26.7	5	135,000	3.29	3.43	76
Means		3.3	-.06	36	38			23.4	24.7		$92,740	3.4	5	79
Unhealthy														
Female	Male	4.0	-2.36	36	39	6	4	20.5	25.4	9	60,000	2.43	0.57	76
Female	Male	4.0	-0.18	34	36	7	6	21.1	25.4	9	92,000	1.71	1.29	70
Female	Male	3.0	3.58	35	38	6	6	24.2	23.8	9	106,000	1.29	1.43	66
Female	Male	3.0	0.23	38	38	6	6	20.4	23.2	9	160,000	3.00	1.71	78
Female	Male	2.5	-0.17	24	32	6	2	19.1	22.3	4	69,000	1.57	1.57	56
Female	Female	4.8	-1.44	40	52	5	1	41.9	27.7	2	14,400	0.29	0.86	75
Female	Male	4.0	0.17	36	37	6	4	21.2	24.2	5	70,000	1.14	3.00	86
Male	Female	4.0	0.96	54	47	6	5	23.8	17.0	9	120,000	1.29	2.14	78
Female	Female	4.0	0.44	33	34	6	5	21.9	28.7	8	65,000	1.29	2.86	82
Female	Male	3.5	0.95	36	33	7	7	29.8	32.2	7	71,000	0.29	0.57	83
Means		3.68	0.22	36.6	38.6			24.4	25		$82,740	1.4	1.6	75

BMIz = body mass index z-score; Ed = level of education - Parent education was determined by the following seven options: 1)Left school at 15 years or less; 2) Left school after age 15; 3) Left school after age 15 but still studying; 4) Trade/Apprenticeship; 5) Certificate/Diploma (e.g. TAFE); 6) University degree; or 7) Postgraduate degree.; BMI = body mass index; SES = socioeconomic status; Fruit Av = average fruit serves per day; Veg Av = average vegetable serves per day; GNK = general nutrition knowledge score out of 113 (Hendrie et al., 2008)

*NB – in relation to parent age, education & BMI, the 1st column is the participating parent; the 2nd is the other parent,

5.4.1 Themes

Five key themes containing a total of twenty-two sub-themes emerged. Broadly, these were child diet, parent feeding practices, parent general nutrition knowledge, influences on child diet and behaviour with food. Twenty-three concepts were identified as relating to up to two of the five key themes, e.g., the concept of 'disguising food' was relevant to both *parent general nutrition knowledge* and *parent feeding practices* and 'upbringing and extended family attitudes' was relevant to both *influence* and *child diet* (Table 5.2).

Table 5.2 *Concepts and themes*

CONCEPT		**THEME**
Active Kids	Parents are not too concerned about the kids occasionally eating bad foods if they are active kids	GNK
Child Behaviour with food	Child behaviours surrounding food	B
Child diet	Foods the child eats	CD
Child involvement & discussion of food	Parents involving children in shopping, cooking, growing, etc. and discussions on diet and nutrition	B + GNK
Childcare food provision	Child eats at child care and parent knows they have strict standards. Also includes child care contradicting what they represent. E.g. promoting chocolate drives	CD
Conflicting statements	Contradictions during discussion where a parent claims to provide healthy foods only and later reveals providing unhealthy foods	FP
Cultural influence	How culture might influence child diet and/or food provision	I

Disguising food	So children don't really know when they are eating vegetables (because they won't otherwise eat them)	FP + GNK
Evening Meal	Meal time behaviours such as dining together as a family	B + CD
Facilitators and-or barriers to providing healthy food	What helps and what hinders the parent in providing healthy foods, e.g. cost or time involved in preparation, and media and/or marketing on television and at supermarkets aim at children	I
Food rituals	Special behaviours surrounding food that promoted consumption without pressure, such as story telling	B
Fullness	How do you know when your child is hungry or full	CD + FP
Fussy eaters	Food touching or not liking certain textures etc.	CD
Home food availability & accessibility	What foods are available and accessible for the child to help themselves to ... or not	CD + GNK
No means No	When a parents says 'no' do they stick to it or not	FP
Options	Food choices provided to child	FP + CD
Parent feeding practices	Parent behaviours around restriction, coercion, encouragement and exposure including tactics to encourage consumption	FP + GNK
Parent GNK & perception of a healthy diet	Any information supplied on nutrition knowledge and parent perception of healthy or unhealthy diet	GNK
Partners involvement	Help or hindrance- did the partner support primary caregiver provide healthy foods to child	I
Snack foods	What snacks do the children generally eat	CD
Soft drinks & sweet bevs	Behaviours and consumption of soft drinks and sweet beverages	CD
Upbringing & extended family attitudes	The influence of parents' own upbringing and/or how others help or hinder with child diet or parental GNK	I + GNK

GNK - General Nutrition Knowledge; B – Behaviour with food; CD – Child Diet; FP – Parent Feeding Practices (including coercive behaviours, restriction and encouragement and exposure; I - Influences

Responses were grouped as 'Similarities in responses and concerns for child diet and influencing factors' (table 5.3), and 'Difference between group responses' (table 5.4).

Table 5.3 *Similarities in responses and concerns for child diet and influencing factors*

Child diet – both groups claimed to actively provide and promote healthy food choices which included fresh fruit and vegetables
Child involvement and food discussion - 7/10 'healthy' group participants discussed involving children in grocery shopping and/or meal preparation compared with 8/10 unhealthy group participants
Childcare food providers and early school environment –All participants consistently disillusioned with school canteens (including traffic light system) Additional concern caused by class shared lunches and fundraising (chocolate drives and sausage sizzles) Parents commonly believed childcare provided healthy foods and children enjoyed the social experience. Some were even relieved that although the child might not be consuming these foods at home, they were getting a couple of serves at childcare
Cultural differences - discussed in both groups but not perceived to heavily impact on child diet or were in relation to grandparents/in-laws (as described in the Upbringing & extended family section)
Evening Meals – 8/10 in each group regularly dined together for the evening meal
Facilitators - Making meal times a positive experience and routines were commonly discussed, as well as cooking ahead of time, menu planning, and childcare food provision
Barriers - Common responses were time, cost, marketing, extended family and friends, pre/ school environment and lack of organisation
Home food availability & accessibility – All participants claimed to provide healthy food in the home (fruit, vegetables and healthy snacks) for children to independently access
Soft drinks and sweet beverages – only mentioned by a couple of parents between groups who did not provide them in the home or only allowed consumption at parties

Table 5.4 *Differences between group responses*

Concept	'Healthy' Group Response	'Unhealthy' Group Response
Active kids	6/10 parents considered child's daily activity when allowing non-core food	3/10 parents considered child's daily activity when allowing non-core food with one parent allowing junk food earlier in the day rather than later
Child behaviour with food	7/10 parents reported negative physical and/or behavioural consequences after their child consumed non-core food	1/10 reported negative behaviour in relation to non-core food consumption
Child diet*	5/10 parents read food labels 7/10 avoided non-core food	4/10 parents avoided non-core food 7/10 allowed non-core food 7/10 claimed to struggle with their child's diet
Child involvement and food discussion	5/10 parents discussed food likes/dislikes with their child and/or the effect of different foods on the body 4/10 had a vegetable garden which children were involved in maintaining	2/10 parents discussed food likes/dislikes with the child 2/10 had a vegetable garden which children were involved in maintaining
Conflicting information	4/10 parents provided contradicting information regarding child diet, such as not 'forcing' a child to eat, however the alternative was 'straight to bed'	10/10 parents contradicted themselves, such as claiming not to promote non-core food, however later admitting to using these foods as rewards or contingencies
Disguising Food	3/10 parents disguised food, one of which referred to raisins as 'lollies' with two others making bolognaise or patties to mask recognition of ingredients such as vegetables	8/10 regularly disguised food in patties, sauces, and omelettes, hiding spinach in muffins and mixing a white bean paste in tin spaghetti 3/10 described novel ways to serve food to encourage

		consumption, e.g., ‘tiger toast’, cutting sandwiches into shapes and using symbology (refer to broccoli as trees)
Barriers*	Having a busy life and inappropriate options in the school canteen were considered barriers 5/10 parents discussed the frustrating influence of television media and the use of ABC Kids Television characters to promote products (e.g., Dora & Wiggles)	Unsupportive partners in relation to child diet was considered a barrier 4/10 had an issue with television media promoting ABC characters and programs as well as the advertising of fast food outlets
Fullness*	5/10 accepted the child had eaten enough without pressure commonly acknowledging that the child may have consumed enough or on some days were less hungry than on other days	3/10 accepted the child had eaten enough without pressure Encouraging the child to eat rather than waste food was commonly discussed and parents did not trust that the child knew if they were hungry or full
Fussy eaters	7/10 considered their child to be fussy, however most did not ‘stress’ about it	7/10 considered their child to be fussy and 5 reported feeling stressed about it
Home food availability & Accessibility*	6/10 dis-allowed non-core foods at home with the other 4/10 limiting consumption of non-core foods	2/10 dis-allowed non-core foods at home 7/10 claimed to limit non-core foods 3/10 parents indicated that their child frequently ate non-core food
No means No	8/10 said that when they said no, their child knows they mean no	2/10 believed their child accepted ’no’ when they said ‘no’, one of whom said “no means no” because when her daughter won’t eat dinner she knows she won’t get her Freddo Frog chocolates
Food options	6/10 provided meal time and/or snack food options for children to choose from or access	4 /10 provided meal time and/or snack food options for children to choose from or access
Parent	3/10 encouraged their child to always try the foods	7/10 felt ‘stressed’ over their child’s diet

feeding practices	6/10 allowed non-core foods 'sometimes' 5/10 used dessert (2) or activity (3-park, dvd or story) as a contingency to eating more 4/10 would not provide different food options than already provided	7/10 allowed non-core foods 'sometimes' 6/10 used favoured food or activity as a contingency (not necessarily to finish) 5/10 encouraged child to always try foods 3/10 parents would distract the child while eating
Parent GNK & perception of healthy diet -	10/10 discussed the importance of good nutrition 4/10 claimed main source of nutrition knowledge was their up-bringing, one had a medical degree, another had a cholesterol condition which they believed contributed to their diet choice, one was a cancer survivor which promoted nutrition awareness, and his spouse consulted a naturopath, one was a dental hygienist, studying nutrition during university, and one claimed her knowledge resulted from reading and resenting her own unhealthy upbringing 5/10 expressly read labels	8/10 discussed the importance of good nutrition 1/10 "didn't think about it too much" 2/10 believed their child to have a healthy diet 5/10 claimed main source of information on nutrition was mother/parent and one added being environmentally aware (avoid packet foods) contributed towards a healthy diet. One parent was 'big' as a child with parents who overate which she believed contributed to her father's adverse health; therefore she practices healthy behaviours in her home. One parent saw a dietician and one relied on the 'Sneaky Chef' cook book. None discussed reading labels
Partners Involvement	6/10 said partners were supportive 4/10 said partners are soft and give in or they have different views with three of these expressing difficulties with grandparents providing inappropriate foods No-one said their partner did not support them	7/10 said partners express different views about child diet, with 5 of these modelling unhealthy behaviours (eating ice-cream when the child is not permitted to), 4 of whom were expressly unsupportive
Snack foods	7/10 avoided processed foods, preservatives, colouring, etc. and provided fresh options, yogurt or nuts	9/10 reported providing healthy options for child to snack on however 3 said the child would refuse

	5/10 do not allow non-core food snacks 3/10 provided healthy snacks where child could reach One parent included Jatz for snacks and one included whole grain crackers	1/10 said child could access snack food 8/10 appeared to allow non-core food snacks occasionally 6/10 provided rice crackers/sao/jatz/organic corn chips as healthy snacks
Upbringing & Extended family attitudes	8/10 believed they had a healthy nutritious upbringing 2/10 believed their upbringing to be unhealthy with parents overeating and providing junk foods 4/10 struggled with grandparents (in law) providing unhealthy food, one of which claimed her own parents were the same 2/10 said own parents displayed healthy attitudes with grand kids	7/10 believed they had a healthy and nutritious upbringing 3/10 believed their upbringing to be unhealthy 5/10 said their own parents provided unhealthy food to their grandchild 3/10 struggled with grandparents (in law) providing unhealthy foods 2/10 said their own parents provided healthy options

* In addition to Similarities table 4; GNK – General Nutrition Knowledge
Non-core foods are energy dense and nutritionally poor food

Similarities between group responses included all participants believing health and nutrition in child diet to be highly important, claiming to both promote and provide healthy food for their child/ren "*Yeah, my wife and I are both fairly, we like to be really aware of what we're eating and so I guess the same with our children, we want to know what's going in, so we buy mostly fresh food".* However, while half of the participants in the 'healthy' group discussed reading labels *"I always go through the labels and the colours and the preservatives and all of those things and minimal sugar content"*, none in the 'unhealthy' group mentioned reading labels. There was a general consensus from all parents that involving children in food preparation (including shopping, cooking and growing) encouraged/facilitated consumption of healthy foods; *"Just recently I've planted a veggie patch with the kids and trying to read more books about getting them involved in planting and the watering and the whole growing cycle so they could have a bit more of a connection with what will come into their mouths this summer, you know as the salad bowl comes to the table",* and a majority of families dined together for the evening meal *"We always eat together and we always eat the same thing, I never make something separate"*. Interestingly, one of the few parents from the 'unhealthy' group who did not dine at the same time as her children and described her child as a 'picky eater' made the following comment*: "I know with my four year old if he has sort of gone to bed and we're up eating and he comes out and just doesn't feel like going to bed and he sees what we've got, he will almost want to try it, almost always regardless of whether it's stir fry or couscous or... Just the fact that it's on your plate and it is something different. "*

Parents with a child in childcare consistently believed this environment to provide a positive influence on child diet *"It's good, and [child] goes to childcare three days a week, so I*

know he's getting a good variety and range there", whereas parents with children who recently commenced primary school believed the school environment to have a negative influence, particularly in relation to school canteen options: *"but what they (state schools) class as healthy is not"* and " you *can't get a single piece of fruit in the canteen"*. Common facilitators to providing healthy food across groups were identified as the child attending childcare, and being organised with food preparation, cooking ahead of time and/or child routine: *"yes, often on weekends we'll often cook ahead of time so we'll have stuff ready to go"*. Commonly cited barriers included time constraints (to shop and prepare), cost (of healthy foods), negative influence from extended family and friends, lack of organisation, media and advertising, and fundraising drives (chocolate sales, sausage sizzle, etc.). *"Time is probably the main factor, I think, time to cook and plan"*.

Most notable group differences included partner involvement, with the 'healthy' group having supportive partners: *"Probably cause I guess, my wife and I have fairly similar approaches and I guess we try and send the same messages. You don't want to have conflicting messages, you know"*; whereas the 'unhealthy' group predominantly did not appear to have the support of their partners in relation to child diet *"Yeah, I've already set reasonably strict boundaries, but my husband's quite the opposite".* Parents in the 'healthy' group regularly considered their child's daily activity levels and energy expenditure when providing food options *"My daughter generally eats well, so, even though, when she does eat junk food, she gets lots of exercise so it's not that she's putting on weight, she's always really quite active and stuff"*. These parents also appeared less stressed about child diet and

accordingly they appeared to be less concerned with the child refusing food *"they go through their stages when they want some foods and don't want other foods. Nothing really major"*. Furthermore, parents of children with 'healthy' diets also noticed negative physical and behavioural consequences with inadequate diet and therefore appeared to naturally prefer healthy foods *"I have noticed behaviourally they don't cope as well, in their systems, they're healthier and happier when they are eating fresh stuff"*. A majority of these parents also stood their ground when saying 'no' to their child "*whatever you do it's still a no"* whereas only a couple of the parents in the 'unhealthy' group claimed to remain steadfast "*sometimes I will give in, just depending*". Another area of notable difference was 'disguising food' with most parents in the 'unhealthy' group regularly attempting to disguise healthy foods *"making purees, and for the pizza sauce, you mix like a white bean paste in with the pizza sauce, so they don't notice it…blueberry, or spinach and blueberry, and its pureed again, you hide the spinach in it"*, whereas the opposite appeared to be true for the 'healthy' group *"we have the plates there and then put, you know, like salad and fish or whatever might be in the middle and then they get it themselves onto their own plate so sort of then yeah, doing it themselves so they sort of choose how much they eat".* Lastly, half of the 'healthy' group discussed reading labels *"I always go through the labels and the colours and the preservatives and all of those things and minimal sugar content"*, whereas none in the 'unhealthy' group reported reading labels.

