

University of Warwick institutional repository: <http://go.warwick.ac.uk/wrap>

**A Thesis Submitted for the Degree of PhD at the University of Warwick**

<http://go.warwick.ac.uk/wrap/3785>

This thesis is made available online and is protected by original copyright.

Please scroll down to view the document itself.

Please refer to the repository record for this item for information to help you to cite it. Our policy information is available from the repository home page.

**An evaluation of *'Families for Health'*: a new family-based intervention for the management of childhood obesity**

**by**

**Wendy Robertson BSc, MPhil, MSc, MPH, FFPH**

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy

**University of Warwick**

**Health Sciences Research Institute, Warwick Medical School**

**December 2009**

## TABLE OF CONTENTS

	<b>Page</b>
<b>List of Tables</b>	ix
<b>List of Figures</b>	xiii
<b>List of Boxes</b>	xv
<b>Acknowledgments</b>	xvi
<b>Declaration</b>	xvii
<b>Abstract</b>	xx
<b>Publication</b>	xxi
<b>CHAPTER 1: INTRODUCTION</b>	
1.1 Background	1
1.2 Aim and Objectives	2
1.3 Structure of the Thesis	3
1.4 Why I was interested in this research project	4
<b>CHAPTER 2: REVIEW OF LITERATURE</b>	
2.1 Overview	6
2.2 Defining and Measuring Childhood Obesity	7
2.2.1 Multi-component and two-component models/techniques	7
2.2.2 Predictive Measures	8
2.2.3 Simple Measurements of Body Composition	13
2.3 Prevalence of Childhood Obesity	24
2.3.1 International Studies	24
2.3.2 National Studies	26
2.3.3 Childhood Obesity in the West Midlands	33
2.4 Health and Social Consequences of Obesity in Childhood	36
2.4.1 Physical Health Consequences in Children/Adolescents	36
2.4.2 Psycho-social health in Children/Adolescents	38
2.5 Health and Social Consequences of Childhood Obesity in Adulthood	41
2.5.1 Persistence of childhood obesity into adulthood	41
2.5.2 Impact of childhood obesity on mortality and morbidity in adulthood	45
2.5.3 Impact of childhood obesity on social and economic outcomes in adulthood	47
2.6 Determinants of Childhood Obesity	48
2.6.1 Genetic vs Environment	49
2.6.2 Socio-economic factors	50
2.6.3 Family Influences	52
2.6.4 Parenting and its links to childhood obesity	53
2.7 Treatment (Management) or Prevention?	59
2.8 Effectiveness of Interventions for Treatment of Childhood Obesity	62
2.8.1 Systematic Reviews	62
2.8.2 Key primary studies contributing to the evidence base for family-based programmes	68
2.8.3 Studies in the UK on the Treatment of Childhood Obesity	72

2.9 Cost-Effectiveness of Interventions for the Treatment of Childhood Obesity	78
2.10 Public Health Policy on Obesity in England	79
2.10.1 The Health of the Nation (1992)	79
2.10.2 Our Healthier Nation (1999)	80
2.10.3 Choosing Health – Making Healthier Choices Easier (2004)	81
2.10.4 Foresight Report (2007)	82
2.10.5 Healthy Weight, Healthy Lives (2008)	83
2.10.6 National Child Measurement Programme	84
2.10.7 Summary	88
<b>CHAPTER 3: METHODOLOGY</b>	
3.1 Introduction	89
SECTION I – Philosophical Paradigm	90
3.2 The Paradigm Debate	90
3.3 Pragmatic Approach using Mixed-Methods	92
3.4 Definition of Mixed-Methods Research	94
3.5 Purpose of Mixed-Methods Research	95
3.6 Design of Mixed-Method Studies	99
3.6.1 Implementation of data collection	99
3.6.2 Priority given to data collection method	100
3.6.3 Stage of Integration	100
3.6.4 Theoretical perspective	102
3.6.5 Six Mixed-Methods Study Designs	103
SECTION II – Evaluating Interventions for the Treatment of Obesity	104
3.7 Randomised Controlled Trials	104
3.8 Medical Research Council’s Framework for evaluation of complex interventions	105
3.9 ‘Before and After’ Evaluation Designs	107
3.10 Process and Outcome Evaluation	108
SECTION III – Application to the Evaluation of ‘Families for Health’	110
3.11 Pilot	110
3.12 Mixed Methods – the Purpose	111
3.13 Mixed Methods - the Study Design	112

<b>CHAPTER 4: METHODS</b>	
4.1 Introduction	115
SECTION I – Research Governance and Funding	116
4.2 Research Governance	116
4.2.1 Funding of the Research	116
4.2.2 Advisory Group for the Research	117
SECTION II – Development, Recruitment & Delivery of the Programme	118
4.3 Development of the Programme	118
4.4 Setting for the Pilot: Coventry	118
4.5 Recruitment of Families for Two Groups	120
4.5.1 Sample Size	120
4.5.2 Inclusion and Exclusion Criteria	121
4.5.3 Identification of Families	122
4.5.4 Procedure for Obtaining Informed Consent	124
4.6 Overview of the Delivery of the Intervention	124
SECTION III – Data Collection	126
4.7 Overview of Mixed-Methods Evaluation	126
4.8 Baseline Socio-Demographic and Other Characteristics of Families	128
4.9 ‘Before and After’ Outcome Evaluation	129
4.9.1 Measures of Overweight of Children	130
4.9.2 Psycho-Social Measurements with Children and Parents	132
4.9.3 Eating and Activity Behaviour	136
4.9.4 Statistical Analysis	143
4.10 Process Data whilst Programme was being Delivered	145
4.10.1 Attendance and Withdrawals	145
4.10.2 Changes to the Delivery of the Programme & Costs	145
4.10.3 Parents’ Weekly Evaluation Forms	146
4.10.4 Facilitators’ Weekly Evaluation Forms	147
4.11 End-of-Programme Data Collection with Parents	148
4.11.1 Parents End-of-Programme Evaluation Questionnaire	148
4.11.2 Questionnaire on Costs of Families to Attend	150
4.11.3 Interviews with Parents	150
4.12 End of Programme Data Collection with Children	155
4.12.1 Group Interviews with Children	155
4.13 Analysis of the One-to-one and Group Interviews	158
4.14 End-of-Programme Data Collection with Programme Developer	160
SECTION IV – Process, Outcome and Economic Evaluation	161
4.15 Process Evaluation of the Delivery of the Intervention	162
4.16 Outcome Evaluation to Assess Effectiveness	164
4.17 Economic Evaluation	165

<b>CHAPTER 5: DEVELOPMENT OF THE PROGRAMME</b>		
5.1	Theoretical Underpinning and Evidence Base	166
5.1.1	Family-Based Treatment of Childhood Obesity	167
5.1.2	Parenting Programmes	169
5.1.3	Family Links Nurturing Programme	170
5.2	Tendering process for the Development of the Programme	172
5.3	Description of the ' <i>Families for Health</i> ' Programme	173
5.3.1	Parents' Programme	176
5.3.2	Children's Programme	177
5.4	Handbooks to Support the Delivery of the Programme	178
5.5	Identification and Training of Facilitators	182
5.6	Summary	184
<b>CHAPTER 6 – DELIVERY OF THE '<i>Families for Health</i>' PROGRAMME</b>		
6.1	Introduction	185
6.2	Context for the Intervention	185
6.3	Recruitment	187
6.3.1	How Families were Recruited	187
6.3.2	Recruitment via the Media	189
6.3.3	Recruitment via General Practices	190
6.4	Reach	194
6.4.1	Participation by 'intended' audience	194
6.4.2	Characteristics of Participants	195
6.4.3	Attendance and Drop-out	196
6.5	Dose Delivered	201
6.6	Dose Received	203
6.6.1	Overall Perception of Weekly Sessions and Programme	204
6.6.2	Engagement with Weekly Topics	205
6.6.3	Family Break Time with Children	210
6.6.4	Engagement with the Group from Weekly Evaluations	212
6.7	Programme Fidelity	214
6.7.1	Overall comments	214
6.7.2	Families who Withdrew from the Programme	215
<b>CHAPTER 7 – OUTCOME EVALUATION</b>		
7.1	Introduction	226
7.2	Uptake and Attrition	227
7.3	Characteristics of Parents and Children who were interviewed	228
7.4	Changes in Measures of Body Composition	229
7.4.1	BMI and BMI z-score	230
7.4.2	Waist and Percentage Body Fat	230
7.4.3	Height	230
7.4.4	Changes in BMI z-score for individuals	233
7.5	Psycho-social Health of Children	237
7.5.1	Children's Quality of Life	237
7.5.2	Children's Self-Esteem	238
7.5.3	How Children Feel about Themselves	242

7.5.4 How Children Feel at School	244
7.5.5 Potential for Harm to Psycho-Social Health of Children	246
7.5.6 Summary	247
7.6 Parents' Mental Health	248
7.7 Family Relationships	255
7.7.1 Parent-child Relationships	255
7.7.2 Other Family Relationships	262
7.7.3 Summary	264
7.8 Lifestyle Changes – Healthy Eating	265
7.8.1 Changes to Eating Style	267
7.8.2 Changes to Stimulus Exposure	269
7.8.3 Increase in Fruit and Vegetable Consumption?	275
7.8.4 Children in Charge of what is eaten	277
7.8.5 Potential Barriers to Healthier Eating	278
7.8.6 Summary	280
7.9 Lifestyle Changes – Physical Activity	281
7.9.1 Physical Activity Measures of Children - Questionnaire	281
7.9.2 Physical Activity Measures of Children - Accelerometers	285
7.9.3 Changes in Physical Activity made by Families	286
7.9.4 Summary	294
7.10 Extreme Case Analysis	295
7.10.1 Children with Large Reductions in BMI z-score	295
7.10.2 Children with an Increase in BMI z-score	300
7.11 Summary of Chapter	301
<b>CHAPTER 8 – ECONOMIC EVALUATION</b>	
8.1 Introduction	302
8.2 Direct Costs to Provide the Intervention	304
8.3 Costs to Families to Attend ' <i>Families for Health</i> '	306
8.3.1 Direct costs to Families	307
8.3.2 Indirect Costs to Families	309
8.4 Cost-Outcome Description	310
8.5 Comparison of Costs with Other Obesity Treatment Programmes	312
<b>CHAPTER 9 – USER and PROVIDER PERSPECTIVES</b>	
9.1 Introduction	315
9.2 Venue	316
9.3 Length of the 12-week Course	317
9.4 Length of Sessions (2½ hours)	319
9.5 Content of the Programme	321
9.5.1 Different to Expectations	321
9.5.2 Parents' Perspective on Physical Activity	322
9.5.3 Children's Perspective on Physical Activity	325
9.5.4 Programme Developer's Perspective on Physical Activity	328
9.6 Benefits of a Group-based Programme	330
9.6.1 Relationship between Facilitators and Parents	330
9.6.2 Mirroring of concerns by other parents	332
9.6.3 Group Provided Safe Environment to Contribute	333

9.6.4 Parents felt supported by other parents	334
9.7 Structure of the Programme	335
9.7.1 Same Topics Each Week for Parents and Children	335
9.7.2 Combining of Children's and Parents' Groups?	335
9.8 Summary	338
<b>CHAPTER 10 – VALIDITY of ACCELEROMETER DATA</b>	
10.1 Introduction	339
10.2 Compliance Data from Accelerometers and Daily Diaries	340
10.3 'Unmonitored' Activity	343
10.3.1 Functioning of Uniaxial Accelerometers	343
10.3.2 Children not wearing the Accelerometers	344
10.4 Over-monitored Activity ?	347
10.4.1 More active than usual?	347
10.4.2 Trampolining	347
10.5 Improvements and Alternatives to using Accelerometers	350
10.6 Summary	351
<b>CHAPTER 11 – DISCUSSION and CONCLUSIONS</b>	
11.1 Introduction	352
11.2 Recruitment and Retention of Families	353
11.3 Review of Main Outcomes with Published Work	356
11.4 Potential Adverse Effects	359
11.5 Methodological Strengths of the Study	360
11.6 Main Limitations of the Study	361
11.7 Suggested Changes to the Families for Health Intervention	363
11.8 Recommendations for Future Research	365
11.8.1 Further Piloting	365
11.8.2 Research around Recruitment	366
11.8.3 'Parent-only' <i>versus</i> current 'family-based' intervention	368
11.8.4 Randomised Controlled Trial	369
11.9 Conclusions	371
<b>REFERENCES</b>	<b>373</b>



<b>APPENDICES</b>	
Appendix I - Further Details of UK Studies on Tracking of Childhood Obesity to Adulthood	402
Appendix II - Further Details of Studies Examining Impact of Childhood Obesity on Social and Economic Outcomes in Adulthood	404
Appendix III – Research Grant, Services Support and Treatment Costs	406
Appendix IV – Letters confirming Ethical Approval from Coventry Research Ethics Committee (NHS) (REC reference 05/Q2802/15)	407
Appendix V – Letter confirming Research & Development Approval from Coventry PCT	417
Appendix VI – Members of the Research Advisory Group	418
Appendix VII -Articles in the local Coventry newspapers for recruitment	419
Appendix VIII – Participant Information sheet for children	422
Appendix IX – Participant Information sheet for parents	423
Appendix X - Consent form for parents	429
Appendix XI – Activity Diary to use alongside the accelerometer	430
Appendix XII - End-of-programme questionnaire for Parents	431
Appendix XIII – Costs questionnaire for parents (end of programme)	436
Appendix XIV - Interview schedule for parents	442
Appendix XV – Coding Framework for NVivo for the one-to-one interviews with parents	445
Appendix XVI - Tendering process for the development of the programme	448
Appendix XVII – Further Information on Changes to the Delivery of the Intervention	450
Appendix XVIII – Further Information on Dose Received	452
Appendix XIX – Published Paper in Archives of Disease in Childhood	456

## List of Tables

		<b>Page</b>
Table 2.1	Strengths and Weaknesses of Main Methods to Measure Body Composition (Part I)	9
Table 2.2	Strengths and Weaknesses of Main Methods to Measure Body Composition (Part II)	10
Table 2.3	Definitions for Childhood Overweight and Obesity used in policy, surveys and clinical practice in the UK	17
Table 2.4	Relationship between change in BMI z-score and cardiovascular risk in children after obesity treatment intervention	23
Table 2.5	Prevalence of obesity and overweight amongst children in Reception and Year 6 from the 2006-7 National Child Measurement Programme, for England, West Midlands and Coventry.	31
Table 2.6	Longitudinal studies from the UK that have examined the Tracking of Obesity from Childhood to Adulthood	43
Table 2.7	Longitudinal studies examining the risk of childhood obesity on Mortality in adulthood	46
Table 3.1	Comparison of the Positivist and Constructivist Paradigm	90
Table 3.2	Pragmatic Approach of Morgan, versus Quantitative and Qualitative Research methods	93
Table 3.3	Factors to help decide the Design for a Mixed-Methods Study	99
Table 3.4	Types of Mixed-Methods Study Designs	103
Table 3.5	Revised MRC framework for Phase 0, I and II for developing RCTs of complex interventions	106
Table 3.6	Framework for the Process Evaluation - Key Components which will be assessed	109
Table 4.1	Key stages in the research governance of the project	116
Table 4.2	Facilitators of the ' <i>Families for Health</i> ' programme, indicating their professional background	125
Table 4.3	Mapping of Data Collection in the Mixed-Methods Evaluation of the ' <i>Families for Health</i> ' Programme	126
Table 4.4	Eight and three group versions of the National Statistics Socio-economic Classification	128
Table 4.5	Typology of Purposive Sampling	151
Table 4.6	Framework for the Process Evaluation	163
Table 5.1	Sequence and content of Parents' and Children's Parallel Groups for ' <i>Families for Health</i> ' (version 1)	175
Table 5.2	Week 3 of the Parents' Programme for ' <i>Families for Health</i> ' (version 1)	180
Table 5.3	Week 3 of the Children's Programme for ' <i>Families for Health</i> ' (version 1)	181
Table 6.1	Methods of Recruitment of families to ' <i>Families for Health</i> '	189

Table 6.2	Extent of Media Coverage for Recruitment to Families for Health	190
Table 6.3	Systematic Recruitment Methods of Three General Practices	191
Table 6.4	Socio-demographic and Baseline Characteristics of Families and their Children who started the <i>'Families for Health'</i> Programme	196
Table 6.5	Enforced Changes to the Structure of the Programme	202
Table 6.6	Weekly Evaluation of Parents: How do you feel about today's session?	204
Table 6.7	Topics that parents found or did not find useful/enjoyable	206
Table 6.8	How helpful have these <u>parenting</u> topics been, and are parents using the ideas confidently?	207
Table 6.9	How helpful have these healthy lifestyle <u>physical activity</u> topics been, and are parents using the ideas confidently?	208
Table 6.10	How helpful have these healthy lifestyle <u>food</u> topics been, and are parents using the ideas confidently?	208
Table 6.11	Responses from Parents of Group 1 and Group 2 in their weekly evaluations to reflect the stages in group development (Tuckman 1965)	213
Table 6.12	Characteristics of Families who Withdrew from the Programme, their reason for withdrawing and whether they were Interviewed	216
Table 6.13	Baseline Characteristics of the 18 'Completers' (15 fully engaged, 3 partially engaged) vs 9 Drop-outs	217
Table 7.1	Characteristics of Parents who were Interviewed	228
Table 7.2	Group Interviews of the Children	229
Table 7.3	Summary of body composition measurements at baseline (0 months), end-of-programme (3 months) and nine month follow-up, in 22 children with follow-up data to 9-months	231
Table 7.4	Summary of body composition measures at baseline, end-of-programme (3 months), 9-months and 2-year follow-ups in 19 children who were followed up for 2-years	232
Table 7.5	Magnitude of change in BMI z-score for each child from baseline to the end-of-programme (3 months), 9-month and 2-year follow-ups, to assess for clinically significant changes	235
Table 7.6	Change in Category of Obesity and Overweight for each child at the end-of-programme (3 months), 9-month and two-year follow-ups	236
Table 7.7	Summary of children's quality-of-life, from the parents' and the children's perspectives, at baseline (0 months), end-of-programme (3 months) and nine month follow-up, in 22 children with follow-up data	239

Table 7.8	Summary of children’s quality-of-life, from the parents’ and the children’s perspectives at baseline (0 months), end-of-programme (3 months), nine month and 2-year follow-ups, in 19 children who were followed up for 2-years	240
Table 7.9	Summary of children’s self-esteem scores at baseline (0 months), end-of-programme (3 months) and nine month follow-up, in 22 children with follow-up data	241
Table 7.10	Responses to ‘How do you feel about yourself now: better, worse or the same?’ in the Children’s End-of-Programme interview.	243
Table 7.11	Responses to ‘How do things feel for you at school now: better, worse or the same?’ in the Children’s End-of-Programme interview.	245
Table 7.12	Summary of parent’s mental health scores at baseline (0 months), end-of-programme (3 months) and nine-month follow-up, for the 16 parents with follow-up data	249
Table 7.13	Summary of parent’s mental health at baseline (0 months), end-of-programme (3 months), nine-month and 2-year follow-ups, for 13 parents who were followed up for 2-years	249
Table 7.14	Summary of the relationship between parents and children at baseline (0 months), end-of-programme (3 months) and nine month follow-up, in 22 children with follow-up data	256
Table 7.15	Summary of the relationship between parents and children at baseline (0 months), end-of-programme (3 months), nine month and 2-year follow-ups, in 19 children who were followed up for 2-years	256
Table 7.16	Summary of healthy eating measures, at baseline (0 months), end-of-programme (3 months) and nine month follow-up in 22 children with data	266
Table 7.17	Summary of healthy eating measures at baseline, end-of-programme (3 months), nine month and 2-year follow-ups in 19 children who were followed up for 2-years	266
Table 7.18	Parents’ and Children’s Interview data about ‘Treat Days’, in relation to Change in Stimulus Exposure and BMI z-score.	273
Table 7.19	Summary of physical activity measures at baseline (0-months), end-of-programme (3-months) and nine-month follow-up in 22 children with data	283
Table 7.20	Summary of physical activity measures at baseline, end-of-programme (3-months), nine-month and 2-year follow-ups in 19 children who were followed up for 2-years.	284
Table 7.21	Children who had a Change in BMI z-score >-0.5	295
Table 7.22	Children who showed an increase in BMI z-score	300
Table 8.1	Types of Health Care Economic Evaluation, distinguishing FULL from PARTIAL economic evaluations.	302
Table 8.2	Types of Full Economic Evaluation	303

Table 8.3	Direct Costs to the NHS to run the ' <i>Families for Health</i> ' Programme in the two Pilot Groups in Coventry	305
Table 8.4	Costs to families to attend ' <i>Families for Health</i> '	306
Table 8.5	Cost-Outcome Description: Relating Costs to Run the Programme to Changes in BMI z-score	312
Table 9.1	Data from the End-of-Programme about the Duration (12-weeks) of the Programme	318
Table 9.2	Data from the End-of-Programme about the Length of each Session (2½ hours)	320
Table 9.3	Interview data from children about the good things about the ' <i>Families for Health</i> ' programme	326
Table 9.4	Interview data from children about what they have not liked about the ' <i>Families for Health</i> ' programme.	327
Table 9.5	Interview data from parents about wishing for more combined sessions with parents and children	336
Table 9.6	Interview data from parents supporting the rationale for separate groups for parents and children	337
Table 10.1	Compliance of Children with Wearing the Accelerometer and Completing the Diary	341
Table 10.2	Children's Activity from their diary that is likely to be partially or wholly unmonitored by the Uniaxial Accelerometer	344
Table 11.1	Change in BMI z-score with ' <i>Families for Health</i> ' compared with other Interventions for the Treatment of childhood	357

## List of Figures

		<b>Page</b>
Figure 2.1	Prevalence of Children who are Overweight in Selected Countries in the World, from 1967 to 2005	24
Figure 2.2	Percentage of young people aged 13 to 15 who are overweight according to BMI, in the Organisation for Economic Co-operation and Development (OECD) member countries, in 2001/2	26
Figure 2.3	Prevalence of overweight and obesity amongst children aged 2 to 10, 1995 to 2007, in England, by sex, from the Health Survey for England	29
Figure 2.4	Prevalence of overweight and obesity amongst children aged 11 to 15, 1995 to 2007, in England, by sex, from the Health Survey for England	29
Figure 2.5	National Child Measurement Programme for Childhood Obesity: Data for West Midlands PCTs, West Midlands & England in Year 6 in 2006/7	34
Figure 2.6	Childhood Obesity in Year 6 in Schools in Coventry in 2006	35
Figure 2.7	Model of Determinants of Health from Dahlgren and Whitehead (1991)	48
Figure 2.8	Prevalence of obesity amongst children aged 2-15, by Parental BMI status and child's gender, from Health Survey for England 2007	52
Figure 2.9	Model from Rhee (2008) showing the relationship between parental feeding, parental style and family functioning and their influence on energy consumption and overweight status.	55
Figure 2.10	Childhood Obesity Pyramid for England	59
Figure 2.11	Forest Plots from the Cochrane Systematic Review on the Management of Obesity in children under 12 (Oude Luttikhuis et al 2009)	66
Figure 2.12	Chart illustrating the projected impact of the various programmes on BMI in children, in order to meet the 2020 target	83
Figure 2.13	Three-tiers of Care Pathway for Weight Management of Young People from Healthy Weight, Healthy Lives	84
Figure 3.1	Medical Research Council's Framework for developing RCTs of complex interventions	106
Figure 3.2	Visualisation of the Concurrent Triangulation Mixed-Methods Design for the ' <i>Families for Health</i> ' pilot study	113
Figure 4.1	Coventry: Population Pyramid from the 2001 census	119
Figure 4.2	Time-points for the measurements with families in the 'before-and-after' evaluation of the ' <i>Families for Health</i> ' intervention	129
Figure 6.1	Recruitment to ' <i>Families for Health</i> ' running in Autumn 2005	188

Figure 6.2	Flow Diagram of Outcome of Systematic Recruitment at One General Practice via search of practice database	193
Figure 6.3	Flow of families through the two pilot groups and evaluation, and for the two groups combined	198
Figure 6.4	Weekly Attendance at Families for Health for Group 1 (Autumn 2005) & Group 2 (Spring 2006)	199
Figure 6.5	Number of sessions attended by each Family for Groups 1 and 2	200
Figure 6.6	Exploration of the high drop-out rate in ' <i>Families for Health</i> ' running on Monday evening after school (Group 2)	215
Figure 7.1	Change in BMI z-score for each child from baseline (set to zero) to the end-of-programme (3 months), 9-month and 2-year follow-ups.	234
Figure 7.2	Parents' mental health scores (Short Depression Happiness Scale), arranged by group.	250
Figure 10.1	Record from the Accelerometer at the 9-month follow-up of Child 1A whose diary indicated that they took part in the Coventry Fun Run on 25 <sup>th</sup> June 2006, 10am to 12 noon.	342
Figure 10.2	Record from the Accelerometer at the 9-month follow-up of a Child (16B) whose diary indicated that they were trampolining between 3pm and 4pm	349

## List of Boxes

		<b>Page</b>
Box 2.1	Measuring Change in BMI	21
Box 2.2	Physical health associations of obesity in childhood and adolescence	36
Box 3.1	Greene's Five Purposes of Mixed-Methods Evaluation	96
Box 3.2	Brymans' Scheme to Categorise the Uses of Mixed-Methods Research	97
Box 4.1	Inclusion & Exclusion criteria for the ' <i>Families for Health</i> ' pilot	121
Box 4.2	Standardisation of the Data Collection using Accelerometers	139
Box 4.3	Parents' Weekly Evaluation Forms	146
Box 4.4	Facilitator's Weekly Feedback sheets	147
Box 4.5	Parents' End-of-Programme Evaluation Questionnaire	149
Box 4.6	Topic Guide for the Group Interviews with Children	157
Box 4.7	Framework Approach for the Analysis of Qualitative Data	159
Box 4.8	Interview Schedule of Programme Developer	160
Box 5.1	Principles underpinning the ' <i>Families for Health</i> ' Programme	173
Box 5.2	Handbooks for the Delivery of the Programme	178
Box 5.3	Aims of Facilitator Training for ' <i>Families for Health</i> '	182
Box 5.4	Structure of the Facilitator Training for ' <i>Families for Health</i> '	182
Box 8.1	Definitions of Direct and Indirect Costs	304
Box 11.1	Objectives	352



## Acknowledgements

Firstly, I am indebted to my PhD supervisors who were Professor Sarah Stewart-Brown and Professor Jane Barlow from January 2006 to January 2008; Professor Margaret Thorogood and Professor Jane Barlow since January 2008. They have been incredibly supportive at each stage of the PhD.

The development and piloting of the *'Families for Health'* programme was funded by a Public Health Initiative award from the Department of Health. Coventry Teaching PCT supported the pilot both practically and financially, with specific thanks to Dr Peter Barker and Dr Caron Grainger. I would also like to thank the members of the Research Advisory Group who provided advice and support for the development of the programme and the evaluation.

Sincere thanks to Candida Hunt who developed the *'Families for Health'* programme, in conjunction with the University of Warwick and the Research Advisory Group. The programme was professionally delivered by Candida Hunt, Mandy Coombes, Clair Hobbs, Daksha Myrie, Dawn Swan, Stephen Withers and Sue Douglas; grateful thanks to all. Special thanks to Michelle Oldfield for high quality administrative support and to Dr Tim Friede and Professor Nigel Stallard for their support with statistical analysis. Thanks also to Coventry Sports and Leisure Centre. Finally, a special thank you to all the families who took part in the programme and the research, and I wish them well in the future.

Last, but not least, thank you to my partner Alastair, and sons Hamish and Callum for their patience! I have been spurred on by my eldest son's comment: *"Mum, you only have one life, don't spend it all doing a PhD!"*

## **Declaration**

I declare that the work in the thesis is my own work, and has not been submitted for any other degree at another university. I describe what I did below. Aspects of the research have been supported by others, as indicated.

**Grant Application** - I made a joint application (with Professor Sarah Stewart-Brown) for the grant from the Department of Health's Public Health Initiative for novice researchers. This was successful (£70,385). My contribution involved writing the drafts of the bid and making a major contribution to the study design.

**Development of Programme** - I prepared the tendering documents for the development of the programme alongside Helen Rooney (Purchasing Office) and Professor Sarah Stewart-Brown. I organised the meetings of the Research Advisory Group alongside Michelle Oldfield (Research Administrator), of which I was a member, which oversaw the awarding of the sub-contract for the development of the programme. The programme was developed by Candida Hunt in conjunction with the Research Advisory Group.

**Research Governance** - I completed the COREC forms for the ethical approval from Coventry REC, and all the paperwork for R&D registration with Coventry Teaching PCT. With support from Professor Sarah Stewart-Brown, we secured the service support and excess treatment costs for the programme.

**Recruitment** - I was responsible for the piloting of the various recruitment strategies and the consenting of each family into the study, adhering strictly to

consent procedures. I wrote the draft press releases for the Communications Office (University of Warwick), who contacted the media on my behalf.

**Piloting of the Programme** - My contributions to running the 'Families for Health' programme were:-

- I organised the venue, found the facilitators, sourced some props and liaised with the leisure centre to provide the activity sessions.
- Checked that the facilitators had had CRB checks and organised them if required.
- I was present at all of the sessions of the programme and facilitated the children's group as a reserve facilitator, if required.
- I kept a record of attendance.
- I put in place arrangements for child protection with Coventry PCT.

Candida Hunt co-ordinated the weekly delivery of the programme, supported by a team of facilitators.

**Methods for Evaluation** – I identified the validated questionnaires used in the evaluation and developed other questionnaires to capture the demographic data of families and the costs of families to attend the programme. In conjunction with Candida Hunt, I also designed a questionnaire for parents to complete at the end of the programme. I prepared the interview schedules for the semi-structured interviews of parents and children, in consultation with Professor Sarah Stewart-Brown. I recognised the need for an objective measure of habitual activity, and I researched and purchased the required equipment (e.g. scales, stadiometer, accelerometers).

**Data Collection** - I was responsible for and carried out every aspect of data collection at baseline, the end-of-programme, the 9-month and 2-year follow-ups, including quantitative and qualitative data. The only exception is that some help with the hands on data collection was given by the facilitators, Professor Sarah Stewart-Brown and Michelle Oldfield (Research Administrator) at the end-of-programme and 9-month follow-ups (the number of families made it impossible for me to carry out all of the data collection by myself at these time-points). To increase reliability I did all the measurements of height and weight.

**Data Analysis and Interpretation** - I have carried out all of the statistical analysis and interpretation of the quantitative data described in this thesis, with the support of Michelle Oldfield (Research Administrator) for data entry and advice from Dr Tim Friede and Professor Nigel Stallard on appropriate statistical tests and the use of SAS.

Michelle Oldfield (Research Administrator) transcribed the interviews with parents and children. I devised the coding strategy for the interviews and consulted with Professor Jane Barlow (supervisor) about the themes. The interviews were coded using NVIVO by both myself and Michelle Oldfield (Research Administrator), and then I further analysed and interpreted the data, including the integration with quantitative data.

**Write-Up of the Thesis** – The writing is my own, but each chapter has been commented on by Professor Margaret Thorogood and Professor Jane Barlow (supervisors). The structure of the thesis for the mixed-methods evaluation has evolved from discussions with these two supervisors.

## Abstract

**Objectives** - To develop and pilot a community-based family programme, '*Families for Health*', for intervention with overweight and obese children aged 7-11 years.

**Intervention** – '*Families for Health*' is a 12-week programme, with parallel groups for parents and children, combining support for parenting, lifestyle change, as well as social & emotional development.

**Design of the Evaluation** – Pilot study using mixed-methods comprising: process evaluation; outcome evaluation involving a 'before and after' evaluation and triangulation with interview data; economic evaluation (cost-outcome description); users and providers perspectives.

**Setting** – Leisure Centre, Coventry, England

**Participants** – 27 overweight or obese children aged 7-13 years (18 girls, 9 boys) and their parents, from 21 families.

**Process Evaluation** – Two groups were run, and were delivered as planned. Recruitment was difficult, although most effective via the media. Attendance rate was 62%, with 18(67%) children completing the programme.

**Outcome Evaluation** – Primary outcome was change in the BMI z-score from baseline. For 22 children with follow-up data, BMI z-score was significantly reduced by -0.18 (95% CI -0.30 to -0.05,  $p=0.008$ ) at the end of the programme, and was sustained to 9-months (-0.21) and 2-years (-0.23). There were also significant improvements in the children's quality-of-life, eating and activity environment, child-parent relationships and parent's mental health. Fruit and vegetable consumption, participation in moderate/vigorous exercise, and children's self-esteem did not change significantly. Interview data illustrated the changes made by the families, particularly to their eating environment.

**User and Provider Perspectives** – The group-based parenting approach was received well, providing the 'tools' for parents to become 'agents of change' in the family. Suggested changes to the programme include providing follow-up sessions and a greater focus on physical activity.

**Economic Evaluation** - Costs to run '*Families for Health*' were £517 per family or £402 per child, in-line with other group-based obesity management or parenting interventions.

**Conclusion** - '*Families for Health*' is a promising new intervention for the management of childhood obesity.

## Publication

**Robertson W**, Friede T, Blissett J, Rudolf MCJ, Wallis MA, Stewart-Brown S.

Pilot of '*Families for Health*': community-based family intervention for obesity.

*Archives of Disease in Childhood* 2008; **93**: 921-928.

Published Online First: 7 May 2008. doi:10.1136/adc.2008.139162

This publication is in Appendix XIX.

# Chapter 1

## Introduction

In this introductory chapter I will provide a brief background to the research project and set out the aim and objectives. An outline of the structure of the thesis will follow. Finally, I will describe how this particular topic was chosen for my PhD.

### 1.1 Background

At the inception of the current project in November 2004, the prevalence of obesity in children in England was reaching 'epidemic' proportions and continued to rise (Jotangia et al 2005). The prevention and treatment of childhood obesity became a priority in the public health White Paper 'Choosing Health' and a target was set: *'to halt, by 2010 the year-on-year rise in obesity among children under 11 in the context of a broader strategy to tackle obesity in the population as a whole'* (Department of Health 2004a).

One challenge was how best to treat or manage children who were already obese or overweight. At the start of the current project, systematic reviews reported an inadequate evidence base of interventions for the treatment of childhood obesity with no studies from the UK (Summerbell et al 2003). These reviews did, however, draw attention to multi-faceted family-based interventions as a promising approach (McLean et al 2003, Summerbell et al 2003). Research from Israel also pointed to parents being given the main responsibility for change in the treatment of obesity in children aged under 12 (Golan and Crow 2004a).

Effective services for the treatment of childhood obesity are needed in the UK. In family interventions, where the responsibility for change rests primarily with the parents, it is vital to address parenting skills because these are likely to influence the effectiveness of the programme.

## **1.2 Aim and Objectives**

This study aimed to develop and pilot a new family-based childhood obesity treatment intervention, which was group-based and could be run in the community. The programme became known as '*Families for Health*', and it differs from other family-based programmes being researched in the UK in offering more emphasis on parenting, relationships skills and emotional and social development, alongside lifestyle change. The aim and objectives are stated below:

**Aim** - The aim of the research was to develop and pilot a new family-based intervention ('*Families for Health*'), which is underpinned by evidence relating to obesity management and parenting education, to improve the treatment of overweight/obese children.

### **Objectives**

(1) To develop a new group-based intervention for childhood obesity ('*Families for Health*'), combining elements from parenting education programmes, child programmes & obesity treatment programmes.

(2) To pilot the intervention in the community with families of overweight or obese children in the age range 7-11 years in order to:-

- Evaluate its acceptability to families.



- Evaluate the short term (3-months and 9-months) and longer term (2-years) impact on children and parents.
- Estimate the costs of the intervention.
- Inform the design of a randomised controlled trial (RCT).

The development of the *'Families for Health'* programme, described in Chapter 5, met the first objective. The second objective was met through the piloting of the intervention at Coventry Leisure Centre with 21 families, including 27 children, running two groups.

### **1.3 Structure of the Thesis**

Chapter 2 presents a 'Review of the Literature' around childhood obesity, with a section on treatment interventions. Chapter 3 'Methodology' sets out the philosophical paradigm and the research frameworks which I have used to guide the research. In Chapter 4 detailed methods for the data collection are given. Chapter 5 presents the 'Development of the *'Families for Health'* Programme'. This chapter meets the first objective of this research, describing the development of a new intervention for the treatment of childhood obesity combining elements from parenting, child & obesity management programmes.

Chapters 6 to 9 present the results from the evaluation of the piloting of the *'Families for Health'* programme. Chapter 6 focuses on aspects relating to the delivery of the intervention (process evaluation); Chapter 7 presents the outcome evaluation drawing on both quantitative and qualitative data; Chapter 8 provides the economic evaluation in the form of a cost-outcome description; and Chapter 9 gives the users and providers perspectives. Chapter 10 explores the

validity of using accelerometers to measure physical activity in children who are obese. Chapter 11 discusses the findings in relation to other published literature, and outlines the strengths and limitations of the research and implications for future research.

#### **1.4 Why I was interested in this research project**

I became interested in childhood obesity research as a result of my previous employment. My career has involved a mix of academic and NHS service posts, always with an interest in research that could potentially make a difference either to policy or to individuals.

I graduated in Sports Science & Physical Education from Loughborough University in 1983. I then completed a project on the physiological responses of asthmatics to endurance running, gaining a Master of Philosophy. This led to an interest in exercise responses in respiratory disease, and I was appointed as a Clinical Scientist in the Department of Respiratory Physiology at Birmingham Heartlands Hospital in 1985. Having seen much smoking related illness in this post, I made a sideways move into the prevention and cessation of smoking as a Health Promotion Specialist with Solihull Healthcare NHS Trust in 1992. Although this was primarily a service post, I retained an interest in research. This post catalysed an interest in a career in public health, and in 2000 I commenced Public Health training with the West Midlands Deanery, completing training in December 2006.

In order to broaden my experience of the various settings from which public health is delivered, I rotated to Warwick Medical School at the University of

Warwick in October 2003. In this rotation I had a particular interest in contributing to the evaluation of health promotion interventions where the methodological challenges are greater than they are in pharmaceutical research. At this time childhood obesity was also increasing and becoming a priority area (CMO Annual Report 2002). Furthermore, my academic trainer, Professor Sarah Stewart-Brown, Professor of Public Health had a research interest in the impact of parenting on public health, and was keen to develop and evaluate a parenting programme which focuses on childhood obesity. These factors came together and offered me the opportunity to do a PhD. I bid for and received a Public Health Initiative career award from the Department of Health to develop and pilot a new family-based intervention for the treatment of childhood obesity.

## **Chapter 2**

### **Review of Literature**

#### **2.1 Overview**

This chapter describes how obesity can be measured and the prevalence of childhood obesity in England and Coventry. The health and social consequences of childhood obesity both in childhood and adulthood are then described, and the underlying risk factors for childhood obesity are reviewed to identify targets for intervention. Prevention versus the treatment of children who are already obese is discussed. As the new intervention in this thesis is a treatment intervention, the review then focuses on the evidence relating to the treatment of childhood obesity, focusing on both effectiveness and cost-effectiveness of interventions. Finally, the evolution of policy in England around childhood obesity is described.

My aim in this literature review has been to identify recent high quality systematic reviews. Where systematic reviews were not available, I have identified the most appropriate evidence i.e. longitudinal studies to examine associations and randomised controlled trials (RCTs) to examine effectiveness of interventions.

## **2.2 Defining and Measuring Childhood Obesity**

Obesity is defined as 'excess body fat or adipose tissue' (Sweeting 2007). Studies have shown that health care professionals cannot categorise a child into the correct weight status category by visual cues alone, with a tendency to underestimate overweight and obesity in England (Smith et al 2008), and to over-rate normal weight children as overweight in Australia (Spurrier et al 2006). In both Smith et al (2008) and Spurrier et al (2006) the health care professional was asked to view photographs of children and rate their weight status, which was compared with the degree of adiposity based on body mass index (BMI). Both studies highlighted the need for accurate measurements of adiposity by health professionals rather than a reliance on visual cues alone.

Many different methods are used to measure body fat in children, which have been the subject of two recent reviews by Wells and Fewtrell (2006) and Sweeting (2007). Tables 2.1 and 2.2 describe the main methods available to measure body fat, subdivided according to the classification of techniques advanced by Wells and Fewtrell (2006): multi-component models; two-component models; predictive measurements; and simple measurements.

### **2.2.1 Multi-component and two-component models/techniques**

The most accurate and sophisticated techniques to measure body fat are multi-component (e.g. 3 component models divide body into fat, water and fat free mass) and two-component models (i.e. divide body into fat mass and fat free mass) (Table 2.1). Apart from isotope dilution, all of these require specialist equipment for their measurement. Isotope dilution requires specialist laboratory equipment for the analysis of samples. Although they are the more accurate,

they are too expensive to use in field based studies and/or impractical in the settings in which interventions are delivered. Only multi-component models are now considered by Wells and Fewtrell (2006) to be sufficiently accurate to act as a 'gold standard' diagnostic test or reference method with which to compare other methods.