5.5 Discussion

To our knowledge the methodology presented here is a unique concept designed to compare and contrast perception of child diet between parents of children with higher and lower fruit and vegetable consumption (‘healthy’ versus ‘unhealthy’). Discussions revealed that participating parents were unanimous in reporting a conscious desire to provide their notions of a healthy diet when preparing and serving food for their children. Other similarities in responses indicate that parents commonly have an interest in involving the child in some level of food provision through preparation and discussion, families predominantly dine together in the evening, they appreciated the positive influence of the childcare environment on their child’s diet and expressed concern about negative school influences (if their child had recently commenced school), and reportedly experienced similar facilitators (such as cooking ahead of time and menu planning) and barriers (such as cost and time involved to prepare nutritious meals) in the provision of healthy and nutritious foods. Despite these similarities, this exploratory study revealed new insights into parent perceptions of child health and nutrition. In addition to the ’unhealthy’ group recording lower general nutrition knowledge scores, parents from this group often disguised healthy foods in an attempt to increase consumption; displayed inconsistent parenting practices in relation to food and feeding and received little support in relation to child diet from their partners, with implications for inconsistent parenting styles and feeding practices within the home environment.

The authoritative style of parenting promotes the concept of clearly defined boundaries and consistency in maintaining those boundaries while also allowing for child autonomy and is identified under the *parent feeding practices* theme. As seen in this sample, the parents who were reportedly firm and consistent with boundaries around food ('no means no') also reported having children with healthier diets (higher intakes of fruit and vegetables). These behaviours are consistent with a more authoritative style of parenting. If parents are inconsistent in setting parameters a child may be more likely to push the boundaries by putting pressure on parents to give in to unhealthy food requests. Previous research has investigated the impact of parenting styles and feeding practices on child diet (Hughes et al., 2006; Hughes et al., 2005), suggesting that authoritative parenting is associated with healthier child diet. Consistent boundaries may be one of the ways in which this is manifested. However, there does not appear to be any research investigating the effect of inconsistent intra-parenting styles and practices within the family home and therefore requires further investigation to identify specific, effective feeding and parenting practices that can be taught to parents to promote healthier diets in their young children.

Another related area of difference between the groups pertained to the theme of *influences* and inter-parental conflict (lack of partner support) when promoting effective child feeding practices. Although relatively small in number, groups of parents whose children scored lowest on the fruit and vegetable consumption measure ('unhealthy' group) revealed that their partners predominantly did not support their quest for healthy child diet and/or modelled undesirable eating behaviours in front of the children. While research has

investigated the impact of parental influence such as restrictive, controlling, and permissive feeding practices (Corsini, et al., 2008; Fisher & Birch, 2002; Hubbs-Tait et al., 2008; Hughes et al., 2005; Ogden, et al., 2006), and the less direct influence of parental role modelling, extended family influence, and parental nutrition knowledge (Blaylock et al., 1999; Campbell, et al, 2006; Doan & Bisharat, 1990; Gibson et al., 1998), the area of inter-parental conflict appears to be a limited area of research in general, and seemingly non-existent in relation to child diet and food provision in the home.

A recent qualitative study identified inter-parental conflict in separated families to be considered by the primary carer as a challenge to their influence on child diet when the child visited the other parent (Glassman, et al., 2011). Participants in this study claimed that "*influence over the child's healthy diet and feeding behaviours was lost when the child visited with the other parent who might not share the same approach to feeding behaviours or healthy food choices*" (p. 12). Furthermore, most of the research evaluating parent perceptions and/or the prioritisation of child diet appears to be based on the response of one rather than both parents (Slater et al., 2010); therefore discrepancies between parents (regardless of living arrangements) are generally not reported. Notably, the mixed messages derived from inconsistent inter-parenting on important issues such as child diet could promote confusion and inconsistent *parent feeding practices*.

Another dominant point of difference between the two groups was in relation to the themes of *general nutrition knowledge* and *parent feeding practices*. Parents in the 'unhealthy' group, with children who recorded the lowest fruit and vegetable intakes, also

recorded a small group average of four points lower in the nutrition knowledge scores (collected from previous research), with discussions revealing that a majority of these parents were inclined to disguise healthy foods in an attempt to increase consumption rather than promote whole foods. Additionally, many parents in the 'unhealthy' group used energy dense, nutritionally poor foods for rewards and contingencies to encourage feeding behaviour. These examples could support the notion of an interaction between poor nutrition knowledge and ineffective parent feeding practices having a negative impact on child diet.

Importantly, a reliance on disguising and mixing foods to promote vegetable consumption (incorporating both GNK and FP themes) is likely to limit opportunities for the child to become familiar with the individual flavours of healthy and nutritious foods. Although research has found disguising vegetables to be a suitable method of increasing vegetable intakes (Spill, et al., 2011) it could be argued that this is not going to assist children to develop a taste for, and therefore actively choose, these healthy options. Although this method of encouraging consumption may not be directly harmful to the child, it may reinforce the notion that healthy foods are not palatable or desirable. Additionally, disguising food may be a parent's desperate attempt at covertly coercing their child to consume fruit and vegetables when they find these items unpalatable. Notably, increased consumption of fruit and vegetables recorded in the 'healthy' group may have been confounded by child liking of fruit and vegetables. It is difficult to tease out whether the child's resistance to fruit and vegetables is innate and therefore leading to the parents' disguising them or whether it is due to parental practices such as forcing consumption of fruit and vegetables or offering treats as

a ‘reward’ for eating fruit and vegetables. Parents who employ these practices mean well, i.e. they aim to provide healthy food to their children, but may be inadvertently discouraging children to form a positive preference for these foods, leading to further ineffective practices such as disguising these healthy foods. However, although disguising foods may be beneficial for short term treatment to increase vegetable intake; this is an area that needs to be explored further and as our study suggests, this should not be relied upon as a sole form of introducing and including vegetables in child diet.

Furthermore, a majority of the ‘unhealthy’ group reported increased levels of stress in relation to the *child diet* theme and various food struggles with their child, whereas the ‘healthy’ group appeared to be more relaxed about their children’s diets. These ‘healthy’ diet parents appeared to have a consensus with their partners in their perception and promotion of suitable and healthy food provisions for their child whilst also allowing ‘sometimes’ foods. Although most of these parents discussed the availability and accessibility of ‘sometimes’ foods, often because their child was very active, they also noted that behaviour, performance and general feeling of wellbeing appeared to be compromised following consumption of unhealthy food, with both parents and children alike appearing to naturally opt for the healthier options. The stress experienced by parents of children in the ‘unhealthy’ group could also be a result of inconsistent boundaries which tend to encourage children to place more pressure on parents, whereas if they know where the boundaries are, i.e. that ‘no means no’, they are less likely to persist.

Finally, a possible contributor to the lower fruit and vegetable consumption of children in the 'unhealthy' group could be related to household income. Annual household income from participants in the 'unhealthy' group averaged $10,000 less than participants of the 'healthy' group. Therefore, availability of fruit and vegetables may be related to budgetary constraints, particularly as increased cost of fresh fruits and vegetables was considered a barrier with both groups.

5.6 Conclusion

It is clear that the parents involved in this research were all motivated to provide healthy and nutritious options for their child. A limitation of this research could be social desirability with parents in the 'healthy' group reporting what they know their child should be consuming rather than the actual consumption. However, we have tried to minimise this by inviting participation based on the questionnaire parents had previously self-reported which is less likely to promote social desirability bias than a face-to-face environment. A majority of the participants were from higher socioeconomic areas with higher levels of education, however, research has found that parental nutrition knowledge can influence young children's healthy food knowledge regardless of socioeconomic status (Zarnowiecki, in press), and less of a socioeconomic gradient for unhealthy food behaviours than previously thought (Zarnowiecki, et al., 2011).

When parents were organising and worrying about food provision for their child's consumption, a lack of knowledge, and inconsistent parenting within the primary home

environment appeared to promote stress for both parents and their children in the 'unhealthy' group. These parents reportedly use negative *feeding practices* to control and encourage consumption (such as using contingency/reward foods and disguising vegetables) whereas parents of the 'healthy' group appeared to promote child autonomy within clearly defined boundaries, which may have promoted positive associations with food. Both groups of parents believed it was important to provide healthy diets for their child; however negative and controlling practices reported by the 'unhealthy' group appeared to be less effective and appeared to be associated with conflict and stress. Positive parenting and feeding practices appeared to be more successful when promoting and encouraging healthy child diet. The information gathered from this exploratory research highlights new and key areas that could be included in future investigations and may assist in the development of interventions to promote healthy diets for young children.

Key Messages

- Positive parenting and feeding practices may be more successful when promoting and encouraging healthy child diet.
- Parental nutrition knowledge and consistent parenting within the primary home environment may promote healthy child diet.
- Disguising foods should not be relied upon as a sole form of introducing and including vegetables in child diet.

5.7 References

Bellisle, F. (2004). Effects of diet on behaviour and cognition in children. *British Journal of Nutrition, 92*(2), S227-S232.

Birch, L. L. (2006). Child feeding practices and the etiology of obesity. *Obesity, 14*(3), 343-344.

Birch, L. L., Marlin, D. W., & Rotter, J. (1984). Eating as the "means" activity in a contingency: effects on young children's food preference. *Child Development, 55*(2), 431-439.

Blaylock, J., Variyam, J. N., & Lin, B. (1999). *Maternal nutrition knowledge and children's diet quality and nutrient intakes* (Food Assistance and Nutrition Research Report No. 1). USDA Economic Research Service. Retrieved from http://www.ers.usda.gov/publications/fanrr1/fanrr1a.pdf.

Campbell, K., Crawford, D., Abbott, G., McNaughton, S., & Ball, K. (2010). Home food availability mediates association between maternal nutritiion knowledge and children's food intakes. [Abstract]. *Australasian Medical Journal, 1*(1), 106.

Campbell, K., & Crawford, D. (2001). Family food environments as determinants of preschool aged children's eating behaviours: implication for obesity prevention policy. *Australian Journal of Nutrition and Dietetics, 58*, 19-25.

Campbell, K. J., Crawford, D. A., & Ball, K. (2006). Family food environment and dietary behaviors likely to promote fatness in 5-6 year-old children. *International Journal of Obesity, 30*(8), 1272-1280.

Campbell, K., Andrianopoulos, N., Hesketh, K., Ball, K., Crawford, D., Brennan, L., Corsini, N., Ti mperio, A. (2010). Parental use of restrictive feeding practices and child BMI z-score. a 3-year prospective cohort study. *Appetite, 55*(1), 84-88.

Commonwealth of Australia. (2007*). Australian National Children's Nutrition and Physical Activity Survey*. Commonwealth Scientific Industrial Research Organisation (CSIRO) Preventative Health National Research Flagship, University of South Australia: Canberra.

Corsini, N., Danthiir, V., Kettler, L., & Wilson, C. (2008). Factor structure and psychometric properties of the Child Feeding Questionnaire in Australian preschool children. *Appetite, 51*(3), 474-481.

Doan, R., & Bisharat, L. (1990). Female autonomy and child nutritional status: The extended-family residential unit in Amman, Jordan. *Social Science & Medicine, 31*(7), 783-789.

Ezzy, D. (2002). *Qualitative Analysis: practice and innovation*. Crows Nest, NSW: Allen and Unwin.

Fisher, J. O., & Birch, L. L. (2002). Eating in the absence of hunger and overweight in girls from 5 to 7 y of age. *American Journal of Clinical Nutrtion, 76*, 226-231.

Fisher, J., Mitchell, D. C., Wright, H. S., & Birch, L. L. (2002). Parental influences on young girls' fruit and vegetable, micronutrient, and fat intakes. *Journal of the American Dietetic Association, 102*(1), 58-64.

Gibson, E., Wardle, J., & Watts, C. (1998). Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. *Appetite, 31*, 205-228.

Glassman, M. E., Figueroa, M., & Irigoyen, M. (2011). Latino Parents' perceptions of their ability to prevent pbesity in their children. *Family & Community Health, 34*(1), 4-16.

Gunnell, D. J., Frankel, . S.J, Nanchahal, K., Peters, T. J., & Smith, G. D. (1998). Childhood obesity and adult cardiovascular mortality: a 57-y follow-up study based on the Boyd Orr cohort. *The American Journal of Clinical Nutrition, 67*(6), 1111-1118.

Hendrie, G., Cox, D., & Coveney, J. (2008). Validation of the General Nutrition Knowledge Questionnaire in an Australian community sample. *Nutrition and Dietitics, 65*(1), 72-77.

Hesketh, K., Waters, E., Green, J., Salmon, L., & Williams J. (2005) Healthy eating, activity and obesity prevention: a qualitative study of parent and child perceptions in Australia. *Health Promototion International, 20*(1): p. 19-26

Hubbs-Tait, L., Kennedy, T. S., Page, M. C., Topham, G. L., & Harrist, A. W. (2008). Parental feeding practices predict authoritative, authoritarian, and permissive parenting styles. *Journal of the American Dietetic Association, 108*(7), 1154-1161.

Hughes, S. O., Anderson, C. B., Power, T. G., Micheli, N., Jaramillo, S., & Nicklas, T. (2006). Measuring feeding in low-income African-American and Hispanic parents. *Appetite, 46*(2), 215-223.

Hughes, S., Power, T., Fisher, J., Mueller, S., & Nicklas, T. (2005). Revisiting a neglected construct: parenting styles in a child-feeding context. *Appetite, 44*, 83-92.

Jager, W. (2003). Breaking 'bad habits': a dynamical perspective on habit formation and change. In L Hendrickx, W Jager & L Steg (Eds.), *Human Decision making and Environmental Perception. Understanding and Assisting Human Decision Making in*

Real-life Settings. Libor Amicorum for Charles Vlek, Groningen: University of Groningen.

Magarey, A., & Daniels, L. (2001). Comparison of Australian and US data on overweight and obesity in children and adolescents. *Medical Journal Australia, 175,* 500-501.

Magarey, A., Daniels, L., & Boulton, T. (2001). Prevalence of overweight and obesity in Australian children and adolescents. assessment of 1985 and 1995 data against new standard worldwide definitions. *Medical Journal Australia, 174,* 561-564.

Magarey, A., Golley, R., Spurrier, N., Goodwin, E., & Ong, F. (2009). Reliability and validity of the Children's Dietary Questionnaire: a new tool to measure children's dietary patterns. *International Journal of Pediatric Obesity, 4*(4), 257-265.

Newman, J., & Taylor, A. (1992). Effect of a means-end contingency on young children's food preferences. *Journal of Experimental Child Psychology, 53,* 200-216.

National Health and Medical Research Council (Australia). (2003). *Dietary guidelines for children and adolescents in Australia [electronic resource]: incorporating the Infant feeding guidelines for health workers* National Health and Medical Research Council, Canberra http://www.nutritionaustralia.org/national/resource/dietary-guidelines-children-and-adolescents.

NVivo qualitative data analysis software; QSR International Pty Ltd. Version 9, 2010.

Ogden, J., Reynolds, R., & Smith, A. (2006). Expanding the concept of parental control: a role for overt and covert control in children's snacking behaviour? *Appetite, 47*(1), 100-106.