## **2.2.2 Predictive Measures**

Table 2.2 gives details of predictive and simple measurements of body composition, which have the potential to be used in field based studies. Predictive measurements include measurements of skinfold thickness and bio-electric impedance analysis, which are used to *predict* body composition using equations, but in doing so make a number of assumptions (Wells and Fewtrell 2006).

### **2.2.2.1 Skinfold Measurements**

Although skinfold measurements are simple to conduct and require little equipment, one of the disadvantages with this measurement stems from the difficulty in ensuring that only fat and not underlying muscle are measured by the callipers. This measurement is more difficult to conduct in obese individuals, and therefore has poorer accuracy and reproducibility in this group. A further difficulty is in the use of prediction equations for percent fat which may not be valid in populations other than in whom they were derived, with errors in prediction in individuals being  $\pm 9\%$  fat (Wells and Fewtrell 2006). Thus the prediction of percentage fat from skinfold measures is both inaccurate and not reproducible in obese children, and is unsuitable for longitudinal comparisons.

**Table 2.1 - Strengths and Weaknesses of Main Methods to Measure Body Composition (Part I)**

Method	Description /Principle	Strengths	Weaknesses
<b>(a) Multicomponent models</b>			
<b>Multicomponent models (i.e. three and four component models)</b>	e.g. Three component model divides body weight into: fat, water, fat-free tissue, by measuring body water (hydrometry) and body volume (densitometry).	(1) Most accurate approach – gold standard to compare other methods (2) Assumptions are minimised as measurements are made on hydration, density etc	(1) Special equipment -limited to research settings. (2) Expensive
<b>(b) Two-component techniques/models</b>			
<b>Density-based methods:-</b> (1) Hydrodensitometry (underwater weighing), (2) Air-displacement plethysmography (volume of air displaced in chamber) (Bodpod)	If the density of a body is known (i.e. weight per unit volume), the proportion of fat mass (FM) & fat free mass (FFM) can be estimated using equations.	(1) Acceptable two component technique (i.e. divides body into FM and FFM)	(1) Hydrodensitometry requires submersion - unsuitable in children (2) Effects of disease on lean mass reduces its accuracy (3) Special equipment -limited to research settings.
<b>Computerised tomography (CT) or Magnetic Resonance Imaging (MRI)</b>	X-rays (CT) or magnetic field (MRI) generates cross-sectional high resolution internal images from which volume of adipose tissue is estimated	(1) Allows estimation of regional body composition i.e. intra-abdominal adipose tissue	(1) Radiation exposure (CT) (2) Expensive (3) Special equipment -limited to research settings
<b>Dual-energy x-ray absorptiometry (DXA)</b>	Transverse scans using low-energy x-ray, with beams differentially absorbed by various tissues.	(1) Two component technique (2) Quick and acceptable to children (3) Assess regional fat distribution as well as overall fat mass.	(1) Radiation exposure (2) Problems with accuracy (3) Special equipment -limited to research settings
<b>Isotope dilution (hydrometry) i.e. deuterium dilution</b>	Water labelled with deuterium given, and then saliva, urine or blood analysed by mass spectrometry to measure total body water.	(1) Acceptable for all age groups (2) Simple to carry out (3) Can be used in field.	(1) Delayed results (2) Inaccurate if a disease affects hydration status (best used where normal hydration can be assumed) (3) Analysed by specialist equipment.

Sources of information: Sweeting (2007); Wells and Fewtrell (2006)

**Table 2.2 - Strengths and Weaknesses of Main Methods to Measure Body Composition (Part II)**

<b>Method</b>	<b>Description /Principle</b>	<b>Strengths</b>	<b>Weaknesses</b>
<b>(c) Predictive Measurements</b>			
<b>Skinfold Measures</b>	Subcutaneous fat is measured by callipers, often from many sites (peripheral & trunk areas).	(1) Simple measures of regional fat if use raw figures (2) Equations available to predict % body fat (3) Cheap, simple & portable	(1) Need to partially undress – may put some children off (2) Poor reproducibility in obesity (3) Poor accuracy, magnified by using prediction equations not derived from the population under study
<b>Bio-electric impedance analysis (BIA)</b>	Electrical currents pass more easily through body fluids in muscle & blood, but encounter resistance from fat (as contains little water). i.e. conductivity is proportional to body water (predicts body fat)	(1) Can be used in field, as analysers as portable. (2) Simple, quick, non-invasive measure (3) Relatively inexpensive (4) Reference data available for some measurement methods	(1) Less accurate than sophisticated measures (2) Prediction equations incorporate assumptions which make them useful only in the population from which the equations were derived. (3) Affected by hydration status
<b>(d) Simple Measurements</b>			
<b>Waist Circumference</b>	Assumption is that waist is proportional to central fat.	(1) Simple, quick measure of central (abdominal) fat (2) Reference data available	(1) Not as accurate as measure of visceral fat
<b>Body Mass Index</b>	Weight (Kg) / height (m <sup>2</sup> ) – used as an index of relative weight for height	(1) Simple and quick (2) Reference data available, taking into account age and sex (expressed as SDS or z-score)	(1) Not a measure of body composition i.e. cannot distinguish between fat and lean mass. (2) For a given BMI in children, there is a large variation in 'fatness'

Sources of information: Sweeting (2007); Wells and Fewtrell (2006)



### **2.2.2.2 Bio-Electric Impedance Analysis**

Bio-electric Impedance Analysis (BIA) involves the passing of an electric current through the body and measuring its impedance. There is no one standard method for the placement of electrodes with options including electrodes manually placed on the wrist and ankle; standing on the electrode with bare feet with a hand-grip in each hand; or just standing on the electrodes (foot-to-foot). The foot-to-foot (or leg-to-leg) method measures lower body impedance only. This is the simplest method and is now incorporated into commercially available weighing scales.

The advantages of bio-electric impedance analysis are that it is a portable, simple, relatively inexpensive and non-invasive measure, and therefore suited for use in field settings (Table 2.2). Reference data are becoming available for percentage fat in children using bio-electric impedance analysis using the Tanita BC-418 MA Segmental Body Composition Analyser (McCarthy 2006). However, without a study cross calibrating these results to other scales these reference curves can only be used if the Tanita BC-418 MA analyser is used.

The disadvantages of bio-electric impedance analysis are that it is not as accurate as multi- and two-compartmental techniques (Table 2.2). Many assumptions are incorporated into the measurements and prediction equations for fat free mass and total body water, with the simplest 'foot-to-foot' method relying most on these assumptions (Wells and Fewtrell 2006). The measure of impedance is first of all adjusted for height and then total body water is estimated, which is then converted to fat free mass. The relationship between the bioelectrical data and total body water is influenced by age, so that different

equations are required for children and adults. Furthermore, it has been shown that equations for the relationship between bioelectrical data and total body water developed in lean children are not applicable to obese children (Wabitsch et al 1996). Thus reference equations have been developed for obese children (Wabitsch et al 1996), though these equations are specific to the method of measurement (e.g. electrode site).

Validity studies that have examined BIA in children include a study by Tyrrell et al (2001) which compared foot-to-foot bio-electric impedance analysis with dual-energy x-ray absorptiometry in 82 children aged 4 to 10 using Bland-Altman plots. They concluded that BIA was an accurate technique to estimate fat free mass and percent body fat. Wabitsch et al (1996) also assessed the validity of bio-electric impedance analysis to detect changes in body composition over a 40 day diet and exercise programme in 146 obese 5 to 18 year olds, comparing it with total body water measured by deuterium dilution. The authors concluded that the bio-electric impedance analysis equation developed in the obese children provides an accurate prediction of total body water, although prediction of changes in total body water with a small amount of weight loss over time is not possible by bio-electric impedance analysis. However, the intervention lasted only 40 days and is therefore unlikely to give a reliable assessment of the value of BIA to detect changes over time in children. Some caution must also be exercised with both of these validity studies because both studies used two-component models as the comparator, whereas only multi-component models are now considered sufficiently accurate to act as a reference (Wells and Fewtrell 2006).

In a 12 week weight-loss programme in adults which resulted in a significant mean loss of weight of 9.9 kg, Jebb et al (2007) examined the validity of leg-to-leg BIA to detect changes in body fat, compared with multi-compartment models as the gold standard. Leg-to-leg bio-impedance was shown to be superior to both tetrapolar bio-electrical impedance and to skinfold thickness (i.e. other 'simple' measures of body fat) at detecting both increases and decreases of body fat. Its performance was similar to air-displacement plethysmography, dual-energy x-ray absorptiometry and deuterium dilution. The authors concluded that leg-to-leg bio-electric impedance analysis is a useful method to measure body composition changes in weight management programmes. However, this study was in adults aged 24 to 65, and thus caution must be used in the direct transfer of this finding to treatment programmes in children.

Wells and Fewtrell (2006) indicate in their review that bio-electric impedance analysis has the potential to provide information on the *direction* (though not magnitude) of change in fat free mass over time in children. This is based on two assumptions:- first, that electrode placement is consistent and, second, that body build is relatively constant over short periods of time in children.

## **2.2.3 Simple Measurements of Body Composition**

### **2.2.3.1 Waist Circumference**

There is some evidence that body fat distribution, rather than total fat, is more predictive of risk (Saelens 2008). Waist circumference is a simple, quick measure, which is used as an important marker for central or intra-abdominal fat accumulation (Table 2.2), and may be more predictive of adverse health outcomes than total fat (McCarthy et al 2003). Waist circumference centile

curves for British children aged 5 to 16 are available (McCarthy et al 2001). This is a simple measure that can be used in the field.

In order to establish the best anthropometric measure of the distribution of body fat, Daniels et al (2000) looked at waist circumference, waist-hip circumference ratio and skinfold thickness and compared these with fat mass from dual-energy x-ray absorptiometry in young people aged 7 to 17 years. Waist circumference was most strongly correlated ( $r=0.80$ ) with dual-energy x-ray absorptiometry and was the best simple measure of fat distribution, least affected by gender, race and overall adiposity. A similar study by Taylor et al (2000) showed that the 80<sup>th</sup> percentile for waist circumference had a high sensitivity, correctly identifying 89% of girls and 87% of boys with a high trunk fat mass on dual-energy x-ray absorptiometry. Specificity was also high, correctly identifying 94% of girls and 92% of boys with a low trunk fat mass.

Waist circumference is also positively correlated with lipid and insulin concentrations as markers of cardiovascular and metabolic risk (Floodmark et al 1994, Freedman et al 1999). Studies in 10 to 16 year olds have shown positive associations between abdominal fat and low density lipoprotein (LDL) cholesterol, triglycerides and insulin, and an inverse association with high density lipoprotein (HDL) cholesterol (Brambilla et al 1994, Caprio et al 1996). Waist circumference appears to be a valid proxy measure of intra-abdominal fat, linked to increased risks to health.

### 2.2.3.2 Defining Childhood Obesity using BMI

Body mass index (BMI) is defined as weight divided by height squared ( $\text{kg/m}^2$ ). BMI has become widely adopted as a proxy measure for obesity, although is not a measure of body composition per se (i.e. does not measure fat), rather a measure of weight in relation to height. The origins of BMI go back to the 19<sup>th</sup> century when Adolphe Quetelet first described it as an index of weight adjusted for height (Hall and Cole 2006). Then it was known as the Quetelet index, but now is commonly known as BMI.

In adults the following cut-offs for BMI are internationally accepted to define overweight and obesity (World Health Organisation 1995):-

- Overweight (or pre-obese) -  $\geq 25 \text{ kg/m}^2$
- Obese -  $\geq 30 \text{ kg/m}^2$ 
  - Obese class I – 30 to 34.99  $\text{kg/m}^2$
  - Obese class II – 35 to 39.99  $\text{kg/m}^2$
  - Obese class III -  $\geq 40 \text{ kg/m}^2$

Cole (1979) was the first to suggest the use of BMI in children. Body composition in children varies with age and sex and thus, unlike adults, the value of BMI used to define overweight and obesity in children will vary with age and sex. Reference centile charts for BMI are used to define overweight and obesity. In the UK two different reference populations (UK and 'international') are in use and there are variations on which centiles define obesity.

BMI centile charts have been derived from UK 1990 growth reference curves (Cole 1995). These charts use UK reference data from 1978 to 1990, which have been fixed at 1990 so that trends in BMI over time are related to this

reference point. If the aim is to track levels of obesity, it is important that the reference BMI centiles are fixed, but the BMI centiles defining overweight and obesity must also be fixed. However, the centile cut-offs used to define overweight and obesity are not consistent across surveys, policy and clinical practice. Two definitions are in common use. One classification defines overweight as  $\geq 85^{\text{th}}$  centile and obese as  $\geq 95^{\text{th}}$  centile, and another classification defines overweight as  $\geq 91^{\text{st}}$  centile and obese as  $\geq 98^{\text{th}}$  centile. The 85th/95th definition has mainly been used for defining prevalence in epidemiological studies (Table 2.3). This means that in 1990, using the 85<sup>th</sup> / 95<sup>th</sup> centile cut-offs for overweight and obesity respectively, 15% of the UK population were defined as overweight (including obese) and 5% as obese. The 91<sup>st</sup>/98<sup>th</sup> definition, with higher cut-offs to define overweight and obesity, has mainly been used in clinical practice (Table 2.3).

The International Obesity Taskforce (IOTF) offer an alternative reference population, which has combined reference data from six countries including the UK (Cole et al 2000). They have set the cut-offs for overweight and obesity to match the adult cut-offs (25 and 30 kg/m<sup>2</sup>) at age 18, as a less arbitrary choice and providing a definition enabling international comparisons (Table 2.3). In practice, the IOTF cut-offs are similar to the 91<sup>st</sup>/98<sup>th</sup> centile cut-offs of the UK reference charts.

**Table 2.3 - Definitions for Childhood Overweight and Obesity used in policy, surveys and clinical practice in the UK**

	<b>Overweight</b>	<b>Obese</b>
<b>Policy</b>		
Obesity Care Pathway and Weight Loss Guide (Department of Health 2006)	$\geq 85^{\text{th}}$ centile	$\geq 95^{\text{th}}$ centile NB. Defined as ' <i>Severely Overweight</i> '
<b>Epidemiology / Research</b>		
Health Survey for England (Jotangia et al 2005)	$\geq 85^{\text{th}}$	$\geq 95^{\text{th}}$
National Child Measurement Programme (Information Centre 2008)	$\geq 85^{\text{th}}$	$\geq 95^{\text{th}}$
SIGN guideline for use in epidemiology (SIGN 2003)	$\geq 85^{\text{th}}$	$\geq 95^{\text{th}}$
Health Behaviour in School-aged Children – UNICEF report in advanced economies (UNICEF 2007)	IOTF – equivalent to $25 \text{ kg/m}^2$	IOTF – equivalent to $30 \text{ kg/m}^2$
<b>Clinical Practice</b>		
SIGN guideline for clinical use (SIGN 2003)	$\geq 91^{\text{st}}$	$\geq 98^{\text{th}}$

### **2.2.3.3 Limitations of BMI in Children**

Despite the widespread use of BMI in surveillance of obesity and in clinical practice, there are a number of limitations with its use as a measure of excess body fat (i.e. obesity) in children.

First, there is no consensus about which cut-offs to use to define overweight and obesity in children and adolescents. The different definitions in use by various surveys, clinical and policy guidance will yield different prevalence rates of obesity and overweight (Toschke et al 2008), and may exaggerate the prevalence (Social Issues Research Centre 2005).

Second, the value of BMI in children which predicts increased risks to health is not clear. In adults, the World Health Organisation cut-offs of BMI for overweight and obesity (levels I, II, III) were defined because they were predictive of increased morbidity (Sweeting 2007). The various cut-offs for BMI to define obesity in children are more arbitrary. Cardiovascular risks are more closely correlated with intra-abdominal fat, but BMI gives no indication of the distribution of body fat (Hall and Cole 2006).

Third, obesity is defined as 'excess body fat' but there is evidence of the poor ability of BMI to predict body fat. The validity of BMI as a proxy for body fat has been compared with direct measurements, using either BIA or two component techniques (i.e. CT or MRI scans, DXA). Studies show a significant correlation of BMI with total and percent body fat in children and adolescents (Pietrobelli et al 1998, Widhalm et al 2001), but there are problems. Pietrobelli et al (1998) showed large confidence intervals around the association of BMI with fat, so



that individuals with similar values for BMI had very large differences in total and percent body fat. Wells and Fewtrell (2006) indicated that at any given BMI there is a two-fold variation in fat mass amongst children. Furthermore, other studies indicate that the relationship between BMI and fat is affected by age. Widhalm et al (2001) using multiple regression analysis showed that a large part of the variance in percent body fat was explained by BMI in children under 10 years (boys: 73%, girls: 63%), whereas the association was poor in children older than 10 years (boys: 27%, girls: 38%). One of the commonly cited reasons for a wide variation in percentage fat at a given BMI is body build, with muscular athletic children wrongly classified as obese. However, Reilly (2006b, 2007) questions the belief that children may be misclassified as obese using BMI if they are muscular, because in reality almost all children and adolescents with a high BMI are excessively fat. Reilly (2006b, 2007) argues that a greater concern is that BMI is not sensitive enough, missing children who are fat.

Fourth, there are ethnic differences in the ability of BMI to predict fat. In a study of 1251 British schoolchildren aged 5 to 18 years from three ethnic groups (white, south Asian, African-Caribbean) percentage fat was determined by dual-energy x-ray absorptiometry and compared with classification into overweight and obese using the IOTF classification for BMI (Shaw et al 2007). The study showed that south Asian boys and girls were over-represented in the group with more than 25% body fat ( $p < 0.001$ ), whereas African-Caribbean boys and girls were over-represented in the obesity group when defined by BMI (girls,  $p < 0.005$ , boys  $p = 0.01$ ). Thus, BMI does not accurately reflect percentage fat in different ethnic groups, and the use of the same BMI criteria to define obesity for different ethnic groups would lead to inaccuracies in identifying children who

are obese. At comparable levels of BMI, south Asian children have higher percentage body fat.

The issue of BMI cut-off points to define overweight and obesity in adult Asian populations has been addressed by the World Health Organisation (WHO 2004). The WHO concluded that in the Asian population there is high risk to health (type-2 diabetes, cardiovascular disease) even when BMI is lower than the cut-off for overweight ( $25 \text{ kg/m}^2$ ). However, the various studies from different Asian populations give different BMI cut-points for 'observed risk' from 22 to  $25 \text{ kg/m}^2$  and for 'high risk' from 26 to  $31 \text{ kg/m}^2$ , so no clear cut-off point for all Asians for overweight or obesity was agreed. The WHO acknowledged that a further public health action point at a BMI of  $23 \text{ kg/m}^2$  was important in the Asian population, and countries were encouraged to decide cut-offs for their population. However, this debate has not been extended to children.

Fifth, body composition can change even if weight, height and BMI stay the same. The widely quoted example is that physical exercise can reduce fat mass and increase muscle mass (i.e. fat free mass), so BMI remains the same even though body composition has changed (Hall and Cole 2006). Thus a disadvantage of BMI is that it does not measure fat mass, fat free mass or changes in fat, which may be more relevant than BMI to assess risks to health (Wells and Fewtrell 2006).

In conclusion, although BMI is recognised as the best simple anthropometric measure in monitoring population level obesity (Hall and Cole 2006) and in clinical management (Cole et al 2005), it has limitations.

#### 2.2.3.4 Measuring Change in Obesity in Children using BMI

Cole et al (2005) has described four ways in which change in BMI can be expressed (Box 2.1).

##### **Box 2.1 - Measuring Change in BMI**

- Change in raw units ( $\text{kg/m}^2$ ) (BMI)
- Percentage change (BMI%)
- Change in BMI z-score – BMI is translated into z-scores\* (SD scores) for age and sex, and then the change in the z-score is used
- Change in BMI centile - BMI is translated into centiles for age and sex, and then the change in the centiles is used

Cole et al (2005)

*\*BMI z-score (or Standard Deviation score) is the distance from the mean in units of standard deviations that the child's BMI is for their age and sex, compared with the reference population. i.e. BMI z-score of 2 indicates the child is two standard deviations above the mean BMI for their age and sex.*

In a study of 135 Italian children aged 29 to 68 months, Cole et al (2005) measured BMI on three occasions over a 9-month period, with an aim of identifying which of these four methods is optimal to measure change. The criterion used by the authors was that the *'measure's within-child short-term variation should be the same whatever the child's adiposity'*. The study found that change in BMI z-score and BMI centile vary according to the child's baseline level of adiposity, such that more obese children showed less variability. Although BMI centile is useful to classify children into overweight and obese categories, this study showed that it is poor at quantifying change because it is insensitive to change at the extremes (highest and lowest centiles). Although BMI z-score is the best measurement for classifying children's obesity status, due to the skewness of the BMI distribution with the upper centiles being further apart, a given change in BMI corresponds to a smaller change in BMI z-score at higher centiles. This makes it problematic in

evaluating weight loss in obese children. One way round this is to adjust the change in BMI z-score for baseline BMI z-score. The authors suggest that short-term (i.e. 9-months) changes in adiposity are best evaluated by changes in raw BMI units or BMI % units, although they qualify this conclusion stating that the advantage of these measures over BMI z-score is small.

Cole et al (2005) are unclear how change in BMI is best expressed in *longer* term studies. Charts show that BMI increases with age from around age 7-years, so that as a child gets older the absolute values for BMI which define overweight and obesity increase, thus standardisation for age (e.g. by z-score) is essential when examining change. This is a problem with using BMI units or BMI % units to measure change as they are not adjusted for age and sex. Longer term intervention studies have used a variety of different ways to express change in BMI, as will be seen in Section 2.8. There is no consistency across studies.

The use of the change in BMI z-score is explored further by Hunt et al (2007), who studied 92 obese children aged 7 to 19 years attending hospital weight management clinics, and measured BMI at two time-points (median interval 0.83 years). Percentage fat was measured via bio-electric impedance analysis as their 'gold standard' for fat loss. The change in BMI z-score was superior to BMI, weight (kg) and weight z-score in predicting changes in percentage fat, although for a given change in BMI z-score the range of percentage fat loss was wide. A limitation of this study is its reliance on bio-electric impedance analysis as a 'gold standard'. The evaluation framework for obesity treatment interventions from the National Obesity Observatory similarly supports the use

of the change in the BMI z-score to measure the change in a child's BMI (Roberts et al 2009, p39).

Hunt et al (2007) stated that to be certain of fat loss that was clinically significant the change in BMI z-score had to be at least -0.5 over a period of up to 6-months and at least -0.6 over a 6-12 month period. An analysis of 130 children aged 4-15 years from the Obeldicks treatment intervention from Germany (Reinehr and Andler 2004) sub-divided children into four groups according to their change in BMI z-score at 12-months (Table 2.4). Improvements in cardio-vascular risk (as measured by blood pressure, HDL and LDL cholesterol, triglycerides) and insulin resistance were only observed in Group IV where the BMI decreased by -0.5 z-score or more, whereas an increase in BMI z-score led to an increase in insulin resistance (Table 2.4). Both of these studies therefore suggest a similar size of change in BMI z-score (-0.5) is clinically significant.

**Table 2.4 – Relationship between change in BMI z-score and cardio-vascular risk in children after obesity treatment intervention**

<b>Group</b>	<b>Change in BMI z-score at 12-month follow-up</b>	<b>n</b>	<b>Systolic BP Mean (SD)</b>	<b>LDL Cholesterol Mean (SD)</b>	<b>Insulin Resistance Mean (SD)</b>
<b>I</b>	Increase	20	+4 (16) p=0.191	+6 (19) p=0.324	+3.1 (7.5) <b>p=0.021</b>
<b>II</b>	Decrease <0.25	33	-6 (17) p=0.097	-4 (28) p=0.512	+0.5 (2.6) p=0.241
<b>III</b>	Decrease $\geq$ 0.25 to <0.5	40	-4 (20) p=0.182	-8 (25) <b>p=0.040</b>	-0.1 (2.0) p=0.893
<b>IV</b>	Decrease $\geq$ 0.5	37	-11 (15) <b>p&lt;0.001</b>	-7 (26) <b>p=0.041</b>	-0.6 (1.5) <b>p=0.019</b>

Source: Reinehr and Andler 2004

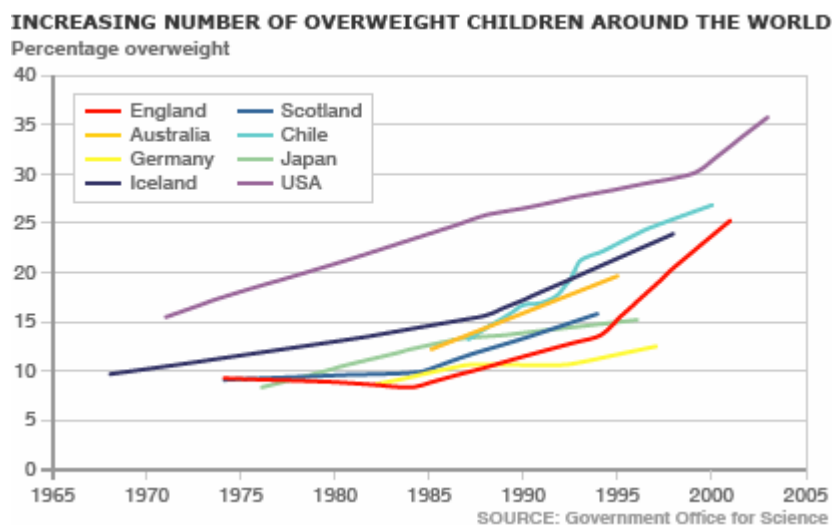
### 2.3 Prevalence of Childhood Obesity

The World Health Organisation has declared childhood obesity as one of the most serious public health challenges of the 21<sup>st</sup> century, estimating that 22 million children worldwide were overweight in 2007 (WHO 2009). At least 75% of these overweight/obese children live in low- and middle-income countries, with many of these countries facing a 'double burden' of disease, associated with under-nutrition and obesity existing together. The following section gives details of the prevalence of childhood obesity in developed countries.

#### 2.3.1 International Studies

Figure 2.1 shows that there is a worldwide trend of an increasing prevalence of overweight amongst young people in selected developed countries, particularly since the 1990's (Lobstein and Jackson-Leach 2007). Moreover, England (in red) shows a marked increase to 25% in 2001, and although the prevalence is not as high as in the USA, it is increasing faster.

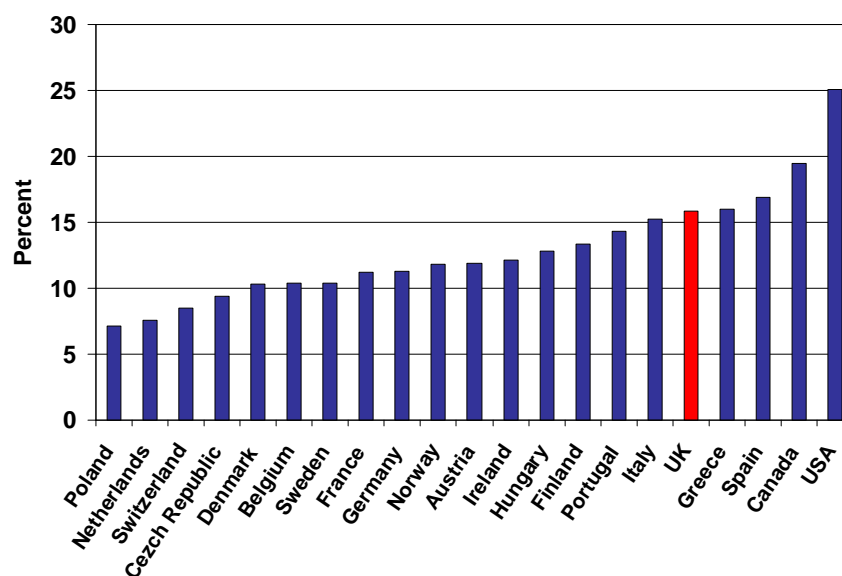
**Figure 2.1 Prevalence of Children who are Overweight in Selected Countries in the World, from 1967 to 2005**



Source: Lobstein and Jackson-Leach (2007) (p4)

A study by UNICEF's Innocenti Research Centre also reported on the well-being of children and young people in 25 of the world's advanced economies (UNICEF 2007). The data is from the Health Behaviour in School-aged Children (HBSC) survey of 2001/2002 (Mulvihill et al 2004). 'League tables' on aspects of child wellbeing are presented, including the percentage of 13-15 year olds who are 'overweight' (including obese), using the international IOTF cut-offs (Cole et al 2000). 21 countries had data on BMI, with the UK being ranked the fifth highest at 16% of 13-15 year olds being overweight (Figure 2.2). The accuracy of this data is, however, questionable. First, the response rate for BMI was low in many countries, particularly in England and Scotland. For example, BMI was missing for 37.5% of 13 year-old boys and 42.1% of 13 year-old girls in England (Mulvihill et al 2004). Second, BMI was calculated using self-reported height and weight, yet self-reporting may underestimate BMI (Connor Gorber et al 2007). Third, non-respondents were different to respondents. Young people who did not report their height and weight were less likely to be physically active, less likely to come from higher socioeconomic groups and consumed less fruit, which suggests they may be more overweight/obese.

**Figure 2.2 – Percentage of young people aged 13 to 15 who are overweight according to BMI, in the Organisation for Economic Co-operation and Development (OECD) member countries, in 2001/2**



Source of data:- UNICEF (2007) (p45)

### 2.3.2 National Studies

National data sources that measure the change over time in the prevalence of childhood obesity in England include the Health Survey for England and, more recently, the National Child Measurement Programme (NCMP).

#### 2.3.2.1 Health Survey for England

The Health Survey for England is an annual survey carried out since 1991, involving around 16,000 adults and 4,000 children in England. Multi-stage stratified random sampling is employed to achieve a sample that is designed to be nationally representative of the different age, sex, geographic area and socio-demographic circumstances of the English population (Jotangia et al 2005). Children have been included in the survey since 1995, including the measurement of height and weight for the calculation of BMI. The protocol for



measuring height and weight has remained constant, allowing for reliable comparisons over time. The 85<sup>th</sup> and 95<sup>th</sup> BMI percentile cut-offs are used to define overweight and obesity in children, using the 1990 UK reference data. Over the various annual surveys, the response rates ranged from 75% to 85%, and amongst cooperating households height and weight were measured in 90-95% of eligible children (Stamatakis et al 2005).

Figure 2.3 shows the prevalence of overweight and obesity by gender for children aged 2 to 10 years. The overall trend has been for an increase in the prevalence of obesity amongst both boys and girls from around 10% in 1995 to 17% in 2005, although it appears to have levelled off in 2006 and 2007. The increase appears linear over this period, rather than an 'epidemic' pattern implying a steeper exponential increase. A further 16.5% of boys and 12.2% of girls were overweight, making a total of 33% of boys and 29% of girls overweight or obese in 2005, although showing some subsequent decline. Jotangia et al (2005) has further analysed the data from the Health Survey for England from 1995 to 2003 for 2 to 10 year olds into four sub-groups: 2-3, 4-5, 6-7 and 8-10 years. This analysis showed that the increase in the prevalence of obesity was statistically significant only for the 8-10 year old age band from 11.2% in 1995 to 16.5% in 2003 ( $p < 0.05$ ). This does give some support for obesity treatment interventions targeting junior school children.

There was also a similar upward trend in obesity in adolescents aged 11-15 from 1995 to 2004 in the Health Survey for England, although there appears to be some reduction in the prevalence from 2005 (Figure 2.4) (Information Centre 2009). The latest figures in 2007 showed that 17.6% of boys and 19% of girls

aged 11-15 were defined as obese, with 33% and 34% defined as overweight (including obese), respectively. These temporal trends were remarkably similar for boys and girls. The prevalence of 33% overweight (including obese) is much higher than the equivalent figure of 16% for the UK in the report from UNICEF (2007). Some of this difference could be explained by the different cut-offs used to define overweight (85<sup>th</sup> centile in Health Survey for England vs IOTF cut-offs in UNICEF), by the timing of the surveys (2007 vs 2001/2) or due to the limitations in the survey used in the UNICEF report described previously.

Figure 2.3 - Prevalence of overweight and obesity amongst children aged 2 to 10, 1995 to 2007, in England, by sex, from the Health Survey for England

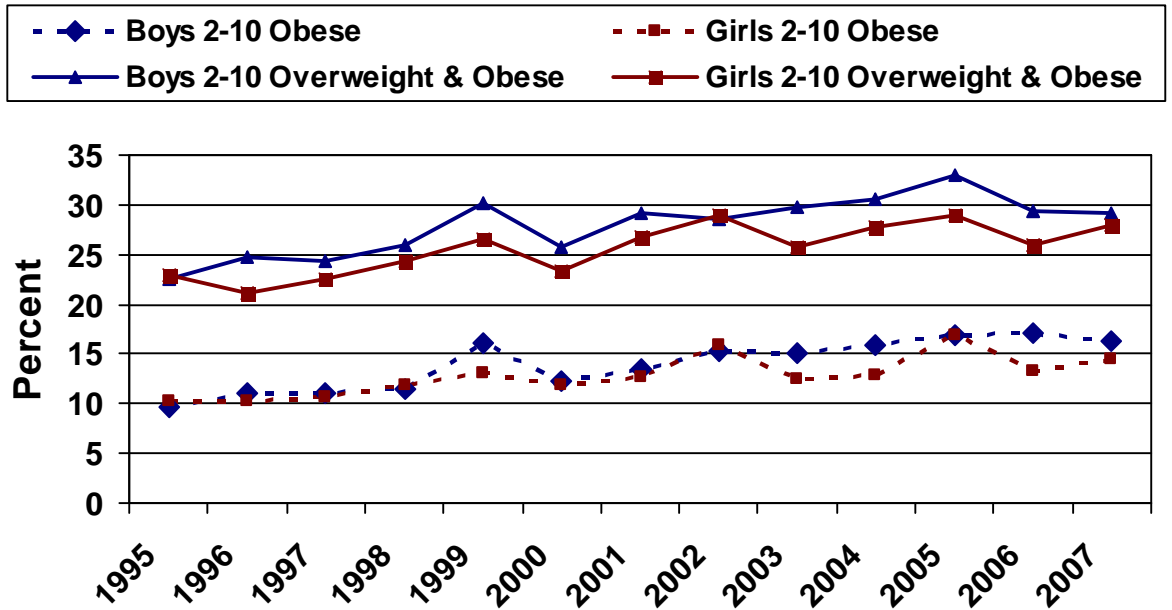
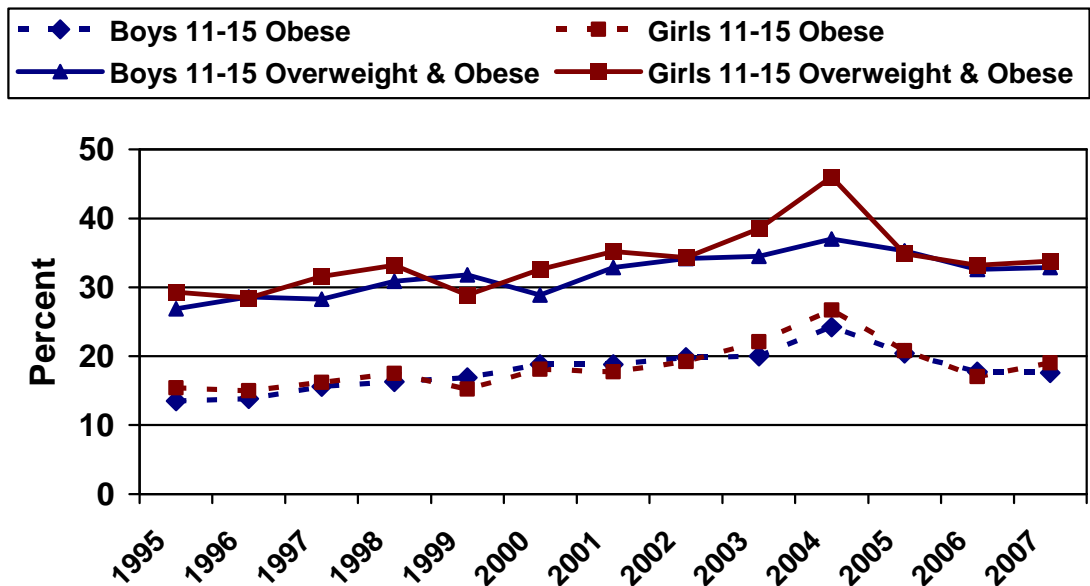


Figure 2.4 - Prevalence of overweight and obesity amongst children aged 11 to 15, 1995 to 2007, in England, by sex, from the Health Survey for England



Data Source:- Information Centre 2009

There is no universal consensus about which cut-offs to use to define overweight and obesity, with different definitions giving different prevalence figures (Toschke et al 2008). The Social Issues Research Centre (2005) present the Health Survey for England data for 2 to 10 year olds, showing that the prevalence of obesity increased from 9.6% in 1995 to 15.5% in 2002 using the UK 95<sup>th</sup> percentile cut-off (Cole et al 1995), whereas the increase was from 3.9% in 1995 to 6.8% in 2003 using the international standard of the International Obesity Task Force (Cole et al 2000). These data relate to different end dates (2002 and 2003), so are not directly comparable. However, they illustrate how different definitions will lead to different interpretations. Although both definitions show similar proportionate increases, the magnitude of childhood obesity varies, with 1 in 6 children aged 2 to 10 deemed to be obese using the UK cut-off, compared with only 1 in 15 children using the international standard (Social Issues Research Centre 2005).

#### **2.3.2.2 National Child Measurement Programme for Monitoring of Childhood Obesity**

Since 2005, the National Child Measurement Programme has provided measures of the prevalence of obesity in all pupils in Reception (aged 4-5 years) and Year 6 (aged 10-11 years) from maintained primary schools in England. The origins and aims will be described later in Section 2.10.6. Three years of data have now been collected and analysed. The data was first collected in the school year 2005/6, albeit the national response rate was only 48%, with overweight children most likely to be withdrawn from the survey by their parents (Crowther et al 2007). Thus, the results from 2005/6 are thought to "significantly underestimate" the prevalence of childhood obesity and will therefore not be presented here. Data from the school year 2006/7 had a much

improved response rate at 83% for Reception and 78% in Year 6 at the national level (Information Centre 2008), and the results are presented in Table 2.5. What is remarkable is that the prevalence of obesity is significantly higher for children aged 10-11 (17.5%) compared with children aged 4-5 (9.9%) (Table 2.5). Boys in England also have a statistically higher prevalence of obesity than girls at both age 4-5 (girls 9.0%, boys 10.7%,  $p < 0.01$ ) and 10-11 years (girls 15.8%, boys 19.0%,  $p < 0.01$ ). Around 1 in 4 (22.9%) pupils in Reception and 1 in 3 (31.7%) pupils in Year 6 were overweight (including obese). Figures were shown to be similar for the 2007/8 school year (Information Centre 2009).

**Table 2.5 - Prevalence of obesity and overweight amongst children in Reception and Year 6 from the 2006-7 National Child Measurement Programme, for England, West Midlands and Coventry.**

		England	West Midlands	Coventry Teaching PCT
<b>Reception (4-5yrs)</b>				
Children Measured		435,927	48,026	2,789
Completeness (%)		83%	82%	83%
% Overweight (>85% and < 95 <sup>th</sup> BMI percentile)	N % 95% CI	56,837 13.0% 12.9 - 13.1	6,383 13.3% 13 - 13.6	408 14.6% 13.3 – 15.9
% Obese (>95 <sup>th</sup> BMI percentile)	N % 95% CI	43,027 9.9% 9.8 - 10	4,983 10.4% 10.1 - 10.7	316 11.3% 10.1 - 12.5
<b>Year 6 (10-11yrs)</b>				
Children Measured		440,489	51,902	3,196
Completeness (%)		78%	80%	89%
% Overweight (>85% and < 95 <sup>th</sup> BMI percentile)	N % 95% CI	62,372 14.2% 14.1 to 14.3	7,402 14.3% 14 to 14.6	437 13.7% 12.5 to 14.9
% Obese (>95 <sup>th</sup> BMI percentile)	N % 95% CI	77,017 17.5% 17.4 to 17.6	9,891 19.1% 18.8 to 19.4	620 19.4% 18 to 20.8

Source of data: Information Centre (2008). (Reference population UK 1990)

The Information Centre's (2008) report has extracted the data from the Health Survey for England for 2006 on those aged 4/5 (n=785) and 10/11 (n=908), in order to make a direct comparison with the National Child Measurement Programme for 2006/7. The prevalence of obesity and overweight are similar in the two surveys for both boys and girls for both age 4/5 and 10/11, apart from obesity in boys aged 4/5 which was higher in the Health Survey for England (17.3%) versus the National Child Measurement Programme (10.7%) ( $p < 0.05$ ).

The surveys are similar in that both use the 85<sup>th</sup> and 95<sup>th</sup> centiles from the UK 1990 reference population as cut-offs for overweight and obesity. A striking difference, however, is the scale of the National Child Measurement Programme in terms of the number of children measured (over 876,000 measured in 2006/7) which dwarfs the Health Survey for England (4,000 measured). An advantage of the National Child Measurement Programme is that data can be disaggregated by geographical location, whereas disaggregation of the Health Survey for England data is not possible due to its smaller sample size (Information Centre 2008). The National Child Measurement Programme can therefore be used to plan services and to monitor progress against targets at a local level. An advantage of the Health Survey for England is that it has collected data in the same way since 1995, and therefore is used to monitor progress against the national target.

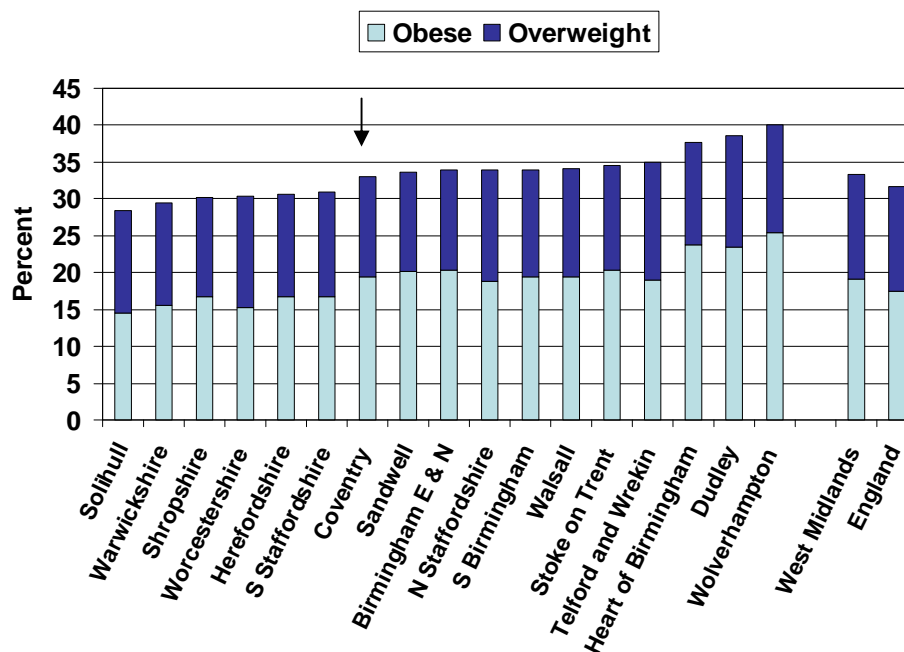
Both of these surveys point to the targeting of junior school pupils (7 to 11 years) with interventions for the treatment of childhood obesity. The Health Survey for England showed a significant rise in obesity amongst 8-10 year-olds from 1995 to 2003 (Jotangia et al 2005). Furthermore, the National Child

Measurement Programme showed that the prevalence of obesity is significantly higher for those aged 10-11 (17.5%) compared with those aged 4-5 (9.9%) (Information Centre 2008). The choice of this target group is further supported by a five year longitudinal study of adolescents from London from Year 7 (11/12 years) to Year 11 (15/16 years) (Wardle et al 2006). A key finding was that few incident cases of obesity emerged during this time, but also few obese or overweight adolescents reduced to a healthy weight. This suggests that persistent obesity is established before age 11. The authors recommend that prevention and treatment of obesity should be implemented in junior school pupils.

### **2.3.3 Childhood Obesity in the West Midlands**

The National Child Measurement Programme allows the analysis of the prevalence of childhood obesity at a local level. The Information Centre (2008) has published data by strategic health authority and PCT for 2006/7. Compared with England, the West Midlands and Coventry PCT had a significantly higher prevalence of obesity amongst Reception and Year 6 pupils, as shown by the non-overlapping confidence intervals in Table 2.5. The data for Coventry were very similar to the whole of the West Midlands (Figure 2.5), with over 1000 pupils in year 6 (around one in three) being either overweight or obese.

**Figure 2.5 – National Child Measurement Programme for Childhood Obesity: Data for West Midlands PCTs, West Midlands & England in Year 6 in 2006/7**

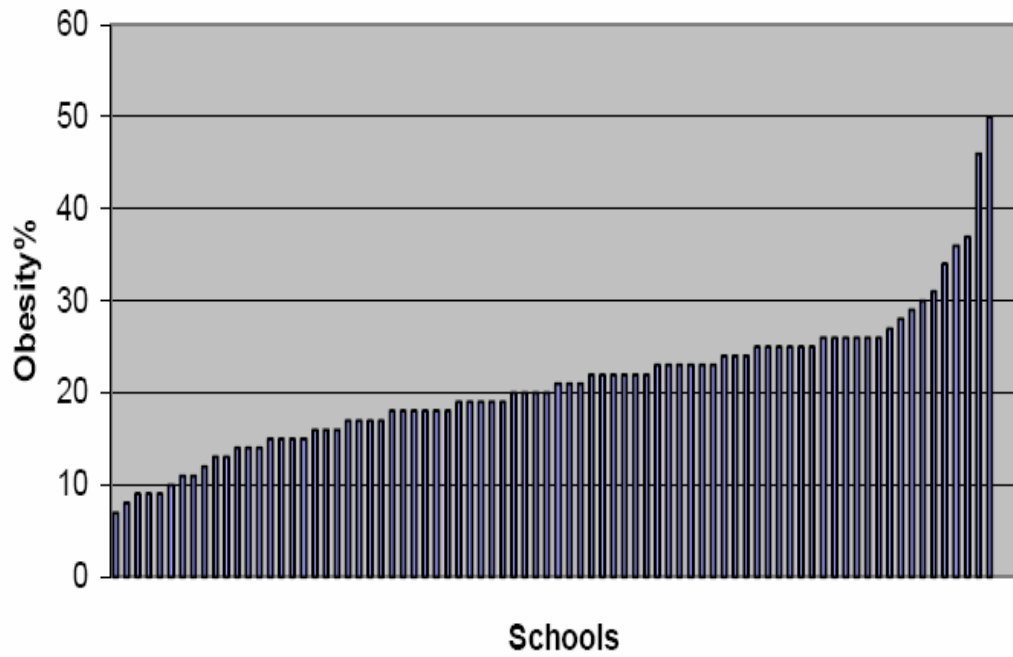


Source: *The Information Centre (2008)*

The Director of Public Health’s Annual Report highlighted a large variation in the prevalence of obesity between schools in Coventry, from 7% to 50% in Year 6 (Figure 2.6), which was unrelated to a measure of deprivation (proportion receiving free school meals) and the amount of physical activity in schools (Grainger 2007a). The differences between schools are unexplained, but possible reasons could include other population factors, variation in response rates, problems with the accuracy of measurements or the relatively small samples per school resulting in statistical uncertainty. A study of 35 primary schools in Leeds also found significant variation in the mean BMI z-score between schools, with deprivation and ethnicity only accounting for a small proportion of the variation (Procter 2008).



**Figure 2.6 – Childhood Obesity in Year 6 in Schools in Coventry in 2006**



Source: Grainger (2007a)

## 2.4 Health and Social Consequences of Obesity in Childhood

Childhood obesity is important because it is associated with ill-health both in childhood and adulthood. This section will look at health and social outcomes in childhood, and the next section will examine the long-term outcomes in later life.

### 2.4.1 Physical Health Consequences in Children/Adolescents

The physical health consequences of obesity in childhood have been reviewed by Lobstein et al (2004). Although this is a comprehensive review the search strategy was not given. There is a large range of medical conditions which occur more frequently in obese children (Box 2.2). Not all of these diseases have, however, been shown to be causally linked to obesity because much of the evidence is from cross-sectional studies.

<b>Box 2.2 - Physical health associations of obesity in childhood &amp; adolescence</b>	
<b>System</b>	<b>Physical effects</b>
Pulmonary	Sleep associated breathing disorders:- - sleep apnoea - Pickwickian syndrome (hypoventilation) Asthma
Orthopaedic	Flat feet / Ankle sprains / Increase fracture risk Slipped capital epiphyses Blount's disease (tibia vara) Tibial torsion
Neurological	Idiopathic intracranial hypertension
Gastroenterological	Cholelithiasis (gall stones in the gall bladder) Non-alcoholic fatty liver disease Gastro-oesophageal reflux
Endocrine	Insulin resistance/ impaired glucose tolerance Type-2 diabetes Menstrual abnormalities (earlier menarche) Polycystic ovary syndrome Hypercorticism Delayed maturation in boys
Cardiovascular	Hypertension Dyslipidaemia (i.e. high cholesterol & triglycerides, or low HDL cholesterol) Left ventricular hypertrophy

Source: Lobstein et al (2004)

Lobstein et al (2004) found that some of the conditions in Box 2.2 were most clearly seen in children with 'severe' obesity. For example, dramatic increases in the proportion of children with raised blood pressure and abnormal serum lipids occurred amongst children at and above the 98<sup>th</sup> BMI centile, although some conditions including early menarche and raised blood pressure also showed an increase in prevalence at the 95<sup>th</sup> BMI centile. Lobstein and Jackson-Leach (2006) in their later review identified the prevalence of various obesity related diseases and risk factors in children with obesity and then subsequently estimated the numbers of children affected in the European Union. For example, the lowest prevalence of raised total cholesterol was 22.1% in children with obesity, indicating that 1.12 million children are affected in the European Union. The prevalence of hypertension was similar (21.8%), showing that cardio-vascular risk factors are raised.

The emergence of Type-2 diabetes in children, linked to obesity, is of particular concern due to the complications of diabetes (cardio-vascular disease, kidney failure, visual problems) which are likely to be evident earlier in adulthood than would normally occur (Lobstein 2004). In the UK, the first published reports of Type-2 diabetes in children were in a case series of eight girls aged 9 to 16 years, who were all overweight (percentage weight for height from 141% to 209%), with a strong family history of diabetes and were of South-Asian or Arab ethnicity (Ehtisham 2000). The emergence of Type-2 diabetes was thought to be confined to young people from ethnic minority groups known to be at greater risk, until 2002, when four white severely obese (BMI >3 z-scores) 13-15 year olds (3F,1M) presented with Type-2 diabetes (Drake 2002). Although Lobstein and Jackson-Leach (2006) estimated that Type-2 diabetes is a relatively low

prevalence condition amongst children and adolescents with obesity at 0.5%, and likely to be evident principally in severe obesity, conservative estimates are that there are 27,000 affected children in the European Union.

To conclude, poorer physical health in childhood is now a well established consequence of childhood obesity, with the risk greatest when obesity is severe.

#### **2.4.2 Psycho-social health in Children/Adolescents**

Children and adolescents who are obese may face stigmatisation, negative stereotyping, discrimination and social exclusion by peers (Lobstein 2004), and as a consequence it has been assumed that their psychological well-being will be impaired. A review of the studies examining the impact of childhood obesity on psychological well-being has been carried out by Wardle and Cooke (2005), including components of body dissatisfaction, self-esteem and depression. The reviewers did not describe their search strategy. The review separately examined clinical samples (i.e. children attending for treatment of obesity) and population samples.

One study of a clinical sample found body dissatisfaction to be significantly reduced, and remained so after hospital based treatment. Self-esteem was lower in three clinical samples compared with community controls (obese or normal weight), although not uniformly so. Another study in a clinical sample showed no relationship of self-esteem with severity of obesity. Mean values may mask problems with self-esteem as one study showed high numbers of obese children in an 'at risk' range for self-esteem, whereas the mean values

were within a normal range. Although most obesity treatment studies were shown to improve self-esteem, one study in 54 obese children aged 10-15 years showed a decrease in self-concept at the end of a 12-week programme compared with controls (Cameron et al 1999). Depression was found to be higher in clinical samples of obese children than in both normal weight children and obese children not seeking treatment.

All 17 studies of population samples showed that body dissatisfaction was significantly greater in heavier children and adolescents. Contrary to general perception, the results showed that the association between obesity and both self-esteem and depression in children is very modest, with values often falling within the normal range (Wardle and Cooke 2005). However, the authors of the review added that half of overweight or obese children did not realise that they were overweight.

Health-related quality-of-life was not included in the review by Wardle and Cooke (2005). Primary studies in clinical and population samples using the paediatric quality-of-life inventory (PedsQL 4.0) (Varni 2001), are consistent. Obese children and adolescents from clinical samples have lower health-related quality-of-life (total score) than 'healthy' control children both from the USA (67.0 vs 83.0 for child-report,  $p < 0.001$ ; 63.3 vs 87.6 for parent-report,  $p < 0.001$ ) (Schwimmer 2003) and the UK (64.7 vs 85.2 for parent-report,  $p < 0.05$ ) (Hughes et al 2007). However, the UK study found that only the physical health domain was significantly lower for the children's self-report, indicating that impairment was greatest when assessed by the parent rather than the child. In a population sample of 2000 9 to 12 year-olds in Australia, children who were obese had

significantly lower quality-of-life scores than children of a healthy weight both for the parent-report: (75.6 vs 83.3,  $p < 0.001$ ) and child-report (75.6 vs 80.8,  $p < 0.05$ ), although scores for the population-based obese group were higher than a severely obese clinical sample (parent-report: 63.3; child-report: 67.0) (Williams 2005).

## **2.5 Health and Social Consequences of Childhood Obesity in Adulthood**

A key question is whether childhood obesity affects adult health. The long term (adulthood) consequences of childhood obesity will be addressed in three parts: persistence of childhood obesity into adulthood; impact of childhood obesity on mortality and morbidity in adulthood; and then the impact of childhood obesity on social and economic outcomes in adulthood.

### **2.5.1 Persistence of childhood obesity into adulthood**

A systematic review (Singh et al 2008) considers the persistence or 'tracking' of childhood overweight into adulthood. The authors searched multiple electronic databases up to February 2007, and screened the reference lists of selected papers. Eighteen studies (in 25 articles) were included, all of them longitudinal designs. The quality of studies was assessed. A narrative synthesis was provided. The authors did not carry out a meta-analysis due to heterogeneity between studies (e.g. definitions of overweight, length of follow-up).

All studies reported an increased risk for overweight and obese youth to be overweight or obese in adulthood. For the highest quality studies, being overweight in childhood ( $\leq 12$  years) carried at least a two-fold risk of being overweight in adulthood, with the risk increasing further for those that were obese (rather than overweight). With increasing age of the youth, the tracking of obesity to adulthood is also higher. The tracking from being obese in childhood to being obese in adulthood ranged from 43% to 60% in children and from 47% to 90% in adolescents ( $\geq 13$  years), and when a study examined more than one age-group tracking increased with the age of the child (Singh et al 2008).

A previous systematic review by Reilly et al (2003), examining 7 studies, similarly estimated that 40% to 70% of obese pre-pubertal children become obese adults. Reilly (2003, 2005) indicates that these figures are likely to underestimate the current tracking of obesity from childhood into adulthood, because some of the studies are based on birth cohorts from the post 2<sup>nd</sup> World War era and not on cohorts growing up in the modern obesigenic environment.

I have identified five longitudinal studies of tracking from four British birth cohorts, of which two were included in the review of Singh et al (2008) (Wright et al 2001, Power et al 1997). Table 2.6 describes the results of these studies. Further details of each study are in Appendix I. These British studies indicate that around a half of children who are obese (90<sup>th</sup> centile, or above, depending on definitions) at the age of 10+ will be obese as adults, whereas tracking appears higher in American cohorts (around 75%) (Whitaker et al 1997, Freedman et al 2001). Furthermore, there is a slight trend for an increase in the persistence of obesity from earlier to later birth cohorts in the UK, although comparisons are difficult due to the different definitions of obesity and the different ages at which measurements are taken. The latest birth cohort which has examined this is from 1970. It remains to be seen if tracking of child to adult obesity in later birth cohorts (i.e. 1991/2 ALSPAC birth cohort) is greater, as predicted by Reilly (2003). Half of all obese children are *not* obese in adulthood, indicating that there are substantial numbers of children who 'grow out' of their obesity, *probably* mostly without medical intervention. Thus most studies in the UK show a modest prediction of adult obesity from childhood measurements of BMI.



**Table 2.6 - Longitudinal studies from the UK that have examined the Tracking of Obesity from Childhood to Adulthood**

Author, year	Population source  Sample Size	Description of Sample i.e. how recruited	Age at measurement (years)		Definition of Over Weight / obese		Sample size (%) with BMI measured as adult	Prevalence of Childhood Obesity	Still Obese in Adulthood? (Genders combined unless indicated)	
			Youth	Adult	Youth	Adulthood			Age	%obese
Hardy, Wadsworth, Kuh (2000)	1946 MRC National Survey of Health & Development n=5362	All children born in 1 week in 1946 in England, Scotland & Wales – socially stratified, nationally representative.	14	20 26 36 43	Overweight: $\geq 20\%$ above 'standard' weight for sex, age, height	BMI $\geq 30$ kg/m <sup>2</sup>	2659 (50%) with at least one adult BMI	Age 14: 16% overweight	14 to 20yr 14 to 26yr 14 to 36yr 14 to 43yr	6% 10% 24% 35%
Wright et al (2001)	1947 Newcastle Thousand Families  n=932	Recruited at birth, May-June 1947, in City of Newcastle. (Those left in cohort by age 50 were less deprived).	9 13	50	BMI $\geq 90^{\text{th}}$ centile	BMI $\geq 30$ kg/m <sup>2</sup>	412 (44%) clinical examination at age 50	Age 9: 6%  Age 13: 10%	9 to 50yr  13 to 50yr	42%  45%
Power, Lake, Cole (1997)	1958 British birth cohort  n=17733	All children born 3-9 <sup>th</sup> March 1958 in England, Scotland & Wales– nationally representative.	7 11 16	33	BMI $\geq 91^{\text{st}}$ , $95^{\text{th}}$ , $98^{\text{th}}$ centiles (results given here are for $95^{\text{th}}$ centile)	BMI $\geq 30$ kg/m <sup>2</sup>	11407 (73%) (followed-up to age 33)	Not reported	7 to 33yr: M 11 to 33yr: M 16 to 33yr: M  7 to 33yr: F 11 to 33yr: F 16 to 33yr: F	38%: 44% 56%  44% 49% 56%
Viner, Cole (2005)	1970 British birth cohort  n=16,567	All children born 1 week in 1970 in England, Scotland & Wales– nationally representative, plus immigrant children.	10	30	BMI $\geq 95^{\text{th}}$ centile	BMI $\geq 28.5$ (to remove bias from self-reporting)	8,490 (51%) with BMI at both 10 & 30 yrs	Age 10: 4.3%	10 to 30yr	52%
Viner, Cole (2006)	1970 British birth cohort n=11,622	As above.	16	30	BMI $\geq 95^{\text{th}}$ centile	As above	4461 (38%) with BMI at 16 & 30	Age 16: 8.2%	16 to 30yr	61%

Reviews and studies from the UK and USA have found similar factors increase the risk of childhood obesity leading onto adult obesity. Persistence of obesity has been shown to increase consistently with the age of the child (Singh et al 2008, Power et al 1997, Whitaker et al 1997); parental obesity (Lake 1997, Whitaker et al 1997); and the severity of obesity (Power et al 1997, Singh et al 2008). Persistence may also increase with accelerated gain in BMI from age 7 to 11 (Toschke 2007) and vary by social class (Hardy et al 2000). Interventions may need to target some of the above groups, in order to decrease tracking.

Although the tracking of obesity from childhood to adulthood is an important consequence of childhood obesity, at least half of obese adults were *not* obese as children or adolescents (Whitaker 1997, Viner and Cole 2005, Wright et al 2001, Power et al 1997, Freedman 2001). For example, a paper from the Bogalusa Heart Study in USA reported that of the 581 adults who were obese only 144 (25%) had been obese in childhood / adolescence (Freedman 2001). Furthermore, from the 1958 British birth cohort, Power et al (1997) report that most obese adults cannot be identified from childhood BMI, with only 40% of obese males at age 33 years being overweight or obese at age 16. Most obese adults have seen their weight gain in adulthood. In their analysis of the Health Survey for England 2003, the Social Issues Research Centre (2005) have argued that the Government's focus on childhood obesity is diverting resources from where the problem really lies which is on efforts to tackle adult obesity.

A serious consequence of childhood obesity is that it persists into adulthood with the associated consequences to adult health, although it must be remembered that not all adults who are obese were obese as children.

## **2.5.2 Impact of childhood obesity on mortality and morbidity in adulthood**

In Section 2.4 I discussed how obesity in childhood impacts on health and social outcomes of children, and that risk factors for CHD are present in childhood. However, the majority of the medical, social and economic burden are in adulthood (Government Office for Science 2007). In this section I review the health implications (morbidity, mortality) of childhood obesity in adulthood and in the following section I consider socio-economic consequences.

Three longitudinal studies are described in Table 2.7, all of which show that higher BMI in childhood or adolescence is associated with an increase (up to two-fold) in mortality from CHD in adulthood (Must et al 1992, Gunnell et al 1998, Baker et al 2007), with the first two studies also showing an increase in all-cause mortality. Two of these studies also showed that the risk of morbidity from CHD was increased (Must et al 1992, Baker et al 2007). The effects on mortality and morbidity were shown to be independent of adult weight in one study (Must et al 1992). The other two studies did not measure BMI in adulthood (Gunnell et al 1998, Baker et al 2007), and were therefore unable to tease out the whether the increase in mortality and morbidity is due to the tracking of obesity to adulthood or due to increased risk factors for cardiovascular disease present in childhood per se. Further large longitudinal studies are required that measure adiposity, cardio-vascular and metabolic outcomes into adulthood, to answer two questions. Do children whose obesity persists into adulthood fare any worse than those who are obese only in adulthood? Does childhood obesity not persisting into adulthood have any long term effects?

**Table 2.7 Longitudinal studies examining the risk of childhood obesity on Mortality in adulthood**

Study	Dates of Measurements		Results: Relative Risk of Mortality (95% CI in brackets)
	Child	Adult	
Harvard Growth study (USA), (Must 1992)  (n=508)	1922-1935	1988	Males with BMI >75 <sup>th</sup> percentile at 13 to 18 yrs, compared with lean adolescents (BMI 25 <sup>th</sup> to 50 <sup>th</sup> ):  - all-cause: RR 1.8 (1.2 to 2.7), p=0.004 - CHD: RR 2.3 (1.4 to 4.1), p=0.002
Boyd Orr cohort (England and Scotland) (Gunnell 1998)  (n=2399)	1937-1939	1995	All subjects (M&F) BMI >75 <sup>th</sup> percentile at 2 to 14 yrs vs BMI 25 <sup>th</sup> -49 <sup>th</sup> percentile:  - all cause: Hazard Ratio: 1.5 (1.1 to 2.2) - CHD: Hazard Ratio: 2.0 (1.0 to 3.9),
Cohort from Denmark (Baker 2007)  (n=276,835)	1930-1976	1977-2001 (min age 25yr)	For 1 unit increase in BMI z-score, Hazard Ratio for mortality from CHD in adulthood was:  - Males age-7: 1.10 (1.06-1.15) - Males age-13: 1.24 (1.19-1.29) - Males age-7: 1.10 (1.06-1.15) - Males age-13: 1.24 (1.19-1.29)

### **2.5.3 Impact of childhood obesity on social and economic outcomes in adulthood**

A small number of longitudinal studies have examined the impact of childhood and adolescent obesity on long-term social and economic outcomes, comprising studies from the 1958 and 1970 UK birth cohorts (Sargent and Blanchflower 1994, Viner and Cole 2005) and the 1966 North Finland birth cohort (Laitinen et al 2002).

Obesity in childhood/adolescence which persisted into adulthood led to reduced earnings for females at age 23 (Sargent and Blanchflower 1994); and unemployment and having no current partner in females at age 30 (Viner and Cole 2005). These effects were not seen in males. Obesity in childhood which does *not* persist into adulthood showed conflicting findings, with lower earnings seen in women in the 1958 birth cohort (Sargent and Blanchflower 1994), whereas no effect in the 1970 birth cohort (Viner and Cole 2005).

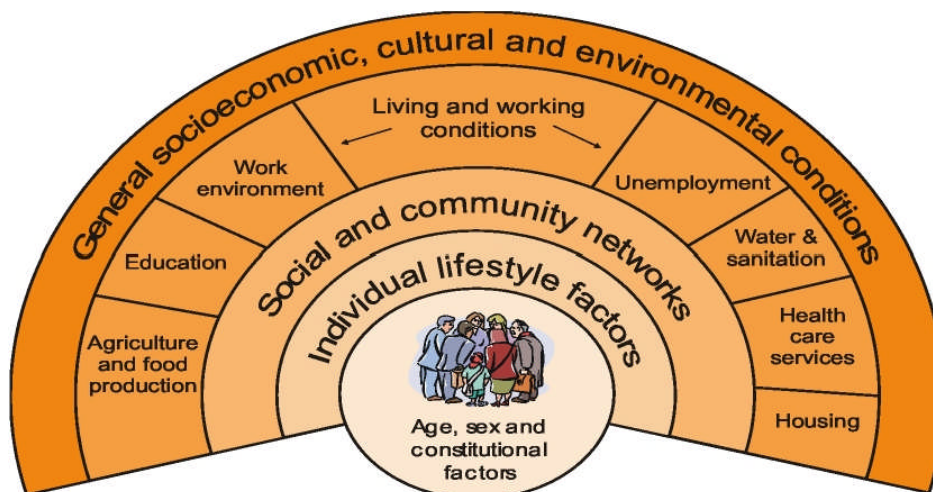
The study from Finland did not support an effect of childhood obesity on long-term unemployment at age 31, but was associated with low educational attainment in both sexes and being single or divorced in females (Laitinen et al 2002). This study is limited because it did not analyse the data in relation to whether obesity in childhood persisted into adulthood or not.

The consistent finding across the three studies is that women appear to carry the main burden of adverse socio-economic outcomes as a result of obesity in childhood. Further details of these studies are in Appendix II.

## 2.6 Determinants of Childhood Obesity

In our quest to identify how best to prevent and manage childhood obesity, it is important to understand the determinants of childhood obesity to identify factors which may be amenable to change. Obesity is caused by an imbalance in our energy intake versus our energy output (WHO 2009, Kipping et al 2008a), but the rise in childhood obesity is multi-factorial and complex. The model of Dahlgren and Whitehead (1991) shows us the different layers of influences on health, starting with 'intrinsic' factors such as age, sex, ethnicity and genetics which are less amenable to change; and radiating out to the layers shown in Figure 2.7, around lifestyle, to our local community networks and to the social and environmental factors that influence health.

**Figure 2.7 Model of Determinants of Health from Dahlgren and Whitehead (1991)**



A large variety and number of risk factors have been identified for the development of obesity in childhood (Kipping et al 2008a). These range from

factors which would be difficult to modify, such as genes and ethnicity, to those which are potentially modifiable such as excessive hours of television viewing; low levels of physical activity; and dietary factors such as eating a diet high in fat, carbohydrate and sugary drinks, missing breakfast and large portion sizes. The following sections will assess genetic factors and then socio-economic factors, before moving on to reviewing family and parental influences on diet, physical activity and screen time.

### **2.6.1 Genetic vs Environment**

There are a number of genetic causes of childhood obesity, such as Prader-Willi syndrome, and Bardet-Biedl syndrome, although these account for a small proportion of children who are obese (Ebbeling et al 2002, Speiser et al 2005).

As knowledge of the gene map for obesity has increased, predisposition to obesity has been associated with 430 genes, markers and chromosomal regions (Snyder et al 2004, cited in Speiser et al 2005). The recent increase in childhood obesity has, however, not been caused by a change in the gene pool, but is instead caused by changes in the environment that have led to increasing numbers of genetically susceptible children and adolescents becoming obese (Styne 1999, Speiser et al 2005, Wardle et al 2008).

Changes in the environment have had a large part to play in the recent rise in obesity. There has been a shift towards an environment which promotes the intake of energy dense foods and one in which with reduced opportunities for physical activity (see Wardle 2007, Maziak et al 2008). Modification of the 'obesogenic environment' is important in tackling the rise in obesity.

## **2.6.2 Socio-economic factors**

Adult obesity, particularly in women, is socially patterned. A systematic review that located and examined 333 studies (mainly cross-sectional) published from 1988 to 2004, showed that obesity in women from highly developed countries was inversely associated with socio-economic status in the majority of studies (i.e. lower socio-economic status associated with more obesity), although studies in men were less consistent (McLaren 2007). However, examining this across countries with different levels of development the proportion of studies showing positive associations in women (i.e. higher socio-economic status associated with more obesity) increases from 3% in highly developed countries, to 43% in medium developed countries and to 94% in low developed countries (McLaren 2007), indicating that obesity is associated with higher economic status in developing countries. They concluded that obesity is a social phenomenon, with socio-cultural and economic factors requiring targeting. This review did not include children.

Research examining the influence of socio-economic status on childhood obesity is of increasing interest, and has been the subject of several systematic reviews. Sobal and Stunkard (1989) identified 34 primary studies published between 1941 to 1989 from developed countries which examined cross-sectional data of the association of socio-economic status and obesity in children. Approximately equal proportions of studies showed inverse associations (36%), no associations (38%) and positive associations (26%). In contrast, the studies from developing countries found mainly positive associations (high socio-economic status, high obesity), consistent with the pattern in adult women. Shrewsbury and Wardle (2008) have recently updated



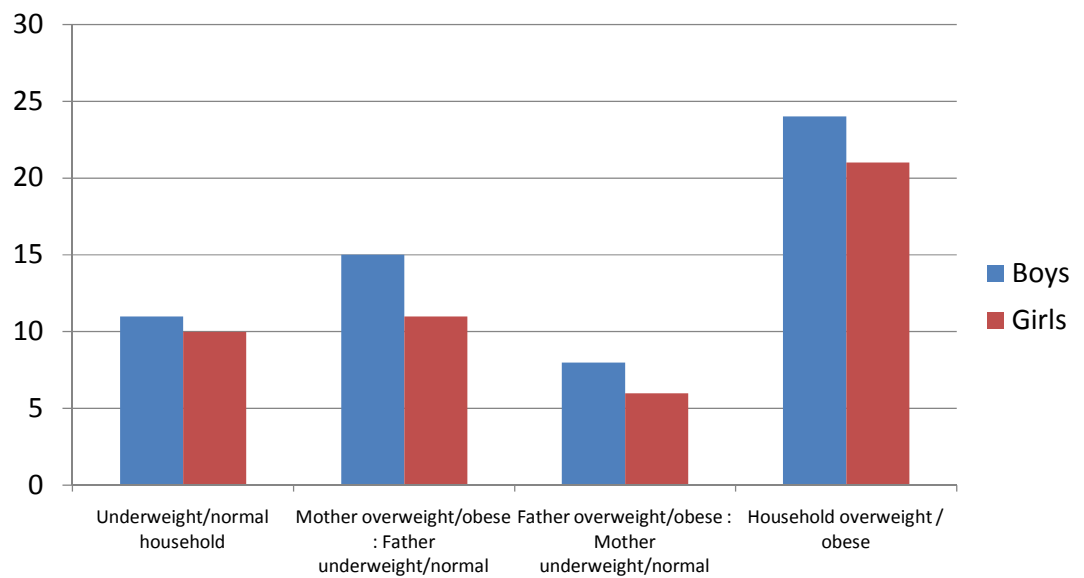
this systematic review, locating 45 cross-sectional studies from western developed countries, published from 1990 to 2005 (i.e. since the review by Sobal and Stunkard 1989), to examine if the relationship between socio-economic status and obesity in children had changed over time. The use of just the PubMed database to identify studies is limited, questioning whether the authors search was sufficiently comprehensive to find all available studies. The findings showed that a higher proportion (42%) of more recent studies had inverse associations between socio-economic status and obesity, 27% of studies showed no association and 31% of studies showed a mixture of inverse and no associations across sub-groups. There were no positive associations. More recent studies therefore show the relationship between socio-economic status and obesity in children is becoming inverse in developed countries.

Recent primary studies in the UK also suggest that childhood obesity is becoming socially patterned, being more prevalent in children from families of lower socio-economic status (Kinra et al 2000, Stamatakis et al 2005, Jebb et al 2004, Wardle et al 2006, Information Centre 2009), although not reaching statistical significance in one study (Brunt et al 2008). Stamatakis et al (2005) suggested that financial constraint limiting access to healthy food may be a mechanism by which parental social class influences childhood adiposity. There is also some evidence for reduced physical activity amongst more deprived households (Kohl et al 1998). This indicates that there may be a need for interventions aimed at reducing economic hardship or a focus on how to 'manage' a healthier lifestyle on a budget.

### 2.6.3 Family Influences

Evidence suggests that obesity clusters in families. The prevalence of obesity amongst children aged 2 to 15 years is higher where the parent(s) in the household are obese (i.e. both parents are obese or where the single parent was obese) compared with households with 'normal/underweight parent(s)', shown by the Health Survey for England in 2007 (Figure 2.8).

**Figure 2.8 Prevalence of obesity amongst children aged 2-15, by Parental BMI status and child's gender, from Health Survey for England 2007**



Source: Information Centre (2009)

## **2.6.4 Parenting and its Links to Childhood Obesity**

This section draws on published systematic reviews to examine the role of the parent in the aetiology of overweight and obesity in children in three areas: feeding (Faith 2004a, Clark et al 2007, Rhee 2008), physical activity (Gustafson and Rhodes 2006) and screen time (Ebbeling 2002, Jordan and Robinson 2008).

### **2.6.4.1 Parental Feeding style**

Two systematic reviews have been carried out in this area. First, Faith (2004a) has carried out a systematic review on the relationship between parental feeding styles and their relationship to child eating (energy intake) and weight status. Only Medline and Psychinfo were searched, and the date of the last search was June 2003. Therefore, this may not have identified all available studies. With that caveat, the authors identified 22 studies of which 19 were cross-sectional and 3 were longitudinal. Studies were sub-divided into those that examined general feeding control and those that examined feeding restriction by parents (e.g. restriction of snack foods). The results of the eight studies focusing on general feeding control were not consistent, showing equal reporting of positive associations (three studies), no association (three studies) and negative associations (two studies) between parental feeding styles and energy intake and/or weight status in children. However, of the nine studies that looked at feeding restriction, eight studies reported positive associations between feeding restriction and child outcome, suggesting that a high level of feeding restriction by parents is associated with increased energy intake and/or increased weight in children.

A more recent systematic review has examined the relationship between parental feeding behaviours and dietary intake and weight of children (Clark et al 2007). The search strategy utilised an extensive range of electronic databases, but was restricted to publications from 1996 to 2006 without giving the rationale, so may be missing earlier papers. The authors do not state how many abstracts were retrieved to identify the 26 selected studies (11 cross-sectional, 6 longitudinal, 4 experimental, 2 observational, 2 qualitative, 1 retrospective). Clark et al (2007) concluded that the most consistent evidence is that parental restriction of snack foods is associated with *'uninhibited eating (when outside of parental control) and weight gain, particularly for girls'*, with nine studies showing positive associations. Four of the studies on restriction were longitudinal, providing some evidence for a causal relationship, in which parental restriction was associated with high fat intake (Lee 2001), high snack intake (Fisher and Birch 2002), higher BMI (Faith et al 2004b), and eating in the absence of hunger (Francis and Birch 2005). The evidence for other parental behaviours such as parental monitoring or pressure to eat was inconsistent.

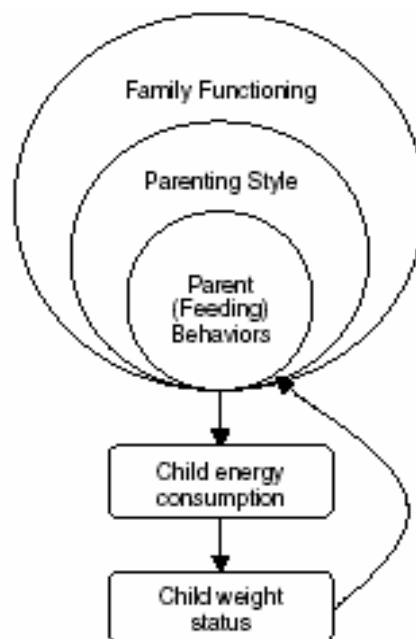
The reviews by Clark et al (2007) and Faith (2004a) are consistent in their finding that restriction of snack foods is unlikely to work in obesity treatment interventions in children. Parents need guidance on *'how'* as well as *'what'* to feed their children. An alternative to 'restriction' is for parents to be given the responsibility for the child's eating environment, making healthy foods available at appropriate times, in line with the recommendations of Satter (2004).

Only 3 of the 22 studies in Faith's (2004a) review and 6 of the 26 studies in Clark et al's (2007) review were longitudinal. Many of the other included studies

were cross-sectional, making it impossible to determine whether the parent's feeding behaviour influences overweight in children, or vice versa. Restrictive feeding practices by parents may lead to overweight status in children, or parents may have been restricting the eating of overweight children to prevent further weight gain. These findings highlight the need for future longitudinal research with parental feeding measured before weight status.

In a non-systematic review by Rhee (2008) a useful model of the relationship between parental feeding, parenting style, and family functioning and their influence on energy consumption and weight has been postulated (Figure 2.9).

**Figure 2.9 Model from Rhee (2008, p30) showing the relationship between parental feeding, parental style and family functioning and their influence on energy consumption and overweight status.**



To summarise, restrictive parental-feeding practices are associated with overweight in children. The restriction of snack foods should not be used in obesity treatment interventions for children.

#### **2.6.4.2 Physical Activity link to Parenting**

The association of parental factors with physical activity in children and adolescents has been the subject of a systematic review by Gustafson and Rhodes (2006). The authors searched five electronic databases and the review included 34 studies (5 longitudinal, 29 cross-sectional) published from 1985 to 2003. The authors provided a narrative synthesis. A meta-analysis was not possible due to heterogeneity.

##### *Parental Physical Activity*

24 studies (20 cross-sectional, 4 longitudinal) examined the association of parents' physical activity level with their children's physical activity level. Only 6 studies measured physical activity objectively using accelerometers, 6 studies used validated questionnaires and 12 studies used non-validated questionnaires, highlighting a problem of validity with the measurements. The authors summarised the results from 14 studies, although it is not clear how these studies were chosen for synthesis. The associations between parents' and children's physical activity levels were inconsistent, showing equal reporting of positive correlations (6 studies) and no association (7 studies), and one further study finding an inverse correlation. The effect of parental modelling on physical activity was therefore mixed. However, the relationship could be obscured by the different study designs and methods of measurement and this area needs further research using longitudinal designs and objective measurements.

A recent study from the ALSPAC cohort from Bristol has shown that few factors in early life (up to age 5 years) predicted physical activity at age 11 to 12,

although parents' physical activity was an exception showing a modest association (Mattocks et al 2008). This study used accelerometers to assess physical activity. Thus there is limited evidence from this longitudinal study that parental physical activity may be important in increasing physical activity in children.

#### *Parental Support for Physical Activity of their Child*

18 of the 19 studies (16 cross-sectional, 3 longitudinal) which examined the relationship between parental support and children's physical activity levels showed a strong positive relationship. The effect in younger children was more pronounced. Encouragement, involvement and facilitation were the three key forms of parental support which increased the likelihood of children engaging in physical activity.

In summary, parental support appears to be important in influencing physical activity in children, whereas the influence of parental modelling is inconsistent.

#### **2.6.4.3 Screen Time**

Reviews have found some evidence suggesting that screen time, including watching TV/videos and playing computer games, has a part to play in the increase in childhood obesity (Ebbeling 2002, Jordan and Robinson 2008). Five longitudinal studies have contributed to this evidence base, showing that TV viewing in childhood and adolescence was positively associated with overweight, from USA (Dietz and Gortmaker 1985, Berkey et al 2000), New Zealand (Hancox and Poulton 2006) and UK (Parsons et al 2007), although one study from USA showed a weak association (Robinson et al 1993).

A further systematic review with a meta-analysis included 30 studies (52 independent samples) on the relationship of TV viewing and body fatness and 24 studies (39 independent samples) on the relationship between TV viewing and physical activity, published since 1985 (Marshall et al 2004). The results showed an expected positive statistically significant relationship between TV viewing and body fatness, and small negative relationship with TV viewing and physical activity. However, the authors concluded that the relationships were too small to be of clinical significance, and that media-based inactivity was unfairly implicated in the rise in childhood obesity.

However, randomised controlled trials have supported this association showing reductions in BMI following a reduction in TV viewing (Robinson 1999, Epstein 2000). An expert panel in the USA has reviewed the evidence around screen time, identifying 5 promising interventions, the first three of which involve parents directly: eliminate TV from bedrooms; monitoring screen time at home; no TV whilst eating family meals; school curriculum based intervention; and training of health professionals (Jordan and Robinson 2008). A family-based treatment intervention needs to include reducing the time children spend in front of a screen as one of its component parts.