Parmenter, K., & Wardle, J. (1999). Development of a general nutrition knowledge questionnaire for adults. *European Journal of Clinical Nutrition, 53*, 298-308.

Patton, M. Q. (2005). Qualitative research. In Brian S Everitt & David C Howell (Eds.), *Encyclopedia of Statistics in Behavioral Science* (Vol. 3, pp. 1633-1636). Chichester, 2005: John Wiley & Sons, Ltd.

Peters, J., Sinn, N., Campbell, K., & Lynch, J. (2011). Parental influences on the diets of 2-5 year old children: Systematic review of interventions. *Early Child Development and Care, 1-21*, DOI:10.1080/03004430.2011.586698.

Peters, J., Parletta, N., Campbell, K., & Lynch, J. (in press). Parental influences of the diets of 2-5 year old children: Systematic review of qualitative research. *Journal of Early Childhood Research*.

Ritchie, L., Ivey, S., Masch, M., Woodward-Lopez, G., Ikeda, J., & Crawford, P. (2001). *Pediatric overweight: A review of the literature*: University of California, Berkley.

Skinner, J., Carruth, B., Bounds, W., & Ziegler, P. (2002). Children's food prefernces: a longitudinal analysis. *Journal of American Dietetic Association, 102*(11), 1638-1647.

Slater, A., Bowen, J., Corsini, N., Gardner, C., Golley, R., & Noakes, M. (2010). Understanding parent concerns about children?s diet, activity and weight status: an important step towards effective obesity prevention interventions. *Public Health Nutrition, 13*(08), 1221-1228.

Smith, A., Kellet, E., & Schmerlaib, Y. (1998). *The Australian guide to healthy eating*.

Spill, M. K., Birch, L. L., Roe, L. S., & Rolls, B. J. (2011). Hiding vegetables to reduce energy density: an effective strategy to increase children's vegetable intake and reduce energy intake. *The American Journal of Clinical Nutrition*.

Ventura, A., & Birch, L. L. (2008). Does parenting affect children's eating and weight status? *International Journal of Behavioral Nutrition and Physical Activity, 5*(1), 15.

Wen, L., De Domenico, M., Elliott, D., Bindon, J., & Rissel, C. (2009). Evaluation of a feasibility study addressing risk factors for childhood obesity through home visits. *Journal of Paediatrics and Child Health, 45*(10), 577-581.

Worobey, J., Pisuk, J., & Decker, K. (2004). Diet and behavior in at-risk children: evaluation of an early intervention program. *Public Health Nursing, 21*(2), 122-127.

Zarnowiecki, D., Dollman, J., & Sinn, N. (2011). *The family environment as mediator of socioeconomic differences in children's dietary behaviours*. [Abstract]. Paper presented at the International Society of Behavior, Nutriton and Physical Activity (ISBNPA) 2011 Annual Meeting. from http://isbnpa.eproceedings.com.au/papers/O32.2.pdf

Zarnowiecki, D., Sinn, N., Petkov, J., & Dollman, J. (In press). Parental nutrition knowledge and attitudes as predictors of 5–6-year-old children's healthy food knowledge. *Public Health Nutrtion*.

CHAPTER 6
GENERAL DISCUSSION

6.1 Overview

This final chapter will draw together the research findings that have resulted from this thesis and present some directions for future research. The chapter will commence with summarising and highlighting the main findings from the studies reported in the previous four chapters regarding the influence of parenting styles, feeding practices and nutrition knowledge on the diets of pre-school aged children, highlighting the important need for further investigation, refinement of research and research tools in this area.

6.2 Summary of the Findings

6.2.1 Systematic review of interventions

Given the importance of the early years in healthy development, the main aim of this chapter was to systematically review the effectiveness of interventions targeting parent nutrition knowledge and/or parenting practices with parents of young children aged two to five years in relation to healthy eating and child diet. From the 17 identified studies, findings highlight a lack of quality research in this area with only one of the studies being allocated a strong quality rating. Five of the included studies measured parenting styles and/or feeding practices and four measured nutrition knowledge/understanding. A majority of the studies (13/17) focused on the promotion of healthy eating rather than weight loss and only three studies

reported longitudinal data post 12 months. Key areas in need of further attention include the promotion of guidelines to inform parents of effective feeding practices and parenting skills to promote healthy child diet.

As outlined in the systematic review of interventions (Chapter 2) standardised guidelines are available to inform parents of what constitutes a healthy child diet; however, no guidelines are available to inform effective parenting and feeding practices. Another key area identified includes the development of new measurement tools to accurately and consistently measure specific parent feeding practices, particularly the different areas of control and restrictive practices considering both the context and delivery of restriction. As discussed in Chapter 4, previous research does not appear to measure the influence of both parent feeding practices together with parent general nutrition knowledge (GNK). The cross-sectional research conducted in Chapter 4 revealed that parent GNK has some small mediating effect on parenting practices and child diet. Given this, it is likely that we have capacity via questionnaires to capture this interaction. Additionally, measuring the influence of parental nutrition knowledge requires further attention, particularly in the context of parenting styles and practices on the diets of 2–5 year old children. Finally, longitudinal research is required to ascertain sustained intervention effectiveness, refinement of interventions to optimise positive outcomes, tracking of future changes and evidence of critical intervention or reinforcement times to promote sustained positive outcomes (Jones et al., 2011).

6.2.2 Systematic review of qualitative research

The main aim of Chapter 3 was to systematically review qualitative research with parents of pre-school aged children specifically targeting parenting practices, parent's nutrition knowledge and child diet with a view to identifying common themes that might influence child diet. With only nine studies meeting the inclusion criteria, and only four of which included a GNK component, this review highlights a need for further investigation into research discussing influential factors on the diets of pre-school aged children with their parents. While all of the included studies were comprised of focus groups discussing a parenting component in relation to child diet, only four of the studies discussed the influence of parental nutrition knowledge or information. The participants across these studies were predominantly Hispanic/Latino and/or African-American from low socioeconomic status (SES) areas; however this provides insight as to the need to address cultural differences and perceptions in intervention design, particularly in culturally diverse countries such as Australia. Main findings from this review include the need to: promote culturally specific research with operationalised definitions; dispel common misconceptions such as 'a heavier child is a healthier child', that a child will outgrow excess weight, and depriving specific food requests is potentially damaging to the child; and to address perceived barriers to healthful food provision, including the perception that energy dense foods are considered to be tastier, time efficient, more readily available and increased value for money. These findings support similar results reported in Australian populations where perceived cost of healthy food was

considered a barrier among middle and low SES mothers and time and convenience was considered a barrier for all mothers (Inglis, Ball & Crawford, 2005).

Findings from this review suggest that there is potential value in conducting qualitative research to investigate parent perception of healthy child diet; effective feeding practices; influences on home food availability; and perceived facilitators and barriers to providing healthy foods. It is possible that comparing the similarities and differences in perceptions between parents of children with healthy diets and parents of children with unhealthy diets could be beneficial and provide new information regarding what works as opposed to what does not work in relation to parent feeding practices and GNK on child diet. This information could further contribute to the currently limited body of literature regarding the influences and interaction of parenting and nutrition knowledge on the diets of pre-school aged children.

6.2.3 General nutrition knowledge as a mediator of parental influences on the diets of 2-5 year old children: Systematic search results and research report

This chapter was two-pronged. The aim of the introduction section of this chapter was to report study characteristics of the 69 observational studies identified in the systematic searches of Chapters 2 (interventions) and 3 (qualitative research) The second aim of this chapter was to report findings from cross-sectional research conducted to investigate factors that predict child fruit/vegetable and non-core food consumption including demographic variables such as socioeconomic status (SES), parental education and children's BMI, family environment, parenting styles and parental GNK. It was primarily hypothesised that,

controlling for covariates, the variables measuring parenting styles would predict the quality of children's diets and parent GNK would to some degree mediate these influences.

The systematic search of observational research included in the introduction of this chapter identified only seven studies to evaluate parenting styles (authoritative, authoritarian, permissive and neglectful) that met the specified criteria, and none of which included a parent nutrition knowledge component. Four of the studies identified evaluated a nutrition knowledge component; however, only one of these studies looked at parental support and role modelling in relation to an intervention and not the child's diet; one study assessed parental attitudes towards child obesity with one question only; one developed a healthy eating and exercise questionnaire to detect GNK differences between Latino and Black women, although results were not meaningful and there was no further reference to maternal GNK; and only one study reported finding a relationship between parental GNK and child diet using the Diet Health Knowledge Survey. Therefore, the impact of GNK together with parenting styles and practices on the diets of young children is an important interaction that remains largely unexplored, and is clearly an area requiring further investigation in to the predictors and prevention of childhood overweight

To further explore the influence of parenting styles, feeding practices and parental nutrition knowledge this study recruited 269 parents of pre-school aged children to complete a battery of questionnaires measuring demographic information, lifestyle, family environment and functioning, parenting styles and feeding practices, and GNK. These are all pertinent

areas of influence, as outlined in the ecological systems theory (EST) model of predictors of childhood overweight discussed in chapter 1 (Bronfenbrenner, 1986; Davison & Birch, 2001). The aim was to assess whether GNK mediated the influence of parenting styles and feeding practices on 2-5 year old children's diets, controlling for confounders and family environment. Results indicated that child fruit/vegetable consumption was predicted by lower lax and overreactive parenting, lower restriction, higher authoritative parenting and dining together as a family, with a small effect of GNK, although not significant. GNK did not mediate the effect of these variables on child diet. Conversely, non-core food consumption was predicted by higher lax and overreactive parenting, child age, increased takeaway food consumption and higher television viewing as well as GNK, and GNK had a small mediating effect on authoritative parenting. Findings from this study highlight that GNK, although necessary, is not sufficient to influence child diet. Parenting styles and family environment appear to play a key influence. This study also supports suggestions that restrictive feeding practices need to be better understood in the context of healthy boundaries versus controlling practices, and points to a need for more comprehensive research tools in this area.

6.2.4 Similarities and differences between parents of pre-school aged children with 'healthy' versus 'unhealthy' diets

To further explore this area and expand on the suggested directions from the systematic review of qualitative research (Chapter 3), the aim of this chapter was to report findings from focus group research conducted with parents of children with 'healthy' diets (n = 10) by

comparing and contrasting the responses with those from parents of children with 'unhealthy' diets (n = 10). The aim was to identify similarities and differences between these two groups of parents. Healthy versus unhealthy diets were based on number of serves of fruit and vegetables consumed per day (data collected in Chapter 3) – i.e. parents of children with highest and lowest fruit/vegetable consumption were invited to take part and allocated to the 'healthy' or 'unhealthy' groups, respectively.

Similarities across the groups included parental intention to provide healthy foods for children; involving the child in some level of food preparation (including growing, harvesting, food preparation and shopping); the family dining together (at the dinner table) for the evening meal; and the negative influence of media and marketing (both in supermarkets and television advertising). However, main group differences identified from the focus groups discussions included boundary setting and consistency between parents (partner support). More specifically, parents from the group with healthier child diets were more likely to set consistent boundaries around food ('no means no') and were more likely to have the support of their partner (a consensus in relation to appropriate child diet and feeding practices). Disguising foods as a form of encouraging child consumption appeared to be more prominent in the 'unhealthy' group, as was pressuring children to eat more. As might be expected, the 'unhealthy' group also recorded lower nutrition knowledge scores (data collected from previous research reported in chapter 4). Findings from this research support the effectiveness of positive and consistent parenting practices and styles as reflected in child diet (fruit and vegetable consumption) and parent self-reported levels of stress. Parents of

children with the healthier diets appeared to be more relaxed, less likely to pressure children to eat or clean their plate and appeared to instinctively opt for healthier options, while understanding that children consume more on some days and less on others. These parents also reported more consistency in their authoritative style parent feeding practices which would provide consistent boundaries for their children, whereas the opposite appeared to be true with the 'unhealthy' group. These perceived parenting practices appeared to be consistently reflected in the diets of children in both groups where the children in the 'healthy' group, who consumed more serves of fruit and vegetables, had parents who were consistent in relation to foods and attitudes around foods and reported increased partner support. Whereas children in the 'unhealthy' group, who consumed fewer serves of fruit and vegetables, had parents who were reportedly inconsistent in their attitudes towards food and often disagreed with the other parent and used coercive tactics to encourage increased consumption

6.3 Conclusions and implications for future research

Previous research has reported that 2-5 year old Australian children are at increased risk of overweight and obesity when compared with the lower prevalence rates of their international counterparts (Magarey & Daniels, 2001; Magarey, Daniels, & Boulton, 2001), thereby highlighting the importance of early intervention as well as healthy habit formation. Parents are generally recognised as the primary influence with children of this age group; therefore, parental education in relation to healthy child diet and parenting practices that may

optimise outcomes should be focussed on parents of younger children. The prime time to do this would be prior to being exposed to other external and persisting influences such as the school environment and peers.

The reviews included in this thesis (Chapters 2 and 3) highlight the influence that parents can have on their child's diet and the effectiveness of longer term interventions, delivered over a minimum of 6 months. Research with older children has found that positive strategies and terminology to promote health and behaviour/lifestyle change rather than the negative connotations of weight loss and food restriction (denial or deprival approach), tend to yield positive results, particularly when parent-driven (Golan, Fainaru, & Weizman, 1998; Golan, Kaufman, & Shahar, 2006; Golan & Weizman, 2001). Therefore, targeting parents of children to promote healthy habits from a young age could be a key strategy in overweight and obesity prevention, and in the promotion of healthy diets that may track across the lifespan.

Findings from Chapter 4, the mediating effects of GNK on child diet, indicate that although nutrition education may assist in promoting healthier diets, parenting and feeding skills, as well as family environment, are also likely to be important. This supports the propositions of chapter 1 in relation to the interaction of various components of the EST model of predictors of childhood overweight both within and between contexts (Bronfenbrenner, 1986; Davison & Birch, 2001). Although, knowledge underpins behaviour and behaviour change; unfortunately evidence to support knowledge and behaviour change in

relation to child diet is limited and inconsistent. If a parent is not aware of the negative effects of inadequate consumption of fruit and vegetables, or excess consumption of inappropriate foods (energy dense and nutritionally poor) on child diet, the parent is less likely to promote this for their children. However, although knowledge is necessary it may not be sufficient to independently achieve behaviour change. As this study indicates, if parents are not aware of effective parenting practices to facilitate and optimise improved diet then positive behaviour change is unlikely to effectively influence child diet. Additionally, from a research point of view, questionnaires need to adequately capture the current climate in parent feeding practices and child diet. Chapter 4 describes contemporary published questionnaires and suggests that, according to findings from this thesis, these questionnaires need to be expanded to capture a broader range of parental influences. For example, this thesis suggests that constructs assessing lax and overreactive parenting, nutrition knowledge and refinement of the operationalisation of restrictive feeding practices within a broader context of authoritative (healthy boundary setting) versus authoritarian (controlling) parenting styles is necessary.