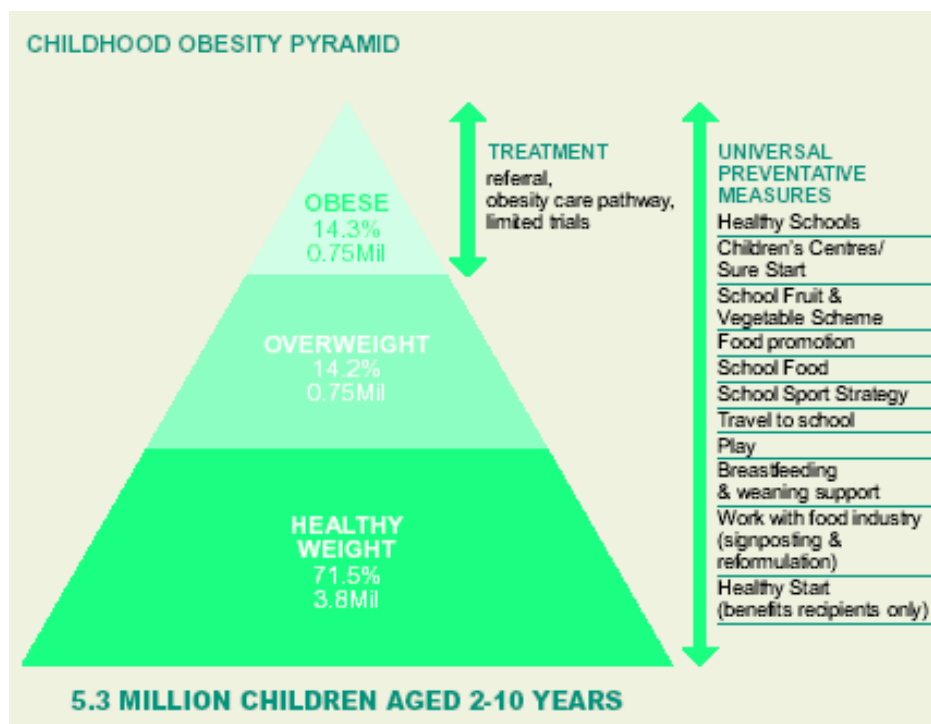
This section has identified that parents play an important role in the aetiology of childhood obesity around the restriction of food, lack of support for physical activity and excessive screen time. This suggests that these factors should be targeted in interventions for the treatment of childhood obesity.



## 2.7 Treatment (Management) or Prevention ?

There are an estimated 0.75 million children aged 2-10 in England who are obese, a further 0.75 million who are overweight and 3.8 million at a 'healthy weight' (Figure 2.10). There are two policy options, either focusing on preventing children who are either overweight or at a healthy weight from becoming obese, or to treat the 0.75 million who are already obese.

**Figure 2.10 – Childhood Obesity Pyramid for England**



Source:- Department of Health (2006a) Choosing Health: Obesity Bulletin.

A review by Lobstein et al (2004) questions the usefulness of the treatment / management approach, suggesting that even with intensive treatment programmes, seriously obese children are likely to remain so both in childhood and through to adulthood, with the concomitant risks to health. He describes treatment programmes as largely 'palliative', controlling rather than resolving obesity. He emphasises that '*prevention is the only realistic solution*' open to

policy makers in developed and developing countries to tackle the rise in childhood obesity. Ells et al (2005) supports this view, stating that *'treatment of childhood obesity is expensive and unlikely – at a population level – to be successful'*.

In contrast, a review by Reilly (2006a) has challenged the adage *'prevention is better than cure'*, demonstrating the implications for childhood obesity. First, there are large numbers of obese children and adolescents (Figure 2.10), with increasing numbers affected by associated co-morbidities. Many seek treatment, and therefore it would *'seem inappropriate not to attempt to treat it'* (Reilly 2006). Second, treatment of childhood/adolescent obesity is a form of 'secondary prevention' leading to the prevention of adult obesity in some children. Left untreated, as I have previously shown in Section 2.5.1, up to 70% of obese children/adolescents will be obese as adults. With treatment, this persistence of obesity to adulthood *may* be lower.

I feel that both prevention and treatment interventions are needed in order to tackle the rising prevalence of obesity. Choosing Health (Department of Health 2006a) advocates both treatment and prevention, although it predicts that prevention will make a larger contribution towards meeting the target in 2020. Although prevention is the priority, it is unethical to watch today's large numbers of obese children grow into obese adults without trying to intervene, now that we know the risk of childhood obesity tracking to adulthood. It is important that treatment programmes are effective as possible.

A key question is what interventions are effective in both areas: prevention and treatment. The evidence base for prevention interventions has been the subject of a Cochrane review, and has been shown to be lacking with further research needed in this vital area (Summerbell et al 2005). The intervention which is the topic of this thesis is a treatment intervention, and the next chapter will review the research evidence on the effectiveness of interventions to manage childhood obesity.

## **2.8 Effectiveness of Interventions for Treatment of Childhood Obesity**

Key resources for this section are the Cochrane systematic reviews on the treatment of childhood obesity (Summerbell et al 2003, Oude Luttikhuis et al 2009) and the National Institute for Health and Clinical Excellence guidance document for the treatment and prevention of obesity (NICE 2006a). Thereafter details of selected primary studies that have contributed to the evidence base will be given, followed by a summary of the main UK interventions.

### **2.8.1 Systematic Reviews**

In 2003 a Cochrane systematic review (search up to July 2001) reported a lack of research on the treatment of childhood obesity, only finding 18 randomised controlled trials, many of which had small sample sizes or other methodological limitations (Summerbell et al 2003). The authors were unable to draw definitive conclusions from this review. A further systematic review examined the nature and effectiveness of family involvement (McLean 2003). Although few studies existed, they indicated that parental involvement is associated with weight loss in children but not in adolescents, and that a greater range of behaviour change techniques improves outcome. The lack of UK based programmes in these reviews stimulated the development and piloting of the *'Families for Health'* programme reported in this thesis.

Subsequently, the National Institute for Health and Clinical Excellence published a guidance document based on the evidence available for the treatment and prevention of obesity in children and adults up to December 2006 (NICE 2006a). The evidence for the NICE guidance was partially based on the

Cochrane review (Summerbell et al 2003), but also included evidence from controlled clinical trials and controlled before-and-after studies, as well as evidence published since the Cochrane review.

The results of the review were split into the treatment of obesity in clinical settings and non-clinical settings. 42 studies were in clinical settings, with 25 studies from USA, none from the UK, and almost all from university obesity research clinics. The highest level of evidence (1++) is available for the following interventions in specialist weight management programmes:-

- Physical activity and diet combined are more effective in weight management in children aged 4-16 years, than diet alone
- Behavioural treatment combined with physical activity and/or diet is effective in children/adolescents aged 3-18 years
- Behavioural treatment can be more effective if parents, rather than children (aged 6-16 years), are given the main responsibility for behaviour change.

The evidence relating to the treatment of childhood obesity in non-clinical or community-based interventions was poor, with only seven RCTs and three controlled 'before and after' studies found, and no studies from the UK. The review found insufficient evidence to compare the effectiveness of interventions with or without family involvement in non-clinical settings. This research is reflected in the guidelines from NICE for interventions to include a focus on lifestyle change within the family, with parents taking the main responsibility for change in children younger than 12 years (NICE 2006a).

In recognition that many studies informing the evidence base were of poor quality (e.g. short follow-up) with little evidence from the UK, NICE (2006a) identified the following research questions for primary research in the UK:-

1. *'What are the most effective interventions to prevent or manage obesity in children and adults in the UK?'*
2. *'How does the effectiveness of interventions to prevent or manage obesity vary by population group, setting and source of delivery ?'*
3. *'What is the cost-effectiveness of interventions to prevent or manage obesity in children and adults in the UK?'*
4. *'What elements make an intervention effective and sustainable, and what training do staff need?'*

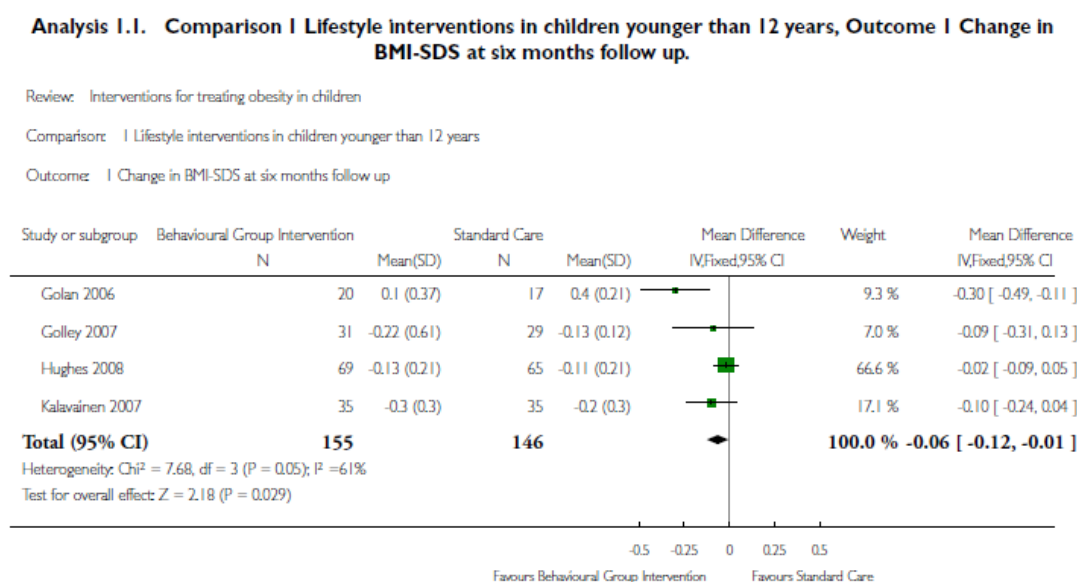
The Cochrane review published in 2003 (Summerbell et al 2003) has recently been updated, now including trials of interventions to treat obesity in children or adolescents published up until May 2008 (Oude Luttikhuis et al 2009). A new comprehensive search strategy found 46 additional randomised controlled trials which met the inclusion criteria, making a total of 64 RCTs (5230 participants) in the systematic review. Of the 64 trials, 10 (1424 participants) focused on anti-obesity drugs in adolescents (i.e. metformin, orlistat, sibutramine) and 54 (3806 participants) focused on lifestyle. Of the 54 RCTs focusing on lifestyle, 36 focused on behavioural oriented treatment programmes aiming to change diet, physical activity and sedentary behaviours (ranging from family-based therapy, cognitive-behavioural treatment, problem solving, multi-component behavioural therapy); 12 focused on physical activity / sedentary behaviour; and 6 focused on diet. For inclusion, the studies had to include a baseline and post-

intervention measurement of height and weight, with the primary outcome measure being the BMI z-score or percentage overweight. A range of secondary outcomes were also considered, including a focus on adverse outcomes. The quality of the RCTs was variable, although studies were not excluded from the narrative synthesis on this basis. Only two of the RCTs were from the United Kingdom (Hughes et al 2008, Daley et al 2006). The authors divided the 54 lifestyle studies for the purpose of analysis by the age of the child: 37 studies (4 dietary, 9 physical activity, 24 behavioural interventions) comprised children with a mean age <12 years and 17 studies (2 dietary, 3 physical activity, 12 behavioural interventions) comprised children with a mean age  $\geq$ 12 years (i.e. adolescents).

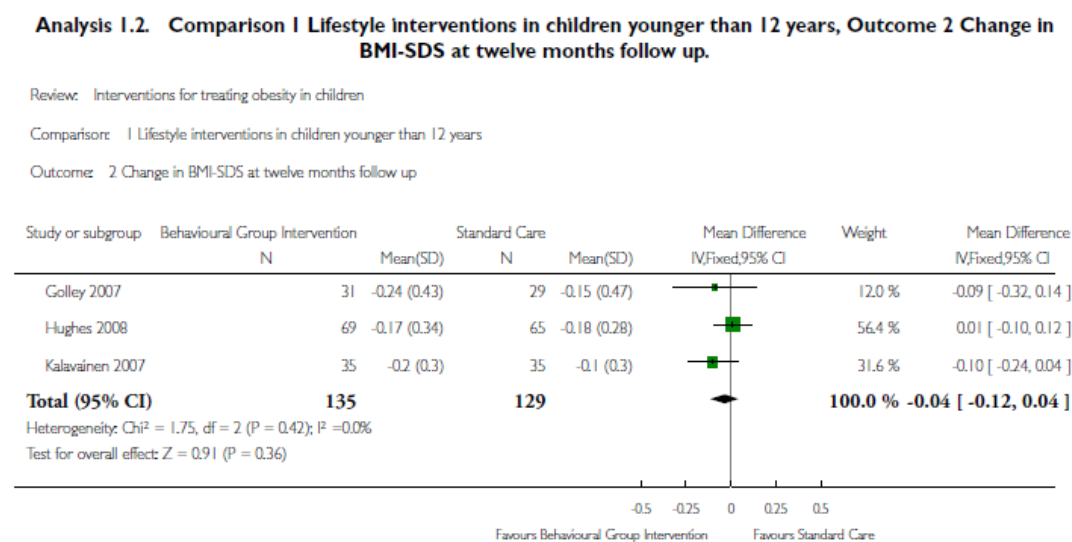
A narrative synthesis and a meta-analysis are presented to establish the effect of behavioural family programmes on the change in BMI z-score, comparing them with standard or minimal care. Only four of the 24 behavioural interventions in children under 12 years fulfilled the criteria to be pooled, with 16 studies excluded from the meta-analysis because they had not been analysed using intention-to-treat principles. The Forest plot combining the remaining four studies showed that the mean difference between the groups in BMI z-score favoured the behavioural intervention over standard care at the 6-month follow-up (-0.06, 95% CI -0.12 to -0.01) (Figure 2.11a), but there was no benefit at 12-months (-0.04, 95% CI -0.12 to 0.04) (Figure 2.11b). The large variation in studies in terms of length of follow-up, different outcome measurements and methodological quality made it difficult to synthesise the results, questioning the benefit of a meta-analysis on such a small proportion of studies.

**Figure 2.11 Forest Plots from the Cochrane Systematic Review on the Treatment of Obesity in children under 12 (Oude Luttikhuis et al 2009)**

(a) Behavioural interventions in children < 12 years – 6-month follow-up



(b) Behavioural interventions in children < 12 years – 12-month follow-up





Similarly, the meta-analysis of behavioural interventions targeting children aged 12 years and older included results from only three of 12 interventions. The pooled effect for BMI z-score was in favour of the intervention compared with standard care or self-help at 6-months (-0.14, 95% CI: -0.17 to -0.12), and persisted until the 12-month follow-up. In adolescents the anti-obesity drugs orlistat and sibutramine, led to significant improvements when combined with lifestyle change (Oude Luttikhuis et al 2009).

The focus on potential adverse effects is an important addition in this systematic review. All 10 studies of anti-obesity drugs reported adverse events very comprehensively, although only 18 of 54 lifestyle studies reported measures of harm. No adverse effects on psychological well being, linear growth or eating disorders were found with lifestyle interventions.

The overall conclusion of the 2009 Cochrane review was that it is difficult to recommend one intervention over another. However, several studies indicate that family-based lifestyle interventions which combine dietary, physical activity and behavioural components can produce *'a significant and clinically meaningful reduction in overweight in children and adolescents'* (p2) compared with standard care, self-help or control (Oude Luttikhuis et al 2009). Combined interventions were more effective than interventions targeting diet or physical activity alone. Furthermore, parental involvement was identified as being particularly useful in children under 12 years.

## **2.8.2 Key Primary Studies Contributing to the Evidence Base for Family-Based Programmes**

The evidence base for family-based programmes to treat childhood obesity (aged 7 to 11), with parents as the main agents of change, has come mainly from the USA (Epstein et al 1990, Israel et al 1985) and Israel (Golan 2004a,b, 2006a).

### **2.8.2.1 Family-Based Behavioural Therapy (Epstein)**

Fifteen of the studies in the NICE guidance (NICE 2006a) and 12 of the studies in the Cochrane review (Oude Luttikhuis et al 2009) were from Epstein's group from the University of Buffalo, New York, USA, thus contributing considerably to the evidence base. This group have evaluated 'Family-Based Behavioural Therapy', examining different lifestyle combinations, behaviour management approaches and/or target groups, delivered to groups over 8-12 weeks (Epstein et al 1994). Their programme used the Traffic Light Diet, which is a calorie-based food exchange system, with foods colour coded with green for 'go'; yellow for 'eat with care'; and red for 'stop'. In a ten-year follow-up of 'Family-Based Behavioural Therapy' in 77 families comprising obese parents and their obese 6 to 12 year olds, long-term changes in weight were best if the parent and child were targeted together (-11.2% at 5 years, -7.5% at 10 years). This is compared with targeting the child alone (+2.7% at 5 years, +4.5% at 10 years) and a group where neither child or parent were specifically targeted (+7.9%, +14.3%) (Epstein et al 1990). Their programme provides evidence that parents should be involved in the therapy process in order to sustain change.

### 2.8.2.2 Golan

A second group of researchers making a significant contribution to the evidence for family-based interventions are headed up by Professor Moria Golan from the Hebrew University of Jerusalem, Israel. Golan and Crow (2004b) reported a 7 year follow-up of a randomised controlled trial of 60 obese children (6-11 years) in which parents *or* children were targeted as the exclusive agents of change. Parents attended 14 one-hour group sessions including eating and activity behaviour modification, decreasing stimulus exposure, parental modelling, and parents were encouraged to practice 'authoritative' parenting. The focus favoured parenting over lifestyle components (personal communication with Golan). The children attended group sessions, were prescribed a diet, and discussions included physical activity, eating behaviour modification and self-monitoring. The mean reduction in percentage overweight was superior for the parent group (29%) compared with the child group (20%) ( $p < 0.05$ ).

Golan et al (2006a) have carried out a further study in 32 families with obese children aged 6-11 years who were randomised either to treatment of parents exclusively *or* treatment of parents with the obese child. Both groups received a 6-month educational and behavioural programme for a healthy lifestyle. Only the intervention group which treated parents exclusively resulted in a significant reduction in percentage overweight, suggesting that interventions delivered to parents alone may be more effective and that the obese child could be omitted from active participation. Golan (2006b) also reported the preliminary results of a roll-out of this programme using 40 trained facilitators, with only parents participating. Drop-out was around 35%, but in a sub-sample of 70 children with

complete data the BMI of the children reduced significantly at the end of the 3-month programme. Longer term follow-up is required to establish the effectiveness of the programme now that it has bridged the gap from research to practice.

### **2.8.2.3 Israel**

In the USA, Israel et al (1985) carried out an RCT with 33 'overweight' children (8-12 years) and their parents, assigning them to one of three interventions:- a multi-component behavioural weight reduction programme, with and without an added parent-training course in child management skills, and a waiting-list control. At the end of the 9 week programme, both treatments groups were better than control for reducing body weight ( $p < 0.001$ ) and percent overweight ( $p < 0.001$ ), albeit the two treatment groups did not differ from each other. At one-year follow-up, the parent training group showed superior maintenance of the improvement in percentage overweight compared with the group that just received the weight reduction programme, indicating that parenting skills are important to sustain the change. A limitation of this study is its small size and that the control group were not followed-up to 1-year.

### **2.8.2.4 Triple P Positive Parenting Programme (Golley)**

Key research published since the NICE guidance includes a new programme with a specific focus on parenting. Golley et al (2007a,b) have examined the effects of 'Triple P' Positive Parenting Program in the treatment of childhood obesity. This is an Australian parenting skills training program originally designed to reduce the prevalence of behavioural and emotional problems in

children and adolescents (Sanders et al 2003). A new group-based programme has been developed which combines parenting skills training using Triple P with healthy lifestyle information, and its use has been described in a 'case study' with one family (Golley et al 2007a). An RCT of this new programme has also been carried out with 111 pre-pubertal overweight/obese children aged 6 to 9 years, in a clinical setting (teaching hospital in Adelaide, Australia) (Golley et al 2007b). Families were randomized to three arms:- Parenting skills training plus intensive lifestyle education (4 two hour group sessions on parenting followed by 7 sessions on lifestyle); parenting skills training alone (parenting component only); a control group who were put on a waiting-list for 12-months. The intervention was only delivered to groups of parents – children did not attend any sessions, and parents were encouraged to deliver change at the level of the family rather than the individual child. Follow-up after 12-months showed a reduced BMI z-score of 10% with the parenting-skills training plus lifestyle intervention, and 5% reduction for both the parenting skills training group and waiting-list control. This indicates that parenting programmes delivered alongside lifestyle components may be a more effective approach for weight management than programmes that focus on parenting alone. A limitation is that the study did not have a traditional family-based 'lifestyle' programme arm without the parenting aspects, in order to assess the benefit of adding parenting skills to the treatment of obesity with lifestyle change.

### **2.8.3 Studies in the UK on the Treatment of Childhood Obesity**

Since the focus on obesity in Choosing Health and the original Cochrane review which highlighted the lack of UK-based research (Summerbell 2003) there has been research activity in the UK on interventions to treat childhood obesity. Interventions which target junior school children (age 7 to 11) and with published evaluations are described in this section. Although these studies were not published when the current intervention was proposed, it is pertinent to review these interventions to enable a comparison of their findings with the current study.

Studies are divided into interventions which have been delivered in a clinical setting *versus* a community setting. Potential advantages of a clinical setting are that interventions are usually delivered on a one to one basis (although not always) permitting an individualised medical (including screening for co-morbidities) and behavioural approach, tailored to the needs of that child/family. This permits a private approach to treatment, and if appropriate, pharmacological intervention. Potential advantages of a community setting for the delivery of primarily group-based interventions are an increase in accessibility, with the intervention held locally in a leisure centre or school for example. Furthermore, delivery in the community offers an alternative approach which non-medicalises childhood obesity, providing treatment in a less imposing environment. With implementation closer to the context of their behaviour, community-based interventions may also provide a greater opportunity for environmental change. Research on the best setting to deliver treatment is underdeveloped.

### **2.8.3.1 Treatment Interventions Delivered in a Clinical Setting in the UK**

#### **(a) Behavioural Approach vs 'Standard' Dietetic Care**

An RCT with 134 five to eleven year old obese children, referred to hospitals in Glasgow and Edinburgh, compared an intensive behavioural approach comprising around 5 hours of one-to-one treatment by a paediatric dietitian with standard dietetic care (control) involving around 1.5 hours of contact (Hughes et al 2008). The intervention, delivered over a 6-month period, used counselling and behavioural strategies to change diet using the 'traffic light diet', increase activity and reduce sedentary behaviour (Stewart et al 2005). The results showed no significant differences between the new intervention relative to standard care in the change in BMI z-score from baseline to 6-months (median difference between groups: 0.03, 95% CI: -0.05 to 0.11,  $p=0.4$ ) or from baseline to 12-months (-0.04, 95% CI: -0.17 to 0.07,  $p=0.5$ ). Both groups showed a small statistically significant reduction in BMI z-score at the 12-month follow-up, between -0.22 to -0.04 (95%CI) for the intervention group and between -0.26 to -0.08 (95%CI) for the standard care group. Weight (kg) increased significantly for both groups from baseline to 6-months and baseline to 12-months (intervention: 95%CI: 5.4 to 7.8 kg, control: 95% CI 5.5 to 7.7kg), but there were significant increases in physical activity (accelerometry) and significant decreases in sedentary behaviour in the new intense intervention group, relative to standard care. In light of the modest benefits, the authors proposed that a more intense and longer term intervention may be required. The control group in this study was 'standard dietetic care' which is not universally available in England for the treatment of childhood obesity. Thus the benefits are difficult to assess without a comparison group of families not offered any treatment.

### **(b) Family-Based Behavioural Treatment**

A group based in London is assessing 'family-based behavioural treatment' (FBBT) in a clinical setting. This 12-session group intervention is based on Epstein's FBBT programme translated from the US into a UK clinical setting, which includes the use of the traffic light diet. The emphasis is on *how* to make changes to the child's diet and exercise, and setting of short- and long-term targets for weight. In the pilot study 27/33 (82%) families with obese children aged 8-13 years old completed the programme (Edwards et al 2006). The results showed an 8.4% reduction in BMI, maintained at a 3-month follow-up, and demonstrated that FBBT is feasible and acceptable. An RCT has compared FBBT versus a waiting-list control in families with obese children aged 8-12 years. It is completed but as yet unpublished (UK Clinical Trials Gateway, ISRCTN51382628).

### **(c) Retraining Eating Behaviour**

A randomised controlled trial has compared the use of a Mandometer with standard individualised care in a hospital based obesity clinic in Bristol with 106 obese young people aged 9 to 17 years (Ford et al 2010). The Mandometer is a device which provides feedback during eating, designed to slow down the speed of eating. The intervention lasted 12-months, with follow-up at 12 months and 18-months from baseline. At 12-months, the difference in the BMI z-score between the Mandometer group and standard care was -0.24 (95% CI: -0.36 to -0.11,  $p < 0.001$ ,  $n = 106$ ). This advantage of the Mandometer was maintained at 18 months with a difference in BMI z-score between groups of -0.27 (95% CI: -0.43 to -0.11,  $p < 0.001$ ,  $n = 87$ ). Retraining of eating behaviour appears to be useful tool to aide the treatment of childhood obesity.



### **2.8.3.2 Treatment Interventions Delivered in Community Settings in the UK**

#### **(a) MEND**

The MEND (mind, exercise, nutrition and do it!) programme is an intensive family-based programme of nutrition education, exercise and behaviour modification, carried out in a community setting. The programme consists of twice-weekly group sessions for 9 weeks held at schools and leisure centres. In a pilot study with 11 families with obese children aged 8-11 years attendance was 78%, and one family dropped out (Sacher et al 2005). Compared to baseline, absolute BMI was significantly improved at the end of the programme (3-months), but the difference was not significant at the 6-month follow-up.

A randomised controlled trial of MEND has now been completed, with the intervention including the 9-week MEND programme followed by a 12-week free family swim pass (Sacher et al 2010). One hundred and sixteen families with obese children aged 8-12 years were randomised to the MEND programme or to a waiting list control. The difference in the BMI z-score at 6-months between the randomised groups was -0.24 (95% CI: -0.34 to -0.13,  $p < 0.0001$ ,  $n=82$ ) in favour of MEND. Within group differences for the intervention (MEND) group showed a change in BMI z-score of -0.30 at 6 months from baseline (95% CI: -0.36 to -0.23,  $p < 0.0001$ ,  $n=71$ ) and -0.23 at 12 months from baseline (95% CI: -0.33 to -0.13,  $p < 0.0001$ ,  $n=42$ ). The roll-out of MEND is already extensive.

## **(b) WATCH IT**

The WATCH IT programme from Leeds is a community-based service for obese children, with a unique model of delivery utilising non-professional health trainers (though supervised by health professionals). Families commit to attend for 3 months, with the option of attending for up to a year. WATCH IT involves one-to-one weekly appointments for the parent and young person, weekly group activity sessions and parenting group sessions once the one-to-one sessions have ended. The programme has been piloted with 94 adolescent and pre-adolescent children (mean age 12.2 years) with moderate to severe obesity, and was successfully implemented with only 15% drop-out and low non-attendance (Rudolf et al 2006). After 6-months the mean change in BMI z-score from baseline for 48 children who had attended to 6-months was -0.07 ( $p < 0.01$ ). A qualitative study of the views of parents attending WATCH IT has described the psychological issues faced by parents of an obese child, and supports a 'whole-family' approach (Dixey et al 2006). An RCT of WATCH IT is underway, including an economic evaluation (East Leeds PCT 2006).

Sabin and Shield (2006) have discussed the distinction between statistical significance and clinical significance. They calculate that WATCH IT's fall in BMI z-score of -0.07 equates to a 3kg weight gain in girls, assuming normal longitudinal growth. Thus the goal of 'weight maintenance' from the Royal College of Paediatrics and Child Health and National Obesity Forum is not achieved by WATCH IT and the mean change in BMI z-score of -0.07 does not reach the reduction of -0.5 BMI z-score required for clinically significant changes (Reinehr and Andler 2004).

### **(c) Commercial Weight Loss Programmes**

Finally, one new area for the community-based treatment of childhood obesity in the UK may be commercial weight loss programmes, such as Weight Watchers and Slimming World. These commercial programmes state that under 16's can join their groups but only with a supporting note from their GP or doctor (Slimming World 2010, Weight Watchers International 2003), although Weight Watchers state they do not accept children below age 10 years. They also both point out that their website and fee-based products are restricted to those over the age of 18 years (Slimming World 2010, Weight Watchers UK 2010). Despite the groups being accessible by children and adolescents there does not appear to be any published literature on the effectiveness and safety of these interventions in the paediatric population. Promotion of weight loss diets to children, as opposed to a focus on healthy lifestyle and weight maintenance, maybe unsuitable and need careful evaluation. This is a gap in the literature.

#### **2.8.3.3 Summary of Treatment Interventions in the UK**

To summarise, there are a number of childhood obesity treatment interventions currently being researched in the UK. Each offer different approaches, but as these studies are not directly comparable due to different study designs and outcome measures, it is not possible to say which is the most promising approach. Some interventions from both clinical and community settings appear effective. The treatment intervention described in this thesis differs from those being researched in the UK in that it offers family-based treatment which has a greater emphasis on parenting, relationship skills and emotional and social development, in addition to lifestyle change.

## **2.9 Cost-Effectiveness of Interventions for the Treatment of Childhood Obesity**

NICE guidance (NICE 2006a) and the Cochrane review (Oude Luttikhuis et al 2009) both point to the paucity of evidence on the cost-effectiveness of non-pharmacological interventions for the treatment of obesity. One study in families was included in these reviews (Goldfield et al 2001), which compared the cost-effectiveness of two different protocols for the delivery of family-based behavioural treatment (FBBT): either group-based treatment or a mix of group-based and individualised treatment. Cost effectiveness was defined as the reduction in standardised BMI (change in BMI z-score) or percentage overweight in children at 12-months follow-up divided by the total cost of treatment. In this small study (31 families randomised) group-based FBBT was shown to be significantly more cost-effective than mixed treatment.

The study by Goldfield et al (2001) has used the change in overweight as the outcome measure to derive cost-effectiveness. It would be useful in future research to obtain information from quality-of-life questionnaires to assess how valuable any change in degree of overweight is to the individual (cost-utility analysis). Cost-effectiveness depends on the intervention changing behaviour after treatment has stopped, and future considerations could take into account the effect of reduced weight on future costs (NICE 2006a). Haby (2006) suggest the use of DALYs saved over a child's lifetime as the outcome measure to assess health benefit in prevention. Although there are methodological uncertainties, it is imperative that cost-effectiveness analyses are conducted alongside effectiveness in future RCTs (Oude Luttikhuis et al 2009).

## 2.10 Public Health Policy on Obesity in England

This section will review the inclusion of obesity in public health policy in England since the 1990s to the present day, with a specific focus on childhood obesity.

### 2.10.1 The Health of the Nation (1992)

'The Health of the Nation' was the first national public health strategy in England, launched in 1992 under the Conservative government, with a focus on five key areas: coronary heart disease (CHD) and stroke; cancer; mental illness; HIV/AIDS and sexual health; and accidents (Department of Health 1992). The emphasis was on individual lifestyle change. Within the key area of CHD, a target was set for the reduction of obesity in adults. To my knowledge this was the first target on obesity in English policy:

- *"To reduce the percentages of men and women aged 16-64 who are obese (BMI>30) by at least 25% for men and at least 33% for women (from 8% in men and 12% in women in 1986/87 to no more than 6% in men and 8% in women in 2005)". (Department of Health 1992) (Target A7)*

Progress against this target was monitored by the Health Survey for England. The National Audit Office (1996) reported limited progress, with 1993 figures showing the proportion of obese men and women aged 16-64 had risen to 13% and 16%, respectively. This target was superseded by new policy. If it had been monitored to 2005, the Health Survey for England showed an alarming increase with 22.1% of men and 21.9% of women obese (Information Centre 2006, p3).

'The Health of the Nation' was criticised for ignoring the '*social and economic constraints on behavioural change*', and the likelihood that the policy may increase inequalities in health (Davey Smith and Morris 1994). Furthermore, it

was seen as a Department of Health initiative and so lacked local ownership (Universities of Leeds and Glamorgan 1998).

### **2.10.2 Our Healthier Nation (1999)**

The change of government to Labour in 1997 brought a new public health policy: 'Saving Lives - Our Healthier Nation' in 1999 (Department of Health 1999). The focus was in four of the same areas addressed in The Health of the Nation: CHD and stroke; cancer; mental illness; and accidents. However, the emphasis moved from a focus on the individual in 'The Health of the Nation' (Department of Health 1992) towards tackling the social, economic and environmental determinants of health, as well as a focus on individual behaviour and health services (Gabbay 1998). The 'third way' evolved: *'a third way between the old extremes of individual victim blaming on the one hand and nanny state social engineering on the other'* (Department of Health 1999, Summary). Obesity was mentioned as a key lifestyle factor to reduce CHD and stroke, and there was also a recognition of health inequalities, in that obesity is highest amongst adults from manual social groups. However, the focus was on smoking, following the white paper 'Smoking Kills' (Department of Health 1998), with less focus on healthy eating and exercise, and no target for obesity.

The focus on childhood obesity was first made in 2001 with the report 'Tackling Obesity in England' (National Audit Office 2001). This highlighted the increasing prevalence, the human cost and the financial cost of obesity, estimated at £½ billion per year to the NHS and £2 billion to the wider economy. The annual report from the Chief Medical Officer in 2002 described the public health consequences of the rising prevalence of childhood obesity as a *'global*

*epidemic*' and a *'health time bomb with the potential to explode over the next three decades into thousands of extra cases of heart disease, certain cancers...'*. He added: *'Unless this time bomb is diffused the consequences for the population's health, the costs to the NHS and losses to the economy will be disastrous'*, and urged action across government departments (CMO 2002, p44). To my knowledge, this was one of the first times that the government had discussed the rise in childhood obesity.

### **2.10.3 Choosing Health - Making Healthier Choices Easier (2004)**

In 2004, the Public Health White Paper 'Choosing Health - Making Healthier Choices Easier' outlined a new target on childhood obesity as a priority (Department of Health 2004a).

- ***'To halt, by 2010 the year-on-year rise in obesity among children under 11 in the context of a broader strategy to tackle obesity in the population as a whole.'***

In 'Choosing Health' there are six priority areas: Smoking, Obesity, Exercise, Alcohol, Sexual Health, Mental Health. This white paper also represented a shift back to 'individual responsibility', with the Government creating the 'right environment'. The focus on childhood obesity rather than adults has led to a central role for the family, and attention on the environment (i.e. school meals, labelling of foods, advertising of foods etc). The responsibility for this target is shared between the Department of Health, Department of Education and Skills and Department of Culture, Media and Sport.

Since 2004 the focus on childhood obesity has increased, including the Foresight Report 'Tackling Obesities: Future Choices' (Government Office for

Science 2007), the new obesity strategy 'Healthy Weight, Healthy Lives, A Cross Government Strategy for England' (Department of Health 2008a) and the introduction of the National Child Measurement Programme (Department of Health 2006b).

#### **2.10.4 Foresight Report (2007)**

The future impact of rising obesity in the UK was emphasised in the Foresight Report (Government Office for Science 2007). Modelling, based on current trends, indicated that by 2050 *'60% of adult men, 50% of adult women, and about 25% of all children under 16 could be obese'* (p2). The financial impact of ill health caused by obesity was estimated to increase from £7 billion in 2002 to £45.5 billion by 2050. The report likened tackling obesity as *'a societal challenge, similar to climate change'* (p3), requiring a long-term commitment at every level (personal, family, community, national) and partnership between government, science, business and civil society.

The Labour Government replaced the original target on childhood obesity with a longer term target in 2007. This was introduced around the same time the Foresight report was published.

- ***“By 2020, we aim to reduce the proportion of overweight and obese children to 2000 levels” (Department of Health 2008a)***

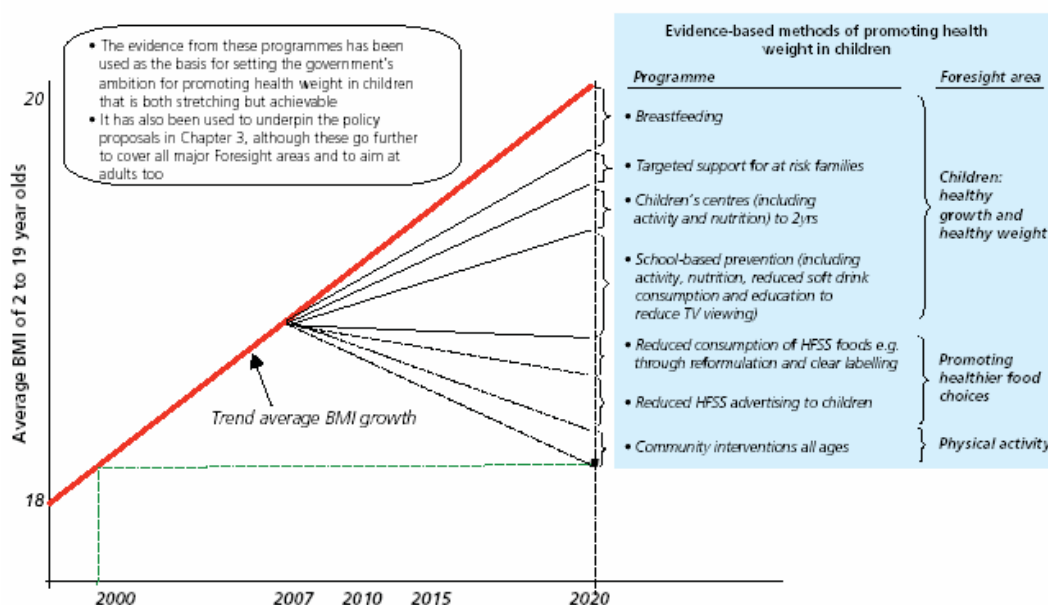


## 2.10.5 Healthy Weight, Healthy Lives (2008)

In January 2008, following on from this new target, the government in England launched their new obesity strategy 'Healthy Weight, Healthy Lives, A Cross Government Strategy for England' (Department of Health 2008a). Figure 2.12 shows the contribution that various programmes need to make in order to reach the 2020 target. 'Targeted support for at-risk families' includes prevention and treatment for families most at risk, indicating that programmes like the one in this project have a small albeit recognisable part to play.

**Figure 2.12 Chart illustrating the projected impact of the various programmes on BMI in children, in order to meet the 2020 target**

**Illustrative chart of potential reduction in average BMI in children from implementing best practice programmes – indicative trajectory**



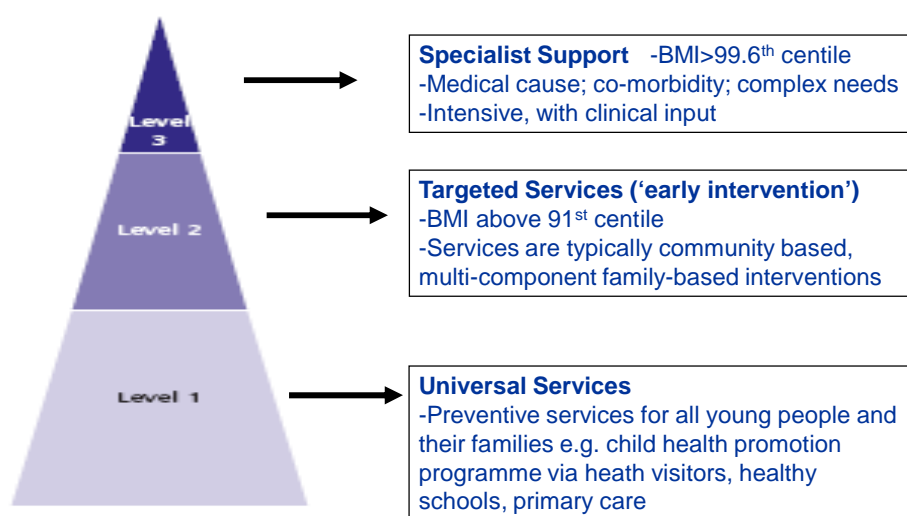
Source: Department of Health analysis

**Source:- Healthy Weight, Healthy Lives (Department of Health 2008a, p9)**

The Commissioning Strategy for 'Healthy Weight, Healthy Lives' identified a three-tier pyramid model for local care pathways of weight management services of children and young people (Figure 2.13) (Department of Health 2008c). Primary Care Trusts and their partners are required to develop these

care pathways. The intervention in this project is a targeted weight management service, also referred to as an ‘early intervention’ service (level 2). As part of the ‘Healthy Weight, Healthy Lives’ strategy, the National Obesity Observatory was established in April 2008. They have recently published a standard evaluation framework for weight management interventions (Roberts et al 2009).

**Figure 2.13 Three-tiers of Care Pathway for Weight Management of Young People from Healthy Weight, Healthy Lives**



**Source: Healthy Weight, Healthy Lives: Commissioning weight management services (Department of Health 2008c)**

### 2.10.6 National Child Measurement Programme

In 2005 the Department of Health in England introduced a system of “population surveillance” or monitoring for childhood obesity, the ‘National Child Measurement Programme’. This involves annual measurement of BMI amongst all pupils in Reception (aged 4-5 years) and Year 6 (aged 10-11 years) in all maintained primary schools in England. Primary Care Trusts are responsible for the measurement of height and weight, with support from schools and the

Department for Education and Skills (DfES). Guidance to PCTs was first issued in January 2006 for the school year 2005-6 (Department of Health 2006b), with updated guidance re-issued annually (Department of Health 2007, Cross Government Obesity Unit 2009). The introduction of the 'National Child Measurement Programme' was not without controversy, and has been said to be lacking coordination and poorly articulated in terms of its intended application of surveillance or screening (Lake 2009).

The first mention of the new measurement programme in school children was in 2004 in the report from the House of Commons Health Committee (2004), which recommended that children should have their BMI measured annually at school, with the results '*sent home in confidence to their parents*'. The Government's main motive seemed to stem from the research that '*parents are no longer even able to identify whether their children are overweight or not, this seems to us a vital step in tackling obesity*' (Recommendation 58).

As this was to be a national screening programme, it was first considered by the Child Health Sub-Group of the UK National Screening Committee (2006), against their criteria for the effectiveness and appropriateness of screening programmes. These criteria are not met by the screening test for childhood obesity, with concerns expressed that BMI does not have an agreed cut-off point in children that is linked to increased morbidity; there was also insufficient evidence about the effectiveness of treatments for children who are obese; and the psychological impact of screening was unknown as it may '*do more harm than good*' stigmatising those children who are obese (UK National Screening Committee 2006&7). Their conclusion was that screening should *not* be offered.

This decision has recently been supported by a Health Technology Assessment systematic review, which found no trials assessing the effectiveness of screening for childhood obesity in primary school age, with the authors concluding *'it is difficult to see how screening to identify individual children can be justified without effective interventions'* (Westwood et al 2007, Fayter et al 2007). This decision is due for review in 2008/9 by the UK National Screening Committee, but by September 2009 had not been reported on their website.

Undeterred, in 2005 the Department of Health in England instead by-passed the UK National Screening Committee and introduced a system of "population surveillance" or monitoring rather than a screening programme. Monitoring seeks to collect information at a population level to examine the scale of childhood obesity, whereas screening has *'the aim of reducing risk of an adverse outcome, or with the aim of giving information about risk'* (UK National Screening Committee 2009). The monitoring included an 'opt-out' consent, so that parents only need to send back a slip if they do not wish their child to be measured. The aims of the National Child Measurement Programme in 2006/7 were stated as (Information Centre 2008):

- *inform local planning and delivery of services to children*
- *gather population level data to allow analysis of trends in growth patterns and obesity*
- *increase public and professional understanding of weight issues in children and be a vehicle for engaging with children and families about healthy lifestyles and weight issues*

The last aim is curious as parents were not to be routinely given their child's results with the 2006-7 guidance stating: *'Parents have a right to information about their children and can request their child's height and weight results from the PCT within one month of the measurement taking place. ... Measurements should not be fed back routinely to parents...'* (Department of Health 2007). In practice, the only practical difference between the monitoring programme in place and a 'screening' programme is in the lack of feedback to children and their parents. There are ethical issues around collecting the data and then not feeding this back to the parents or carers, and the lack of feedback removes any potential for change at an individual level. However, for the school year 2008/09, Primary Care Trusts were given the option to either routinely feedback results to parents or to provide results on request from parents, with 50% of PCTs choosing each option (Cross Government Obesity Unit 2009, p8). In the guidance for the school year 2009/10, the Government now **expects** that Primary Care Trusts will send results to parents and carers as a routine, and follow-up on children identified as underweight, overweight and obese (Cross Government Obesity Unit 2009). With this forthcoming change, there is a greater need than ever before to be able to offer support to parents if their child is classified as obese. It is also not ethical or effective to 'screen' children for obesity if there are no effective programmes in place to offer to children and their families; therefore it is imperative that evidence-based treatment programmes are offered at a local level.

### **2.10.7 Summary**

The first focus on obesity in policy in England was in 1992, with a target set for the reduction of obesity in adults in 'The Health of the Nation' (Department of Health 1992). This target was not met, with obesity amongst adults continuing to rise. Concern around childhood obesity was not evident in policy until 2002, following the publication of the National Audit Office (2001) report and the subsequent annual report from the Chief Medical Officer (CMO 2002). 'Choosing Health' (Department of Health 2004a) outlined childhood obesity as one of its main priorities, with the 'Healthy Weight, Healthy Lives' strategy (Department of Health 2008a) now taking forward this policy. This includes the development of local care pathways of weight management services for children and young people. Reducing childhood obesity is now a key public health priority, and with a target set for 2020, is likely to remain so for the foreseeable future.

## Chapter 3

### Methodology

#### 3.1 Introduction

Methodology refers to the *'underlying principles of inquiry'* whereas methods are the *'specific techniques'* for data collection used in the research (Wolcott 2001, p93). More expansive definitions are offered by Sandelowski (2003, p305), referring to methodology as *'an overall approach to inquiry regularly linked to particular theoretical frameworks'* and method as a *'synonym for the techniques for sampling, data collection, and data analysis with which the methodologies are implemented'*. Thus, methodology refers to the philosophical assumptions and theoretical frameworks that underlie an investigation, whereas methods refers to the specific tools used in the investigation.

This chapter sets out the philosophical paradigm and the research frameworks which I have used to guide the research. In the following chapter (Chapter 4), detailed methods for the data collection are given.

## SECTION I – Philosophical Paradigm

### 3.2 The Paradigm Debate

There are two original contrasting philosophical positions about knowledge and how it is created, which Labonte and Robertson (1996) have mapped out, as shown in Table 3.1. These are the positivist paradigm and constructivist or interpretivist paradigm, which are described in relation to their ontology, epistemology and methodology.

**Table 3.1 - Comparison of the Positivist and Constructivist Paradigm**

	<b>Conventional ‘Positivist’ Paradigm</b> (most quantitative work)	<b>Constructivist or Interpretivist Paradigm</b> (most qualitative work)
<b>Ontology</b> ( <i>about the nature of reality</i> )	<ul style="list-style-type: none"> <li>• Single reality</li> <li>• Universal truths</li> <li>• Cause-effect</li> </ul>	<ul style="list-style-type: none"> <li>• Multiple realities</li> <li>• Local and specific truths</li> </ul>
<b>Epistemology</b> ( <i>what can we know about reality &amp; the relationship between the inquirer and knowledge</i> )	<ul style="list-style-type: none"> <li>• Subject (researcher) and object (phenomenon being researched) are independent</li> <li>• Value-free enquiry</li> </ul>	<ul style="list-style-type: none"> <li>• Subject and object are interrelated</li> <li>• Creation of inquiry process</li> </ul>
<b>Methodology</b> ( <i>strategies employed to know reality(ies)</i> )	<ul style="list-style-type: none"> <li>• Hypothesis testing</li> <li>• Context-free variables</li> </ul>	<ul style="list-style-type: none"> <li>• Hermeneutic and dialectic</li> <li>• Interaction and synthesis</li> </ul>

*Adapted from Labonte and Robertson (1996, p435)*

Ontology refers to the assumptions we make about *‘the way the world is, the nature of reality’* (Labonte and Robertson 1996, p433). From the positivist paradigm the ontological assumptions are that there is a single objective reality to be found and that universal truths, independent of time and place, exist. Whereas the constructivist paradigm holds that multiple realities exist - there is no single reality.



Epistemology is *'the branch of philosophy that is concerned with the origins, nature, methods and limits of human knowledge'* (Reber 1995, p256), in other words *'our assumptions about what we can know about that reality'* (Labonte and Robertson 1996, p433). Underpinning the epistemology of the positivist paradigm is that the researcher (the subject) can investigate a phenomenon (the object) in an unbiased and value free way, without the investigator influencing the findings (Labonte and Robertson 1996). Thus, the researcher and what is being investigated are independent entities (Sale et al 2002). In the constructivist paradigm the researcher is part of the reality being researched, with reality constructed in and through our quest for knowledge. The researcher and the object of study are interactively linked so the findings of the inquiry are created within the context of the situation (Sale et al 2002).

The methodology for research in these two distinct paradigms is most often quantitative in the positivist paradigm and qualitative in the constructivist paradigm (Milburn et al 1995). Broadly, quantitative research involves hypothesis testing with a 'deductive, objective, generalising' approach and qualitative research offers an 'inductive, subjective, contextual' approach (Morgan 2007). The emphasis in quantitative research is to measure and analyse causal relationships whereas the emphasis of qualitative research is on process and meanings (Sale et al 2002).

Due to these two distinct paradigms, tension emerged between quantitative and qualitative methodologies in the 1960s. This debate became known as the *'paradigm wars'*, during which the relationship of paradigm and methodology was debated fiercely (Tashakkori and Teddlie 1998). Some researchers held

that the two approaches were incommensurate, so if their beliefs were from one paradigm they rejected the other paradigm and its methodology. However, others claimed that these paradigmatic divisions were overstated (Dixon-Woods et al 2004), and felt that the fundamental differences were between the paradigms, *not* between quantitative and qualitative methodology, as illustrated below:-

*'From our perspective, both qualitative and quantitative methods may be used appropriately with any research paradigm. Questions of method are secondary to questions of paradigm, which we define as the basic belief system or worldview that guides the investigator, not only in the choices of methods but in ontologically and epistemologically fundamental ways'. (Guba and Lincoln 1994, p105)*

### **3.3 Pragmatic Approach using Mixed-Methods**

Mixed-methods research was developed in the 1980s and 1990s as a way forward from the paradigm debate, with acknowledgement of the value of using both quantitative and qualitative methods to answer complex research questions (Dixon-Woods et al 2004). When assessing the application of qualitative research methods to health technologies, Murphy et al (1998) took a pragmatic view:

*'.. decisions about whether qualitative or quantitative methods (or a combination of both) are most appropriate to a particular research problem should be made on the basis of which approach is likely to answer the question most effectively and efficiently.'* (Murphy et al 1998, p2)

Morgan (2007) has recently formalised the 'pragmatic approach'. He calls for a disentangling of the choice of methods from the paradigm debate and for recognition of the benefits of combining quantitative and qualitative methods. The 'pragmatic approach' is put forward as a new paradigm in social science research methods, and this is contrasted with separate qualitative and

quantitative methodologies in Table 3.2 (Morgan 2007). His framework deliberately avoids the paradigm debates around the philosophy of knowledge (i.e. ontology, epistemology).

**Table 3.2 – Pragmatic Approach of Morgan, versus Quantitative and Qualitative Research methods**

	<b>Quantitative Approach</b>	<b>Qualitative Approach</b>	<b>Pragmatic Approach – (Mixed-Methods)</b>
Connection of theory and data	Deduction	Induction	Abduction
Relationship to research process	Objectivity	Subjectivity	Intersubjectivity
Inference from data	Generality	Context	Transferability

*Source: Adapted from Morgan (2007), p 71*

Abductive reasoning moves backwards and forwards between induction and deduction, firstly devising theories and then testing theories through action (Morgan 2007). Within this approach, qualitative research is seen as feeding into the quantitative research and vice versa. Similarly, the concept of ‘intersubjectivity’ offers a pragmatic mid-way between the ‘objective-subjective’ extremes to define the relationship of the researcher with the research process. In terms of the inferences that can be made in the pragmatic approach, ‘transferability’ rejects that qualitative results are always context specific or quantitative results are always generalisable to every setting, and offers an intermediate way to make appropriate use of knowledge. This framework suggests that the pragmatic approach is *‘more than just a mechanically superior way to answer the research questions’* (Morgan 2007, p73).

Although the *‘paradigm wars’* debate has for most researchers been resolved with the pragmatic approach and mixed-methods research gaining acceptance,

some researchers' claim that it is not possible to move beyond the paradigm debate. Some still see the position between qualitative and quantitative research as incommensurate, based on two distinct paradigms drawing on different types of reality (e.g. Sale, Lohfeld, Brazil 2002). They are critical of mixed-methods research which they say is often carried out without reference to the philosophical positions underpinning qualitative and quantitative research. Sale et al (2002) argue for a middle ground which permits mixed-methods research but only if it is done in a way that it does not violate the philosophical position of qualitative and quantitative methodologies.

My philosophical position is in support of the 'pragmatic approach'. This PhD thesis involves the use of a 'mixed-methods' approach, because it will enable me to answer a research question which involves assessing both the acceptability and likely effectiveness of the '*Families for Health*' programme. In the following sections I discuss mixed-methods evaluation designs in more detail.

### **3.4 Definition of Mixed-Methods Research**

Several definitions of mixed-methods research designs have been suggested, though there is no consensus. One definition is as follows:

*"including at least one quantitative (designed to collect numbers) and one qualitative method (designed to collect words), where neither type of method is inherently linked to a particular inquiry paradigm or philosophy"* (Greene, Caracelli, Graham 1989, p256).

However, Sale et al (2002) contest this definition as separate quantitative and qualitative methods are still shaped by their paradigms and just mixing them in

a study does not get away from this debate. A more detailed definition of mixed-methods research is that it:

*“involves the collection or analysis of both quantitative and/or qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research”* (Creswell et al 2003, p165)

This definition raises important issues about the design of mixed-methods studies, which will be returned to in Section 3.6.

### **3.5 Purpose of Mixed-Methods Research**

Two main typologies have been put forward to define the purposes of mixed-methods evaluation research.

First, Greene et al (1989) described five purposes of mixed-methods evaluation: triangulation, complementarity, development, initiation and expansion (Box 3.1). This early typology continues to be influential. In their review of 57 early mixed-methods studies, Greene et al (1989) coded each study into these five purposes, both in terms of their ‘stated purpose’ and the ‘actual use’ when the results were presented. The stated purpose for these studies showed that complementarity (29%) and expansion (25%) were cited the most, whereas development (10%), triangulation (8%) and initiation (0.4%) were less common (the rationale was not stated for 27% of studies). Once the 57 reports were examined for the ‘actual use’ to which mixed-methods were put, complementarity (45%) and expansion (31.5%) both increased in frequency. The most frequent purpose for studies focusing on ‘evaluation research’ was ‘expansion’.

### **Box 3.1 – Greene’s Five Purposes of Mixed-Methods evaluation**

1. *Triangulation* (Denzin 1978): process of examining an issue using different methods and then focusing on degree with which findings converge (aimed at enhancing validity of results).
2. *Complementarity*: different methods address different but complementary research questions, and then seeks clarification of the results from one method with the results of the other method (aimed at seeking deeper understanding).
3. *Development*: results from one method inform the development or use of another method, using the two data types iteratively.
4. *Initiation*: seeks to discover inconsistencies in the results by contrasting the results from one method with another.
5. *Expansion*: to extend the breadth of the research using different methods for different components of the inquiry i.e. quantitative methods for measures of effectiveness and qualitative methods to assess process measures around the delivery of an intervention. Also aimed at facilitating the interpretation of the study results, e.g. statistical analyses from a quantitative study may be enhanced by a qualitative account, or vice versa.

**Greene et al (1989)**

Limitations of Greene’s typology are that not all mixed-methods research can be categorised into these five purposes, and there appears to be overlap between these broad purposes. With these concerns in mind, Bryman (2006) devised a more detailed scheme involving 16 uses of mixed-methods research (Box 3.2). Although there is clearly overlap between the five purposes of Greene et al (1989) and the 16 purposes of Bryman (2006), this later scheme offers greater explanations of the reasons for carrying out mixed-methods research and is also more comprehensive.

### **Box 3.2 - Brymans' Scheme to Categorise the Uses of Mixed-Methods Research**

1. *Triangulation* – degree to which findings converge, enhancing validity
2. *Offset* – offset the weaknesses of qualitative and quantitative research & draw on the strengths of both
3. *Completeness* – more comprehensive account
4. *Process* – quantitative research provides account of structures in social life but qualitative research provides sense of process
5. *Different research questions* – can answer different questions
6. *Explanation* – help explain findings generated by the other
7. *Unexpected results* – generates surprising results
8. *Instrument development* – qualitative research used to develop questionnaires
9. *Sampling* – one approach used to decide on sampling of respondents
10. *Credibility* – employing both approaches enhances integrity of results
11. *Context* – qualitative research provides the context for the results from larger survey
12. *Illustration* – qualitative data illustrates quantitative findings
13. *Utility* – mixed-methods will be more useful to practitioners, in articles with an applied focus
14. *Confirm and discover* – qualitative data generates hypotheses, and quantitative data tests them in a single project
15. *Diversity of views* – (i) combining researchers & participants perspectives via quantitative and qualitative data, respectively; (ii) uncovering relationships (quantitative) and meaning (qualitative)
16. *Enhancement* – expand the findings from one data type with the other
17. *Other/unclear*
18. *Not stated*

*Bryman (2006)*

Bryman (2006) used his scheme to categorise 232 mixed-methods research articles published from 1994 to 2003. The purpose or rationale of using mixed-methods was stated for 170 (73.3%) studies. 'Enhancement' was the stated rationale for a third of the studies (31.5%) which rose to over a half (52.2%) when studies were assessed against how mixed-methods were actually used. 'Enhancement' is equivalent to 'expansion' in the typology from Greene et al (1989), thereby confirming the findings of the earlier study in terms of the importance of enhancement or expansion when using mixed-methods. Bryman (2006) found a striking difference between the proportion of studies citing

'triangulation' as a rationale (12.5%, 29 studies) and the proportion actually using triangulation (34.5%, 80 studies). Of the 29 studies citing triangulation as the rationale only 19 actually used it in this way. The mis-match between rationale and actual use is therefore striking, with only 19 of the 80 studies which used triangulation having cited this as their rationale for doing mixed-methods research.

This mis-match may be due to two reasons (Bryman 2006). First, the rationale for mixed-methods research are not thought through in sufficient detail at the protocol stage, resulting in a mis-alignment when the results are analysed and presented. Second, mixed-methods research provides vast quantities of data and it is only when collected that the true potential emerges. Researchers then pursue different analytical strategies to that which was originally planned. For example, researchers may decide to use triangulation only when inconsistency between quantitative and qualitative data have emerged: *'when faced with the two sets of data, some researchers find it hard to resist making allusions to the symmetry or otherwise between these findings'* (Bryman 2006, p266). This has the potential to bring greater understanding, although an argument against this *laissez faire* approach is that there should be a clear rationale for the use of mixed-methods at the outset to ensure that the right data collection methods are used.



### 3.6 Design of Mixed-Method Studies

The design of a study refers to the procedure for collecting, analysing and reporting the research. Four factors are important in determining the type of design for a mixed-methods study (Table 3.3) (Creswell et al 2003). These four factors are variable, as shown in column two, and are closely associated with the purpose of the study. They are each discussed in detail below.

**Table 3.3 - Factors to help decide the Design for a Mixed-Methods Study**

<b>Factors in Mixed-Methods Designs</b>	<b>Options</b>
Implementation of data collection	Concurrent - No sequence Sequential - Qualitative first Sequential – Quantitative first
Priority given to each data collection method	Equal Qualitative Quantitative
Stage of Integration	At data collection At data analysis At data interpretation With some combination
Theoretical perspective	Explicit Implicit

*Adapted from Creswell et al (2003), p171.*

#### 3.6.1 Implementation of data collection

The implementation of the quantitative and qualitative data collection in a mixed-methods study can either be concurrent or sequential. Data that are collected concurrently are analysed to see the degree to which the quantitative and qualitative findings converge (i.e. triangulation). If collected sequentially, the objectives of the study will determine which data type are collected first (Creswell et al 2003). If quantitative data are collected first using a large sample, qualitative methods are then used to explore aspects in more depth with a few cases. For a topic which needs to be explored qualitatively first, quantitative data are then collected using a larger sample in the second phase.

### **3.6.2 Priority given to data collection method**

The priority given to each type of data also needs to be decided, with options being to give equal priority to quantitative and qualitative data, emphasise quantitative more or emphasise qualitative more (Creswell et al 2003). A decision about priority needs to be explicit at all stages of the research, although this can be problematic. Several factors can help decide on the emphasis including the need to understand data from one method before proceeding and practical constraints with data collection, but it is recognised that the 'comfort level of the researcher' with the data types may have the greatest influence (Creswell et al 2003).

### **3.6.3 Stage of Integration**

It is desirable to be explicit at the outset of a mixed-methods study about the timing (i.e. during data collection, analysis and/or interpretation) and nature of the integration of the qualitative and quantitative methods (Creswell et al 2003).

The degree of integration of quantitative and qualitative data varies between studies. A review of 57 'early' mixed-methods studies showed that 25(44%) studies showed no integration at analysis or interpretation; 18(31%) studies analysed qualitative and quantitative data separately, with some integration during interpretation; 5(9%) studies showed integration at both analysis and interpretation; and 9(16%) studies did not report details of their analysis (Greene et al 1989). The total lack of integration was particularly the case when 'expansion' was the purpose. They concluded that mixed-methods research is being hindered by a tendency for quantitative and qualitative findings not to be integrated or only integrated to a limited degree (Greene et al 1989).

More recently, Bryman (2006) also observed that of the 232 mixed-methods studies that he analysed only 42 (18%) had genuinely integrated the qualitative and quantitative findings, indicating that this problem remains. Instead, the majority of articles still present parallel accounts of the quantitative and qualitative findings. There have been calls for greater attention to the writing of mixed-method articles in order to 'genuinely integrate' quantitative and qualitative findings (Bryman 2007), and to do this across the analysis, interpretation and reporting stages (Caracelli and Greene 1993).

However, there may be situations in which integration at the analysis stage is not appropriate. Caracelli and Greene (1993) have developed this argument in relation to the five purposes of mixed-methods evaluation outlined earlier (Greene et al 1989). In mixed-methods studies involving *triangulation*, research questions are addressed using different methods to see the extent to which the results agree. Thus, the theory behind triangulation requires an independence of analysis and interpretation of the different data sources, and it would not be appropriate to integrate. This is also the case for mixed-methods studies which have a *complementarity* purpose where different methods address different aspects within the study, thus making integration at the analysis stage less useful. However, when the purpose of the mixed-methods study is *development, initiation* or *expansion*, analysis strategies which integrate the qualitative and quantitative data are desirable and appropriate (Caracelli and Greene 1993). This indicates that decisions about the stage when the data should be integrated depends on the purpose for using mixed-methods.

With regards to the nature of the integration of qualitative and quantitative data, four strategies are available (Caracelli and Greene 1993). First, data transformation involves transforming one type of data into the other type to permit analyses of the data types together. For example, qualitative data is coded into numeric data, which is then used in the analysis alongside quantitative data. This is referred to as 'quantitising'. Or transformation of quantitative data to qualitative data is referred to as 'qualitising' (Sandelowski 2003). Second, typology development involves the analysis of one type of data which places individuals into categories (typologies) which are then used in the analysis of the other data type. Third, extreme case analysis identifies 'extreme cases' from one data type which are then analysed further using the other data type, in order to scrutinise the initial explanation for the extreme cases. For example, individuals who dropped out of a study could be interviewed to assess if they differ from those who did not drop out. Fourth, data consolidation or merging involves the review of both data types and then the creation of new variables for use in further analyses. These strategies help in identifying how integration of the analysis of qualitative and quantitative data can be done.

#### **3.6.4 Theoretical perspective**

The fourth factor which researchers need to consider when designing mixed-methods research is whether the research is driven by theoretical perspectives held by the researcher (Creswell et al 2003). Deeply held perspectives might include, for example, class, race and gender perspectives such as feminist theory. Some mixed-methods research employs transformative designs in which the goal of the research is to advocate for change either at the individual level or to influence policy at the political level. If a transformative model is used

then it is important that the ‘theoretical lens’ is made explicit in the study. Others feel that all research is influenced by the researchers’ theoretical perspectives (personal communication, M Thorogood).

### 3.6.5 Six Mixed-Methods Study Designs

The four criteria described above (sections 3.6.1 to 3.6.4) has led Creswell (2003) to identify six mixed-methods study designs (Table 3.4). Three employ sequential implementation of data collection, and three employ concurrent data collection. Thereafter the order and priority of the data collection, the stage of integration and the theoretical perspective describe six distinct study designs.

**Table 3.4 - Types of Mixed-Methods Study Designs**

<b>Design Type</b>	<b>Implementation Sequence</b>	<b>Priority</b>	<b>Stage of Integration</b>	<b>Theoretical perspective</b>
<b>Sequential explanatory</b>	Quant - Qual	Quant (usual); can be Qual or equal	Interpretation	May be present
<b>Sequential exploratory</b>	Qual - Quant	Qual (usual); can be Quant or equal	Interpretation	May be present
<b>Sequential transformative</b>	Either:- Quant – Qual or Qual - Quant	Quant, Qual or equal	Interpretation	Definitely present
<b>Concurrent triangulation</b>	Concurrent collection of Quant & Qual	Equal (preferably); can be Quant or Qual	Interpretation or Analysis	May be present
<b>Concurrent nested</b>	Concurrent collection of Quant & Qual	Quant or Qual	Analysis	May be present
<b>Concurrent transformative</b>	Concurrent collection of Quant & Qual	Quant, Qual or equal	Analysis (usual); can be during interpretation	Definitely present

*Adapted from Creswell et al (2003), p179.*

Having detailed the potential mixed-methods designs, I will now look at the frameworks in place for the evaluation of health promotion interventions.

## **SECTION II – Evaluating Interventions for the Treatment of Childhood**

### **Obesity**

This section examines the frameworks underpinning the evaluation of the *'Families for Health'* programme used in this PhD. *'Families for Health'* is a health promotion intervention, and therefore may be subject to theoretical and practical problems experienced in the evaluation of health promotion activity (Thorogood and Coombes 2004). However, interventions for the treatment of childhood obesity need to be evaluated with rigour in order to establish a reliable evidence base for effective interventions.

#### **3.7 Randomised Controlled Trials**

A randomised controlled trial (RCT) is the gold standard and thereby the design of choice to evaluate the effectiveness of interventions (Britton and Thorogood 2004). The RCT involves random allocation to an intervention or to a comparator (placebo or standard treatment). This is designed to ensure equivalent groups thus minimising selection bias and confounding, and ensuring that any differences between the groups can be attributed to the treatment under study. However, the use of randomised controlled trials in evaluating interventions for the treatment of childhood obesity may be problematic, due to the unique features of health promotion (Victora et al 2004, Britton and Thorogood 2004). First, it is difficult and often impossible to blind people to the intervention they are receiving. Second, outcomes are often long-term making it difficult to know whether any changes were due to the intervention or due to some other exposure/intervention in the intervening years. Third, people who participate in trials are different to those who do not, such that external validity

is affected, thereby limiting the ability to generalise the findings to a wider population.

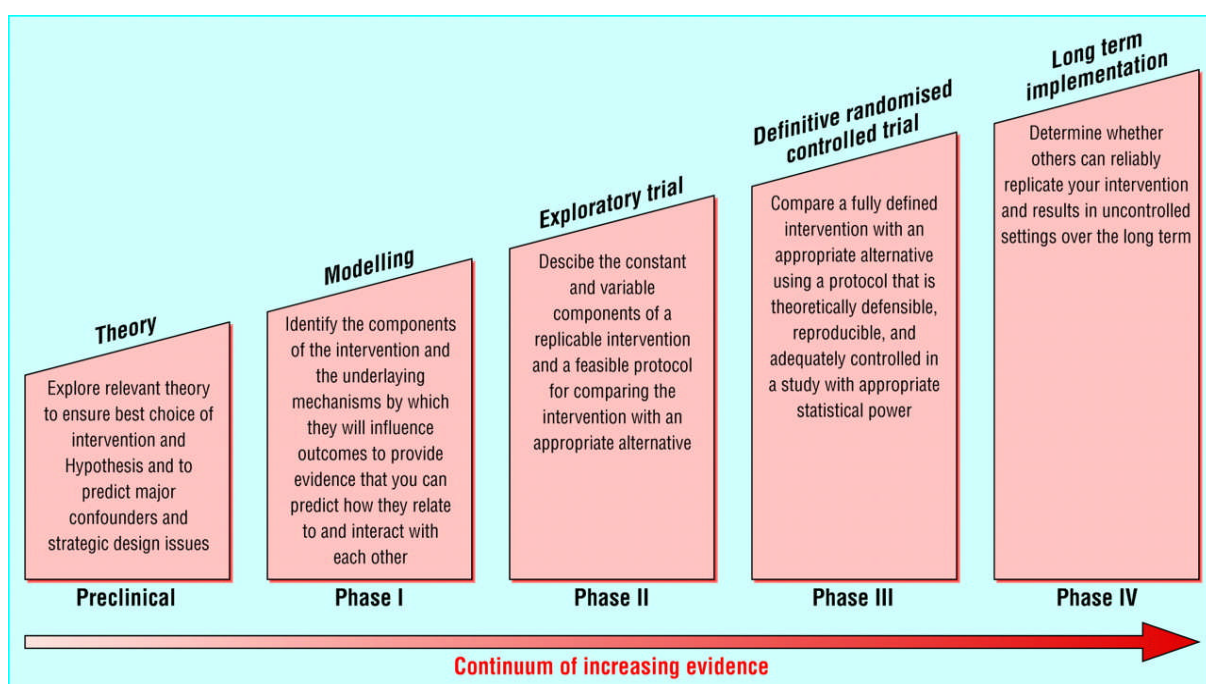
It is desirable to carry out an RCT of family-based treatment interventions for childhood obesity, as this is the design of choice to ultimately evaluate the effectiveness. However, the *'Families for Health'* intervention is still at the development stage, and is being informed by the Medical Research Council's framework for the evaluation of complex interventions.

### **3.8 Medical Research Council's Framework for Evaluation of Complex Interventions**

The Medical Research Council (MRC) has developed a framework with five sequential phases for the development of complex interventions and their evaluation using RCTs (Medical Research Council 2000, Campbell et al 2000) (Figure 3.1). This framework has recently been reviewed (Campbell et al 2007), and now considers phases 0 (preclinical), I & II as a 'parallel approach', with a greater emphasis on an understanding of the context of the problem and optimising the intervention and evaluation, prior to decisions about whether to proceed to a definitive RCT (Table 3.5).

Piloting of an intervention is needed prior to proceeding to a definitive RCT. An 'exploratory trial' or pilot (feasibility) RCT is indicated by the MRC framework. The current study was at the early stages of developing the intervention, mainly concerned with examining the acceptability and likely effectiveness of the intervention. Therefore, it was felt that it was too early to proceed to a pilot RCT, and a 'before-and-after' study design was chosen instead.

**Figure 3.1 – Medical Research Council’s Framework for developing RCTs of complex interventions**



Source: Campbell et al (2000)

**Table 3.5 Revised MRC framework for Phase 0, I and II for developing RCTs of complex interventions**

MRC Stepwise Approach (2000)	MRC Parallel Approach (2007)
Phase 0 - Pre-clinical or Theoretical phase	One larger iterative activity, which can happen simultaneously to:-
Phase I – Defining components of the intervention (Modelling)	
Phase II – Defining trial and intervention design (Exploratory trial)	
Phase III – Definitive RCT	
Phase IV – Long term implementation	

Source: Campbell et al (2007)



### 3.9 'Before-and-After' Evaluation Designs

Pilot studies can comprise a before-and-after study (or a pre-post study), which is defined as *'a study in which characteristics of a population or a group of individuals are compared before versus after a particular event or intervention, for example the introduction of a new healthcare service, to gauge what the effects of the event or intervention have been'* (NHS Choices 2009). In this design the intervention group act as their own controls, and change is measured over time to assess the effectiveness of the intervention. This design is low down in the hierarchy of evidence of effectiveness for experimental studies (Britton and Thorogood 2004).

The main limitations of a 'before-and- after' study design stem from the lack of a control group with which to compare the changes. First, the lack of a control group makes it difficult to know whether any changes seen are due to the intervention or due to other changes occurring at the same time (Britton and Thorogood 2004). For example, temporal change may occur in the degree of obesity, for example as children reach puberty, and without a control group it is not possible to measure what would have happened without the intervention. Second, if participants with extreme values are singled out from a distribution to take part in an intervention these studies face another threat to validity: 'regression to the mean' (Unauthored 1999). Even without intervention, participants selected because of extreme values will, on average, have less extreme measures at follow-up. Thus they will 'regress to the mean' so that they become closer to the 'usual measurement' (Stephenson and Imrie 1998). Regression to the mean is a possible explanation for any change in this

intervention as children with a high BMI z- score are selected at baseline for the childhood obesity treatment intervention.

### **3.10 Process and Outcome Evaluation**

Both process and outcome measures are required to assess effectiveness of a health promotion intervention (Nutbeam 1998). Nutbeam (1998) describes three levels of outcomes, arranged in a continuum from proximal to distal. First, the lowest level is 'Health Promotion Outcomes' which are the most immediate results from an intervention (proximal). Depending on the intervention these could include 'health literacy' such as an increase in knowledge, skills and self-efficacy. The second level is 'Intermediate Health Outcomes' that increase control over the determinants of health, and could include changes to personal behaviours, improvement in the environment (e.g. access to healthy food), and appropriate use of health services. The third level, 'Health and Social Outcomes', are more distal and include changes to quality-of-life, as well as changes to mortality and morbidity. However, it is acknowledged that it is often impossible to measure distal outcomes of mortality and morbidity when evaluating health promotion interventions, as these outcomes often occur too far in the future for this to be practical. However, if there is established evidence that changing proximal outcomes will impact on distal outcomes, it is not necessary to evaluate distal outcomes (Coombes 2004).

Additionally, there is a need for process evaluation to enhance understanding of the success (or otherwise) of health promotion interventions (Linnan and Steckler 2002). Process evaluation focuses on factors relating to the delivery of

the intervention, and has three main aims (Platt et al 2004). First, to describe and understand the implementation of the intervention e.g. was it delivered as intended, to the planned target group. Information about the quality of the delivery of the intervention is crucially important because sub-optimal delivery may lead to a type-III error – *‘the rejection of effectiveness of a programme when the programme itself was inadequate in terms of design or delivery’* (Green 2000, p 126). Second, to help explain ‘how’ and ‘why’ the intervention has reached the outcome it has i.e. if the outcome was successful, process evaluation can identify the components that have made a significant contribution; if the outcome was not successful process evaluation can explore why. Third, to contribute to improvement in health promotion practice, providing a steer as to which interventions should be continued, modified or discontinued.

Six components of process evaluation have been identified (Linnan and Steckler 2002) (see Table 3.6). The seventh component in Table 3.6, “Implementation”, is a composite score of four components.

**Table 3.6 Framework for the Process Evaluation - Key Components which will be assessed**

<b>Component</b>	<b>Definition</b>
Context	Wider environment in which the intervention is embedded (i.e. social, political, economic)
Recruitment	Methods used to approach and recruit participants
Reach	Degree to which an intended audience participates
Dose delivered	The ‘amount’ of intervention provided by the intervention team <i>i.e. What proportion of the intended intervention was actually delivered to the intended audience?</i>
Dose received	Extent of engagement with the intervention by the target population
Fidelity	Extent to which the intervention was delivered as planned i.e. quality & integrity of the intervention as envisaged by the developers
Implementation	Composite score - extent to which the intervention was implemented & received (reach, dose delivered, dose received, fidelity)

Source:- Linnan and Steckler (2002)

## **SECTION III – Application to the Evaluation of ‘Families for Health’**

### **3.11 Pilot**

Although the eventual aim is to evaluate the effectiveness of ‘Families for Health’ using an RCT, the decision to first of all carry out a pilot fits in with the MRC framework (Campbell et al 2007). The pilot of the intervention comprises a ‘before-and-after’ evaluation, without a control group. The main limitations of a ‘before-and-after’ study design, as described previously, stem from the lack of a control group and includes difficulty in deciding whether any changes would have occurred anyway without the intervention (due to temporal change or regression to the mean). In this pilot study outcome measurements are taken immediately after the 12 week intervention, so that any change is unlikely to be due to temporal change (Unauthored 1999). The purpose of the pilot, however, is not to provide definitive evidence of effectiveness but to explore the likely effectiveness and acceptability of the programme, and thus a ‘before-and-after’ study is suitable.

As indicated by Nutbeam (1998), it is imperative that both outcome (effectiveness) measures and process measures relating to the delivery of the intervention are undertaken in the evaluation. In this pilot study I have identified valid measures of intermediate outcomes, to include measures of the eating environment and lifestyle behaviours and changes in BMI and quality-of-life. Distal outcomes of morbidity and mortality are not available in the timescale of the study. I have undertaken a comprehensive process evaluation using an adaptation of the framework developed by Linnan and Steckler (2002).

### 3.12 Mixed-Methods – the Purpose

As previously indicated, my philosophical position is in support of the ‘pragmatic approach’. In this PhD thesis a ‘mixed-methods’ approach is being used because it will enable me to answer a research question involving exploration of both the acceptability and likely effectiveness of the *‘Families for Health’* programme. Qualitative and quantitative data are essential for both the process and outcome evaluation.

The purpose of using mixed-methods should be explicit at the outset of a study. When I embarked on a mixed-methods approach *‘expansion’* or *‘enhancement’* was the original main purpose, to extend the breadth of the research by using quantitative and qualitative methods to address different aspects of the study. Quantitative methods were to be used to address the objective: *‘To evaluate the short term (3-months and 9-months) and longer term (2-years) impact on children and parents’*. Qualitative methods were primarily to be used to assess programme processes, such as whether the programme was delivered as planned and to obtain families’ perceptions of the programme in order to address the objective: *‘To evaluate its acceptability to families’*. My original intention was to analyse and report the quantitative and qualitative aspects separately.

Although the primary purpose of *‘expansion’* still remains, the mixed-methods approach and the analysis strategy has since evolved as a result of enhanced understanding of the purpose of using mixed-methods. A secondary purpose of the mixed-methods approach in this study is that of *‘triangulation’* (Denzin 1978) (i.e. examining an issue using different methods and focusing on the degree to

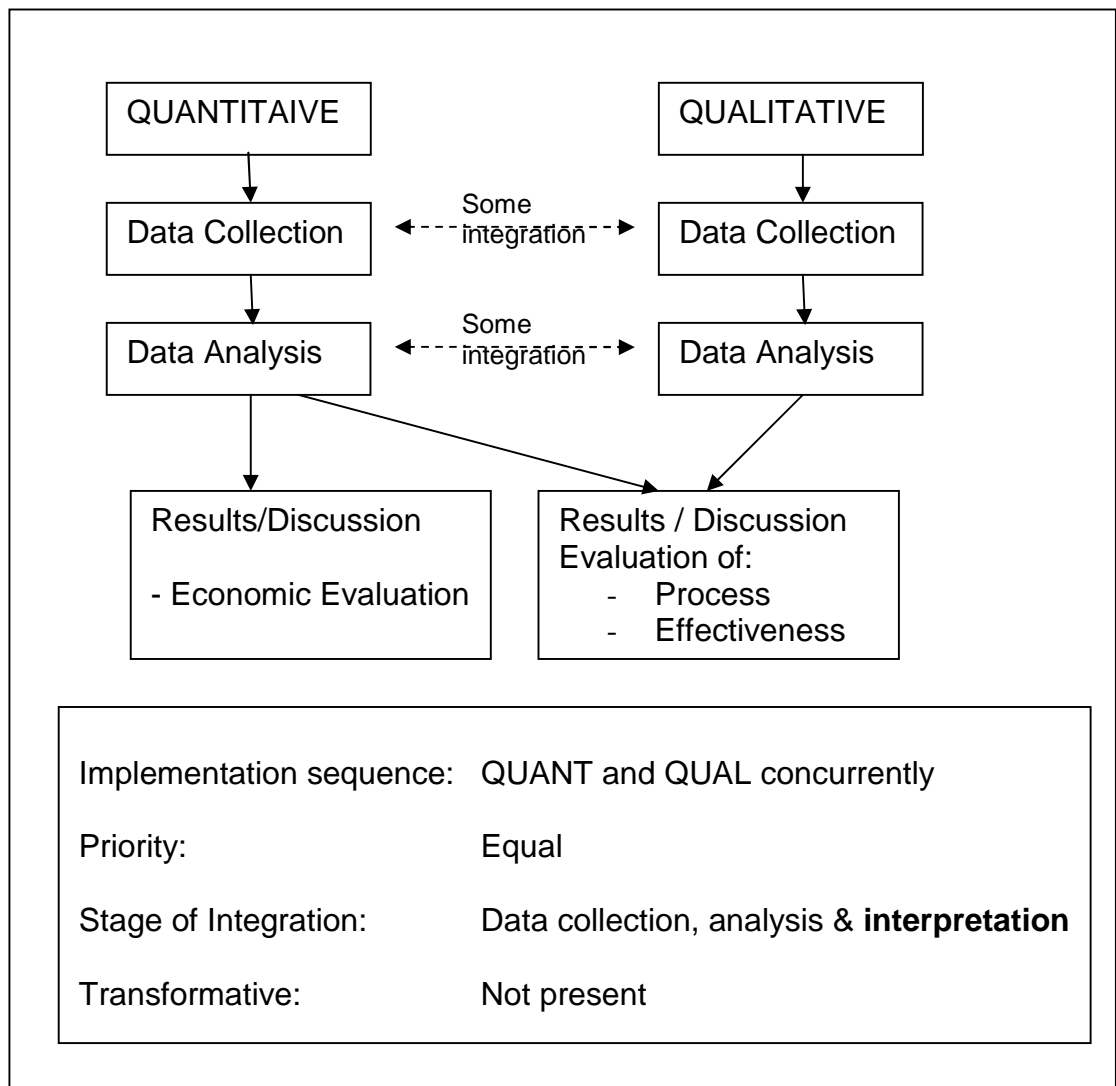
which the findings converge). For example, one area where *'triangulation'* is beneficial is to see the degree to which the responses to questionnaires and interviews converge around issues such as changes made in the home eating environment, in the child's physical activity and in parent-child relationships. This type of analysis will enhance the validity of the findings of each data collection method, and lead to greater insight. This involves separate analysis of the two types of data and then integration at the interpretation stage.

There were three further purposes for utilising mixed-methods in the current study: 'Credibility', enhancing the integrity of the results. This is in turn linked to the purpose of 'utility' in that the research is applied (i.e. attempting to find an effective intervention for the treatment of childhood obesity), and a mixed-methods approach will give more useful information to practitioners. Lastly, 'illustration' was an important purpose, with qualitative data illustrating or illuminating the findings from the quantitative data.