This study also supported previous research reporting that increased television viewing (and therefore exposure to advertising of fast and non-core foods) was associated with increased non-core food consumption and decreased fruit and vegetable consumption (Campbell, Crawford, & Ball, 2006; Golley, Perry, Magarey, & Danies, 2007). Similarly, our results reported that dining as a family was associated with increased fruit/vegetable consumption whereas increased takeaway food consumption was predictive of increased non-core food consumption. Both of these outcomes support earlier research with a large sample

(*N* = 16,202) of 9 year old children where dining together as a family for the evening meal was associated with healthful dietary intakes that included increased consumption of fruit and vegetables and decreased consumption of energy dense and nutritionally poor food (Gillman et al., 2000). Results such as these stand to reason since a majority of family meals are prepared in the home and are more likely to consist of fresh ingredients, whereas a majority of takeaway food options generally consist of energy dense, nutritionally poor foods and commonly come with meal deal or up-sizing options (including choices such as hot chips, energy dense drinks and soft serve ice-cream), which could account for a number of non-core food serves in one meal and might also lead to the displacement of fruit and vegetable consumption. In support of this, the negative impact of marketing and advertising was a 'barrier' commonly discussed among our focus group parents in Chapter 4 whereby these participants perceived the promotion and advertising of non-core foods to create problems for parents. Parents were justified in their concern as there is a higher prevalence of confectionary and fast/takeaway food advertising broadcast on Australian television during children's viewing, compared with adult viewing times (Neville, Thomas, & Bauman, 2005). This supports suggestions that excessive and inappropriate media advertising specifically targeting programs commonly viewed by young children should be reviewed and further regulated as it appears to be having detrimental consequences for young children

The cross-sectional investigations of Chapter 4 found that lax and overreactive parenting were predictive of child-diet, having a negative association with fruit/vegetable and positive association with non-core food consumption. As discussed in Chapter 3 there is

limited research available that has utilised the parenting scale (PS) in relation to child diet and feeding practices. In other domains, previous research used the PS on parents of 3-7 year old children to evaluate how various forms of dysfunctional discipline predict child externalising behaviour (Kimberly & Susan, 2007), indicating significant associations between externalising behaviour and maternal overreactive parenting (aggressive and controlling) and lax parenting (permissive and inconsistent). These findings support suggestions that allowing children to do as they like, and lacking an appropriate mix of warmth and firmness in communicating boundaries, could have deleterious outcomes for the child including an influence on the formation of food behaviours and preferences. This highlights the importance of supporting parents to develop effective skills and feeding practices in relation to child diet and encouraging healthy habits that optimise positive dietary outcomes. Once learned, these parenting skills and practices may translate with potential benefits across other and/or all domains of child rearing.

Finally, authoritative parenting played a prominent role in the review chapters (2 and 3). This style of parenting is characterised by high demands and high responsiveness, with clearly communicated boundaries while allowing for child autonomy (restricted choices). Authoritative parenting is commonly reported as the preferred parenting style to produce positive outcomes across multiple domains, such as higher competence in children (Kaufmann et al., 2000) and higher competence and lower maladjustment in adolescents (Baumrind, 1991), and is evident in the domain of parent feeding practices with positive outcomes reflected in child weight (Rhee et al., 2006) and diet (Kremers et al., 2003). To

further support this area of research, the cross-sectional study reported in Chapter 4 highlights that authoritative parenting predicted increased consumption of fruit/vegetables. Similarly, the parents in our focus groups (Chapter 5) who self-reported healthier child diet also reportedly set more consistent boundaries around food. Further, these parents commonly discussed food options with their children and involved them in the process of preparing food, whether that be in growing, shopping or cooking. The parents of the children in the 'unhealthy' group reported food struggles, failed attempts at disguising food (which required effort in preparation and disguising from the child), and increased stress when trying to find new ways to hide food and promote consumption. These reported food struggles and self-perceived levels of stress are likely to be influenced by the problems arising from inconsistent boundaries and overreactive parenting, such as giving in to inappropriate food requests after relentless child badgering, which may teach the child that persistent badgering produces successful results. The parents in the 'unhealthy' group admitted to repeatedly accommodating inappropriate food requests in an attempt to placate the child or encourage core food consumption, and they predominantly conflicted with the other parent over child diet. In contrast, the 'healthy' group reported greater partner support and presenting a united front around appropriate food provision for their child.

This thesis identifies the need to further investigate opportunities by which we can promote positive parenting styles and feeding practices to parents of young children. Future research should consider supporting parents to acquire skills and strategies around nutrition and effective parenting techniques that provide boundaries for children to choose from while

allowing for autonomy, and creating a positive food environment. Nutrition information should include the importance of involving children in food knowledge and preparation thereby encouraging them to make healthy, informed choices that could also promote child autonomy.

In conclusion, effective parenting practices that promote healthy child diet have received considerable attention throughout this research. Ineffective practices, such as lax and overreactive parenting have been identified; inconsistencies in parenting practices such as boundary setting ('no means no') and the influence of partner support (chapter 5); excessive television viewing; and takeaway food consumption (chapter 4) have also been seen to be associated with poorer child diet. Conversely, effective practices, including authoritative parenting, increased GNK and dining together as a family, consistent parenting and partner support were supported and highlighted throughout this research.

Therefore, young children's diets may be improved by interventions targeting a broader range of positive and supportive parenting practices in combination with nutrition knowledge education for parents of young children. Despite the mediating effect of GNK being very small and only in relation to child non-core food consumption, its contribution to the model highlights the importance of targeting parental nutrition knowledge as well as parental practices in relation to child diet. Further insights into how parents can positively influence children's diets will come from broad and effective measurement tools that will investigate the interaction of the variables highlighted in this thesis using the EST model of predictors of childhood overweight as a general frame work (Bronfenbrenner, 1986; Davison & Birch,

2001). Longitudinal research will further evaluate sustainability and promote habitualised healthy eating behaviours in young children. These are behaviours that could ultimately change the course of a young life and collectively have a positive influence on the current epidemic of unhealthy diets and the associated health problems.

6.4 References

Baumrind, D. (1991). The influence of parenting style on adolescent competence and substance use. *Journal of Early Adolescence, 11*(56), 56-95.

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: research perspectives. Developmental Psychology, 22(6), 723-742.

Campbell, K. J., Crawford, D. A., & Ball, K. (2006). Family food environment and dietary behaviors likely to promote fatness in 5-6 year-old children. *International Journal of Obesity, 30*(8), 1272-1280.

Davison, K, & Birch, L. (2001). Childhood overweight: a contextual model and recommendations for futue research. Obesity, 2, 159-171.

Gillman, M. W., Rifas-Shiman, S. L., Frazier, A. L., Rockett, H. R. H., Camargo, C. A., Jr., Field, A. E., Berdey, C. S., Colditz G. A. (2000). Family dinner and diet quality among older children and adolescents. *Archives of Family Medicine, 9*(3), 235-240.

Golan, M., Fainaru, M., & Weizman, A. (1998). Role of behaviour modifcation in the treatment of childhood obesity with the parents as the exclusive agents of change. *International Journal of Obesity, 22*, 1217-1224.

Golan, M., Kaufman, V., & Shahar, D. R. (2006). Childhood obesity treatment: targeting parents exclusively v. parents and children. *The British journal of nutrition, 95*(5), 1008-1015.

Golan, M., & Weizman, A. (2001). Familial approach to the treatment of childhood obesity: conceptual mode. *Journal of nutrition education, 33*(2), 102-107.

Golley, R., Perry, R., Magarey, A., & Danies, L. (2007). Family-focused weight management program for five-to nine-year-olds incorporating parenting skills training with healthy lifestyle information to support behaviour modification. *Nutrition & Dietetics, 64,* 144-150.

Inglis, V., Ball, K., Crawford, D. (2005). Why do women of low socioeconomic status have poorer dietary behaviours than women of higher socioeconomic status? A qualitative exploration. Appetite 45(3), 334-343.

Jones, R. A., Sinn, N., Campbell, K. J., Hesketh, K., Denney-Wilson, E., Morgan, P. J., Lubans, D. R., Magarey, A. (2011). The importance of long-term follow-up in child and adolescent obesity prevention interventions. *International Journal of Pediatric Obesity, 6*(3-4), 178-181

Kaufmann, D., Gesten, E., Santa Lucia, R., Salcedo, O., Rendina-Gobioff, G., Gadd, R. (2000). The Relationship Between Parenting Style and Children's Adjustment: The Parents' Perspective. Journal of Child and Family Studies 9(2), 231-245.

Kremers, S., Brug, J., de Vries, H., & Engels, R. (2003). Parenting style and adolescent fruit consumption. *Appetite, 41,* 43-50Rhoades, K., & O'Leary, S. (2007). Factor Structure and Validity of the Parenting Scale. *Journal of Clinical Child and Adolescent Psychology, 36*(2), 137-146.

Magarey, A. M., & Daniels, L. A. (2001). Comparison of Australian and US data on overweight and obesity in children and adolescents. *Medical Journal Australia, 175*, 500-501.

Magarey, A. M., Daniels, L. A., & Boulton, T. J. C. (2001). Prevalence of overweight and obesity in Australian children and adolescents: reassessment of 1985 and 1995 data against new standard international definitions. *Medical Journal of Australia, 174*, 561-564.

Neville, L., Thomas, M., & Bauman, A. (2005). Food advertising on Australian television: the extent of children's exposure. *Health Promotion International, 20*(2), 105-112.

Rhee, K., Lumeng, J., Appulgliese, D., Kaciroti, N., & Bradley, R. (2006). Parenting styles and overweight status in first grade. *Pediatrics, 117*(6), 2047-2054.

APPENDIX A: STATEMENT OF AUTHOR CONTRIBUTIONS FOR PUBLICATION

This chapter is a co-authored publication.

Peters J, Sinn N, Campbell K, Lynch J. Parental influences on the diets of 2-5 year old children: Systematic review of interventions. Early Child Development and Care. 2011:1-21. DOI:10.1080/03004430.2011.586698.

J. Peters and N. Sinn devised the idea for this manuscript. J. Peters and N. Sinn extracted the data. J. Peters prepared and edited the manuscript. N. Sinn, K. Campbell and J. Lynch edited the manuscript.



Ms J. Peters



Dr N. Sinn



Dr K. Campbell



Prof J. Lynch

APPENDIX B: DATA EXTRACTION TOOL FOR INTERVENTIONS

INTERVENTIONS

Review title: ***The role of parenting styles, attitudes, feeding practices and/or parent nutrition knowledge in the diets of young children***							
Reviewer:			*Date:* __ __ / __ __ / __ __				
Author:			*Year* __ __ __ __				
Eligibility checking					*Pg # & Comments*		
Setting		Childcare Preschool	Home based	Group	Mixed	Lab	other
Sample size at baseline							
Is child age between 2-5 yr? (or 12mths – 8 years for overlap)		Yes	No	Overlap	Age range:		
Does the research clearly indicate parent involvement?		Yes	No	Unclear			
Does the research evaluate a parenting component		Yes	No	Unclear			
Is the parenting component food specific		Yes	No	Unclear			
Does the research clearly indicate a parent nutrition knowledge or education component?		Yes	No	Unclear			
Measures of child diet		Yes	No	Unclear	Details:		
Measures of child BMI or weight status?		Yes	No	Unclear			
Is the parent involvement measured &distinguishable in the results?		Yes	No	Unclear			
What is the primary research focus?	Health promotion	Weight loss	Both	Other	Details;		
Does the research meet the eligibility criteria of this review		Yes	No	Unclear			
Final decision		**Include**	**Unclear**	**Exclude***		*If exclude: do not continue with form	

Geographic region and/or Culture?
What is the focus of the research?

1

Participants

Selection Bias		Yes	No	unclear	If yes, details:	
Cultural considerations/analysis		Yes	No	unclear	If yes, details:	
Child Gender		Male	Female	Both	Unspecified	
Child weight status		Normal	O/W	Obese	Combined	
Child weight collection method	Parent report	Researcher collection		Unclear		
Parent Age (range / mean)					Unspecified	
Parent Gender		Male	Female	Both	Unspecified	
Parent BMI and/or weight		Normal	o/w	Obese	Unspecified	
SES	Low	Middle	High	All	Unclear/NR	
Parent education	Low	Average	High	All	Unclear/NR	
Control for confounding variables?		Yes	No	Unclear/NR	If yes, details:	
Was an incentive provided to participate?		Yes	No	Unclear/NR	Details:	
Any other relevant participant information		Yes	No	Details:		

Measure of Child Diet

Was a FFQ (or equivalent) completed, if so which one ?				YES	NO	Details:							
Was parent recall of child diet provided, if so # of days?				YES	NO	# of days							
Dietary Variables	Fruit	Veg	Core	Non-core	Juice	H2o	High engery Bev	High energy Food	Fat	Low fat diary	Meat	Combined	Other

Parenting

Was a questionnaire on parent styles/feeding practices completed, if so which one?	YES	NO	Details:				
Parenting styles	authoritative	authoritarian	Permissive	Neglectful	N/A		
Parenting practices	Positive	Negative	Restriction	Control	Pressure	Monitoring	other
Parenting beliefs/attitude/concern/ perceptions toward child diet	Yes	No	Unclear				

Parenting involvement in the research/intervention	Low	Med	High	Unclear	
Nutrition information or education supplied to parent?	Yes	No	Unclear	Details:	
Assessment of parent nutrition knowledge/ understanding/importance	Yes	No	Unclear	Details:	
Reliability of measures used	Yes	No	Reported elsewhere	Not reported	
Data collection time points	Baseline	Post			

Intervention/Prevention	Treatment	Control	Other group	Total
Number participants at baseline				
Number participants at completion				
Withdrawals / drop-outs				
Child age (Range or mean) each group				

Were participants randomly allocated to control/treatment groups?	Yes	No	Unclear	Details:
Type of study design?				
Were the assessors blinded to the participant allocation		Yes	No	Unclear
Is the variable of interest to this review the Primary outcome of the research?		Yes	No	
Treatment group details:				
Control group details				

Intervention details:	# of groups:	# per group:	# of sessions:	Session duration:	Intervention Duration:
Did the participants comply with rules of intervention	Yes	No	Unclear	Details:	

Outcomes

Outcome of interest defined?	Yes	No	Unclear	Details:

Description:					
Are the results clearly identifiable?	Yes	No	Unclear	Details:	
Data collection time point/s:	Baseline	Post			
Are the results statistically significant?	Yes	No	Unclear	Details:	
Findings (mean +/- SD or specify other units)					
Parent BMI/weight or diet change	Yes	No	NR	Details:	

Additional Outcomes (if applicable)

Description:					
Is it subsequent outcome clearly defined?	Yes	No	Unclear		Details:
Are the results clearly identifiable?	Yes	No	Unclear		Details:
Data collection time point/s:	Baseline	Post			
Are the results statistically significant?	Yes	No	Unclear	Details:	
Findings (mean +/- SD or specify other units)					
Evaluation & Final comments:					
Can results be generalized? Yes / No					
Include in review? Yes / No					

APPENDIX C: QUALITY ASSESMENT TOOL AND DICTIONARY

McMaster University
School of Nursing

EFFECTIVE PUBLIC HEALTH PRACTICE PROJECT (EPHPP)

Ref ID: _____
Author: _____
Year: _____
Reviewer: _____

QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES

COMPONENT RATINGS

A) SELECTION BIAS

(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?

1 Very likely
2 Somewhat likely
3 Not likely
4 Can't tell

(Q2) What percentage of selected individuals agreed to participate?

1 80 - 100% agreement
2 60 – 79% agreement
3 less than 60% agreement
4 Not applicable
5 Can't tell

RATE THIS SECTION See dictionary	STRONG 1	MODERATE 2	WEAK 3

B) STUDY DESIGN

Indicate the study design

1 Randomized controlled trial
2 Controlled clinical trial
3 Cohort analytic (two group pre + post)
4 Case-control
5 Cohort (one group pre + post (before and after))
6 Interrupted time series
7 Other specify _____
8 Can't tell

Was the study described as randomized? If NO, go to Component C.

No Yes

If Yes, was the method of randomization described? (See dictionary)

No Yes

If Yes, was the method appropriate? (See dictionary)

No Yes

RATE THIS SECTION See dictionary	STRONG 1	MODERATE 2	WEAK 3

C) CONFOUNDERS

(Q1) Were there important differences between groups prior to the intervention?

1 Yes
2 No
3 Can't tell

The following are examples of confounders:

1 Race
2 Sex
3 Marital status/family
4 Age
5 SES (income or class)
6 Education
7 Health status
8 Pre-intervention score on outcome measure

(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?

1 80 – 100%
2 60 – 79%
3 Less than 60%
4 Can't Tell

RATE THIS SECTION See dictionary	STRONG 1	MODERATE 2	WEAK 3

D) BLINDING

(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?

1 Yes
2 No
3 Can't tell

(Q2) Were the study participants aware of the research question?

1 Yes
2 No
3 Can't tell

RATE THIS SECTION See dictionary	STRONG 1	MODERATE 2	WEAK 3

E) DATA COLLECTION METHODS

(Q1) Were data collection tools shown to be valid?

1 Yes
2 No
3 Can't tell

(Q2) Were data collection tools shown to be reliable?

1 Yes
2 No
3 Can't tell

RATE THIS SECTION See dictionary	STRONG 1	MODERATE 2	WEAK 3

F) WITHDRAWALS AND DROP-OUTS

(Q1) Were withdrawals and drop-outs reported in terms of numbers and/or reasons per group?

1 Yes
2 No
3 Can't tell

(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).

1 80 -100%
2 60 - 79%
3 less than 60%
4 Can't tell

RATE THIS SECTION See dictionary	STRONG 1	MODERATE 2	WEAK 3

G) INTERVENTION INTEGRITY

(Q1) What percentage of participants received the allocated intervention or exposure of interest?

1 80 -100%
2 60 - 79%
3 less than 60%
4 Can't tell

(Q2) Was the consistency of the intervention measured?

1 Yes
2 No
3 Can't tell

(Q3) Is it likely that subjects received an unintended intervention (contamination or co-intervention) that may influence the results?

4 Yes
5 No
6 Can't tell

H) ANALYSES

(Q1) Indicate the unit of allocation (circle one)

community organization/institution practice/office individual

(Q2) Indicate the unit of analysis (circle one)

community organization/institution practice/office individual

(Q3) Are the statistical methods appropriate for the study design?

1 Yes
2 No
3 Can't tell

(Q4) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?

1 Yes
2 No
3 Can't tell

GLOBAL RATING

COMPONENT RATINGS

Please transcribe the information from the gray boxes on pages 1-4 onto this page.

		RATE THIS SECTION See dictionary	STRONG 1	MODERATE 2	WEAK 3
A	SELECTION BIAS				
B	STUDY DESIGN				
C	CONFOUNDERS				
D	BLINDING				
E	DATA COLLECTION METHODS				
F	WITHDRAWALS AND DROPOUTS				

GLOBAL RATING FOR THIS PAPER (circle one):

1	STRONG	(four STRONG ratings with no WEAK ratings)
2	MODERATE	(less than four STRONG ratings and one WEAK rating)
3	WEAK	(two or more WEAK ratings)

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

No Yes

If yes, indicate the reason for the discrepancy

1 Oversight
2 Differences in interpretation of criteria
3 Differences in interpretation of study

Final decision of both reviewers (circle one):

1 STRONG
2 MODERATE
3 WEAK

McMaster University
School of Nursing

Effective Public Health Practice Project (EPHPP)

Quality Assessment Tool for Quantitative Studies Dictionary

The purpose of this dictionary is to describe items in the tool thereby assisting raters to score study quality. Due to under-reporting or lack of clarity in the primary study, raters will need to make judgements about the extent that bias may be present. When making judgements about each component, raters should form their opinion based upon information contained in the study rather than making inferences about what the authors intended.

A) SELECTION BIAS

(Q1) Participants are more likely to be representative of the target population if they are randomly selected from a comprehensive list of individuals in the target population (score very likely). They may not be representative if they are referred from a source (e.g. clinic) in a systematic manner (score somewhat likely) or self-referred (score not likely).

(Q2) Refers to the % of subjects in the control and intervention groups that agreed to participate in the study before they were assigned to intervention or control groups.

B) STUDY DESIGN

In this section, raters assess the likelihood of bias due to the allocation process in an experimental study. For observational studies, raters assess the extent that assessments of exposure and outcome are likely to be independent. Generally, the type of design is a good indicator of the extent of bias. In stronger designs, an equivalent control group is present and the allocation process is such that the investigators are unable to predict the sequence.

Randomized Controlled Trial (RCT)
An experimental design where investigators randomly allocate eligible people to an intervention or control group. A rater should describe a study as an RCT if the randomization sequence allows each study participant to have the same chance of receiving each intervention and the investigators could not predict which intervention was next. If the investigators do not describe the allocation process and only use the words 'random' or 'randomly', the study is described as a controlled clinical trial.

See below for more details.

Was the study described as randomized?

Score YES, if the authors used words such as random allocation, randomly assigned, and random assignment.

Score NO, if no mention of randomization is made.

Was the method of randomization described?

Score YES, if the authors describe any method used to generate a random allocation sequence.

Score NO, if the authors do not describe the allocation method or describe methods of allocation such as alternation, case record numbers, dates of birth, day of the week, and any allocation procedure that is entirely transparent before assignment, such as an open list of random numbers of assignments.
If NO is scored, then the study is a controlled clinical trial.

Was the method appropriate?

Score YES, if the randomization sequence allowed each study participant to have the same chance of receiving each intervention and the investigators could not predict which intervention was next. Examples of appropriate approaches include assignment of subjects by a central office unaware of subject characteristics, or sequentially numbered, sealed, opaque envelopes.

Score NO, if the randomization sequence is open to the individuals responsible for recruiting and allocating participants or providing the intervention, since those individuals can influence the allocation process, either knowingly or unknowingly.

If NO is scored, then the study is a controlled clinical trial.

Controlled Clinical Trial (CCT)
An experimental study design where the method of allocating study subjects to intervention or control groups is open to individuals responsible for recruiting subjects or providing the intervention. The method of allocation is transparent before assignment, e.g. an open list of random numbers or allocation by date of birth, etc.

Cohort analytic (two group pre and post)
An observational study design where groups are assembled according to whether or not exposure to the intervention has occurred. Exposure to the intervention is not under the control of the investigators. Study groups might be non-equivalent or not comparable on some feature that affects outcome.

Case control study
A retrospective study design where the investigators gather 'cases' of people who already have the outcome of interest and 'controls' who do not. Both groups are then questioned or their records examined about whether they received the intervention exposure of interest.

Cohort (one group pre + post (before and after)
The same group is pretested, given an intervention, and tested immediately after the intervention. The intervention group, by means of the pretest, act as their own control group.

Interrupted time series
A time series consists of multiple observations over time. Observations can be on the same units (e.g. individuals over time) or on different but similar units (e.g. student achievement scores for particular grade and school). Interrupted time series analysis requires knowing the specific point in the series when an intervention occurred.

C) CONFOUNDERS

By definition, a confounder is a variable that is associated with the intervention or exposure and causally related to the outcome of interest. Even in a robust study design, groups may not be balanced with respect to important variables prior to the intervention. The authors should indicate if confounders were controlled in the design (by stratification or matching) or in the analysis. If the allocation to intervention and control groups is randomized, the authors must report that the groups were balanced at baseline with respect to confounders (either in the text or a table).

D) BLINDING

(Q1) Assessors should be described as blinded to which participants were in the control and intervention groups. The purpose of blinding the outcome assessors (who might also be the care providers) is to protect against detection bias.

(Q2) Study participants should not be aware of (i.e. blinded to) the research question. The purpose of blinding the participants is to protect against reporting bias.

E) DATA COLLECTION METHODS

Tools for primary outcome measures must be described as reliable and valid. If 'face' validity or 'content' validity has been demonstrated, this is acceptable. Some sources from which data may be collected are described below:

Self reported data includes data that is collected from participants in the study (e.g. completing a questionnaire, survey, answering questions during an interview, etc.).

Assessment/Screening includes objective data that is retrieved by the researchers. (e.g. observations by investigators).

Medical Records/Vital Statistics refers to the types of formal records used for the extraction of the data.

Reliability and validity can be reported in the study or in a separate study. For example, some standard assessment tools have known reliability and validity.

F) WITHDRAWALS AND DROP-OUTS

Score **YES** if the authors describe BOTH the numbers and reasons for withdrawals and drop-outs.

Score **NO** if either the numbers or reasons for withdrawals and drop-outs are not reported.

The percentage of participants completing the study refers to the % of subjects remaining in the study at the final data collection period in all groups (i.e. control and intervention groups).

G) INTERVENTION INTEGRITY

The number of participants receiving the intended intervention should be noted (consider both frequency and intensity). For example, the authors may have reported that at least 80 percent of the participants received the complete intervention. The authors should describe a method of measuring if the intervention was provided to all participants the same way. As well, the authors should indicate if subjects received an unintended intervention that may have influenced the outcomes. For example, co-intervention occurs when the study group receives an additional intervention (other than that intended). In this case, it is possible that the effect of the intervention may be over-estimated. Contamination refers to situations where the control group accidentally receives the study intervention. This could result in an under-estimation of the impact of the intervention.

H) ANALYSIS APPROPRIATE TO QUESTION

Was the quantitative analysis appropriate to the research question being asked?

An intention-to-treat analysis is one in which all the participants in a trial are analyzed according to the intervention to which they were allocated, whether they received it or not. Intention-to-treat analyses are favoured in assessments of effectiveness as they mirror the noncompliance and treatment changes that are likely to occur when the intervention is used in practice, and because of the risk of attrition bias when participants are excluded from the analysis.

Component Ratings of Study:

For each of the six components A – F, use the following descriptions as a roadmap.

A) SELECTION BIAS

Strong: The selected individuals are very likely to be representative of the target population (Q1 is 1) **and** there is greater than 80% participation (Q2 is 1).

Moderate: The selected individuals are at least somewhat likely to be representative of the target population (Q1 is 1 or 2); **and** there is 60 - 79% participation (Q2 is 2). 'Moderate' may also be assigned if Q1 is 1 or 2 and Q2 is 5 (can't tell).

Weak: The selected individuals are not likely to be representative of the target population (Q1 is 3); **or** there is less than 60% participation (Q2 is 3) **or** selection is not described (Q1 is 4); and the level of participation is not described (Q2 is 5).

B) DESIGN

Strong: will be assigned to those articles that described RCTs and CCTs.

Moderate: will be assigned to those that described a cohort analytic study, a case control study, a cohort design, or an interrupted time series.

Weak: will be assigned to those that used any other method or did not state the method used.

C) CONFOUNDERS

Strong: will be assigned to those articles that controlled for at least 80% of relevant confounders (Q1 is 2); **or** (Q2 is 1).

Moderate: will be given to those studies that controlled for 60 – 79% of relevant confounders (Q1 is 1) **and** (Q2 is 2).

Weak: will be assigned when less than 60% of relevant confounders were controlled (Q1 is 1) **and** (Q2 is 3) **or** control of confounders was not described (Q1 is 3) **and** (Q2 is 4).

D) BLINDING

Strong: The outcome assessor is not aware of the intervention status of participants (Q1 is 2); **and t**he study participants are not aware of the research question (Q2 is 2).

Moderate: The outcome assessor is not aware of the intervention status of participants (Q1 is 2); **or** the study participants are not aware of the research question (Q2 is 2); **or b**linding is not described (Q1 is 3 and Q2 is 3).

Weak: The outcome assessor is aware of the intervention status of participants (Q1 is 1); **and** the study participants are aware of the research question (Q2 is 1).

E) DATA COLLECTION METHODS

Strong: The data collection tools have been shown to be valid (Q1 is 1); **and** the data collection tools have been shown to be reliable (Q2 is 1).

Moderate: The data collection tools have been shown to be valid (Q1 is 1); **and** the data collection tools have not been shown to be reliable (Q2 is 2) **or** reliability is not described (Q2 is 3).

Weak: The data collection tools have not been shown to be valid (Q1 is 2) **or** both reliability and validity are not described (Q1 is 3 and Q2 is 3).

F) WITHDRAWALS AND DROP-OUTS - a rating of:

Strong: will be assigned when the follow-up rate is 80% or greater (Q2 is 1).

Moderate: will be assigned when the follow-up rate is 60 – 79% (Q2 is 2) **OR** Q2 is 5 (N/A).

Weak: will be assigned when a follow-up rate is less than 60% (Q2 is 3) or if the withdrawals and drop-outs were not described (Q2 is 4).

APPENDIX D: PUBLISHED ARTICLE

This journal article has been removed from this thesis due to copyright. Please refer to print copy held by the UniSA Library.

Peters, Jacqueline, Sinn, Natalie, Campbell, Karen and Lynch, John 2012, Parental influences on the diets of 2-5 year-old children : systematic review of interventions, *Early child development and care*, vol. 182, no. 7, pp. 837-857.

DOI:10.1080/03004430.2011.586698

APPENDIX E: STATEMENT OF AUTHOR CONTRIBUTIONS FOR PUBLICATION

This chapter is a co-authored publication.

Peters J, Parletta N, Campbell K, Lynch J. Parental influences on the diets of 2–5 year old children: systematic review of qualitative research. Journal of Early Childhood Research (in press).

All authors devised the idea for this manuscript. J. Peters and N. Parletta extracted the data. J. Peters prepared and edited the manuscript. N. Parletta, K. Campbell and J. Lynch edited the manuscript.



Ms J. Peters



Dr N. Parletta



Dr K. Campbell



Prof J. Lynch

APPENDIX F: QUALITATIVE STUDIES EXTRACTION TOOL

Qualitative Review ***The role of parenting styles, attitudes, feeding practices and/or parent nutrition knowledge in the diets of young children***								Author: _____ Year: _____ Reviewer:
Sample size	*N=*	Groups	Per group		# of sessions		Duration	
Are there differences between groups?		Yes	No	Details:				
Were the groups treated differently?		Yes	No	Details:				
Is child age between 2-5 yr? (or 12mths–8 yrs for overlap)			Yes	No	Overlap	Range:		
Recruited from/setting?	Home	Pre-school /childcare	Group	Mixed	Other			
Type of qualitative design			Focus groups	Interviews	Observation/ grounded	Ethnographic		
What was sampling strategy (e.g., random) & was it appropriate?						Yes	No	
Ethics approval?	Yes	No	Unclear/NR	**Informed consent?**	Yes	No	Unclear/NR	
Collection method			Video	Audio	Both			
Are the questions clear?			Yes	No	Unclear			
Are the interpretations clear?			Yes	No	Unclear			
What analysis is used?								
Is the analysis clear & appropriate?			Yes	No	Unclear			
Are the claims made supported by sufficient evidence?			Yes	No	Unclear			
Is the analysis valid?	Yes	No	Unclear	**Details:**				
Does the research discuss parenting styles, feeding practices and/or attitudes/beliefs/concern/perceptions?			Yes	No	Unclear			
Does the research discuss parent nutrition knowledge?			Yes	No	Unclear			
Is child diet discussed or measured?			Yes	No	Unclear			
Is child BMI or weight status discussed or measured?			Yes	No	No Unclear			
Geographic region and/or culture?								
What is the focus/purpose of the research?								
Parent Age (range / mean)						Unspecified		
Parent Gender			Male	Female	Both	Unspecified		
Parent BMI and/or weight			Normal	o/w	Obese	Unspecified		
Child Gender			Male	Female	Both	Unspecified		
Child weight status			Normal	O/W	Obese	Combined		
Child weight collection method			Parent report	Researcher collection		Unclear/NR?		
SES			Low	Mid	High	Unclear/NR		
Parent education			Low	Mid	High	Unclear/NR		
Cultural considerations			Yes	No	Unclear/NR			
Was an incentive provided to participate?			Yes	No	Unclear/NR			
Were problems with the research discussed?			Yes	No	Unclear/NR			
Does the research add to existing knowledge?			Yes	No	Unclear/NR			
What are the major outcomes of the research								
Final comments:								
Include in review? Yes / No								

APPENDIX G: CROSS-SECTIONAL/OBSERVATIONAL STUDIES EXTRACTION TOOL

Observational Summaries

*Author :*_____
*Year:*_____
*Reviewer:*_____

Sample size	# of Samples	Setting	Community	CC or pre-school	Home based	Group	Mixed	Lab	Other

Is child age between 2-5 yr? (or 12mths – 8 years for overlap)	Yes	No	Overlap	Age range:
Does the research evaluate parenting styles or feeding practices?	Yes	No	Unclear	
Does the research clearly evaluate a parent's knowledge of nutrition?	Yes	No	Unclear	
Measures of child diet?	Yes	No	Unclear	Details:
Measures of child BMI or weight status?	Yes	No	Unclear	

Geographic region and/or culture??