### **3.13 Mixed-Methods – the Study Design**

The pilot of the *'Families for Health'* intervention takes the form of a 'concurrent triangulation' design. This design *'involves collecting and analysing quantitative and qualitative data concurrently, merging the two sets of data, and using the combination to best understand a research problem.'* (Creswell et al 2003, p376). The merging or integration of the two sets of data can either be at the analysis stage and/or at the interpretation stage. This is expressed in the visual representation of the study in Figure 3.2.

**Figure 3.2 - Visualisation of the Concurrent Triangulation Mixed-Methods Design for the 'Families for Health' pilot study**



The qualitative and quantitative data were collected concurrently throughout the study, and have been given equal priority in the evaluation. The only exception where there was some sequencing in the quantitative and qualitative was in the parents' end-of-programme evaluation: Parents completed their end-of-programme questionnaires and then in the following week a sample of the parents were interviewed to explore their perception of the programme in more depth, and to triangulate the findings.

The timing of the integration of quantitative and qualitative methods was influenced by the purpose to which it was put. When the purpose of the mixed-methods was triangulation, separate analysis of the two types of data was undertaken and integration was only at the interpretation stage. For example, the results from the questionnaire data (with parents and children) were triangulated with the interview data about the changes made as a result of the intervention. When the main purpose was 'expansion', integration of the data collection and data analysis was done to produce greater insight than would be available from either data collection method alone.

This chapter has set out the philosophical paradigm and the research frameworks which I have used to guide the research. In the following chapter (Chapter 4), detailed methods for the data collection are described and discussed.



## Chapter 4

### Methods

#### 4.1 Introduction

This chapter details the methods for the evaluation of the *'Families for Health'* childhood obesity treatment intervention. This was a pilot study, focusing on the preliminary stages (Preclinical and Phases I and II) of the MRC's framework for developing RCTs of complex interventions (Campbell et al 2007). The pilot will contribute to refining the intervention and the evaluation tools, in order to inform the design of a future RCT in Phase III if indicated.

The pilot of the intervention comprised a 'before-and-after' evaluation, without a control group. The purpose of the pilot, however, is not to provide definitive evidence of effectiveness but to provide an estimate of effect size to aid power calculations in an RCT and to explore the acceptability of the programme.

Section I of this chapter outlines the research governance of the project. Section II outlines the development of the programme, the setting where the pilot was carried out, how families were recruited to the intervention and the delivery of the programme. Section III gives the details of the data collection. The evaluation uses a mixed-methods approach incorporating both quantitative and qualitative methodology, chosen as being most likely to address the aims and objective of the research (see Chapter 1, Section 1.2). Section IV then describes how the mixed-methods data collection provides the information for the three aspects of the evaluation: process evaluation to assess the delivery of

the programme; outcome evaluation to assess the likely effectiveness of the programme; and an economic evaluation to assess the costs of the intervention.

## **SECTION I - Research Governance and Funding**

### **4.2 Research Governance**

Table 4.1 below summarises the key stages in the research governance of the project.

**Table 4.1 – Key stages in the research governance of the project**

	<b>Date achieved</b>
<b>i. Research Grant</b> applied for from Department of Health, Public Health Initiative for novice researchers (£70,385). See Appendix III for detailed breakdown.	Awarded 1 <sup>st</sup> November 2004 to 31 <sup>st</sup> October 2006 (Extension to March 2008, for 2-year follow-up)
<b>ii. Ethical Approval</b> from Coventry Research Ethics Committee (NHS) – REC reference 05/Q2802/15  Substantial amendment to include 2-year follow-up of families using a minimum dataset.  See Appendix IV for the letters confirming ethical approval.	Ethical approval granted 17 <sup>th</sup> March 2005.  Ethical approval granted for 2-year follow-up on 9 <sup>th</sup> May 2007.
<b>iii. R &amp; D Registration</b> - submitted to Coventry Teaching PCT in March 2005  See Appendix V for R&D approval letter.	Approved 6 <sup>th</sup> April 2005.
<b>iv. Ad Hoc Funding</b> - Application was made in June 2005 to the Department of Health, and subsequent discussions with Coventry PCT.	July 2005 – Department of Health agreed to pay the service support costs. September 2005 - Coventry PCT agreed to pay the excess treatment costs.
<b>v. Research Advisory Group assembled and meetings organised</b>	Regular meetings. Pilot data presented at final meeting in December 2006.

#### **4.2.1 Funding of the Research**

Funding of £70,385 was sought and obtained from the Department of Health's Public Health Initiative 2003 for novice researchers. This was a personal award

to myself, under the supervision of Professor Sarah Stewart-Brown. This award specifically excluded the funding of 'treatment costs' (*i.e. patient care costs which would continue if the treatment or service continued once the research stopped*) and 'service support costs' (*i.e. temporary additional patient care costs which start and stop with the research*) (HSG(97)32, NHS Executive 1997). The R&D department at the Department of Health agreed to pay service support costs of £3,709 to Coventry Teaching PCT. Coventry Teaching PCT agreed to pay the estimated excess treatment costs of £12,836, paying the providers (hire of venue and facilitators) directly.

#### **4.2.2 Advisory Group for the Research**

An Advisory Group was assembled for the research covering a wide range of research and clinical skills. These included community and hospital paediatrics; childhood obesity treatment / nutrition; physical activity promotion; social science; qualitative research; epidemiology; parenting interventions; and evaluation of complex interventions (Appendix VI). The group met five times between February 2004 and December 2006, and functions included input into the research bid; the tendering process for the development of the programme; commenting on the draft programme; and discussing the results. In addition, individual members were consulted as required by the needs of the research.

## **SECTION II – Development, Recruitment and Delivery of the Programme**

### **4.3 Development of the Programme**

The development of the new family-based group intervention for childhood obesity was put out to external tender. The contract was awarded to Candida Hunt, then Associate Director of Family Links, a charity which delivers parenting programmes. The programme, which became known as *'Families for Health'*, was developed by Candida Hunt in conjunction with the Research Advisory Group. The final *'Families for Health'* programme comprised 12 weekly sessions lasting 2½ hours, designed to be delivered to a parental group (n=10-15) and a separate child group (n=up to 15). The sessions combine elements from parenting education and support and obesity management programmes. Details about the development of the *'Families for Health'* programme, and its theoretical underpinning, are provided in Chapter 5

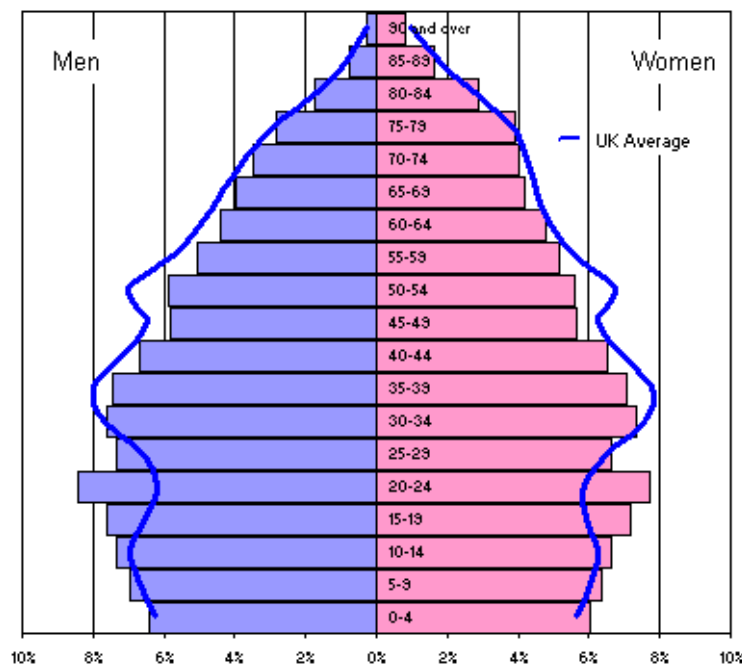
### **4.4 Setting for the Pilot: Coventry**

The City of Coventry was chosen as the setting to pilot the *'Families for Health'* programme for three reasons: First, the University of Warwick is within the metropolitan district of Coventry, and thus is in close proximity to carry out the research. Second, Coventry is diverse, both with regards to socio-economic status and ethnicity. Third, Coventry Teaching Primary Care Trust was a willing partner.

Coventry is a city and metropolitan borough located in the West Midlands of England with a population of 300,848 at the 2001 census (National Statistics 2001), and estimated to have increased to 307,000 by 2008 (Coventry Health

Profile 2008). The city covers 38 square miles and is compact. The population is younger than the UK average with a higher proportion of people under 30 years than England (Figure 4.1 and Grainger 2007b).

**Figure 4.1 Coventry: Population Pyramid from the 2001 census**



Source:- Census 2001 (National Statistics 2001)

Coventry has a multi-cultural population. At the 2001 census 84.0% of the population described themselves as 'White', 11.3% as 'Asian or Asian British', 1.8% as 'Black or Black British', 1.7% as 'mixed' and 1.2% as 'other' ethnic groups (Coventry City Council 2001). Coventry is also ranked one of the poorest local authorities in England. It is ranked 50<sup>th</sup> on the extent of deprivation and 51<sup>st</sup> on the intensity of deprivation out of 354 local authorities (Grainger 2007b). There are also pockets of high affluence (Coventry Health Profile 2008).

We did not know the prevalence of childhood obesity in Coventry when we chose this setting. However, Coventry has a significantly higher prevalence of obesity amongst its Year 6 children (19.4%, 95% CI 18.0 to 20.8) compared with England (17.5%, 95% CI 17.4 to 17.6) (Information Centre 2008).

The venue chosen for the delivery of the intervention was Coventry Sports and Leisure Centre, which is a community venue in central Coventry, located close to the bus depot and to a large car park. The children's group was run in a large gym and the parents' group was run in a conference room. Children also had access to the swimming pool for one of the weeks, and to the indoor play area ('Jungle Junction') another week.

#### **4.5 Recruitment of Families for Two Groups**

We piloted the programme with families where there was at least one overweight or obese child aged 7-11 years. We had planned to run the 12 week programme for two groups of families in the Autumn term in 2005. Parents were offered two choices of time, either a Saturday morning or a weekday after school (Wednesday), in order to assess the acceptability of these different timings. The recruitment methods are detailed below.

##### **4.5.1 Sample Size**

Our aim was to recruit a sample of at least 20 families. The sample size was pragmatic, to enable the experience of a range of different families to inform the evaluation. A further aim was for the pilot to indicate the likely effect sizes for calculation of sample size in a subsequent randomised controlled trial (if the results of the pilot indicated that this was appropriate).

## 4.5.2 Inclusion and Exclusion Criteria

The inclusion and exclusion criteria are summarised in Box 4.1. Although the programme could potentially be useful with a wider age range of children, it was piloted with 7 to 11 year olds because of the difficulties which arise from combining children of very different ages in physical activity groups. The prevalence of obesity is also higher in this age group than in a younger population (Information Centre 2008). Children who were overweight ( $\geq 91^{\text{st}}$  centile) as well as obese ( $\geq 98^{\text{th}}$  centile) were included, noting that the more stringent cut-offs for BMI for clinical use were being used for the inclusion criteria (SIGN 2003). The inclusion of over-weight children stemmed from a desire to include overweight siblings, this being consistent with a ‘whole family’ approach. Including children at or above the  $91^{\text{st}}$  centile for BMI is also consistent with the ‘targeted weight management services’ (level 2) within care pathways, as required by the Commissioning Strategy for ‘Healthy Weight, Healthy Lives’ (Department of Health 2008c, p50). Groups were open to families from any social or ethnic group, but restricted to families who speak English. The reason for this is that parents or children with insufficient command of English would find it difficult to participate in the group.

### **Box 4.1 – Inclusion & Exclusion criteria for the ‘Families for Health’ pilot**

#### **Inclusion**

- Children aged 7 to 11 years who are overweight (BMI  $\geq 91^{\text{st}}$  to  $98^{\text{th}}$  centile) or obese (BMI  $\geq 98^{\text{th}}$  centile), defined using the UK 1990 BMI reference charts (Cole et al 1995)
- Living with a parent and guardian, who must also be willing to attend

#### **Exclusion**

- Children with underlying medical cause of obesity or recognised eating disorder
- Families where parents do not speak English

All overweight/obese children aged 7 to 11 years in the family were offered a place, and non-overweight siblings in the age range were welcome to attend. Both parents were invited to attend.

#### **4.5.3 Identification of Families**

Recruitment of families was undertaken using “recruitment packs” which included parent and child information sheets, inclusion/exclusion criteria and a permission slip for their details to be passed on to me. Four different methods of recruitment were tested to establish the two pilot groups.

##### ***4.5.3.1 Recruitment by General Practices***

19 of the 63 (30%) general practices in Coventry were given information about the project. These included 15 General Practices in Coventry who were not currently participating in research projects with Warwick Medical School. Four further General Practices expressed an interest following two presentations I made at a Coventry PCT Protected Learning Time Initiative (22<sup>nd</sup> June 2005) and West Midlands South SHA Primary Care Research Event (23<sup>rd</sup> June 2005).

Each of the 19 general practices was subsequently telephoned, and seven practices were willing to help with recruitment on an opportunistic basis. Three of these seven general practices also agreed to a systematic search of their practice computer’s database to identify children who were overweight/obese, and then to approach their families.

##### ***4.5.3.2 Opportunistic Recruitment by Other Health Professionals***

I also requested a wide range of other health professionals to recruit suitable families on an opportunistic basis. The health professionals were all issued with



recruitment packs. These included Dieticians and Paediatricians with a special interest in childhood obesity who were on the Research Advisory Group; and School Nurses and Health Visitors, following my attendance at their respective professional meetings.

#### **4.5.3.3 Media**

By the end of July 2005 it was apparent that health professionals were not going to recruit sufficient families. We decided to advertise the programme directly to families. I prepared a press release with the support of the University press office. This resulted in several radio interviews and articles in the local Coventry newspapers (Appendix VII).

#### **4.5.3.4 Flyer to Schools**

Despite the above three recruitment methods, there were only enough families for one group to run in September 2005 on Saturday mornings (10am to 12:30pm). Therefore, I introduced an additional method of recruitment to identify a group who were able to start the programme on a weekday in January 2006.

I developed and delivered A5 flyers (in envelopes) to two primary schools in Coventry for distribution in the first week of December 2005. Aldermans Green Primary School distributed 200 flyers and Saint John Fisher School distributed 380 flyers to Years 3 to 6 (the target age range). I was a named contact on the flyer, but there was also a named contact at the school (School Nurse and a teaching assistant) for families to contact for more information. The school also had copies of the recruitment packs, to enable families to access further information. These schools were chosen for two reasons: First, the School Nurse attached to these schools was a facilitator on the second programme, and was willing to help with recruitment from her schools. Second, the School

Nurse identified these two schools from the 11 primary schools which she managed as having a greater problem with childhood obesity. She contacted the headteachers and secured agreement to distribute the flyer.

The flyer was used in addition to the other recruitment methods which were also continued to recruit for the second group. Sufficient families were recruited to a second group which ran on a Monday evening (5pm to 7:30pm) from January to April 2006.

#### **4.5.4 Procedure for Obtaining Informed Consent**

I used a three step procedure to obtain informed consent from families, in accordance with the requirements of Coventry local research ethics committee. This included giving parents time to consider whether they wished to participate.

The first step involved each potential participant being given or sent by post the information sheets (children and parents versions) (Appendices VIII and IX). After a minimum of 3 days, the second step involved contacting parents by telephone to answer any questions. Step three involved visiting the parent(s) and child(ren) at their home, offering further information and responding to questions. At the home visit I explained the consent form (Appendix X) and asked for the parents written consent, and the child's verbal assent.

#### **4.6 Overview of the Delivery of the Intervention**

We ran the '*Families for Health*' 12-week programme in Coventry with two groups of families with at least one overweight or obese child aged 7-11 years. The first group ran on Saturday mornings (10am to 12:30pm) from September

to December 2005 starting with 9 families. A second group ran on a Monday evening (5pm to 7:30pm) from January to April 2006 starting with 12 families.

The groups were led by trained facilitators, with the intention that two facilitators would lead the parents' group and two would lead the children's group. The facilitators of the parents' groups included the programme developer who is experienced in running parenting groups. Other facilitators were recruited from local services in Coventry and Warwickshire including from the NHS, Local Authority and non-governmental organisations. They had experience in nutrition, emotional development and/or working with children or adults, and most were experienced in running groups (Table 4.2). We provided a 3 day training course to run the programme, led by the programme developer. The programme developer also organised supervision after each session. Due to a shortage of facilitators for the second group, the programme developer facilitated the parents' group on her own (NB. Different to the original plan which proposed that two facilitators would each lead the parents and childrens groups). Facilitators recruited from local services were paid via Coventry PCT as part of the levy for excess treatment costs.

**Table 4.2 –Facilitators of the '*Families for Health*' programme, indicating their professional background**

	<b>Group 1 (Saturday morning)</b>	<b>Group 2 (Monday evening)</b>
Parents' Group	Programme developer / trainer Health Visitor	Programme developer / trainer
Children's Group	School healthy lifestyle worker Child mental health worker	School Nurse Nutritionist

## SECTION III – Data Collection

### 4.7 Overview of Mixed-Methods Evaluation

The pilot of the *'Families for Health'* programme was evaluated using mixed-methods. Using Greene et al's (1989) typology introduced in the previous chapter the main **purpose** of using mixed-methods was principally 'expansion', extending the breadth of the research to examine different aspects of the inquiry. A secondary purpose was 'triangulation', examining the degree to which the quantitative and qualitative data converged, for example around any changes made by families. From the detailed typology of Bryman (2006), credibility (i.e. enhancing the integrity of the results), utility (i.e. more useful to practitioners) and illustration (of quantitative data by qualitative) were three additional purposes of using a mixed-methods approach in this study.

In this section I describe the data collection methods in the order that the data was collected, to give a better understanding of exactly what data was collected and when. In Section IV I describe how the various data sources were integrated in the analysis and interpretation stages.

An overview of the data collection is provided in Table 4.3. This gives a schematic representation of the quantitative and qualitative measures used with the parents, children and facilitators, from the baseline data collection to the two year follow-up.

**Table 4.3 Mapping of Data Collection in the Mixed-Methods Evaluation of the ‘Families for Health’ Programme**  
 (Colour code:- black = quantitative; blue = qualitative; orange = structured questionnaires but requiring some or all textual responses)

Timepoint	Weeks	Parents									Children						Facilitators / Programme Developer			
		Meas-ure	Questionnaires						Quali-tative	Measures		Questionnaires			Quali-tative	Questi-onnaire	Qualitative			
		BMI (if willing)	Demographics	Family Eating/Activity	PedsQL	Mental Health	Child-Parent rel	Weekly Feedback	End-of-Programme Evaluation	What did it cost?	One-to-one Interviews	BMI, %fat, Waist	Habitual Activity (accelerometer)	PedsQL	Self-esteem	0-100% health rating	Day in the Life	‘Natural Group’ interviews	Weekly Feedback	One-to-one Interview (x2) with programme developer
Baseline	0	X	X	X	X	X	X					X	X	X	X	X	X			
Programme Running	1 to 11							X											X	
Last Week of Programme	12			X	X	X	X		X			X	X	X	X	X	X	X		
Within 2 wks of End-of-programme	12-14									X										X
9-month follow-up	40			X	X	X	X					X	X	X	X	X	X			
2-year follow-up	104			X	X	X	X					X		X		X	X			

#### 4.8 Baseline Socio-Demographic and Other Characteristics of Families

Once consent had been obtained, I asked parents to complete a brief baseline questionnaire. This requested information about the child(ren)s date of birth (age), gender and ethnic group, and whether they were being seen by anyone else about their weight. Information on family structure was requested, with families categorised into three family types: single parent (mother or father specified), two-parent and step-family. It also asked how they had heard about the *'Families for Health'* programme, in order to determine the success of recruitment strategies.

Employment status of the mother and/or father was recorded including their actual occupation and whether they were self-employed or an employee. This information was used to code families into eight socio-economic classes using the National Statistics Socio-economic Classification (ONS 2005). As the number of families was small this was subsequently collapsed into three classes, plus a fourth category of 'never worked and long-term unemployed' (Table 4.4).

**Table 4.4 - Eight and three group versions of the National Statistics Socio-economic Classification**

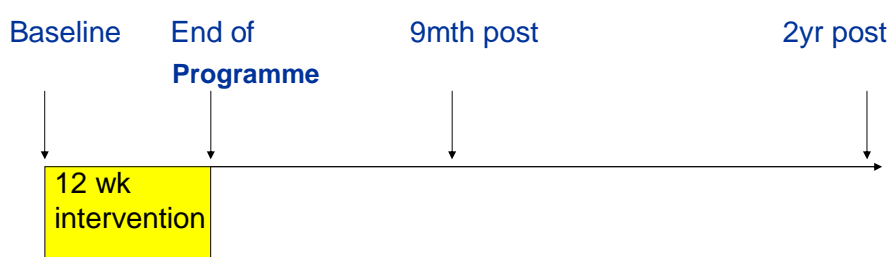
<b>Eight Classes</b>	<b>Three classes</b>
1. Higher managerial & professional occupations 1.1 Large employers & higher managerial occupations 1.2 Higher professional occupations	1. Managerial and professional occupations
2. Lower managerial & professional occupations	
3. Intermediate occupations	2. Intermediate occupations
4. Small employees and own account workers	
5. Lower supervisory and technical occupations	3. Routine and manual occupations
6. Semi-routine occupations	
7. Routine occupations	
8. Never worked and long-term unemployed	Never worked and long-term unemployed

Source:- ONS (2005) (Adapted from p15).

#### 4.9 'Before-and-after' Outcome Evaluation

The quantitative aspects of the outcome evaluation comprised a 'before-and-after' design, with quantitative measures recorded first at baseline, then again at the end of the programme (3-months), at 9-months and 2-years from baseline (Figure 4.2). The two year time-point was not in the original protocol. However, when positive results were seen at 9-months we decided to extend the evaluation to 2-years. I endeavored to obtain measurements on all participants, whether they completed the programme or not, so that an 'intention to treat' analysis could be performed. Families who had dropped-out of the programme were contacted once and asked if they were willing to complete the research measurements.

**Figure 4.2 – Time-points for the measurements with families in the 'before-and-after' evaluation of the 'Families for Health' intervention**



The baseline measurements were completed at the home visit prior to the start of the intervention, apart from one questionnaire (Day in the Life Questionnaire, Edmunds and Ziebland 2002) which was completed at the first session of the programme. The 'end-of-programme' measurements were completed during the last session of the programme, or at a home visit if families were not present. The measurements at 9-months were completed at the leisure centre in a special session arranged to complete the evaluation; families not present were

visited at home. All measurements for the 2-year follow-up were carried out during home visits.

At each time-point both children and parents self-completed four validated questionnaires each, with assistance if required (apart from the 2-year follow-up when one of the children's questionnaires was not administered). The data collection methods are detailed below.

#### **4.9.1 Measures of Overweight of children**

All measures of body size were taken in a standard way by myself to eliminate any inter-observer variability, and to reduce intra-observer variability.

##### **4.9.1.1 BMI**

Children's weight was measured in light clothing and bare feet, to the nearest 0.1 kg with Tanita scales/body composition analyser, model TBF-300 MA (medically approved version, with calibration certificate) (Tanita, Yiewsley, UK). Height was measured to the nearest 0.1cm with a Leicester portable stadiometer (Child Growth Foundation, London, UK). Children were measured in bare feet, with arms down by their side, taking care to keep the head level (i.e. top of ears were level with their eyes).

BMI ( $\text{weight}(\text{kg})/\text{height}(\text{m})^2$ ) was calculated and converted into standard deviation (SD) scores (or z-scores) adjusted for age and sex using an Excel programme from the Child Growth Foundation based on the UK 1990 growth reference curves for BMI (Cole et al 1995). The centile was also obtained.



The primary outcome measure was change in children's BMI z-score at baseline, with that at the end of the programme (3-months), at 9-months and at 2-years.

At baseline, parents were also asked if they were willing for their height and weight to be measured. Parents were classified as overweight if their BMI was  $>25 \text{ kg/m}^2$  and  $\leq 30 \text{ kg/m}^2$  and obese if their BMI was  $>30 \text{ kg/m}^2$ .

#### **4.9.1.2      *Waist Circumference***

Waist circumference was measured to the nearest 0.1cm using a Seca 200 tape taken at the level of the umbilicus, consistent with the method of Daniels et al (2000). Measurements were made without compressing the skin, taken while standing with feet together, arms hanging by side and looking straight ahead. Although a loose waist band was encouraged, trousers / skirts were not undone. Waist circumference was translated into z-scores for age and sex using 2001 reference data for British children aged 5 to 16 (McCarthy et al 2001).

#### **4.9.1.3      *Percentage Body Fat***

An indirect measure of percentage body fat was made using the Tanita scales (model TBF-300 MA) using bioelectrical impedance analysis (BIA) (Wells and Fewtrell 2006), at the same time that weight was being measured. An electrical signal (50Khz, 800 $\mu$ A) is sent through the body via the pressure-contact electrodes on which the child stands, to get a measure of impedance (Ohms) (Tanita, undated). BIA is based on the fact that lean tissue (muscle, blood)

contains high levels of water and electrolytes and therefore acts as a conductor of electrical signals; whereas fat tissue acts as a resistor to the flow of an electrical signal, leading to higher impedance, and corresponding to a higher percentage of body fat. The percentage of body fat is calculated using an inbuilt equation based on impedance, height, age, gender and body type. Wells and Fewtrell (2006) indicate in their review that BIA has the potential to provide information on the *direction* (though not magnitude) of change in fat free mass over time in children, and thus is used to examine whether these changes are in the same direction as BMI and other measures of obesity.

#### **4.9.2 Psycho-Social Measurements with Children and Parents**

##### **4.9.2.1 Children's Quality-of-Life**

Children's quality-of-life was measured using the PedsQL™ Pediatric Quality-of-Life Inventory™ version 4.0 (UK), for ages 8 to 12 (Varni 1998). Children completed the 23-item self-report version and the parent's completed the almost identical parent-proxy version about their child's quality-of-life. This measures four domains of health-related quality-of-life: physical health (8Qs), emotional health (5Qs), social (5Qs) and school-functioning (5Qs). The latter three domains are summarised to obtain a single psycho-social health score (15Qs). All questions are on a 5 point Likert scale from 0 (Never a problem) to 4 (Almost always a problem), which are then re-scored: 0=100, 1=75, 2=50, 3=25, 4=0. Summary scores are then derived for the physical domain (8Qs), the psycho-social health domain (emotional/social/school) (15Qs) and for a total scale score (all 23Qs), with the best possible score being 100 (range 0 to 100).

Varni et al (2001) measured the internal consistency reliability using Cronbach's Alpha ( $\alpha$ ), with 963 children and 1,629 parents in an American sample. The Cronbach Alpha scores showed that the questionnaire had internal reliability for: the total score (all 23 questions,  $\alpha=0.88$  for child-report,  $\alpha=0.90$  for parent-report); the physical health score (8Qs,  $\alpha=0.80$  for child-report,  $\alpha=0.88$  for parent-report); and the psycho-social summary score (15Qs,  $\alpha=0.83$  for child-report,  $\alpha=0.86$  for parent-report). This study demonstrated the reliability and validity of the PedsQL 4.0. The reliability of the UK version of the PedsQL was also assessed in a sample of 1399 children and 970 parents from South Wales, and shown to have similar internal reliability with all sub-scales on both the child- and parent-reports reaching  $\alpha=0.70$  (minimum standard), and exceeded  $\alpha=0.90$  for the total score (Upton et al 2005). They recommended the UK version of PedsQL for assessment of quality-of-life in UK children.

#### **4.9.2.2 Children's Self-Esteem**

Self-esteem was measured using the 36-item Self-Perception Profile for Children (Harter 1985), completed by the children, with the questionnaire entitled 'What I am Like'. This questionnaire is appropriate for children aged 8 and upwards. This was used to measure self-esteem in six subscales with six questions each: scholastic competence, social acceptance, athletic competence, physical appearance, behavioural conduct and global self worth. For the six questions in each sub-scale, three questions are worded so the first part reflects high competence and three questions are worded so the first part reflects low competence. The scoring of each question ranged from 1 to 4, with 1 being the least adequate self-judgement and 4 being the most adequate self-judgement. The mean of each sub-scale is calculated.

The internal consistency reliability of this questionnaire was measured using Cronbach's Alpha( $\alpha$ ), with reasonable scores across two samples aged 8 to 11 years from Colorado, USA for the six subscales: scholastic competence ( $\alpha=0.80$  &  $0.82$ ), social acceptance ( $\alpha=0.75$ ), athletic competence ( $\alpha=0.80$  &  $0.81$ ), physical appearance ( $\alpha=0.76$  &  $0.80$ ), behavioural conduct ( $\alpha=0.71$  &  $0.73$ ), and global self-worth ( $\alpha=0.78$ ) (Harter 1985). The reliability was also assessed in 4282 Scottish children aged 8 to 15 years, and showed similar reliability (ranging from  $\alpha=0.72$  to  $0.83$  for the sub-scales) (Hoare et al 1993).

This questionnaire was excluded from the 2-year follow-up due to its length, therefore minimising the burden on participants who were asked to complete the evaluation at this additional time-point.

#### ***4.9.2.3 How good is your health today? (Children)***

Children completed a visual analogue scale from the EQ-5D quality-of-life questionnaire to rate how good their health was today (Rabin and Charro 2001). The 20cm vertical visual analogue scale was anchored by the descriptors 'best possible health' (100%) and 'worst possible health' (0%), with children placing a mark on how they felt their health was at that time.

#### **4.9.2.4 Parents' Mental Health**

Parental mental health was measured using the Short Depression-Happiness Scale, which is a six-item questionnaire comprising three negative and three positive items scored on a four point Likert scale from 0 to 3 (Joseph et al 2004). The tool was found to have an internal consistency reliability using Cronbach's Alpha ranging from  $\alpha=0.77$  to 0.92 in student samples. The six items are summed (best possible score 18), with a higher score indicating improved functioning on the depression-happiness continuum. Joseph et al (2004) suggests that a score below 10 is indicative of clinical depression.

#### **4.9.2.5 Relationship between Parents and Children**

Assesment of the quality of the parent-child relationship was made using the Child-Parent Relationship Scale (Pianta 1992), which was self-completed by parents. The short-form version was used which has 15 items assessed on a 5 point Likert scale, with 8 of the questions reverse scored. A mean score is derived with the best possible score being 5 (range 1 to 5).

### **4.9.3 Eating and Activity Behaviour**

#### **4.9.3.1 *Children's Fruit and Vegetable Consumption***

Children completed a 24-hour food recall using the 'Day in the Life Questionnaire' (Edmunds and Ziebland 2002). This also asked about transport to and from school and daily activity, but the primary aim was to assess the number of portions of fruit and vegetables consumed the previous day. The questionnaire was checked and clarification sought if necessary with parents (e.g. orange juice: was this 'squash' or 'fruit juice'?). In line with national recommendations, fruit juice could only account for one portion of 'fruit and veg' per day, despite the number of times it was drunk; beans/pulses did not count as a 'fruit and veg' portion; composite foods where it was difficult to determine portions of 'fruit and veg' were also excluded. Coding of the questionnaires was done by myself and the research administrator. Any discrepancies were discussed and agreement reached.

The questionnaire had been validated for measuring fruit and vegetable consumption with 7 to 9 year olds (Edmunds and Ziebland 2002). The validation was done with four schools, comparing the questionnaire with observation by a researcher for fruit and vegetables eaten at lunchtime; achieving a modest kappa of 0.54 to 0.58. The reliability was assessed both by a test-re-test, which was acceptable; and of inter-rater reliability of two coders assessing the portions of fruit and vegetables, with a high kappa of 0.85 to 0.92 indicating high agreement between coders. The questionnaire was also shown to be sensitive to change following the distribution of free fruit, also making it an

good questionnaire to use in the current study to measure any change in fruit and vegetable intake.

Limitations of this questionnaire are that food intake is only recorded for one day which may not be representative of the rest of the week, and that it requires to be completed retrospectively for 'yesterday' which has to be a school day (other questions relate to travel to and from school and activity at break-times). When '*Families for Health*' was run on a Monday this caused some problems because 'yesterday' was Sunday. Children were therefore asked to complete the questionnaire for Friday, which placed greater demands on recall. Furthermore, the validity of the 'Day in the Life' questionnaire was assessed using a whole school sample, and has not been assessed specifically with children who are obese (Edmunds and Ziebland 2002).

#### **4.9.3.2 Family Eating and Activity**

Eating and activity behaviour in the family was assessed using a modified version of the Family Eating and Activity Questionnaire from Israel (Golan 1998b). Slight modifications were made in order to 'anglicise' it. This was principally in the list of snacks in Question 5, excluding those not heard of in the UK (e.g. Chitos, Ruffles) and adding those that were common in the UK (e.g. Crisps). The questionnaire includes the following 4 sub-scales:- First, activity level (4-items), to record the balance between physical activity and sedentary pastimes (i.e.TV). Second, stimulus exposure (8-items) e.g. presence and visibility of unhealthy snacks kept at home, allowed to eat snack/sweets without parental permission, allowed to buy own sweets. Third, eating related to hunger

(4-items) e.g. who initiates the eating in the family, behaviour if the child is not hungry. Fourth, eating style/rites (13-items) e.g. where and with whom does eating take place, second helpings. The Cronbach Alpha as a measure of internal consistency reliability was calculated at  $\alpha=0.83$  for the questionnaire overall, and  $\alpha=0.82, 0.78, 0.86, 0.88$  for the four sub-scales described above, respectively (Golan 1998b).

Parents completed the questionnaire, and then summary scores were calculated for the children's scores for the four sections in accordance with the scoring instructions (Golan 1998b). Lower scores are 'better' on each section.

#### **4.9.3.3 *Physical Activity in Children using Accelerometers***

Children's physical activity level was measured objectively using a 7-day recording with a uniaxial accelerometer with pedometer function (GT1M Actigraph, Fort Walton, Florida) at three time-points: baseline, end-of-programme (3-months) and at 9-months. Recordings were **not** done at the two year follow-up in order to minimise respondent burden. A 7 day recording provides a reliable estimate of usual physical activity in children allowing for any differences between weekday and weekend (Troost et al 2005). The data collection interval was set to record both activity and pedometer counts at 60sec intervals. This time interval was chosen in order to allow the storage of a full week of data recording. Box 4.2 describes the other aspects for which the data collection was standardised.



**Box 4.2 – Standardisation of the Data Collection using Accelerometers**

- Same monitor (i.e. serial number) used for a child at each time-point (to remove 'between-unit' variation in accelerometer output)
- Worn on right hip, on an elastic belt around the waist
- 7 *consecutive* days, to include 2 weekend days
- Worn from waking to bedtime
- Attempt made to standardise for school or holiday period for a child at each time-point
- Children wore the monitor when it was given to them to allow habituation; data collection started the following day.

Children (sometimes with help from parents) completed an activity diary alongside the accelerometer measurements, in order to enable interpretation of the accelerometer and pedometer data. The diary was adapted from an adult activity diary in use by Wilcock, Coventry University (personal communication) (Appendix XI). From the diary it was possible to determine if the child had participated in any activity which would not be picked up by a uniaxial (vertical) monitor, such as cycling.

For a day to be classified as a complete monitoring day and used in analysis, there has to be evidence of activity counts indicating that the accelerometer had been on for most of the day. To illustrate, on occasions where subjects forgot or chose not to put the monitor on to go to school, but put it on after school, these days were excluded. However, days (often weekends) where a subject had slept in until late (verified by the diary) and in which the monitor was put on around lunchtime, were included in the analysis.

For a record to be included in the 'before-and-after' analysis, a minimum of 4 out of the 7 days of monitoring had to be available, because 4 is the *minimum* number of days needed to obtain a reliable measurement of habitual physical activity in children (reliability of 0.80) (Troost et al 2005).

At each time-point in the data collection two measures were calculated:- mean daily pedometer counts; and mean daily time spent in moderate and vigorous physical activity (MVPA). UK guidelines recommend an hour of at least moderate exercise per day for children and young people (Department of Health 2004b), though studies vary widely with regards to the proportion of children meeting this standard (Troost et al 2006, Riddoch et al 2007). It has recently been recognised that the differences in minutes of moderate and vigorous physical activity (MVPA) for children between studies is likely to be due to different cut-off points of accelerometer counts used to define MVPA (Riddoch et al 2007). I have therefore analysed the accelerometer recordings using two different methods to calculate MVPA in use for the Actigraph:

#### **(i) Freedson Equation**

The number of minutes per day undertaking moderate to vigorous physical activity (MVPA) was calculated by:-

1. Translating activity counts into METs using the Freedson equation for children (Freedson et al 2005, Troost et al 2006):-

$$\text{METs} = 2.757 + (0.0015 \times \text{counts.min}^{-1}) - (0.08957 \times \text{age [yr]}) - (0.000038 \times \text{counts.min}^{-1} \times \text{age [yr]})$$

2. Calculating the number of minutes each day at 4 METS or above (four times the standard resting metabolic rate) used as a cut-off point for MVPA. Then a

daily average time for MVPA was obtained for the record. (4 METS was used to define MVPA, rather than 3 METS which leads to over-estimation in children - personal communication with S Trost).

Using the Freedson equation the cut-off point of 4 METS equated to a mean activity count of 1834 counts.min<sup>-1</sup> for the children at baseline. However, this ranged from 1510 counts.min<sup>-1</sup> for the youngest child (7yrs) to 2515 counts.min<sup>-1</sup> for the oldest child (13.7yrs), because the equation takes into account the age of the child.

## **(ii) Puyau**

Puyau et al (2002) has more simply defined MVPA as an activity count of 3200 counts.min<sup>-1</sup> or above in children, not taking into account age, derived from a calibration study in 6 to 14 year olds. The number of minutes each day at an activity count of 3200 counts.min<sup>-1</sup> or above was determined and then a daily average time undertaking MVPA was calculated for the record.

Thus, the activity count which defines MVPA is much lower using the Freedson equation (mean: 1834 counts.min<sup>-1</sup>, at baseline) compared with the 3200 counts.min<sup>-1</sup> recommended as the threshold by Puyau. Reilly et al (2008) has recently suggested that from current evidence the most appropriate cut-off point for MVPA in children is from 3000 to 3600 counts.min<sup>-1</sup>. This supports the use of the cut-off of 3200 counts.min<sup>-1</sup> from Puyau et al (2002) rather than the Freedson (2005) equation. Both methods of calculating MVPA will however be used to enable comparison.

#### **4.9.3.4 Further Assessment of Validity of Eating & Activity Measurements**

Assessment of dietary intake in the children (Edmunds and Ziebland 2002) and the home food environment (Golan 1998b) were both made via self-reported questionnaires. Although both of these questionnaires were validated and reliable as previously reported, the self-reporting of the previous day's food intake by children and the reporting of the food availability and eating style at home by parents may be prone to social desirability response bias, compromising the validity of these tools (Herbert et al 1995). Social desirability response bias is the tendency to present a favourable image on questionnaires, in order to present socially acceptable answers, thus avoiding criticism (van de Mortel 2005). Self-reported questionnaires tend to underreport energy intake. Furthermore, in childhood obesity intervention studies there is evidence of bias in the reporting of dietary intake in favour of the intervention group relative to control (Harnack et al 2004). Their explanation for the differential intervention-related bias is that healthy eating is emphasised by the intervention, making social desirability response bias more likely by the intervention group after the intervention. It would have been desirable to have had objective measures of both dietary intake in children and of the home eating environment, but this was not done. The sole use of self-reported questionnaires could therefore lead to social desirability response bias in the current study, potentially leading to artefactual results.

Assessment of children's physical activity was however made indirectly through a questionnaire with parents (Golan 1998b) but was also measured directly using an accelerometer. A systematic review has examined agreement between indirect and direct assessment of physical activity in children and adolescents

( $\leq 19$  years), with questionnaires providing an overestimation of physical activity when compared with directly measured values (Adamo et al 2009). Thus the measurement of physical activity using accelerometers is likely to be more accurate than questionnaires which rely on self-report. Although validity studies with accelerometers have usually focused on general paediatric populations, van Coevering (2005) found that a higher proportion of children who were overweight/obese (66%) recorded all 7-days of accelerometer data compared with children who were not overweight (46%), indicating their use appears acceptable in this population. Further assessment of the utility of accelerometers in children who are obese is given in Chapter 10.

#### **4.9.4 Statistical Analysis**

I have summarised binary and categorical data by frequencies and percentages and continuous variables by means and standard deviations. I assessed change in the outcome measures for both pilot groups together, by comparing the baseline scores at entry to the programme with the follow-up scores at three time-points: (i) baseline vs end-of-programme (3-months), (ii) baseline vs 9-month follow-up, and (iii) baseline vs 2-year follow-up. Six families had two children participating in the study. In order to account for the hierarchical nature of the data induced by the family clustering I fitted linear mixed models with random family effects to analyse for differences between the time-points. 'Intention to treat' analyses are presented including data from all families who contributed data, whether the family completed or withdrew from the programme.

Differences between the two groups (Saturday morning and Monday evening) were also investigated. If a difference was found significant at a level of 5%, the results were analysed and presented for both groups separately. Otherwise I present an analysis for the combined sample.

The analyses were conducted using SAS version 9, with support from a Statistician (Dr Tim Friede). The SAS PROC MIXED programme for multi-level and hierarchical models was used (Singer 1998, Sullivan et al 1999).

#### **4.9.4.1 Consideration of Multiplicity of Statistical Testing**

The primary outcome – change in BMI z-score – was pre-designated, chosen as the most important outcome which the intervention aimed to change. There were also 28 pre-designated secondary outcomes each relevant to assess in a treatment intervention for childhood obesity: children’s waist z-score, height, percentage fat, quality of life (6), state of health, self esteem (6), physical activity/inactivity (6), fruit and vegetable consumption; home eating environment (3); parents’ mental health; and parent-child relationship. A further reason for the large number of secondary outcomes is that the pilot study aimed to optimise the evaluation in subsequent research, and therefore potential measurements and questionnaires were tested.

A potential disadvantage of using this large number of secondary outcomes relates to the multiplicity of univariate statistical testing. Most outcomes were measured at four time points, with statistical tests comparing each timepoint to baseline. In total, there were 78 tests of statistical significance in the pre-designated primary and secondary outcomes. The level of statistical

significance was chosen as  $p < 0.05$ , which by definition means that one test in 20 will appear to be statistically significant when it is actually due to chance (Feise 2002). Thus the large number of statistical tests carried out potentially poses a problem for Type I error rate (i.e. increased number of false positive results), that is declaring a difference when there isn't one, potentially concluding that the intervention leads to benefits when it actually does not. This must be considered when interpreting the results.

#### **4.10 Process Data whilst Programme was being Delivered**

##### **4.10.1 Attendance and Withdrawals**

I kept a register of attendance for each week of the programme. To be defined as having completed the programme families had to attend at least six (half) of the sessions. I telephoned all families who withdrew from the programme to identify their main reason(s) for them not continuing.




##### **4.10.2 Changes to the Delivery of the Programme and Costs**

I kept written notes of any enforced changes to the delivery of the programme, for example by closure of the venue or changes to the programme due to numbers attending. I also recorded the direct costs to deliver the programme, including printing, venue, facilitators and consumables.

### 4.10.3 Parents' Weekly Evaluation Forms

At the end of each weekly session (weeks 1 to 11) the facilitators of the parents group requested parents to complete a weekly evaluation form. These forms were supplied by the programme developer, and were slightly modified from standard forms used to evaluate the generic parenting programmes run by Family Links. They were completed anonymously.

The weekly evaluation forms comprised a question about the individual session and how they felt about the ‘*Families for Health*’ programme overall, using a 1 to 5 Likert scale (Box 4.3). The textual responses of parents to the open-ended questions ‘*What did you find useful or enjoyable this week?*’ and ‘*What did you NOT find useful or enjoyable this week?*’ were related to the weekly topics in the ‘*Families for Health*’ programme (see details of weekly course content in Chapter 5). The number of comments made about the weekly topics were noted, thus transforming qualitative data into quantitative data (Caracelli and Greene 1993). This was done in order to examine whether parents engaged with the new topics each week. Selected quotes (verbatim) from the weekly evaluation questionnaires have also been given to illustrate the points made by the parents about the content of the course, and their engagement with it.

<b>Box 4.3 - Parents' Weekly Evaluation Forms</b>					
	 <b>1</b> <b>Awful</b>	<b>2</b> <b>Bad</b>	 <b>3</b> <b>OK</b>	<b>4</b> <b>Good</b>	 <b>5</b> <b>Great</b>
1. How do you feel about today's session ?	1	2	3	4	5
2. How do you feel about the programme ?	1	2	3	4	5
<i>Free text questions:-</i>					
3. What did you find useful or enjoyable this week?					
4. What did you NOT find useful or enjoyable this week?					
5. We would be glad to have any other ideas or comments.					



#### 4.10.4 Facilitators' Weekly Evaluation Forms

Each week (weeks 1 to 11) the facilitators completed a questionnaire giving feedback on how well the session had been received. This comprised four questions about the group, four questions about the programme, six questions asking about their own response as a facilitator, and a question inviting any other comments (Box 4.4). Questions were predominantly 'open-ended'. These forms were also supplied by the programme developer, as a standard form in use by Family Links for the evaluation of parenting programmes.

##### **Box 4.4 – Facilitator's Weekly Feedback sheets**

###### **The Group**

1. How receptive generally was the group to the session topics today?
2. If anyone was difficult to handle or very uncomfortable, what did you do to help?
3. How were the group dynamics and was everyone able to contribute?
4. How much fun and laughter was there during the session?

###### **The Programme**

5. Which topics worked well in this session –and why do you think this is so?
6. Which topics did not work well – and why do you think this is so?
7. How did the timing work?
8. What do you think could improve this session?

###### **Your own response**

9. How do you feel about today's session?
10. What would you have liked to have done better in this session?
11. What did you do particularly well in this session?
12. Please note examples of empathic and / or solution focused responses you or your co-leader(s) gave during the session?
13. How is the collaboration between you and your co-leader(s)?
14. If you have any anxieties or concerns you would like to discuss, please outline them.
15. Please add any other comments, queries or suggestions

Facilitators were also asked to complete a 'halfway feedback' at 6 weeks into the programme. This asked for their perception about: whether the training had

equipped them to run the programme; how they were managing the preparation for the sessions; the venue; the programme handbooks and other resources; and whether they felt supported before, during and between the sessions. A further sheet asked for their perceptions about the activities on the programme.

#### **4.11 End-of-Programme Data Collection with Parents**

In addition to the end-of-programme measurements in the 'before-and-after evaluation' detailed in Section 4.9, parents were also requested to complete two further questionnaires and to take part in an interview.

##### **4.11.1 Parents' End-of-Programme Evaluation Questionnaire**

Parents were requested to complete an end-of-programme questionnaire developed by myself in conjunction with the programme developer (Box 4.5, full version in Appendix XII). This questionnaire was distributed to parents during the last session of the programme, or at home visits to families who had dropped out or who were unable to attend the last session. The questionnaire comprised items about parents' perception of the programme, including the atmosphere, what they did or did not enjoy, the venue and timing, and any impact on the child and family. The questionnaire also asked how helpful they had found the various parenting, activity and food topics, and whether they were using them confidently. The format of the questions was either a 1 to 5 Likert scale or open-ended questions requiring a textual response.

### Box 4.5 - Parents' End-of-Programme Evaluation Questionnaire

	☹ Awful	Bad	☺ OK	Good	😊 Great					
1. How do you feel about the programme?	1	2	3	4	5					
<i>Free text questions were:-</i>										
2. How did you find the atmosphere in the group?										
3. How well were the group sessions run?										
4. What did you find especially enjoyable or useful about the programme?										
5. What did you <u>not</u> enjoy or find useful about the programme?										
6. What do you think about (a) the length of each session (2½ hrs) and how these were structured, (b) length of the course (12 weeks), (c) Coventry Sports & Leisure Centre as a venue?										
Qs 7,8 & 9. How helpful have these <u>parenting skills</u> (Q7) / <u>activity</u> (Q8) / <u>food</u> (Q9) topics been, and are you using the ideas confidently?										
<i>Scoring for Qs 7,8 &amp; 9</i>	<i>How helpful?</i>					<i>Using confidently?</i>				
	Not ☹		Very 😊			Not ☹		Very 😊		
<i>Parents were asked to rate 12 parenting topics, 5 activity topics and 10 food topics</i>	1	2	3	4	5	1	2	3	4	5
10. Do you think your child has enjoyed the programme? (comments also invited)										
11. Have you noticed any changes in your child as a result of the programme? (comments also invited)										
12. Do you think the programme has helped you and your child to tackle his/her weight difficulty ? (comments also invited)										
13. Do you think the programme has helped the rest of the family? (comments invited)										
14. Would you recommend the programme to other families? (comments invited)										
<i>Scoring for Qs 10,11,12,13,14</i>	☹ No	Not sure	☺ A bit	Defin- itely	😊 A lot					
	1	2	3	4	5					

Frequencies and percentages were derived for the questions using a 5-point likert scale. Comments were collated for each group and then reviewed for the main points.

#### **4.11.2 Questionnaire on Costs of Families to attend**

I assessed private costs incurred by families to attend the programme using a questionnaire completed by parents during the last session (or at a home visit if absent or dropped-out) (Appendix XIII). This included how they travelled to *'Families for Health'* and the costs incurred; whether they had to take time off from paid work to attend; and whether they had incurred additional expenditure. The latter included whether they had bought any new equipment (training shoes, bicycles etc) or any additional costs of a healthy diet.

I developed the questionnaire specifically for the *'Families for Health'* pilot project. The development of the questionnaire was informed by a cost questionnaire for patients (Thompson and Wordsworth 2001).

#### **4.11.3 Interviews with Parents**

I administered semi-structured in-depth interviews to six parents from each of the two pilot groups. These were carried out at the parent's home just after the end of the programme. The partner of the parent was also invited to participate.

The aim of the interviews was to obtain the parents' overall perception of the *'Families for Health'* programme. An additional purpose of these interviews was to triangulate the qualitative data obtained with the quantitative data to explore whether they converged and also to illuminate and help explain the short term outcomes resulting from the intervention.

#### 4.11.3.1 **Sample of Parents**

I used purposive sampling techniques to select parents to interview. Purposive sampling is defined as *'selecting units based on specific purposes associated with answering a research study's questions'* rather than randomly (Teddlie and Yu 2007). Teddlie and Yu (2007) outline a typology of purposive sampling which includes three broad categories (Table 4.5). The technique used in the selection of parents to interview in the current study was category A: 'Sampling to Achieve Representativeness or Comparability'. This has two goals. First, to select a sample which is representative of a broader group of cases and second, to enable comparison between different types of cases.

**Table 4.5 Typology of Purposive Sampling**

<b>Category of Purposive Sampling</b>	<b>Types</b>
A. Sampling to Achieve Representativeness or Comparability	1. Typical case sampling 2. Extreme or deviant case sampling ('outlier sampling') 3. Intensity Sampling 4. Maximum variation sampling 5. Homogeneous sampling 6. Reputational case sampling
B. Sampling Special or Unique Cases	7. Revelatory case sampling 8. Critical case sampling 9. Sampling politically important cases 10. Complete collection ('criterion sampling')
C. Sequential Sampling	11. Theoretical sampling ('theory based sampling') 12. Confirming or disconfirming cases 13. Opportunistic sampling ('emergent sampling') 14. Snowball sampling ('chain sampling')

Source:- Teddlie and Yu (2007) (p81)

Parents were selected for interview depending on whether they completed the programme or not, the number of their children who had participated in the programme, and their family structures. I invited six parents from the 9 families who started Group 1 to be interviewed and all agreed, of whom five had

completed the programme and one was the family who had partially engaged (i.e. attended the first half but little of the second half but did not withdraw). The one family which dropped-out from Group 1 was uncontactable. I also invited six parents from the 12 families who started Group 2 to be interviewed and all accepted, including three families who had dropped-out. In addition, of the four families who dropped out of the programme and who declined follow-up measurements, one parent agreed to take part in a brief interview over the phone and their comments have been included. Only one interview was carried out with a partner present. For two of the interviews with families who had dropped out from the second programme, their children contributed to the interview. The characteristics of the parents who were interviewed are described in Chapter 7 'Outcome Evaluation'.

#### **4.11.3.2 Content of Parents' Interviews**

The interviews were exploratory allowing respondents to report their experience in their own words but were guided by an interview schedule including open-ended questions (Appendix XIV). Interviews aimed to cover feelings about being approached to take part in the study; to gain their perception of the programme and about being in the group; to illuminate any effects that the programme has had on them and their children and any changes that they had made; to explore factors detracting from effectiveness and factors that would enhance the programme; and to assess future plans (if any).

Two additional questions were also asked to those who had withdrawn from the programme, to further explore reasons for families dropping out:

*What were the reasons for your family not continuing with the programme please?*

*If there was another opportunity to come to the programme, would you want to try again ? Is so, what would need to be different ?*

A further aim of the interview with parents was to gauge 'respondent burden'. The term 'respondent burden' relates to the concern for the burden that complex and volumous data collection places on respondents, with four components identified (Bradburn 1978):-

1. Length of interviews, questionnaires, other measures
2. Respondent effort i.e. are they asked about simple things which they can respond to easily or are they asked for complex information, difficult measurements etc ?
3. Respondent stress i.e. is there any personal discomfort with the data collection ?
4. Frequency of being surveyed / measured, in longitudinal studies

Respondent burden is important as this may reduce both response rates and the quality or validity of their responses (i.e. it may influence the thoroughness that a participant will answer questions if too much is asked of them). However, Bradburn (1978) argues that if respondents are convinced that the data are important then they will accept a high degree of burden.

Therefore, to gauge respondent burden I also asked participants about their views on the research measurements. This included questions about the self completion questionnaires and the outcome measures with the children,

including the measurement of physical activity using accelerometers. This was deemed to be relevant in the pilot, in order to inform and optimise the data collection methods in any subsequent evaluation.

#### **4.11.3.3      *Conduct of Parents' Interviews***

Interviews were carried out in the parent's home and were around one hour long. Written consent for the interview had been given on the consent form at baseline, but consent was checked verbally when arranging the date for the interview. Interviews were recorded with participant's verbal consent given at the interview; no-one declined.



## **4.12 End-of-Programme Data Collection with Children**

### **4.12.1 Group Interviews with Children**

I conducted group interviews with participant children during the last session of the programme. The aim of the group interviews was to gauge the children's perception of the programme, to establish what they felt they had gained, what they liked and what they did not like. The children already knew each other and thus this type of group interview is best referred to as a 'natural group' interview (Green and Thorogood 2004).

The decision to run natural group interviews with the children, rather than one-to-one interviews, was based on the perception that children are likely to feel more comfortable talking with fellow participants and disclose more honestly. A further methodological strength is that group interviews provide a more 'natural' interaction between children, which may stimulate their ideas and may provide access to shared group culture (Green and Thorogood 2004). One limitation, however, is that responses made in a group situation *may* be different to the responses in an individual interview: The group interview can be part of the process by which viewpoints are produced, and thus it does not just collect pre-existing ideas and viewpoints but these evolve during the group interview (Green and Thorogood 2004). Group dynamics may also have meant that marginal or less acceptable opinions, such as for example negative opinions about the '*Families for Health*' programme, may not be voiced. Such comments would have been better accessed during one-to-one interviews.

#### **4.12.1.1 Sample of Children**

All children who attended the last week of the programme were invited to take part in the group interview; no child declined and all parents gave their consent. For each pilot group I split the children into two groups by age because I hypothesised that this would encourage younger children to participate. The non-overweight siblings who attended the programme were also included. I carried out a further group interview at home with the children from a family from Group 1 who had been unable to attend the last session. In total, five group interviews were run with 3 to 5 children each (details of participants are in Chapter 7).

#### **4.12.1.2 Content of Group Interviews with Children**

The group interviews were guided by a topic guide providing a semi-structured interview schedule (Box 4.6). The thoughts and opinions of children who did not complete the programme are also important but more difficult to capture. As indicated earlier, I managed to arrange two 'one-to-one' interviews of parents from families who had dropped out, where both the parent and child(ren) contributed to the discussion. Although the dynamics of these interviews was different, I have included the comments from these 3 children in the analysis.

#### **Box 4.6 Topic Guide for the Group Interviews with Children**

If a friend at school asked you about the programme, how would you explain it to them?

What have been the good things about the programme ?

What have you not liked about the programme ?

Have you learnt anything about healthy eating ?

- Have you made any changes to what you eat?

Have you learnt anything about having an active lifestyle ?

- Have you made any changes to your lifestyle?

How do you feel about yourself now ? Are you feeling better, worse or the same about yourself than before the programme?

How do things feel for you at home now? Are they better, worse or the same than before the programme?

How do things feel for you at school now? Are they better, worse or the same than before the programme?

Would you recommend the programme to a friend?

Is there anything else that you would like to say ?

#### **4.12.1.3 Conduct of Group Interviews with Children**

I interviewed the children, typically in groups of 3 to 5 for around 30 minutes. The interviews were recorded, with the consent of the parents. I had an assistant to keep written notes and to check that the recorders were switched on and working. Children were reminded of the importance of one person talking at once so that the recording would be clear, and a 'talking object' was used so that children could only talk when they were holding it. All children had the opportunity to voice their opinions on each question in turn or to pass if they so wished, and then they were asked at the end of each question if anyone wanted to add anything else. Although this format aided transcription of the

recording, I am aware that this format of controlling the turn-taking may have reduced the interaction between the children (Green and Thorogood 2004).

For the first pilot group the interviews were carried out in a corner of the gymnasium at the leisure centre. However, I found there was too much noise and too many distractions in the gymnasium, so for the second pilot group I held the group interviews in a private room in the leisure centre which was a much quieter location.

#### **4.13 Analysis of the One-to-one and Group Interviews**

Recordings of the interviews with parents and the group interviews with the children were transcribed verbatim, and anonymised. The family code number was kept to identify each speaker. This would mean that the comments made could be related to socio-demographic characteristics and to quantitative data from the 'before-and-after' part of the study. In addition, comments made by children could be matched to those made by parents, if required.

The interview data was analysed using the framework approach as described by Ritchie and Spencer (1993). Framework approach is a practical form of qualitative data analysis developed for use in applied health and social research (Pope et al 2000). Box 4.7 summarises its five interconnected stages.

#### **Box 4.7 Framework Approach for the Analysis of Qualitative Data**

**Familiarisation** – Immersion in the raw data (i.e. listening to tapes, reading transcripts) in order to gain an overview of the data

**Identifying a Thematic Framework** – Identifying the key issues, concepts and themes from the data, and produce a detailed index (i.e. framework) for subsequent exploration of the data.

**Indexing** – Apply the index or thematic framework systematically to the transcripts.

**Charting** – Data from all the transcripts are rearranged according to the themes, producing 'charts'.

**Mapping and interpretation** – The charts are used to search for patterns in the data, find associations between themes, create typologies etc, with a view to providing explanations and meaning for the findings.

Source: Ritchie and Spencer (1993)

Transcripts were loaded into NVivo qualitative analysis software (Version 7), which was used to apply the framework approach to the data analysis in a systematic way. After initial familiarisation with the data, I developed a thematic framework in NVivo for the one-to-one interviews with parents and a separate framework for the group interviews with children. These coding frameworks were both guided by the interview schedule but with additional themes (Appendix XV). This included main nodes, and sub-nodes. Transcripts were then indexed or coded according to the thematic framework by myself and another observer. I then used NVivo to organise the data into the themes, and then used this to interpret the data.

This analysis was carried out separately for the interview data from parents and the groups interview data with children. Shared themes were identified from both datasets and then comparisons undertaken.

#### 4.14 End-of-Programme Data Collection with Programme Developer

I also interviewed the programme developer after both groups to assess her perception of the fidelity of the programme, using a semi-structured interview schedule (Box 4.8).

##### **Box 4.8 – Interview Schedule of Programme Developer**

1. What changes do you think some of the families have made due to the '*Families for Health*' programme? Have you got any examples?
2. Which aspects of the programme were embraced well by the families?
3. Which aspects of the programme do you think the families were less sure about?
4. Do you think the separate parents / childrens groups worked well ? When numbers were low, we combined the groups – how did this work ? (later section re: Group 2 only)
5. Have there been any changes in how the parents themselves were in the group? Have you noticed any difference?
6. What happens at the end of the programme? Is there anything planned within the parents group?
7. How were the dynamics when there were two parents in the group, mother and father, was that a problem or was it good? Is it important to have Dad's have there?
8. Do you think that the parents engaged with the relationship aspects, the healthy eating aspects and the exercise aspects in an equal way or was the bias towards one of those three elements of the programme?
9. How did this relate to the parent's expectations at the beginning of the programme ?
10. Were there any families on which the programme had a profound impact?

##### **Drop-outs (questions re: Group 2 only)**

11. We have to talk about the high drop-out rate and the low attendance on this programme (attendance record shown). i.e. 7 families dropped out, 4 completed, 1 partial completer. (Group 2 only)
12. I know you were very active in phoning them etc, do you think that made a difference in terms of them coming back? (Group 2 only)
13. Its a balance between pursing people where they have got a right to withdraw from the study versus yes encouraging them to come back. How did we meet that balance?
14. Have you any thoughts about the reasons for the high drop out on this programme ?

##### **The Future**

15. Taking into account the two programmes, what do you see the future for the '*Families for Health*' Programme ?
16. What do you think would have to be different if the programme was to run again ?

## **SECTION IV – Process, Outcome and Economic Evaluation**

I have detailed the quantitative and qualitative data collection in Section III. This section describes how the various aspects of the mixed-methods data collection are integrated at the analysis and interpretation stages to provide the information for the three aspects of the evaluation: First, a process evaluation, in order to assess the delivery of the programme. Second, an outcome evaluation in order to assess the 'likely effectiveness' of the programme. Third, an economic evaluation to determine costs associated with the programme. The results of these analyses will be presented in three separate results chapters.

As some of the data collection methods contributed to more than one aspect of the evaluation, I felt that it was helpful to first of all present the data collection methods and then give information on how they informed each aspect of the evaluation.

#### **4.15 Process Evaluation of the Delivery of the Intervention**

The delivery of the intervention was assessed by a detailed process evaluation evaluating whether *'Families for Health'* was implemented as planned and how the programme was received by families as implementation took place. This was done using a modified version of the framework for process evaluation from Linnan and Steckler (2002), previously introduced in Chapter 3. The data collection methods I used to address each aspect of the process evaluation are described in Table 4.6. The seventh component of Linnan and Steckler's (2002) original framework 'Implementation' requires the calculation of a composite score to indicate the extent to which the intervention was implemented and received as planned. This was deemed too difficult, as it was not possible to define precise numerical scores for each of the four components (reach, dose delivered, dose received, fidelity) for the composite score to be calculated with accuracy. Instead a verbal comment on the overall implementation is given.

If an RCT is to be carried out after this pilot, it is important that process evaluation also informs refinements to both the intervention and evaluation (Campbell 2007). In my opinion Linnan and Steckler's (2002) framework does not allow sufficiently for this. In the current study an additional component of the process evaluation is included of 'Users and Providers Perspectives'. The parents' end-of-programme questionnaire and the interviews with parents and children contributed to an assessment of their overall perception of the *'Families for Health'* programme and what could be changed in terms of the intervention and evaluation. Interviews with parents of the families who withdrew which aimed to explore in detail the reasons for withdrawing are also important. The perception of the facilitators and the programme developer are also important.



**Table 4.6 - Framework for the Process Evaluation**

<b>Component</b>	<b>Definition</b>	<b>How Assessed in Evaluation</b>
Context	Wider environment in which the intervention is embedded (i.e. social, political, economic).	(1) Review of literature for national context. (2) Obtain knowledge of existing services in Coventry for childhood obesity, principally from members of the Research Advisory Group who were working with children with weight problems in Coventry.
Recruitment	How successful were the methods used to approach and recruit participants.	(1) Baseline questionnaire asked parents how they heard about ' <i>Families for Health</i> ' and whether families were referred or self-referred, to assess recruitment strategies. (2) Results of systematic recruitment at General Practices.
Reach	Degree to which an <i>intended</i> audience participates in an intervention.	(1) Estimate of the proportion of all obese 7 to 11 year olds in Coventry attending, using the National Child Measurement Programme as a denominator (Information Centre 2008). (2) Baseline questionnaire with parents asked about socio-demographic characteristics, to define if participants reflected the population of Coventry and if any sub-groups were more or less likely to participate. (3) Register of attendance by families, including the number who withdrew.
Dose delivered	The 'amount' of intervention provided by the intervention team.	(1) Notes I kept on changes to the programme, enabled an assessment of the number of sessions delivered as planned. (2) Facilitators' weekly evaluation forms.
Dose received	The extent of engagement with the intervention by the target population, including extent to which participants 'actively engage'.	(1) Parents' weekly evaluation questionnaires. (2) Parents' end-of-programme questionnaire.
Fidelity	The extent to which the intervention was delivered as planned i.e. quality and integrity of intervention as envisaged by developers.	(1) Facilitators' weekly evaluation forms. (2) Interviews with programme developer. (3) Parents' weekly evaluation questionnaires. (4) Parents' end-of-programme questionnaire.
*Users and Providers Perspectives on the intervention	The extent to which the target audience liked what was delivered, in order to optimise intervention and evaluation in the future.	(1) Interviews with Parents. (2) Interviews with Children. (3) Facilitators' weekly evaluation forms. (4) Interviews with programme developer.

Source:- Adapted from Linnan and Steckler (2002) (\*New component)

#### **4.16 Outcome Evaluation to assess effectiveness**

The estimate of the likely effect size of the *'Families for Health'* programme, to aid subsequent power calculations if an RCT is indicated, draws mainly on the quantitative data collection in the 'before-and-after' evaluation described previously. Differences in the measurements between (i) baseline and end-of-programme (3-months) scores, (ii) baseline and 9-month follow-up scores, and (iii) baseline and 2-year follow-up scores were obtained, and analysed for statistical differences.

However, the quantitative data was also integrated with the other data collection methods in two ways, the first in the data analysis stage and the last one at the data interpretation stage:

First, the main findings seen with the quantitative data were triangulated with the findings from the interviews with parents and children, to explore whether the results converged. Issues such as changes made by families in the home eating environment, in the child's physical activity and in parent-child relationships were explored.

Second, the interviews with parents and children were explored to help explain or illuminate any short-term outcomes of the intervention. 'Extreme case analysis' was undertaken with children with the greatest and least changes in BMI z-score. The qualitative data was explored to see if the changes made by the family and the child could explain the change in BMI z-score.

#### **4.17 Economic Evaluation**

The economic evaluation is a 'cost-outcome' description (Drummond 1997). Both the outcomes and the costs of the '*Families for Health*' programme are described. As there is no comparison treatment, a cost-effectiveness analysis or cost-utility analysis cannot be performed.

Direct costs to run the '*Families for Health*' programme were recorded, including facilitator time to set up and run the programme, costs of venue, handbooks and consumables. Costs to train the facilitators, although indicated, were not included in the total costs to run the programme as this is not a recurring cost.

The total costs to run the programme were calculated, and these were then expressed as a cost per family to attend the programme. The costs were also compared with the change in BMI z-score. The method of Goldfield et al (2001) was employed to express the change in BMI z-score units per amount spent (i.e. change in BMI z-score per £1,000 invested in '*Families for Health*'). One potentially controversial aspect with Goldfield's et al (2001) methods is that children who increased their BMI z-score have their value re-set to zero, thus inflating the impact. Thus, change in BMI z-score units per £1000 have been reported without re-setting the BMI z-scores to zero.

I also used the data from the end-of-programme economic questionnaire completed by parents to assess the costs incurred by families of attending '*Families for Health*'.

The next section will now focus on the development of the programme, before moving onto the results of the evaluation.

## Chapter 5

### Development of the Programme

The first objective of this research was to develop a new intervention for the treatment of childhood obesity combining elements from parenting education programmes, child programmes & obesity management programmes. The programme became known as *'Families for Health'*.

This chapter summarises the theoretical underpinning and the evidence base underpinning the *'Families for Health'* programme. Details of the tendering process for the development of the programme are specified. A description of the new programme is then given. My aim is to give sufficient information about the *'Families for Health'* programme so that the reader has greater understanding of what is being evaluated in the subsequent chapters.

#### 5.1 Theoretical Underpinning and Evidence Base

*'Families for Health'* differs from the other childhood obesity treatment interventions currently being researched in the UK (outlined in Chapter 2), in that it offers a greater emphasis on parenting, relationship skills and emotional and social development, in addition to lifestyle change.

The theoretical underpinning of this programme is based on behavioural change, rather than the acquisition of knowledge or change in attitudes, with the intention that this will enhance its long-term sustainability. However, the design of the programme was not guided by a specific theory of behavioural change from psychology, such as the health belief model (Rosenstock 1974), theory of reasoned action (Fishbein and Ajzen 1975) or stages of change (Prochaska 1992). It is now acknowledged that it would have been useful to have adopted

one of these behaviour change models when developing the intervention, because this may have improved effectiveness (Barker and Swift 2009).

### **5.1.1 Family-Based Treatment of Childhood Obesity**

A systematic review examined the nature and effectiveness of family involvement on childhood obesity (McLean et al 2003). Although few studies were identified, parental involvement was associated with a greater decrease in the percentage overweight in children. Furthermore, the National Institute for Health and Clinical Excellence, on the basis of both controlled and uncontrolled clinical trials, found evidence that programmes incorporating behavioural treatment alongside physical activity and/or diet were effective in under 12s particularly if parents were given the main responsibility for behaviour change (NICE 2006a).

The evidence for family-based interventions for the treatment of childhood obesity is mainly derived from two research groups: First, in the USA, Epstein's 'family-based behavioural treatment' (FBBT) was delivered to groups of 6 to 12 year olds and their parents over 8-12 weeks (Epstein et al 1994). Long-term (10-year) follow-up indicated that reduction in overweight was more likely if the parent and child were treated together compared with targeting the child alone (Epstein et al 1990). Second, research from Israel has reported an RCT in which parents *or* children (6-11 years) were targeted as the exclusive agents of change showing that the mean reduction in children's weight was greater for the parent group than the child group after a 7-year follow-up (Golan and Crow 2004a). In a further study, Golan et al (2006a) provided evidence that

interventions delivered to parents alone may be more effective than when delivered to parents and children together. Thus an emphasis on parenting skills is supported by Golan's work which shows that giving parents the main responsibility for behaviour change is central to success in the treatment of childhood obesity.

Research published since the inception of the *'Families for Health'* programme further supports a focus on parenting in combination with lifestyle interventions. Golley et al (2007b) examined the effects of the 'Triple P' Positive Parenting Program, an Australian group-based parenting skills training program using a behavioural approach (Sanders et al 2003). In an RCT with 111 overweight/obese children aged 6 to 9 years, the combined parenting skills training and healthy lifestyle information group showed a reduced BMI z-score of 10% at 12-months follow-up; compared with a 5% reduction for parenting skills training alone and for the waiting list control group.

Family-based interventions are based on the premise that the home environment is important in the aetiology of childhood obesity. The evidence suggests that parents influence obesity through feeding practices and the food and activity behaviours they model for their children. Parenting style and skills have been shown to predict children's BMI, fruit and vegetable intake, healthier eating, physical activity and sedentary behaviours. (Rhee et al 2006; Kremers et al 2003; Schmitz et al 2002). Overall, these studies suggest that it is important for programmes to address parenting skills as well as lifestyle advice. Qualitative research with parents of overweight/obese children in England has

also indicated that parents want help with the general aspects of parenting (Edmunds 2002), and therefore should be receptive to the type of intervention offered by *'Families for Health'*.

### **5.1.2 Parenting Programmes**

Parenting programmes are *'focused, short-term interventions aimed at helping parents improve their relationship with their child, and preventing or treating a range of problems including behavioural and emotional adjustment'* (Barlow and Parsons 2003, p3). Programmes can be offered to groups of parents or on a one-to-one basis, although there is evidence that they are more cost-effective when run with groups of parents (Gibbs et al 2003).

Parenting programmes can be divided into two broad categories, based on their theoretical underpinning (Stewart-Brown 2005, Gibbs et al 2003). First, behavioural approaches use techniques such as boundary setting and positive discipline to reinforce desirable behaviour and manage undesirable behaviour in children. Parents learn about how these techniques are implemented during the parenting programme and have an opportunity to practice these skills. Second, relationship approaches aim to provide parents with improved ways to communicate with their children. The aim is to build emotional awareness in themselves and their children, developing respect and empathy, and learn how to nurture themselves as well as their children. Some parenting programmes combine these two approaches and in doing so may offer the advantage of support for the development of self-esteem and social competence (Einzig 1999).

Systematic reviews on the effectiveness of parenting programmes have examined a variety of conditions and lifestyles, though not obesity specifically. To illustrate, NICE (2006b) showed that parent training programmes directed at children with conduct disorder reduced problem behaviours in the short-term. NICE (2006b) recommends group-based rather than individual based parent training in the management of conduct disorders in children aged 12 and younger. Petrie et al (2007) has also carried out a systematic review on the impact of parenting programmes on the prevention of the misuse of tobacco, alcohol or drugs in under 18s. Findings from self-reports from the young people, showed that 6 of 14 studies reported reductions in alcohol use, 5 of 9 studies reported reductions in drug use, and 9 of 13 studies reported reduction in tobacco use. They conclude that parenting programmes have been shown to reduce or prevent substance abuse. Parenting programmes can therefore be used to support parenting generally and health promotion more specifically, for a wide range of conditions.

### **5.1.3 Family Links Nurturing Programme**

This section provides information about one particular parenting programme – the Family Links Nurturing programme – as this programme underpinned the design of the *'Families for Health'* programme. The Nurturing Programme was originally developed by Stephen Bavolek in Colorado, USA, for use in the treatment and prevention of child abuse and neglect (Bavolek 2005). There have been extensive positive evaluations of the programme in the USA (Bavolek 2005, Nurturing Parenting Program 2008). Family Links have an exclusive license to develop the Nurturing Programme for use in the UK (Hunt 2003).



The Family Links Nurturing Programme is a 10 week group-based course for parents/carers and children delivered in early years settings and in schools (Family Links 2009). In the school setting, the intervention comprises a parenting programme offered to all parents and a curriculum-based intervention for children facilitated by teachers (Barlow and Stewart-Brown 2001). The programme is recommended in national policy for use at a universal level in the extended schools prospectus (Department for Education and Skills 2005a); in the Social and Emotional Aspects of Learning guidance to improve children's emotional literacy (Department for Education and Skills 2005b); and by SureStart as an evidence-based parenting programme (Sure Start 2008).

The parenting aspects of the Family Links Nurturing Programme focus on four key constructs (Family Links 2009): First, to increase self-awareness (know ourselves well) and boost self-esteem in parents/carers and children; second, for parents to have appropriate expectations about what their child can do; third, positive discipline is emphasised which focuses on praise, giving choices and responsibility; and fourth, empathy, which involves helping parents and children tune into the emotional feelings of others. The aims of the school-based Family Links Nurturing programme for children include raising children's self esteem, empowering children to make responsible choices, and to develop communication skills. The programme uses circle time, now widely used in schools where children and their teacher sit together in an open circle discussing issues, with the use of a talking object to facilitate discussion. In the Family Links Nurturing Programme for school years 1 to 4, topics include praise and criticism, personal power, choices and consequences, anger, touch, telling others, keeping secrets and glad to be me (Nurturing Programme Classroom

Handbook 2) (Family Links 2006). An intention of the Nurturing Programme is to develop parents' and children's emotional literacy.

The Family Links Nurturing Programme has received positive evaluations in qualitative research in the UK with parents (Barlow and Stewart-Brown 2001, Osgood and James 2006, Stringer 2007) and in a pre-post evaluation (Kirkpatrick 2005). Norgate et al (2008) has also carried out an evaluation of the circle time element of the Nurturing Programme, finding that junior school children rated circle time positively (8.3 out of 10) and found it useful to help them develop social skills. The Family Links Nurturing Programme has not been subject to more rigorous evaluation, although an RCT of the parenting programme is registered and has commenced (Stewart-Brown 2008).

## **5.2 Tendering process for the Development of the Programme**

The development of the programme for the treatment of childhood obesity was put out to tender. Tendering documents were prepared in accordance with university regulations. Fourteen organisations were invited to tender, with four organisations submitting tenders. The Research Advisory Group short-listed two proposals. The lead applicants from these two proposals gave a presentation to the Research Advisory Group on 11<sup>th</sup> November 2004. The tender was awarded to Candida Hunt, then Associate Director of Family Links (Oxford, UK). Further details of the tendering process are in Appendix XVI. The development of the *'Families for Health'* programme commenced in December 2004. Candida Hunt developed the programme in conjunction with the multi-disciplinary Research Advisory Group (Appendix VI).

### 5.3 Description of the '*Families for Health*' Programme

'*Families for Health*' is a childhood obesity treatment intervention focusing on family-wide change, with parents identified as the 'agents of change'. The programme consists of a 12-week group-based community programme involving a 2½ hour session each week, comprising parallel groups for overweight or obese children aged 7 to 11, and their parents. The sessions combine proven elements from parenting programmes, school-based emotional development programmes and family lifestyle programmes. Box 5.1 summarises the main principles underpinning the '*Families for Health*' intervention.

#### Box 5.1- Principles underpinning the '*Families for Health*' Programme

<ul style="list-style-type: none"><li>• Parents are the 'agents of change' (Golan and Crow 2004a), responsible for implementing lifestyle change in the family</li></ul>
<ul style="list-style-type: none"><li>• Parent training combines elements of both behavioural and relationship approaches</li></ul>
<ul style="list-style-type: none"><li>• Parenting skills are key to implement and maintain behaviour change</li></ul>
<ul style="list-style-type: none"><li>• Lifestyle change includes healthy eating (not diet) and activity for the <i>whole family</i> (i.e. not just for the obese child), with parents making healthy choices available. Focus is on healthy lifestyle', not diet/weight.</li></ul>
<ul style="list-style-type: none"><li>• Focus on children's social and emotional wellbeing</li></ul>
<ul style="list-style-type: none"><li>• Parents to nurture themselves as well as their children</li></ul>
<ul style="list-style-type: none"><li>• Realistic expectations made of parents and autonomy of parents</li></ul>
<ul style="list-style-type: none"><li>• Children to 'grow into their weight' i.e. aim is weight maintenance in this community based programme</li></ul>

The parenting aspects in the parents' group and the emotional aspects in the children's group both draw on the Family Links Nurturing Programme (Hunt 2003). This was because the programme developer, Candida Hunt, was an Associate Director of Family Links with considerable knowledge of the Nurturing Programme. She wished to develop '*Families for Health*' in line with the Nurturing Programme. Candida Hunt obtained permission from both Stephen Bavolek (developer of the Nurturing Programme) and Family Links to use aspects of the Family Links Nurturing Programme in the '*Families for Health*' programme. '*Families for Health*' therefore shares some of its theoretical underpinning with the Family Links Nurturing Programme (Section 5.1.3).

Table 5.1 outlines the content of the parallel parents' and children's groups for the 12 weeks. Each week both groups had two main topics, and where possible the topics were the same for both parents' and children's groups to promote greater understanding and discussion at home. Parents and children met mid-way through each weekly session, providing an opportunity for 'family nurturing time' (Bavolek 2005), with children and parents engaging in an active game and sharing a healthy snack. This gave facilitators an opportunity to model new skills, and to introduce ways in which children and parents can interact at home. It also provided an opportunity for children to prepare healthy snacks and to try new foods. The next section provides further details about the parents' and children's programmes.

**Table 5.1 – Sequence and content of Parents’ and Children’s Parallel  
Groups for ‘Families for Health’ (version 1)**

<b>Week</b>	<b>Parents’ Programme</b>	<b>Children’s Programme</b>
1	<b>INTRODUCING ‘FAMILIES FOR HEALTH’</b> What is health? Nurturing the family, nurturing ourselves	<b>WHY WE ARE HERE</b> Our rules...and rewards Why be healthy?
2	<b>HOW HEALTHY ARE WE?</b> Ideas around discipline (incl. praise) Balancing act 1: energy in, energy out	<b>HOW HEALTHY ARE WE?</b> Balancing act 1: energy in, energy out The magic of praise
3	<b>A HEALTHY WAY OF LIFE</b> Balancing act 2: what our bodies need to eat Family rules, family rewards	<b>A HEALTHY WAY OF LIFE</b> Balancing act 2: what our bodies need to eat Let’s make a rainbow ( <i>of fruit &amp; veg</i> )
4	<b>PERSONAL POWER – OUR ALLY FOR HEALTH</b> Finding our personal power Surviving at the supermarket	<b>PERSONAL POWER – OUR HEALTH HELPER</b> Finding our personal power Let’s get active
5	<b>THE QUESTION OF CHOICE</b> Our eating habits Choices...and consequences	<b>OUR CHOICES</b> Making choices: using our personal power Let’s go shopping
6	<b>HEALTH IS A FAMILY AFFAIR</b> How much we eat Building self-esteem	<b>LIKING OURSELVES</b> Glad to be me Praise snakes and ladders
7	<b>FEELINGS – A GUIDE TO OUR EMOTIONAL HEALTH</b> Thinking about feelings Active alternatives to staring at the screen	<b>THINKING ABOUT OUR FEELINGS</b> Feeling up, feeling down Screen savers: what else can we do
8	<b>SOLUTIONS TO STRESS</b> Stress – and what we can do about it Coming to our senses	<b>TIME TO CHILL OUT</b> What winds us up What calms us down
9	<b>A WORLD OF LABELS</b> Food labels: what do they mean? Labelling our children	<b>FOOD DETECTIVES</b> What’s on the label? Activity taster
10	<b>TAKING CHARGE</b> A life of diets or a healthy lifestyle? Communicating clearly: using “I” statements	<b>LOOKING AFTER MYSELF</b> Taking good care – what I can do Activity taster
11	<b>LIVING HEALTHILY</b> From problem to solution Meeting the challenge	<b>LIVING HEALTHILY</b> Problems, puzzles and solutions Activity taster
12	<b>TOWARDS A HEALTHY FUTURE</b> We are stars! Family party: time to celebrate	<b>TOWARDS A HEALTHY FUTURE</b> We are stars! Family party: time to celebrate

Copyright: Candida Hunt and University of Warwick

### 5.3.1 Parents' Programme

The topics in the parenting programme cover both support with parenting skills and family lifestyle, which were integrated in the weekly sessions. The approaches used included facilitated discussion, role play, goal setting, skill practice, a solution-focused approach rather than a focus on problems, and homework.