What is the focus of the research?

Child Gender	Male	Female	Both	Unspecified		
Child weight status	Normal	O/W	Obese	Combined	Unspecified	BMI:
Child weight collection method	Parent report	Researcher collection	Unclear			
Parent Gender	Male	Female	Both	Unspecified		
Parent BMI and/or weight	Normal	o/w	Obese	Combined	Unspecified	
SES	Low	Middle	High	All	Unclear/NR	
Parent education	Low	Average	High	All	Unclear/NR	
Was an incentive provided to participate?	Yes	No	Unclear/NR	Details:		

Measure of Child Diet

Was a FFQ (or equivalent) completed, if so which one ?	YES	NO	Details:
Was parent report of child diet recall provided, if so # of days?	YES	NO	# of days

Parenting

Was a questionnaire on parent styles/feeding practices completed, if so which one?	YES	NO	Details:				
Parenting styles	authoritative	authoritarian	Permissive	Neglectful	N/A		
Parenting practices	Positive	Negative	Restriction	Control	Pressure	Monitoring	other
Parenting beliefs/attitude/concern/ perceptions toward child diet	Beliefs	Attitudes	Concern	Perception	Other	No	
Assessment of parent GNK understanding/importance	Yes	No	Unclear				

Reliability and/or validity	Reliability reported		Validity reported		Measure Reported		Internal consistency only	Reported elsewhere/ NR
	Yes	No	Yes	No	All	Some		

Outcomes – Hypothesis 1

Outcome of interest & results clearly defined?	Yes	No	Unclear	Details:	
Are the results statistically significant?	Yes	No	Some Are	Unclear	Details:
What are the relevant findings?					

Longitudinal

Number participants at:	Baseline:	Completion:	# withdrawals/dropouts:
Data collection time points:			
What are the relevant findings?			

Include in review? Yes / No **Quality Rating: 0 1 2 3 4**

APPENDIX H: STATEMENT OF AUTHOR CONTRIBUTIONS FOR PUBLICATION

This chapter is a co-authored publication.

Peters J, Parletta N, Campbell K, Lynch J. A comparison of parental views of their pre-school children's 'healthy' versus 'unhealthy diets: A qualitative study. Submitted to Child: Care, Health & Development (under review).

J. Peters and N. Parletta devised the idea for this manuscript. J. Peters and N. Parletta conducted the focus groups and J. Peters analysed the data. J. Peters prepared and edited the manuscript. N. Parletta, K. Campbell and J. Lynch edited the manuscript.



Ms J. Peters



Dr N. Parletta



Dr K. Campbell



Prof J. Lynch

APPENDIX I: RECRUITMENT & MATERIALS

I.0 Recruiment details

Recruitment of Participants

Recruitment flyers (Appendix I1 and I3) were designed and printed by the primary researcher. The primary research contacted various pre-school environments requesting permission to post a required number (approximately 50-100) of information flyers for distribution to parents. The information flyer indicated if parents were interested in participating in the research to contact the researcher direct (via phone or email) who sent out the questionnaire package (Appendix I.4-I.8). In most instances child care directors (or the equivalent) were very supportive of the research and offered to distribute flyers to all parents' individual information folders.

Information tear-off flyers (Appendix I.1) were also placed on various community information boards such as the Royal Adelaide Hospital, University information boards (UniSA and Adelaide University) Parenting centres; recreation centres and various shopping centre information/community boards.

Interested participants contacted the researcher and in most cases requested the questionnaire package to be sent via postal mail (email on a couple of occasions). In most cases a postal address was provided. The package consisted of a letter to the parent (Appendix I4); the 15-page questionnaire (Appendix I5); information sheets explaining the project (Appendix I6); and a movie ticket claim form (Appendix I7).

If email or phone details were provided the researcher contacted participants to ascertain intention to complete or with draw, where most participants intended to complete the questionnaire.

Upon receipt of the completed questionnaire parents were sent a thank you letter (Appendix I9) and complimentary double movie pass in appreciation for the time involved in completing extensive questionnaires.

I.1 Information posted on community boards

Factors that contribute to children's diets

Researchers: Jacqueline Peters (PhD Candidate) and Dr Natalie Sinn (supervisor)



For parents of children aged 2-5 years

You are invited to participate in a new research project looking at factors that influence diets and food choices of young children.

The quality of children's diets is important for both their physical and psychological health and wellbeing. With conflicting environmental influences from television, canteens and peers etc, it can be difficult for parents to develop healthy dietary habits in their children.

The aim of this project is to investigate contributing factors to Australian children's diets in order to develop an evidence-based program for parents of young children under five, to help them learn strategies for developing healthy dietary behaviours in their children early in life.

What will it involve?

This project will involve completing questionnaires that will ask questions about your child's dietary intake and your general nutrition knowledge and general child-feeding and parenting practices. They will take about 30-40 minutes to complete.

As a token of appreciation for your time and effort you will be sent a

double movie pass

on receipt of the completed forms.

Jacqueline Peters - **8302 2906**
Jacqueline.peters@postgrads.unisa.edu.au

Jacqueline Peters - **8302 2906**
Jacqueline.peters@postgrads.unisa.edu.au

I.2 Information letter sent to child care facilities

University of South Australia

Nutritional Physiology Research Centre

Date

Name
Child Care Centre
Address
Address



Dear ,

As per my telephone conversation with you today, I have included (requested number) information sheets to distribute to parents.

Please do not hesitate to contact me if you require more information or information sheets. My email address is Jacqueline.peters@postgrads.unisa.edu.au.

I would like to sincerely thank you for taking the time to assist me with this project.

Kind regards

Jacqueline Peters
PhD Candidate
Nutritional Physiology Research Centre
University of South Australia
GPO Box 2471, Adelaide SA 5001
Phone: 61 8 8302 2906

Nutritional Physiology Research Centre
School of Health Sciences
University of South Australia
GPO Box 2471, Adelaide. SA 5001

Affiliated with UniSA | Sansom Institute

Telephone: +61 8 8302 2097
Facsimile: +61 8 8302 2178
Email: nutritional.physiology@unisa.edu.au
Website: www.unisa.edu.au/nutritional.physiology

I.3 Information flyer for parents

Factors that contribute to children's diets

Researchers: Jacqueline Peters (PhD Candidate) and Dr Natalie Sinn (supervisor)



For parents of children aged 2-5 years

You are invited to participate in a new research project looking at factors that influence diets and food choices of young children.

The quality of children's diets is important for both their physical and psychological health and wellbeing. With conflicting environmental influences from television, canteens and peers etc, it can be difficult for parents to develop healthy dietary habits in their children.

The aim of this project is to investigate contributing factors to Australian children's diets in order to develop an evidence-based program for parents of young children under five, to help them learn strategies for developing healthy dietary behaviours in their children early in life.

What will it involve?

This project will involve completing questionnaires that will ask questions about your child's dietary intake and your general nutrition knowledge and general child-feeding and parenting practices. They will take about 30-40 minutes to complete.

As a token of appreciation for your time and effort you will be sent a

movie pass

on receipt of the completed forms.

If you would like to assist us with this research by completing the above questionnaires please contact **Jacqueline Peters by telephone on 8302 2906** or by email Jacqueline.peters@postgrads.unisa.edu.au and I will send them to you with a reply-paid envelope.

I.4 Letter to parents



Dear

Thank you for agreeing to participate in the first stage of this project.

Please find enclosed an information sheet, a Dietary Questionnaire (for your child) and Child Feeding and Parenting questionnaires. The questionnaires should take approximately 30-40 minutes to complete.

Once you have completed the questionnaires please return them in the enclosed reply-paid envelope. On receipt of the completed questionnaires I will send you a movie pass as a token of my appreciation for your time and effort involved in this project.

Should you have any questions or concerns regarding the questionnaires or the study, please do not hesitate to contact me on 8302 2906 or e-mail jacqueline.peters@postgrads.unisa.edu.au,or my supervisor Dr Natalie Sinn on (08) 8302 1757 or e-mail natalie.sinn@unisa.edu.au.

I look forward to receiving your completed questionnaires.

Kind regards

Jacqueline Peters
PhD Candidate
Nutritional Physiology Research Centre
University of South Australia
GPO Box 2471, Adelaide SA 5001
Phone: 61 8 8302 2906
Fax: 61 8 8302 2178
E-mail: Jacqueline.peters@postgrads.unisa.edu.au

I.5 Questionnaire

Factors that contribute to children's diets

Researchers: Jacqueline Peters (PhD Candidate), Dr Natalie Sinn, Prof John Lynch, Dr Karen Campbell (supervisors)

Sansom Institute for Health Research - Division of Health Sciences, University of South Australia

PARENT QUESTIONNAIRE

For parents of children aged 2-5 years

Contact Information:

Email: Jacqueline.Peters@postgrads.unisa.edu.au

Natalie.sinn@unisa.edu.au

Dear Parent

Please carefully read the enclosed *information & instruction* provided throughout the survey.
It should take approximately 30-40 minutes to complete.

Please answer every question, giving the most applicable answer.

The survey is divided into eight sections.

All responses are confidential and will only be identified by an ID number.

We are grateful for your time in completing this questionnaire

Turn over the page to start the first section.

1. *General Information about you and your child aged between 2-5years*

Note: Parent 1 is the parent filling out the survey.

(Please circle or tick the correct answer as required)

2. Child's age: _____
3. Child's gender: ❑ Male ❑ Female
4. Child's height _____
5. Child's weight _____
6. Please indicate your family status: ❑ Single parent ❑ Two parent ❑ Other
7. How many children do you have? _____
8. What is your age? Parent 1 _____ Parent 2 _____
9. What is your gender? Parent 1 _____ Parent 2 _____
10. What is your height? Parent 1 _____ Parent 2 _____
11. What is your weight? Parent 1 _____ Parent 2 _____
12. Please tell us your residential postcode. __ __ __ __
13. What is your current employment status?

    Parent 1: ☐ full-time ☐ part-time ☐ casual ☐ home

    Approximate hours per week at work? _____

    Parent 2: ☐ full-time ☐ part-time ☐ casual ☐ home

    Approximate hours per week at work? _____

14. What is your current occupation?

    Parent 1: _____ Approximate income: _____

    Parent 2: _____ Approximate income: _____

15. Please indicate your highest level of education completed.

	Parent 1	Parent 2
Still at school	☐	☐
Left school at 15 years or less	☐	☐
Left school after age 15	☐	☐
Left school after age 15 but still studying	☐	☐
Trade/Apprenticeship	☐	☐
Certificate/ Diploma (eg. TAFE)	☐	☐
University degree	☐	☐
Postgraduate degree	☐	☐

2. *Lifestyle Information*

(Please circle or tick the correct answer as required)

1. What is your child's cultural background?

   _____

2. Does/did your child attend childcare prior to starting school? ❑ Yes ❑ No

   If yes: From what age did your child attend? _____Until:_____

   Approximately how many hours per week? _____

   Did the centre provide food for your child? ❑ Yes ❑ No

3. How many hours of television does your child watch per day on average?

   ❑ none ❑ less than 1 hour ❑ 1-2 hours

   ❑ 2-3 hours ❑ 3-4 hours ❑ more than 4 hours

4. How many nights does your family eat dinner at the table together in a typical week (out of 7 nights)

   ❑ none ❑ 1 ❑ 2 ❑ 3 ❑ 4 ❑ 5 ❑ 6 ❑ 7

5. How many takeaway meals does your family consume per week?

   ❑ none ❑ 1 ❑ 2 ❑ 3 ❑ 4 ❑ 5 or more

6. Was your child breast-fed?

   ❑ Yes ❑ No

   If yes, For how long? _____ (weeks)

7. Is your child on a special diet? (For instance, due to celiac disease, diabetes)

   ❑ Yes ❑ No

   If yes, please specify_____

8. On a scale of 1 (extremely important) to 5 (not important), please rate how important you feel it is to teach your child about eating healthy foods:

   1 2 3 4 5
   Extremely important Moderately important Not important

9. What do you consider is most important when choosing food for your child? Please rate the following options from 1 (most important) to 7 (least important) ***using each number only once***.

   taste _____ convenience _____
   cost _____ health _____
   disease prevention _____ weight control _____
   speed _____

3. *Your Child's Dietary Patterns*

SECTION A

Please indicate in the box provided if your child ate any of the following fruits and vegetables in the **past 7 days** and indicate how many times they ate a serve of each item (e.g. one serve = 1 apple/1 bunch of grapes).

Fruit (fresh, canned, frozen or stewed – not juice)					
		How many?			**How many?**
1. Fruit salad	❑ Yes	____	2. Mandarin	❑ Yes	____
3. Apricot	❑ Yes	____	4. Dried Fruit	❑ Yes	____
5. Strawberries	❑ Yes	____	6. Paw Paw	❑ Yes	____
7. Grapes	❑ Yes	____	8. Nectarine/Peacherine	❑ Yes	____
9. Orange	❑ Yes	____	10. Melon (water/rock/honeydew)	❑ Yes	____
11. Pineapple	❑ Yes	____	12. Plum	❑ Yes	____
13. Peach	❑ Yes	____	14. Apple	❑ Yes	____
15. Pear	❑ Yes	____	16. Kiwi fruit	❑ Yes	____
17. Mango	❑ Yes	____	18. Banana	❑ Yes	____
19. Other	❑ Yes	____			

Vegetables (fresh, frozen, raw or cooked – not juice)					
		How many?			**How many?**
20. Pumpkin	❑ Yes	____	21. Sweet potato	❑ Yes	____
22. Peas and/or Beans	❑ Yes	____	23. Mushroom	❑ Yes	____
24. Eggplant	❑ Yes	____	25. Turnip	❑ Yes	____
26. Corn	❑ Yes	____	27. Potato (not hot chips)	❑ Yes	____
28. Capsicum	❑ Yes	____	29. Celery	❑ Yes	____
30. Brussel sprouts	❑ Yes	____	31. Broccoli	❑ Yes	____
32. Cucumber	❑ Yes	____	33. Tomato	❑ Yes	____
34. Avocado	❑ Yes	____	35. Cabbage	❑ Yes	____
36. Cauliflower	❑ Yes	____	37. Spinach	❑ Yes	____
38. Lettuce	❑ Yes	____	39. Squash	❑ Yes	____
40. Carrot	❑ Yes	____	41. Olives	❑ Yes	____
42. Legumes (chickpeas, lentils, kidney beans, etc)	❑ Yes	____	43. Vegetables in mixed dishes (soups or stews, etc)	❑ Yes	____
44. Zucchini	❑ Yes	____	45. Mixed frozen vegetables (stir-fry packets, etc.)	❑ Yes	____
46. Other	❑ Yes	____			

SECTION B

How often did your child consume each of the following food and drink items in the **past 24 hours?**

0 = Not at all; 1 = Once; 2 = Twice; 3 = 3 times; 4 = 4 times; 5 = 5 or more times	
1. Fruit juice (100%)	0 1 2 3 4 5
2. Water	0 1 2 3 4 5
3. Full cream/full fat milk (including flavoured milk - either as a drink or on cereal)	0 1 2 3 4 5
4. Cheese and/or cheese spreads	0 1 2 3 4 5
5. Regular yoghurt or custard	0 1 2 3 4 5
6. Reduced fat/low fat yoghurt or custard	0 1 2 3 4 5
7. Vegetables (raw or cooked)	0 1 2 3 4 5
8. Salad in a sandwich or with evening meal	0 1 2 3 4 5
9. Vegetables with evening meal	0 1 2 3 4 5
10. Fruit (fresh, frozen, canned, stewed or dried)	0 1 2 3 4 5

SECTION C

How often did your child consume each of the following food and drink items in the **past 7 days?**

0 = Not at all; 1 = Once; 2 = Twice; 3 = 3 times; 4 = 4 times; 5 = 5 times; 6 = 6 or more times	
11. Peanut butter or nutella	0 1 2 3 4 5 6
12. Pre-sugared cereals (eg, Coco Pops, Fruit Loops)	0 1 2 3 4 5 6
13. Sweet biscuits, cakes, muffins, doughnuts, fruit pies, Museli or fruit bars	0 1 2 3 4 5 6
14. Potato chips/crisps, cheezles, corn chips, savoury biscuits (shapes) etc.	0 1 2 3 4 5 6
15. Chocolate (bar, block, coated biscuit) or Lollies	0 1 2 3 4 5 6
16. Soft drink, cordial (not diet varieties), Fruit drink (<30% fruit juice)	0 1 2 3 4 5 6
17. Ice creams, iceblocks	0 1 2 3 4 5 6
18. Pie, Pasty or Sausage Roll	0 1 2 3 4 5 6
19. Pizza	0 1 2 3 4 5 6
20. Hot chips, French fries	0 1 2 3 4 5 6
21. Hot dog, fritz, processed meats	0 1 2 3 4 5 6
22. Takeaway Meals: McDonalds, Hungry Jacks, KFC, Fish & chips/chicken shop	0 1 2 3 4 5 6
23. How many days in the last week did your child eat fruit (fresh, canned, frozen, stewed, or dried – excluding juice)	0 1 2 3 4 5 6
24. How many days in the last week did your child eat vegetables (raw or cooked)	0 1 2 3 4 5 6

4. Child Eating Behaviours

	1 = never; 2 = seldom; 3 = half of the time; 4 = most of the time; 5 = always					
1.	When your child is at home how often are you responsible for feeding her/him?	1	2	3	4	5
2.	How often are you responsible for deciding what your child's portion is?	1	2	3	4	5
3.	How often are you responsible for deciding if your child has eaten the right kind of foods?	1	2	3	4	5

	1 = markedly underweight; 2 = underweight; 3 = normal; 4 = overweight; 5 = markedly overweight					
1.	What was your weight in your childhood (5-10 years old)?	1	2	3	4	5
2.	What was your weight during adolescents?	1	2	3	4	5
3.	What was your weight during you 20's	1	2	3	4	5
4.	What do you consider your weight to be at present?	1	2	3	4	5
5.	What was your child's weight during the first year of life?	1	2	3	4	5
6.	What was your child's weight as a toddler?	1	2	3	4	5
7.	What was your child's weight as a pre-schooler?	1	2	3	4	5

	1 = unconcerned; 2 = a little concerned; 3 = Concerned; 4 = fairly concerned; 5 = very concerned					
1.	How concerned are you about your child eating too much when you are not around him/her?	1	2	3	4	5
2.	How concerned are you about your child having to diet to maintain a desirable weight?	1	2	3	4	5
3.	How concerned are you about your child becoming overweight?	1	2	3	4	5

	1 = disagree; 2 = slightly disagree; 3 = neutral; 4 = slightly agree; 5 = agree					
1.	I have to be sure that my child does not eat too many sweets (candy, icecream, cake, pastries)	1	2	3	4	5
2.	I have to be sure that my child does not eat too many high fat foods	1	2	3	4	5
3.	I have to be sure that my child does not eat too much of his/her favorite foods	1	2	3	4	5
4.	I intentionally keep some foods out of my child's reach	1	2	3	4	5
5.	I offer sweets (candy, icecream, cake, pastries) to my child as a reward for good behaviour	1	2	3	4	5
6.	I offer my child his/her favourite foods in exchange for good behaviour	1	2	3	4	5
7.	If I did not guide or regulate my child's eating, he/she would eat too many junk foods	1	2	3	4	5
8.	If I did not guide or regulate my child's eating, he/she would eat too much of his/her favourite foods	1	2	3	4	5
9.	My child should always eat all of the food on his/her plate	1	2	3	4	5
10.	I have to be especially careful to make sure my child eats enough	1	2	3	4	5
11.	If my child says 'I'm not hungry', I will try to get him/her to eat anyway	1	2	3	4	5
12.	If I did not guide or regulate my child's eating, he/she would eat much less than he/she should	1	2	3	4	5

	1 = never; 2 = rarely; 3 = sometimes; 4 = mostly; 5 = always					
1.	How much do you keep track of the sweets (candy, icecream, cake, pastries) your child eats?.	1	2	3	4	5
2.	How much do you keep track of the snack food (chips, Doritos, cheezles) your child eats?	1	2	3	4	5
3.	How much do you keep track of the high-fat foods that your child eats?	1	2	3	4	5

5. *Parenting (A)*

For each statement below circle the number that best describes your beliefs about parenting your child. *There are no right or wrong answers*. We are looking for your overall impression regarding each statement. In the right column, please CIRCLE your answer for each item and answer every question:

SA = Strongly Agree; **A** = Agree; **N** = Neither Agree nor Disagree; **D** = Disagree; **SD** = Strongly Disagree

0	In a well run home children should have their way as often as parents do	SA A N D SD
1	It is for my children's own good to require them to do what I think is right, even if they don't agree	SA A N D SD
2	When I ask my children to do something, I expect it to be done immediately without questions	SA A N D SD
3	Once family rules have been made, I discuss the reason for the rules with my children	SA A N D SD
4	I always encourage discussion when my children feel family rules and restrictions are unfair	SA A N D SD
5	Children need to be free to make their own decisions about activities, even if this disagrees with what a parent might want to do	SA A N D SD
6	I do not allow my children to question the decisions that I make	SA A N D SD
7	I direct the activities and decisions of my children by talking with them and using rewards and punishments	SA A N D SD
8	Other parents should use more force to get their children to behave	SA A N D SD
9	My children do not need to obey rules simply because people in authority have told them to	SA A N D SD
10	My children know what I expect from them, but feel free to talk with me if they feel my expectations are unfair	SA A N D SD
11	Smart parents should teach their children early exactly who is the boss in the family	SA A N D SD
12	I usually don't set firm guidelines for my children's behaviour	SA A N D SD
13	Most of the time I do what my children want when making family decisions	SA A N D SD
14	I tell my children what they should do, but I explain why I want them to do it	SA A N D SD
15	I get very upset if my children try to disagree with me	SA A N D SD
16	Most problems in society would be solved if parents would let their children choose their activities, make their own decisions, and follow their own desires when growing up	SA A N D SD
17	I let my children know what behavior is expected and if they don't follow the rules they get punished	SA A N D SD
18	I allow my children to decide most things for themselves without a lot of help from me	SA A N D SD
19	I listen to my children when making decisions, but I do not decide something simply because my children want it	SA A N D SD
20	I do not think of myself as responsible for telling my children what to do	SA A N D SD
21	I have clear standards of behaviour for my children, but I am willing to change these standards to meet the needs of the child	SA A N D SD
22	I expect my children to follow my directions, but I am always willing to listen to their concerns and discuss the rules with them	SA A N D SD
23	I allow my children to form their own opinions about family matters and let them make their own decisions about those matters	SA A N D SD
24	Most problems in society could be solved if parents were stricter when their children disobey	SA A N D SD
25	I often tell my children exactly what I want them to do and how I expect them to do it	SA A N D SD
26	I set firm guidelines for my children but am understanding when they disagree with me	SA A N D SD
27	I do not direct the behaviours, activities or desires of my children	SA A N D SD
28	My children know what I expect of them and do what is asked simply out of respect for my authority	SA A N D SD
29	If I make a decision that hurts my children, I am willing to admit that I made a mistake	SA A N D SD

6. *Parenting (B)*

At one time or another all children misbehave or do things that could be harmful, that are 'wrong', or that parents don't like. Examples include: hitting someone, whining, forgetting homework, not picking up their things, lying, sulking, refusing to go to bed, going out without permission, arguing back and coming home late.

Parents have many different ways or styles of dealing with these types of problems. Below are items that describe some styles of parenting. For each item, circle the number that best describes your style of parenting during the past 2 months with your child.

1. When my child misbehaves.....

I do something right away	1	2	3	4	5	6	7	I do something about it later

2. Before I do something about a problem.....

I give my child several reminders or warnings	1	2	3	4	5	6	7	I use only one reminder or warning

3. When I'm upset or under stress.....

I am picky and on my child's back	1	2	3	4	5	6	7	I am no more picky than usual

4. When I tell my child not to do something.....

I say very little	1	2	3	4	5	6	7	I say a lot

5. When my child pesters me.....

I can ignore the pestering	1	2	3	4	5	6	7	I can't ignore the pestering

6. When my child misbehaves.....

I usually get into a long argument	1	2	3	4	5	6	7	I don't get into an argument with my child

7. I threaten to do things that.....

I am sure I can carry out	1	2	3	4	5	6	7	I know I won't actually do

8. I am the kind of parent that.....

Sets limits on what my child is allowed to do	1	2	3	4	5	6	7	Let my child do whatever he or she wants

9. When my child misbehaves.....

I give my child a long lecture	1	2	3	4	5	6	7	I keep my talk short and to the point

10. When my child misbehaves.....

I raise my voice or yell	1	2	3	4	5	6	7	I speak to my child calmly

11. If saying no doesn't work right away.....

I take some other kind of action	1	2	3	4	5	6	7	I keep talking and trying to get through to my child

12. When I want my child to stop doing something.....

I firmly tell my child to stop	1	2	3	4	5	6	7	I coax or beg my child to stop

13. When my child is out of sight.....

I often don't know what my child is doing	1	2	3	4	5	6	7	I always have a good idea of what my child is doing

14. After there's been a problem with my child.....

I often hold a grudge	1	2	3	4	5	6	7	things get back to normal quickly

15. When we're not a home.....

I handle my child the way I do at home	1	2	3	4	5	6	7	I let my child get away with more

16. When my child does something I don't like.....

I do something about it every time it happens	1	2	3	4	5	6	7	I often let it go

17. When there's a problem with my child.....

things build up and I do things I don't mean to do	1	2	3	4	5	6	7	things don't get out of hand

18. When my child misbehaves, I spank, slap, grab, or hit my child.....

rarely or never	1	2	3	4	5	6	7	most of the time

19. When my child doesn't do what I ask.....

I often let it go or end up doing it myself	1	2	3	4	5	6	7	I take some other action

20. When I give a fair threat or warning.....

I often don't carry it out	1	2	3	4	5	6	7	I always do what I said

21. If saying 'No' doesn't work.....

I take some other kind of action	1	2	3	4	5	6	7	I offer my child something nice so that he/she will behave

22. When my child misbehaves.....

I handle it without getting upset	1	2	3	4	5	6	7	I get so frustrated or angry that my child can see that I'm upset

23. When my child misbehaves.....

I make my child tell me why he/she did it	1	2	3	4	5	6	7	I say 'No' or take some other action

24. If my child misbehaves and then acts sorry.....

I handle the problem like I usually would	1	2	3	4	5	6	7	I let it go at that

25. When my child misbehaves.....

I rarely use bad language or curse	1	2	3	4	5	6	7	I almost always use bad language

26. When I say my child can't do something.....

I let my child do it anyway	1	2	3	4	5	6	7	I stick to what I said

27. When I have to handle a problem.....

I tell my child I am sorry about it	1	2	3	4	5	6	7	I don't say why I am sorry

28. When my child does something I don't like, I insult my child, say mean things or call my child names.....

rarely or never	1	2	3	4	5	6	7	most of the time

29. If my child talks back or complains when I handle a problem.....

I ignore the complaining and stick to what I said	1	2	3	4	5	6	7	I give my child a talk about not complaining

30. If my child gets upset when I say 'No'.....

I back down and give in to my child	1	2	3	4	5	6	7	I stick to what I said

7. *Problem Solving & Communication questionnaire*

When our family struggles with problems or conflicts which upset us, I would describe my family in the following :

	F = False; MF = Mostly False; MT = Mostly True; T = True				
1.	We yell and scream at each other	F	MF	MT	T
2.	We are respectful of each others' feelings	F	MF	MT	T
3.	We talk things through till we reach a solution	F	MF	MT	T
4.	We work hard to be sure family members were not hurt, emotionally or physically	F	MF	MT	T
5.	We walk away from conflicts without much satisfaction	F	MF	MT	T
6.	We share with each other how much we care for one another	F	MF	MT	T
7.	We make matters more difficult by fighting and bringing up old matters	F	MF	MT	T
8.	We take the time to hear what each other has to say or feel	F	MF	MT	T
9.	We work to be calm and talk things through	F	MF	MT	T
10.	We get upset, but we try to end our conflicts on a positive note	F	MF	MT	T

8. *General Nutrition Knowledge*

(1) Do you think the *Dietary Guidelines for Australians* recommends that people should be eating more, the same amount, or less of these foods? (*Tick one box per food*)

	More	Same	Less	Not sure
Vegetables	☐	☐	☐	☐
Sugary foods	☐	☐	☐	☐
Meat	☐	☐	☐	☐
Starchy foods	☐	☐	☐	☐
Fatty foods	☐	☐	☐	☐
High fibre foods	☐	☐	☐	☐
Fruit	☐	☐	☐	☐
Salty foods	☐	☐	☐	☐
Dairy Products	☐	☐	☐	☐

(2) How many servings of fruit and vegetables EACH DAY do you think experts are advising people to eat? Examples of 1 serve are a piece of fruit or 1 cup of salad vegetables. (*Please circle one alternative for fruit and one for vegetables*)

Fruit
1 2 3 4 5 6 7 8 9 10 >10

Vegetables
1 2 3 4 5 6 7 8 9 10 >10

(3) Which fat do experts say is most important for people to cut down on? (*Tick one only*)

Monounsaturated fat	☐
Polyunsaturated fat	☐
Saturated fat	☐
Not sure	☐

(4) What version of dairy foods do experts say people should eat? (*Tick one only*)

Full fat	☐
Low fat	☐
Mixture of full fat & lower fat	☐
None, dairy foods should be cut out	☐
Not sure	☐

(5) Do you think these foods are **high or low in added sugar**? (*tick one box per food*)

Food	High	Low	Not sure
Bananas	☐	☐	☐
Unflavoured yoghurt	☐	☐	☐
Ice-cream	☐	☐	☐
Orange 35% Juice	☐	☐	☐
Tomato ketchup	☐	☐	☐
Tinned fruit in natural juice	☐	☐	☐

(6) Do you think these are **high or low in fat**? (*Tick one box per food*)

Food	High	Low	Not sure
Pasta (without sauce)	☐	☐	☐
Mayonnaise	☐	☐	☐
Baked Beans	☐	☐	☐
Lunch/ sandwich meat	☐	☐	☐
Honey	☐	☐	☐
Vegetarian pastry	☐	☐	☐
Nuts	☐	☐	☐
White bread	☐	☐	☐
Cottage cheese	☐	☐	☐
Polyunsaturated margarine	☐	☐	☐

(7) Do you think experts put these in the **starchy/high carbohydrate foods group**? (*Tick one box per food*)

Food	Yes	No	Not sure
Cheese	☐	☐	☐
Pasta	☐	☐	☐
Butter	☐	☐	☐
Nuts	☐	☐	☐
Rice	☐	☐	☐
Porridge	☐	☐	☐

The questionnaire continues on the next page. Please answer the remaining question.

(8) Do you think these are **high or low in salt?** *(Tick one box per food)*

Food	High	Low	Not sure
Sausages	☐	☐	☐
Pasta	☐	☐	☐
Anchovies	☐	☐	☐
Red meat	☐	☐	☐
Frozen vegetables	☐	☐	☐
Cheese	☐	☐	☐

(9) Do you think these are **high or low in protein?** *(Tick one box per food)*

Food	High	Low	Not sure
Chicken	☐	☐	☐
Cheese	☐	☐	☐
Fruit	☐	☐	☐
Baked Beans	☐	☐	☐
Butter	☐	☐	☐
Cream	☐	☐	☐

(10) Do you think these are **high or low in fibre/roughage?** *(Tick one box per food)*

Food	High	Low	Not sure
Cornflakes	☐	☐	☐
Bananas	☐	☐	☐
Eggs	☐	☐	☐
Red Meat	☐	☐	☐
Broccoli	☐	☐	☐
Nuts	☐	☐	☐
Fish	☐	☐	☐
Baked potatoes with skins	☐	☐	☐
Chicken	☐	☐	☐
Baked beans	☐	☐	☐

(11) Do you think these fatty foods are high or low in saturated fat? *(Tick one box per food)*

Food	High	Low	Not sure
Tuna	☐	☐	☐
Whole milk	☐	☐	☐
Olive oil	☐	☐	☐
Red meat	☐	☐	☐
Sunflower margarine	☐	☐	☐
Chocolate	☐	☐	☐

(12) Some foods contain a lot of fat but no cholesterol? *(tick one box)*

Agree ☐
Disagree ☐
Not sure ☐

(13) Do you think experts call these a **healthy alternative to red meat?** *(Tick one box per food)*

Food	Yes	No	Not sure
Liver pate	☐	☐	☐
Lunch meats	☐	☐	☐
Baked Beans	☐	☐	☐
Nuts	☐	☐	☐
Low fat cheese	☐	☐	☐
Quiche	☐	☐	☐
Mushrooms	☐	☐	☐

(14) Half a glass of unsweetened (100%) fruit juice counts as a serve of fruit. *(Tick one)*

Agree ☐
Disagree ☐
Not sure ☐

(15) Saturated fats are mainly found in: *(Tick one)*

Vegetable oils ☐
Dairy products ☐
Both of the above ☐
Not sure ☐

(16) Brown sugar is a healthy alternative to white sugar. *(Tick one)*

Agree ☐
Disagree ☐
Not sure ☐

(17) There is more protein in a glass of whole milk than in a glass of skimmed milk. *(Tick one)*

Agree ☐
Disagree ☐
Not sure ☐

(18) Polyunsaturated margarine contains less fat than butter. *(Tick one)*

Agree ☐
Disagree ☐
Not sure ☐

The questionnaire continues on the next page. Please answer the remaining questions.

(19) Which of these breads contain the most vitamins and minerals? *(Tick one)*

White ☐
Brown ☐
Wholegrain ☐
Not sure ☐

(20) Which do you think is higher in kilojoules: butter or regular margarine? *(Tick one)*

Butter ☐
Regular margarine ☐
Both the same ☐
Not sure ☐

(21) A type of oil which contains mostly monounsaturated fat is: *(Tick one)*

Coconut oil ☐
Sunflower oil ☐
Olive oil ☐
Palm oil ☐
Not sure ☐

(22) There is more calcium in a glass of whole milk than a glass of skimmed milk. *(Tick one)*

Agree ☐
Disagree ☐
Not sure ☐

(23) Which one of the following has the most kilojoules for the same weight? *(Tick one)*

Sugar ☐
Carbohydrate ☐
Fibre/roughage ☐
Fat ☐
Not sure ☐

(24) Harder fats contain more: *(Tick one)*

Monounsaturated fat ☐
Polyunsaturated fat ☐
Saturated fat ☐
Not sure ☐

(25) Polyunsaturated fats are mainly found in: *(Tick one)*

Vegetable oils ☐
Dairy products ☐
Both of the above ☐
Not sure ☐

The next few questions are about choosing foods. Please answer what is being asked and not whether you like or dislike the food.

For example, suppose you were asked….
'If a person wanted to cut down on fat, which cheese would be best to eat?'

(a) Cheddar cheese
(b) Camembert
(c) Cream Cheese
(d) Cottage Cheese

If you didn't *like* cottage cheese, but knew it was the right answer, you would still tick cottage cheese

(26) Which would be the best choice for a low fat, high fibre snack? *(Tick one)*

Diet strawberry yoghurt ☐
Sultanas ☐
Muesli bar ☐
Wholemeal crackers & cheddar cheese ☐

(27) Which would be the best choice for a low fat, high fibre meal light meal? *(Tick one)*

Grilled chicken ☐
Cheese on wholemeal toast ☐
Baked beans on wholemeal toast ☐
Quiche ☐

(28) If a person wanted to reduce the amount of fat in their diet, which would be the best choice? *(Tick one)*

Steak, grilled ☐
Sausages, grilled ☐
Skinless turkey, grilled ☐
Pork chop, grilled ☐

(29) If a person wanted to reduce the amount of fat in their diet, but didn't want to give up chips, which one would be the best choice? *(Tick one)*

Thick cut chips ☐
Thin cut chips ☐
Crinkle cut chips ☐

The questionnaire continues on the next page. Please answer the remaining questions.

(30) If a person felt like something sweet, but was trying to cut down on sugar, which would be the best choice? *(Tick one)*

Honey on toast ☐
A cereal snack bar ☐
Plain digestive biscuit ☐
Banana with plain yoghurt ☐

(31) Which of these would be the healthiest dessert? *(Tick one)*

Baked apple ☐
Strawberry yoghurt ☐
Wholemeal crackers & cheddar cheese ☐
Carrot cake with cream cheese topping ☐

(32) Which cheese would be the best choice as a lower fat option? *(Tick one)*

Plain cream cheese ☐
Edam ☐
Cheddar ☐
Brie cheese ☐

(33) If a person wanted to reduce the amount of salt in their diet, which would be the best choice? *(Tick one)*

Ready made frozen shepherd's pie ☐
Gammon (bacon/ham) with pineapple ☐
Mushroom omelette ☐
Stir fry vegetables with soy sauce ☐

The following section is about health problems or diseases.

(34) Are you aware of any major health problems or diseases that are related to **a low intake of fruit and vegetables?**

Yes ☐
No ☐
Not sure ☐

If yes, what diseases or health problems do you think are related to a low intake of fruit and vegetables?

_____
_____
_____
_____

(35) Are you aware of any major health problems or diseases that are related to **a low intake of fibre?**

Yes ☐
No ☐
Not sure ☐

If yes, what diseases or health problems do you think are related to a low intake of fibre?

_____
_____
_____
_____

(36) Are you aware of any major health problems or diseases that are related to **how much sugar people eat?**

Yes ☐
No ☐
Not sure ☐

If yes, what diseases or health problems do you think are related to sugar?

_____
_____
_____
_____

(37) Are you aware of any major health problems or diseases that are related to **how much sodium people eat?**

Yes ☐
No ☐
Not sure ☐

If yes, what diseases or health problems do you think are related to salt?

_____
_____
_____
_____

The questionnaire continues on the next page. Please answer the remaining questions.

(38) Are you aware of any major health problems or diseases that are related to the amount of fat people eat?

Yes	☐
No	☐
Not sure	☐

If yes, what diseases or health problems do you think are related to fat?

_____
_____
_____
_____

(39) Do you think these help to reduce the chances of getting certain kinds of cancer? *(Answer each one)*

	Yes	No	Not sure
Eating more fibre	☐	☐	☐
Eating less sugar	☐	☐	☐
Eating less fruit	☐	☐	☐
Eating less salt	☐	☐	☐
Eating more fruit & vegetables	☐	☐	☐
Eating less preservatives/additives	☐	☐	☐

(40) Do you think these help to prevent heart disease? *(Answer each one)*

	Yes	No	Not sure
Eating more fibre	☐	☐	☐
Eating less saturated fat	☐	☐	☐
Eating less salt	☐	☐	☐
Eating more fruit & vegetables	☐	☐	☐
Eating less preservatives/additives	☐	☐	☐

(41) Which one of these is more likely to raise people's blood cholesterol level? *(Tick one)*

Antioxidants	☐
Polyunsaturated fats	☐
Saturated fats	☐
Cholesterol in the diet	☐
Not sure	☐

(42) Have you heard of antioxidant vitamins?

Yes	☐
No	☐

If yes, do you think these are antioxidant vitamins? *(answer each one)*

	Yes	No	Not sure
Vitamin A	☐	☐	☐
B complex Vitamins	☐	☐	☐
Vitamin C	☐	☐	☐
Vitamin D	☐	☐	☐
Vitamin E	☐	☐	☐
Vitamin K	☐	☐	☐

Do you have any comments you would like to make?

_____
_____
_____
_____
_____

I.6 Information sheets & instructions

Factors that contribute to children's diets

Researchers; Jacqueline Peters (PhD Candidate)
Dr Natalie Sinn Prof John Lynch and Dr Karen Campbell (supervisors)



Information Sheet

Introduction

The quality of children's diets is important for both their physical and psychological health and wellbeing. With conflicting environmental influences from television, canteens and peers etc, it can be very difficult for parents to develop healthy dietary habits in their children.

Research has indicated at age 3 children respond to their internal cues of satiation. However, at age 5 it appears that children are more responsive to the external environmental cues, meaning a child will eat even when they are not hungry. Furthermore, a recent large Australian survey identified that many children are not meeting dietary guidelines and this is likely to be associated with increased risk of diseases like type-II diabetes in childhood. Importantly, research indicates that habits formed early in life often follow through adolescence into adulthood and can be very difficult to change.

Therefore, since the family environment can have an important influence on the early development of habits, more research needs to be conducted to understand what factors may be related to children's diets and food choices.

Aim of the Project

The aim of this project is to investigate contributing factors to Australian children's diets in order to inform evidence-based programs for parents of young children under five, to help them learn strategies for developing healthy dietary behaviours in their children early in life.

How will the Study be Conducted?

- Parents of children aged between 2-5 years are required for the study.
- Parents will be asked to complete questionnaires in relation to their children's diets, feeding practices and family environment.
- No payment will be received for participating, however as a token of appreciation for your time and effort a movie pass will be provided on receipt of the completed questionnaires.
- All questionnaires and reply paid envelopes will be supplied by the University of SA.

Eligibility

- Participants are required to be the main care giver of a child aged from 2-5 years of age and have knowledge of the child's regular diets and feeding practices.

Benefits of Participating in the Study

- Although there are no direct benefits of participating in the study, participants will be providing valuable information that may contribute to a broader understanding of children's feeding practices.
- A movie pass will be provided on return of the completed questionnaires.

Are There any Risks Involved?

- There are no risks involved in participating in the study.

Confidentiality

- All information provided on the questionnaire is completely confidential and only identifiable by allocated ID numbers to ensure anonymity.
- Names and addresses will be requested on a separate piece of paper in order to forward the movie pass.
  Consent will be requested to possibly contact you for future research relating to this project. These details will be matched to your ID number in a pass word protected file.
- Results of the study will be sent to you if we have your address and consent to contact you, otherwise can be supplied upon request.
- Any publications or press releases arising from the study will not contain any identifiable information.

Data Storage

- All data collected from the questionnaires will be stored securely within a locked office in the School of Health Sciences at the University of South Australia for 5 years.
- Questionnaires (containing only ID numbers) will be stored in boxes within this restricted-access facility.
- Electronic data will only contain ID numbers.
- Please provide your name and address on the separate sheet attached; this will not be stored with the questionnaires. Your personal details will be matched to your ID numbers in a password protected file and may be used to contact parents for future research related to this project.

What if I Wish to Withdraw

- Participants are free to withdraw any time during the study.

Other Information

The findings from this study will be used in preparation for a PhD thesis looking into childhood obesity prevention.

This study has been approved by the University of South Australia's Human Research Ethics Committee. Should you wish to discuss the project with someone not directly involved, in particular in relation to matters concerning policies, information about the conduct of the study, or your rights as a participant, please contact the UniSA Ethics Officer, Ms Vicki Allen on 8302 3118; fax 8302 3921; email: vicki.allen@unisa.edu.au.

For Further Information or Questions

Should you have any questions or concerns regarding the questionnaires or the study, please do not hesitate to contact either:

Jacqueline Peters on 8302 2906 or e-mail jacqueline.peters@postgrads.unisa.edu.au,

Dr Natalie Sinn on (08) 8302 1757 or e-mail natalie.sinn@unisa.edu.au.

Factors that contribute to children's diets

Researchers; Jacqueline Peters (PhD Candidate) and Dr Natalie Sinn (supervisor)



Important Instructions

Please Read Prior to Commencement

Child Feeding and Parenting Questionnaires

- This questionnaire collects information about you and your child and your family's lifestyle and eating habits.
- Please read and answer **every question** in this booklet as best as you can.
- Some of the questions may seem a bit personal, but this information will be very useful to us and will remain confidential.
- Please follow all instructions highlighted throughout the questionnaire.
- Should you have any questions or concerns regarding the questionnaires, please do not hesitate to contact **Jacqueline Peters** on 8302 2906 or e-mail jacqueline.peters@postgrads.unisa.edu.au, or research supervisor Dr Natalie Sinn on 8302 1757 or e-mail natalie.sinn@unisa.edu.au.

I.7 Movie address form

Factors that contribute to children's diets

Researchers; Jacqueline Peters (PhD Candidate)

Dr Natalie Sinn (supervisor)

In order to receive your movie pass, please provide your name and postal address and return in the reply paid envelope with the completed questionnaire.

(You will need to complete one for each questionnaire)

NAME:
ADDRESS:

I.8 Consent form to contact for future research

University of South Australia

CONSENT FORM

Project title: Parental influences on children's diet and food choices

Researcher's name & contact detail
Jacqueline Peters
PhD candidate
School of Health Sciences
GPO Box 2471
Adelaide, SA, 4001
PH: 8302 2906

Supervisor's name & contact details
Natalie Sinn, PhD
Nutritional Physiology Research Centre
Sansom Institute for Health Research
University of South Australia
GPO Box 2471, Adelaide SA 5001
PH: 8302 1757

- I have read the Participant Information Sheet titled 'Parental influences on children's diet and food choices' and I have had the opportunity to discuss the nature and purpose of the research project with the researcher. I understand and agree to take part.
- I understand the purpose of the research project and my involvement in it.
- I understand that I may withdraw from the research project at any stage and that this will not affect my status now or in the future.
- I understand that my information will be retained at the University of South Australia and I may be contacted for further participation with relation to this project. This does not oblige me to take part in any further research.
- I understand that while information gained during the study may be published, I will not be personally identified and my personal results will remain confidential.
- I understand the statement in the information sheet concerning reimbursement to me for taking part in the study.

Name of participant.....

Address .....

Phone:.....Email.....

Signed.....**Date**.....

I have provided information about the research to the research participant and believe that he/she understands what is involved.

Researcher's signature and date.....

This project has been approved by the University of South Australia's Human Research Ethics Committee. If you have any ethical concerns about the project or questions about your rights as a participant please contact the Executive Officer of this Committee, Tel: +61 8 8302 3118; Email: Vicki.allen@unisa.edu.au

I.9 Thank you letter

University of South Australia

Nutritional Physiology Research Centre

Factors that contribute to children's diets



Date

Address 1
Address 2
Address 3

Dear Name

I would like to thank you for taking the time to complete the questionnaire for the above research project. As a token of our appreciation for the time involved, please find enclosed your Wallis Movie ticket.

Kind regards,

Jacqueline Peters
PhD Candidate
Nutritional Physiology Research Centre
University of South Australia
GPO Box 2471, Adelaide SA 5001
Phone: 61 8 8302 2906

Nutritional Physiology Research Centre
School of Health Sciences
University of South Australia
GPO Box 2471, Adelaide. SA 5001

Affiliated with UniSA | Sansom Institute

Telephone: +61 8 8302 2097
Facsimile: +61 8 8302 2178
Email: nutritional.physiology@unisa.edu.au
Website: www.unisa.edu.au/nutritional.physiology