Parenting skills topics included both behavioural (e.g. positive discipline, consistently enforced family rules) and relationship (e.g. giving praise, raising self-esteem, relationships education, emotional health and developing autonomy) approaches to parent training (Hunt 2003). Family lifestyle aspects include a large focus on healthy eating, which draw on nutritional recommendations in the 'Balance of Good Health', focusing on an appropriate balance between the five food groups (Food Standards Agency 2001). Other food topics include making healthy choices available in the home, food labels, portion sizes, importance of family meal times (Barlow and Dietz 1998), cooking advice and the opportunity to try new foods. Parents are encouraged to apply 'covert' control of children's food intake by controlling the home eating environment to limit exposure to unhealthy foods, since this has been associated with lower intake of unhealthy snacks (Ogden et al 2006). *'Families for Health'* promotes parental monitoring and awareness of children's food intake, which has been associated with reduced risk of weight gain in the longer term (Faith et al 2004a). Restriction of children's eating was not employed, as this may lead to weight gain (Clark et al 2007). Thus, parents are given the responsibility for the child's eating environment, making healthy food choices

available at appropriate times, and children had the responsibility for how much they ate, in line with the recommendations of Satter (2004). Changes in physical activity included a focus on decreasing sedentary behaviour (e.g. limiting TV/computer games) and increasing sustainable family-based physical activity.

*'Families for Health'* involves parents being given the responsibility for making the changes in eating and activity in the family, and the parenting aspects aim to support and increase parental capacity to make these changes. Parenting skills are therefore key to implement and maintain lifestyle changes. The programme aims to promote a sustainable, healthy approach to family-wide lifestyle change.

### **5.3.2 Children's programme**

The children's programme included three main components. First, information on healthy eating using the Balance of Good Health (Food Standards Agency 2001), food labels, trying new foods by three taste-tests and practical food preparation (served by the children at the mid-session break with parents). Second, circle time enabled discussion of the emotional aspects of their lives and of living with obesity, to develop their emotional literacy, raise self-esteem and build confidence. Some aspects draw on the Family Links Nurturing Programme for children (Family Links 2006). Improving self-esteem is perceived to be particularly important in children who are obese, as it may give them some resilience to bullying and stigmatisation. Third, a focus on physical activity aimed to increase activity levels by participation in games, the use of pedometers to encourage 10,000 steps per day and the introduction to new

physical activities that could be sustained once the programme finished. An hour of the programme in weeks 9, 10 and 11 was dedicated to three activities chosen from Coventry's Active Kidz programme. They were chosen so that they could be continued once the *'Families for Health'* programme had ended, and included swimming; a mixed session in the gym including uni-hockey, skipping, bouncy castle, indoor tennis etc; and a session in the soft play area (Jungle Junction) with organised games.

#### **5.4 Handbooks to Support the Delivery of the Programme**

Four handbooks were developed by the programme developer to support the delivery of the programme (Box 5.2).

##### **Box 5.2 Handbooks for the Delivery of the Programme**

- Facilitator's handbook to lead the Parents' group
- Facilitator's handbook to lead the Children's group
- Parent's Guide (for each parent) (90 pages)
- Children's Activity Book (for each child) (32 pages)

The facilitators' handbooks detail the content and timing for each of the twelve sessions on the right hand side of the page, with detailed notes on delivery on the left hand side of the page. This aims to maximise the standardisation of the content and delivery of the programme. The Parent's Guide and Children's Activity Book provide information and worksheets for use by parents and children throughout the 12 week course and beyond.



In order to illustrate how the 2½ hour programme was structured each week, the detailed programme for a sample week (Week 3) is described for the Parents' programme in Table 5.2 and the Children's programme in Table 5.3.

The aims for Week 3 were stated as:

Parents' group:

- To clarify the balance of foods that contribute to a healthy lifestyle, and to encourage ways to improve this balance in the family
- To develop clear, fair family rules and positive ways to reinforce them

Children's group:

- To improve the children's understanding of food needs rather than food wants.
- To heighten awareness of the range of fruit and vegetables available.

Each week there are two main topics: these are indicated in bold in Tables 5.2 and 5.3 for Week 3. The rest of the programme is broadly repeated each week, with slightly different delivery to prevent the repeated aspects from becoming tedious for participants. This is with the exception of Weeks 9,10 and 11 for the Children's programme in which the one hour 'activity taster' replaced the second half of the session after the 'family break'. Furthermore, the format for Week 12 was different for both groups as this involved a party, after the data collection had been completed.

**Table 5.2 - Week 3 of the Parents' Programme for 'Families for Health' (version 1)**

	<b>Parent's Programme</b>	<b>Time mins</b>	<b>Description / comments</b>
3.1	Welcome	5	Warm welcome to all. Display group rules and session topics. Introduce collaborative reward system (different reward used each week).
3.2	Warm-up: changing places	10	Warm-up game (games vary each week)
3.3	Activity zone: Task force feedback	15	Feedback on last weeks evaluation. Traffic lights for change: Invite parents to share what they have stopped or started during the past week. Discussion on what has gone well.
<b>3.4</b>	<b>Balancing act 2: What our bodies need to eat</b>	<b>40</b>	Introduce 'Balance of Good Health' poster for 5 food groups. Display list 'What we like to eat' (from Week 2), then allocate to foods groups. Parents to assess what food groups their families' favourites come from. Using body as scales, examine balanced & unbalanced meal options. Discuss in pairs how to start to introduce change in foods offered, and display ideas on flip-chart.
	<i>FAMILY BREAK</i>	25	Parents join the children for: Healthy snack or taste test; then active game.
3.5	Marketplace	10	Sharing of ideas from parents about easy recipes, family activities etc. Give out photocopies of recipes etc from last week's Marketplace.
<b>3.6</b>	<b>Family rules, family rewards</b>	<b>25</b>	Introduction of the need for family rules. Step by step guide to make family rules. Introduction of family reward system (e.g. sticker chart) to motivate. Parents to think of reward system that may be popular in their family. Encourage selection of 'rewards' towards active pursuit / time as a family, rather than food or material gain.
3.7	Family task force	10	Traffic lights for change: encourage parents to choose what they would like to do next week, in light of the programme's suggestions.
3.8	Saying goodbye-Pass a wink	5	Wink to the person next door (different method used each week).
3.9	Tell us what you think	5	Feedback forms issued to parents, completed before they left.
	<i>HOMEWORK</i>		Agree family rules and reward system (children will be given a reward chart & stickers to take home). Introduce some food changes using Balance of Good Health.

Copyright: Candida Hunt and University of Warwick

**Table 5.3 - Week 3 of the Children’s Programme for ‘Families for Health’ (version 1)**

	<b>Programme</b>	<b>Time mins</b>	<b>Description / comments</b>
3.1	Welcome	5	Warm welcome / name badges. Introduce collaborative reward system (different reward used each week). Reminder of group rules. Introduce topics.
3.2	Warm-up games - Three-ball name game - Copy the leader	15	Two games as a warm-up. Invite nominations for rewards for playing well and drink water.
3.3	Activity zone: Task force feedback	10	Traffic lights for change: Invite children to share what they have stopped or started during the past week.
<b>3.4</b>	<b>Balancing act 2: What out bodies need</b>	<b>20</b>	Introduce ‘Balance of Good Health’ poster for 5 food groups. Display list ‘What we like to eat’ (from Week 2), then allocate foods to 5 groups. Using body as scales, examine food combinations (balanced & unbalanced).
3.5	Game: Alphabet arms	5	Active arm game.
3.6	Snack sorting	15	Food preparation for simple snack or taste test.
	<i>FAMILY BREAK</i>	25	Healthy snack or taste test; then active game, with parents.
3.7	Clearing up	5	Reward for children’s help with clearing up.
3.8	Game: Musical islands	10	Active game.
<b>3.9</b>	<b>Let’s make a rainbow</b>	<b>20</b>	Making a large rainbow with real fruit and vegetables. Learning about number of portions (5 a-day). Naming unusual ones. Take home 2 new ones to try.
3.10	Parachute game: Fruit bowl	5	Using a large parachute, play a game involving fruit names.
3.11	Family task force	10	Traffic lights for change: ask children to think what they will choose to do less of or stop and/or start during the next week. Give children a family reward chart and stickers to take home.
3.12	Saying goodbye: High five	5	Congratulate the group on the rewards they have gained in the session. Evaluation of session using hand: 1 finger ‘not good at all’; 5 fingers ‘great’. ‘High five’ to the person next door to say goodbye (different method used each week).
	<i>HOMEWORK</i>		Start family reward chart. Try two new fruit and/or vegetables.

Copyright: Candida Hunt and University of Warwick

## **5.5 Identification and Training of Facilitators**

Skilful facilitators are essential for the optimum delivery of the *'Families for Health'* programme. Two facilitators are required to lead the parent's group and two additional facilitators are required to lead the children's group. The model that was employed is one of training local facilitators in order to increase local capacity and sustainability.

A 'call for facilitators' was circulated to Coventry Teaching PCT, New Deal for Communities (Coventry), Coventry City Council and the Research Advisory Group. Availability on a Saturday morning and/or evenings was essential, and previous experience of group work with parents and/or children was deemed to be an advantage. Personal attributes were identified for facilitators and included being 'capable, kind and enthusiastic'. Following this publicity five facilitators were identified and recruited from local services in Coventry including a health visitor, school nurse, school lifestyle worker, nutritionist and mental health worker. Facilitators undertook a 3-day training course in July 2005 delivered by the programme developer. The aims of the training are described in Box 5.3 and an overview of the structure of the training is in Box 5.4. The facilitators were not paid for attending the training as it was felt that this would benefit their work in general, and employers treated it as continuous professional development. They were, however, paid to run the groups by Coventry Teaching PCT.

**Box 5.3- Aims of Facilitator Training for ‘Families for Health’**

1. To introduce the Programme and its underlying principles.
2. To outline the research agenda.
3. To reflect on the families facing families with overweight children.
4. To explore approaches that foster emotional well-being and positive relationships, and empower families to take charge of their health.
5. To test the Programme activities.
6. To familiarise trainees with the Programme resources.
7. To demonstrate supportive approaches to facilitation.
8. To build confidence in using the Programme effectively and enjoyably.
9. To practice nurturing, solution-focused facilitation skills.
10. To get to know each other – and to have fun.

Source: Candida Hunt (personal communication)

**Box 5.4 - Structure of the Facilitator Training for ‘Families for Health’**

- DAY ONE      Background to the Programme  
Programme overview  
What is health?  
Healthy lifestyle: issues around eating and physical activity
- DAY TWO      Ideas around discipline  
Empowerment: personal power, making choices, building self-esteem  
Feelings – a guide to our emotional health  
Solutions to stress
- DAY THREE    Learning styles and stages in learning  
Solution-focused approaches  
Practising facilitation  
The way forward

Source: Candida Hunt (personal communication)

## 5.6 Summary

The evidence from the literature is that parental involvement is key to the treatment of childhood obesity in under 12s (NICE 2006a). Parenting skills are important to implement and maintain lifestyle changes required for sustained behaviour change in the family. Therefore we have developed the '*Families for Health*' programme, in which group-based parent training is provided alongside interventions which promote a healthy lifestyle. A parallel group is also delivered for children. The programme shares some of the content with the Family Links Nurturing Programme (Hunt 2003), an evidence based parenting programme (Bavolek 2005). The parenting skills address both behavioural and relationship approaches, which aim to promote parents' and children's social and emotional wellbeing as well as lifestyle changes in the family.

## Chapter 6

### Delivery of the '*Families for Health*' Programme

#### 6.1 Introduction

This chapter describes the process evaluation of the '*Families for Health*' intervention. Process evaluation focuses on factors relating to the delivery of the intervention (Platt et al 2004), evaluating whether '*Families for Health*' was implemented as intended to the planned target group and how the programme is received by the families as implementation takes place. It can also help to explain the outcomes of the '*Families for Health*' intervention. As described in Chapter 4, I have used Linnan and Steckler's (2002) framework for the process evaluation. This comprises six components: context; recruitment; reach; dose delivered; dose received and fidelity. The results of each component will be presented.

#### 6.2 Context for the Intervention

The national context in which the intervention is embedded has been covered in Chapter 2: Review of Literature (Section 2.10). At the inception of the project, childhood obesity was on the public health agenda in Choosing Health (Department of Health 2004a), and a target had been set to halt the year-on-year rise by 2010. In recognition of the paucity of evidence of effective interventions, with little or no evidence from the UK, the National Institute for Health and Clinical Excellence recommended primary research around interventions to prevent or manage obesity in children (NICE 2006a). Subsequently, the focus on childhood obesity has accelerated with the Foresight Report (Government Office for Science 2007) and Healthy Weight,

Healthy Lives (Department of Health 2008a), with a longer-term target developed: “By 2020, we aim to reduce the proportion of overweight and obese children to 2000 levels” (Department of Health 2008a). The treatment of children who are obese is one aspect of the national strategy, with local care pathways required for three tiers of intervention (Department of Health 2008c). *‘Families for Health’* is a targeted ‘early intervention’ service (level 2).

The City of Coventry in the West Midlands of England was chosen as the setting to pilot *‘Families for Health’*. Details of the reasons for choosing this setting and the demography of the city are given in Chapter 4. The intervention was delivered in the Coventry Sports and Leisure Centre in the centre of Coventry. I established what support was already being offered in Coventry for the treatment of childhood obesity from members of the Research Advisory Group. At September 2005 there were three interventions running in Coventry. First, Coventry Sports and Leisure Centre ran the Active Kidz group-based programme for 7 to 11 year olds and the Teen Active programme for 12 to 15 year olds, but both of these were focusing only on physical activity. Second, there was limited access of children to dietitians via health professional referral only. Third, there was a specialist paediatric obesity clinic at University Hospital Coventry and Warwickshire. There were no interventions similar to *‘Families for Health’* already taking place in Coventry at September 2005, when the first group was run.



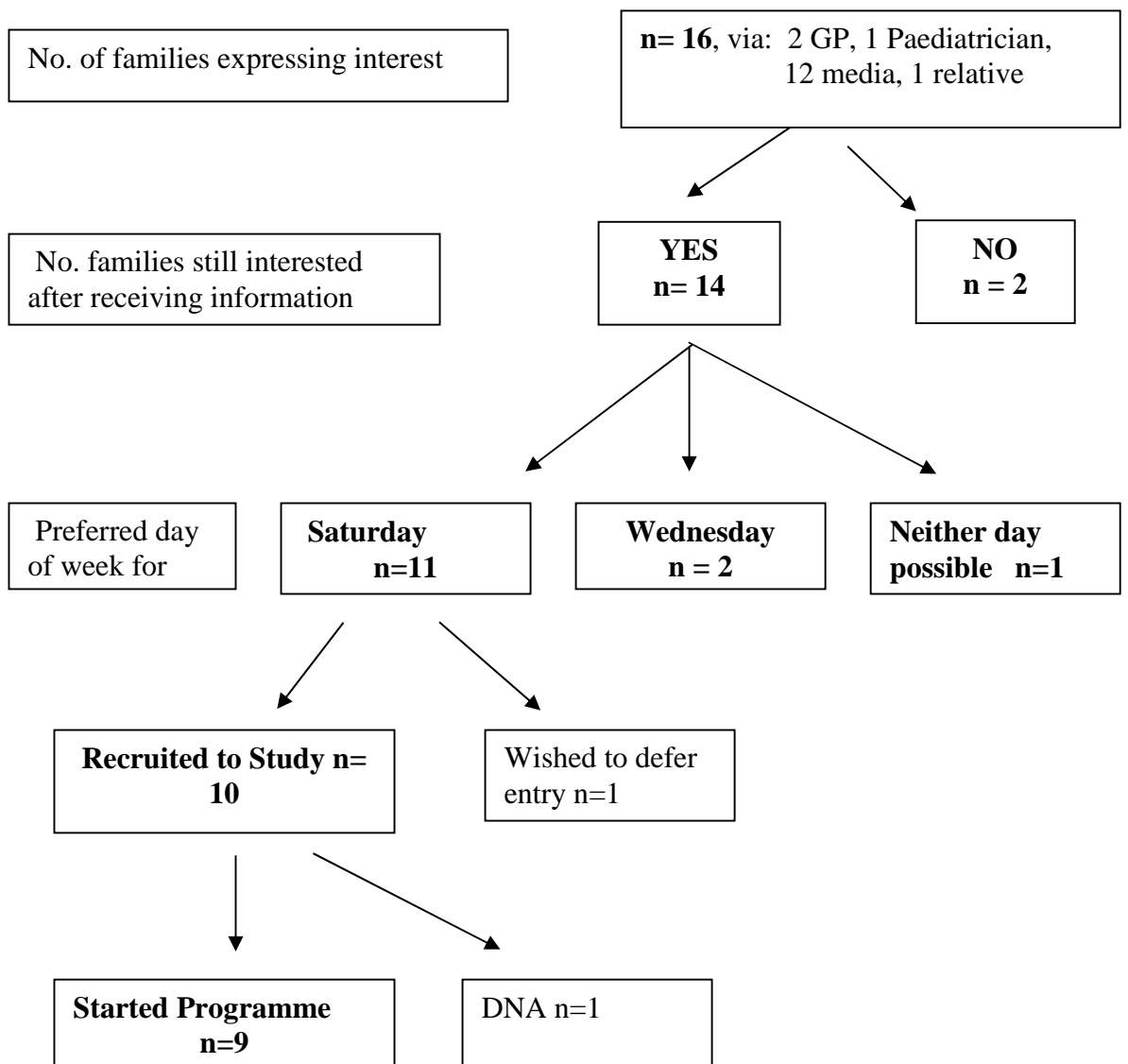
## **6.3 Recruitment**

### **6.3.1 How Families were Recruited**

The aim was to run two '*Families for Health*' groups concurrently in the Autumn term 2005, offering parents two choices of time:- Saturday morning or a weekday after school (Wednesday). By the end of July 2005 only three families had been referred from health professionals, whereas a much more successful strategy was unpaid media advertising in August 2005 resulting in a further 12 families coming forward. In total, 16 families expressed interest, and 14 of these remained interested once they had received the written information and considered participation further (Figure 6.1). However, 11 of the 14 families wished to attend on Saturday morning, with very few families being able to make Wednesday. Therefore, only the Saturday morning pilot was viable for the Autumn term 2005, to which 10 families (14 children) were recruited, with 9 of these families (13 children) started the programme in September 2005.

We were keen to pilot the programme on a weekday after school. I therefore recruited families to a second pilot running on Monday evenings from January to April 2006. Monday evening was chosen because families who were recruited to the first pilot said that Monday was generally a good night with less organised activities (e.g. cubs, brownies, swimming lessons). A total of 15 families expressed interest, with 12 families (14 children) subsequently recruited and started the programme. Therefore, we experienced some difficulty in recruiting sufficient families, with the original intention to run two groups concurrently not being possible, with one group having to be deferred.

**Figure 6.1 Recruitment to 'Families for Health' running in Autumn 2005**



Across the two groups 22 families (28 children) were recruited, with the source of their recruitment described in Table 6.1. Overall, the most successful recruitment method was through self-referral from information provided in the media (newspapers and radio), recruiting 14 of the 22 (64%) families. Health professionals recruited five families, and three families were recruited following recommendations from families who attended Group-1. No families came forward as a result of the school flyer.

**Table 6.1 – Methods of Recruitment of families to ‘Families for Health’**

<b>Recruitment Method</b>	<b>Group 1- Saturday Morning, Sept 2005 (no. families)</b>	<b>Group 2 - Monday Evening. Jan 2006 (no. families)</b>	<b>Overall  (no. families)</b>
<i>Health Professional referral</i>			
General Practice (7 practices)			
- Opportunistic	1	1	<b>2</b>
- Systematic	-	1	<b>1</b>
Paediatricians / Dietitians / Nutritionists	1	1	<b>2</b>
Health Visitors / School Nurses	-	-	<b>-</b>
<i>Other recruitment</i>			
Media – radio & newspapers	8	6	<b>14</b>
Flyer at two schools	N/A	-	<b>-</b>
Recommendation from family / friends	-	3	<b>3</b>
<b>TOTAL</b>	<b>10</b>	<b>12</b>	<b>22</b>

### **6.3.2 Recruitment via the Media**

Table 6.2 shows the level of coverage obtained in the local media, with newspaper articles shown in Appendix VII. For the first programme, the press release resulted in two articles in papers and in five radio interviews. Six of the eight families self-referring cited their source as the Coventry Evening Telegraph daily newspaper; BBC Ceefax was cited by one family; and the Ed Doolan radio show on WM BBC followed by the Coventry Evening Telegraph was cited by 1 family. The press release for the second programme sent on 16<sup>th</sup> December 2005 resulted in a somewhat delayed article to coincide with New Year, and one radio interview. All 6 families who self-referred cited the source as the Coventry Evening Telegraph.

**Table 6.2 Extent of Media Coverage for Recruitment to Families for Health**

	<b>Press releases</b>	<b>Resulting Articles in Local Newspapers &amp; Radio Interviews</b>
Group 1	Press release 3 <sup>rd</sup> August 2005 from University of Warwick's Press Office, entitled ' <i>University offers free help for Coventry children with weight problems</i> '	<p><b>Local Newspapers</b>                      5.8.2005 – Evening Telegraph (daily Coventry paper), '<i>Fun way to help children shed weight</i>' (p33)                      11.8.2005 – Coventry Citizen (free weekly paper), '<i>Uni to pilot weight loss programme for kids</i>' (p6)</p> <p><b>Five Radio Interviews</b>                      3.8.2005 - Heart FM (West Midlands), on the news                      - Kix Radio (Coventry), on the news                      - Mercia FM Radio (Coventry) -news&amp;web                      4.8.2005 - BBC Coventry &amp; Warwickshire, live                      5.8.2005 - Mercia FM Radio (Coventry) – interview</p> <p><b>Websites</b>                      University of Warwick website                      BBC Ceefax and web</p>
Group 2	Press release 16 <sup>th</sup> December 2005 from University of Warwick's Press Office, entitled ' <i>Free New Years Programme for Children with Weight Problems</i> '	<p><b>Local Newspapers</b>                      5.1.2006 – Evening Telegraph (daily Coventry paper), '<i>Slim classes target seven year olds</i>' (p27)</p> <p><b>Radio Interview</b>                      5.1.2006 – Kix Radio (Coventry) - interview</p>

### 6.3.3 Recruitment via General Practices

In total, three families were recruited from General Practices in Coventry, one family as a result of systematic recruitment and two opportunistically. Only 7 of the 19 general practices that I approached were willing to help with the recruitment.

#### 6.3.3.1 Reasons for General Practices Not Willing to help with recruitment

Of the 12 general practices who were unable to help with recruitment, a number of reasons were provided. Two practices did not think they had any children on their list who met the inclusion criteria, and therefore didn't see the need to be involved. A further five practices said they had no means of systematically identifying overweight/obese children from their practice database because they did not record children's BMI. Two practices also cited time constraints brought

about by the General Medical Services (GMS) contract which came into force on 14<sup>th</sup> April 2005 (Department of Health 2008b), making participation difficult for them.

### 6.3.3.2 Systematic Recruitment at General Practices

Of the seven general practices willing to help with recruitment, three offered to explore a systematic or universal recruitment method. The aim was to identify children who met the inclusion criteria from their general practice list and then contact these families. I give further methods and results in Table 6.3.

**Table 6.3 - Systematic Recruitment Methods of Three General Practices**

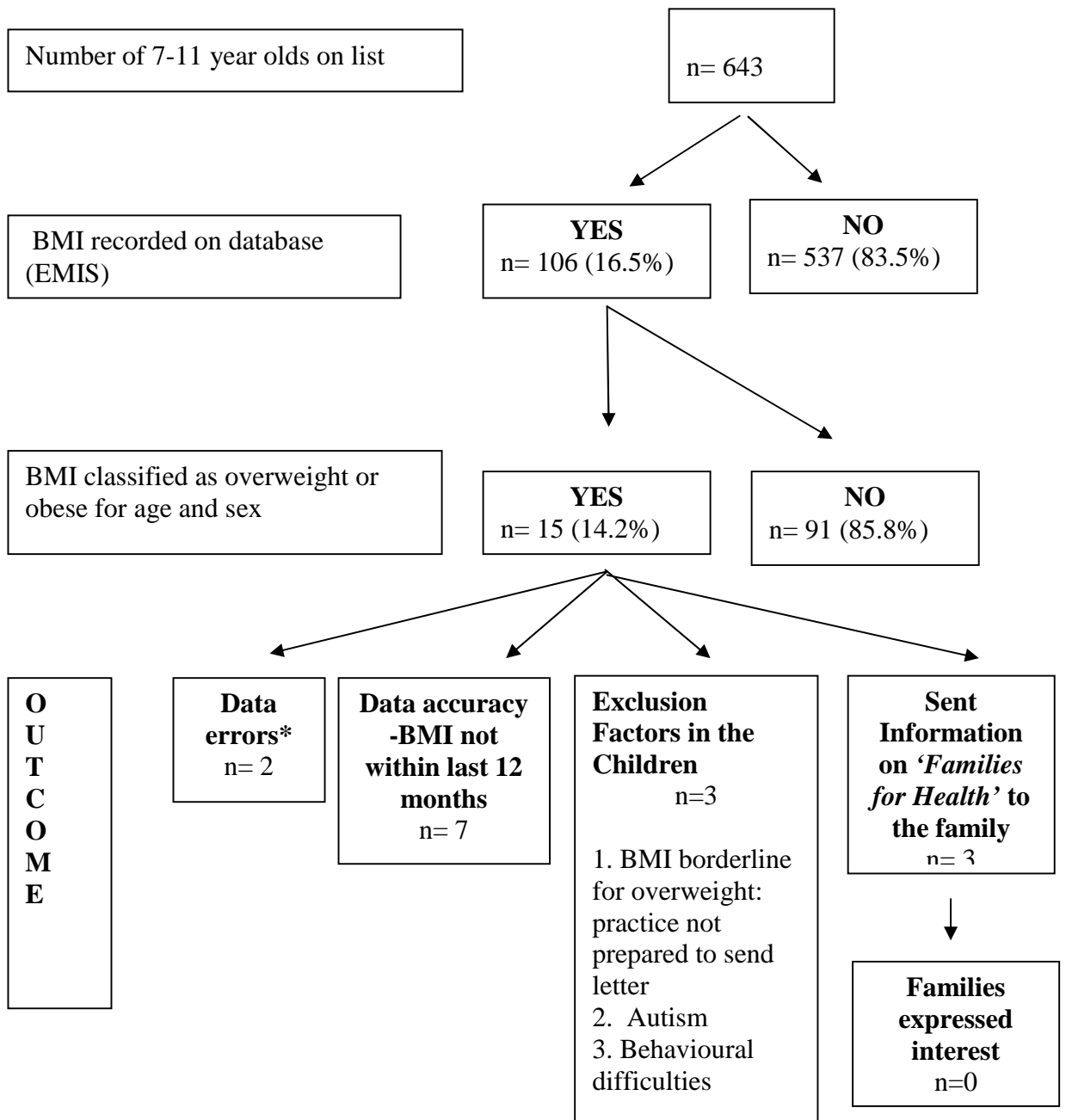
Who I met with	Method	Total Number 7 to 11 year olds	Possible Number of Eligible Children identified	Comments
1. GP with Special Interest in Obesity & Practice manager	Prior to the meeting, GP looked at asthma disease register (7 to 11 yrs) and scanned the practice list	N/A	21, unsure how many GP sent information to.	Asthma register used as children have BMI measured (comment from GP that BMI not measured on many other children). Some children identified as eligible was from GPs knowledge of the practice population, rather than measurement.
2. Practice Research Nurse	Research Nurse searched database before we met.	N/A	20 possible children identified. List passed to doctors for exclusion.	BMI measured mainly on children with asthma. 1 family expressed interest and was recruited to Group 2 (they couldn't make Saturday or Wednesday for the first group, but came to the second group)
3. Practice Research Nurse	Interrogated computer system (EMIS), with me present.	643 (from 10,500 list size)	106 (16.5%) had BMI recorded. Only 3 met inclusion criteria & sent information.	This confirmed the lack of current BMI measurements in children in this General Practice. Further details of the database search are in Figure 6.2.

The first two General Practices had searched their practice database before I met with them. Neither practice had many children with measurements of BMI recorded on their computer, apart from children on the asthma disease register. They identified 21 and 20 children who may be eligible. They both agreed to send letters to parents, once the list of those eligible had been screened for suitability, and one family was recruited as a result.

At the third practice the Research Nurse searched the practice database through their IT system (Egton Medical Information Systems - EMIS) while I was present. Therefore I was able to glean more detailed information, which is presented in Figure 6.2. Only 16% of children aged 7-11 years had BMI recorded on the practice database. Of the 15 children identified as overweight or obese by their BMI measurement, there were data accuracy issues for 9 children: the BMI was either clearly erroneous (n=2) or was not sufficiently recent (n=7). Three of the remaining six children with an appropriate BMI for recruitment were excluded by the Research Nurse, two due to extreme behavioural difficulties, and one because the BMI was only just into the 'overweight' category and she wasn't comfortable about sending out a letter to the family. Three parents were sent information about the study; none of these responded.

This attempt at recruitment via these three general practices highlights that GPs do not measure the BMI of many children and if they do, these measurements are not done regularly enough to make them sufficiently accurate.

**Figure 6.2 Flow Diagram of Outcome of Systematic Recruitment at One General Practice via search of practice database**



\* BMI values of 85.3 kg/m<sup>2</sup> and 71.4 kg/m<sup>2</sup> recorded for two children on the system, which was shown to be an error in the data entry.

## 6.4 Reach

Reach is defined as *'the degree to which the intended audience participates in an intervention'* (Linnan and Steckler 2002). I have chosen to consider three aspects of reach: the proportion of eligible children in Coventry who were recruited; the characteristics of participant families as compared with the profile of the Coventry population; and attendance and drop-out rates of participant families.

### 6.4.1 Participation by 'intended' audience

As one measure of the 'reach', I have estimated the proportion of overweight/obese 7 to 11 year olds in Coventry who came forward for the intervention. The number of overweight and obese 7 to 11 year old children in Coventry can be estimated from the National Child Measurement Programme. For the school year 2006/7, 620 of the 3196 pupils in Year 6 (age 10-11) in Coventry were obese (BMI >95<sup>th</sup> centile) (Information Centre 2008). *'Families for Health'* was aimed at four school years (Years 3 to 6) and was targeted at children who were overweight as well as obese (BMI >91<sup>st</sup> centile). A conservative estimate from the National Child Measurement Programme is that there were around 2000 overweight/obese children in Coventry who would have been eligible. Thus, the recruitment of 28 children from 22 families to the two groups of *'Families for Health'* represents an estimated 'reach' of only 1.4% (i.e. 28/2000). This is a very crude estimate, as the denominator will include children who are already in treatment for obesity, and a large number who did not hear about the intervention. However, it highlights that although some families will seek group-based family support, it is likely that many do not.



#### **6.4.2 Characteristics of Participants**

Table 6.4 shows the socio-demographic characteristics and baseline BMI for the families attending the two groups. Knowledge of which sub-groups participated in *'Families for Health'* is an important measure of reach, in order to establish if participants reflected the target population (Linnan and Steckler 2002). The majority of children were above the 98<sup>th</sup> centile for BMI and were therefore defined as obese (Cole 1995). There were also three children who were overweight, who were all siblings of an obese 'index' child. Three children were above the target age range of 7 to 11, two of whom were slightly older siblings. In more than half of the families at least one parent was obese.

The programme attracted a broad range of family types, from across all socio-economic groups (Table 6.4), reflecting the diversity in Coventry from extreme deprivation to high affluence (Grainger 2007b, Coventry Health Profile 2008). 82% of the children were white and 15% of the children were Asian, broadly reflecting the ethnic make-up of Coventry (84% white, 11.3% Asian or Asian British) (Coventry City Council 2001). Interestingly, two-thirds of the children were girls, due to a gender imbalance in the first group. Therefore, those recruited to the programme broadly reflected the target population, perhaps with the exception of gender.

**Table 6.4 – Socio-demographic and Baseline Characteristics of Families and their Children who started the ‘Families for Health’ Programme**

		<b>Group 1- SaturdayAM</b>	<b>Group 2 - Monday PM</b>	<b>Overall</b>
<b>Families (n)</b>		9*	12	21
Family Type	Two parent family	5	4	9 (43%)
	Single Mother	4	5	9 (43%)
	Mother and Step-Father	-	3	3 (14%)
Socio-economic classification of families	Managerial/professional	1	4	5 (24%)
	Intermediate	3	2	5 (24%)
	Routine & Manual	4	5	9 (43%)
	Never worked/unemployed	1	1	2 (9%)
Parental BMI	Not overweight/obese	1	3	4 (19%)
	At least 1 parent overweight	1	4	5 (24%)
	At least 1 parent obese	7	5	12 (57%)
<b>Children (n)</b>		13 (4 families with 2 children)	14 (2 families with 2 children)	27**
Gender	Males	2	7	9 (33%)
	Females	11	7	18 (67%)
Age (years)	Mean (SD)	9.0 (1.7)	9.5 (2.1)	9.3 (1.9)
	Range	7-12	7-13	7-13
Ethnicity	White	11	11	22 (81.5%)
	Asian	2	2	4 (15%)
	Mixed	-	1	1 (3.5%)
BMI Classification z-score	Overweight (n)	2	1	3 (11%)
	Obese (n)	11	13	24 (89%)
	Mean (SD)	2.65 (0.70)	2.86 (0.47)	2.76 (0.59)

\*Excluding 1 family which was recruited but did not start. \*\* 6 families had 2 children.

### 6.4.3 Attendance and Drop-out

Figure 6.3 shows the flow of families through the intervention and evaluation. For Group-1 (Saturday morning), nine of the 10 families who were recruited started the programme, with the mother attending from five families, and both biological parents attending from four families. Eight families (12 children) completed the programme (attended at least half of the sessions) (Figures 6.3, 6.5), with one family defined as a ‘partial completer’ because their attendance was irregular (attended little of the second half due to the mother’s work). One family dropped-out after two weeks (Figure 6.5), and despite attempts to contact them the reason for dropping out was not ascertained.

For Group-2 (Monday evening), 12 families started the programme (Figure 6.3). The mother attended from seven families; the step-father attended from one family; mother with father or step-father attended together from three families; and in one family the mother *or* father attended but not together. Only 5 families (6 children) completed the programme (Figures 6.3, 6.5), with one family defined as a 'partial completer' because they attended irregularly (attending at the start with the mother, at the end with the father, missing some middle sessions). Seven families (8 children) dropped out (Figures 6.3 and 6.5), with the main reason ascertained for five families by telephone. Four families dropped out due to pragmatic reasons: they had a new baby in the family which made attendance difficult; the mother got a new job which clashed with the timing of the programme; one family experienced a serious domestic issue; and one family had difficulty getting to the group by 5pm because the mother worked full-time. One family had an issue with the content and delivery of the programme, with the child not enjoying it.

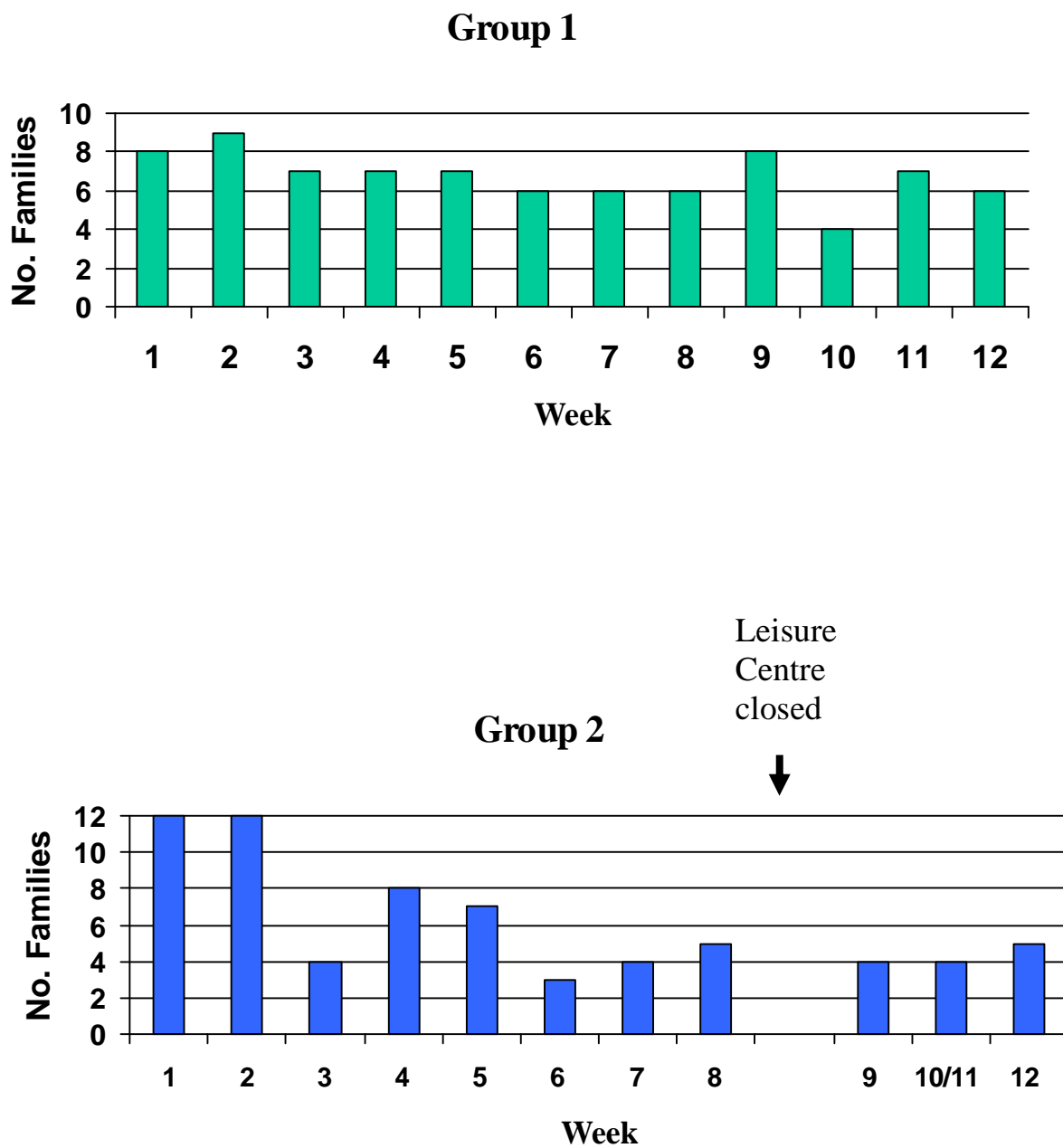
Overall, the reach of the programme was much better on Saturday morning than Monday after school, as shown by better attendance rate (75% vs 52%) (Figure 6.4) and much lower number of families withdrawing (1 family vs 7 families) (Figures 6.3, 6.5). For the two groups combined, attendance was 62%. Of the 27 children who started the programme, 15(56%) completed, 3(11%) partially completed and 9(33%) withdrew from the programme (Figure 6.3). This drop-out rate is within the range for other obesity treatment interventions (NICE 2006a, p460). The reasons for families dropping out were explored further in interviews with parents, and will be reported in the section on the fidelity (section 6.7.2).

Figure 6.3 – Flow of families through the two pilot groups and evaluation, and for the two groups combined

	Group 1 – Saturday Morning			Group 2 – Monday Evening			Both Groups Combined		
<b>Recruited:</b>	10 families (14 children)			12 families (14 children)			22 families (28 children)		
	↓			↓			↓		
	1 family D.N.A (1 child)						1 family D.N.A * (1 child)		
<b>Started Programme:</b>	9 families (13 children)			12 families (14 children)			21 families (27 children)		
	↓			↓			↓		
<b>Programme Completion:</b>	<b>Completed</b>	<b>Partial Completion</b>	<b>Drop Out</b>	<b>Completed</b>	<b>Partial Completion</b>	<b>Drop Out</b>	<b>Completed</b>	<b>Partial Completion</b>	<b>Drop Out</b>
	7 families (10 children)	1 family (2 children)	1 family (1 child)	4 families (5 children)	1 family (1 child)	7 families (8 children)	11 families (15 children)	2 families (3 children)	8 families (9 children)
	↓	↓	↓	↓	↓	↓	↓	↓	↓
<b>Follow-up – 3 &amp; 9 mths</b>	7 families (10 children)	1 family (2 children)	No	4 families (5 children)	1 family (1 child)	3 families (4 children)	11 families (15 children)	2 families (3 children)	3 families (4 children)
	↓	↓	↓	↓	↓	↓	↓	↓	↓
<b>Follow-up – 2 years</b>	6 families (9 children)	1 family (2 children)	No	4 families (5 children)	1 family (1 child)	1 family (2 children)	10 families (14 children)	2 families (3 children)	1 family (2 children)

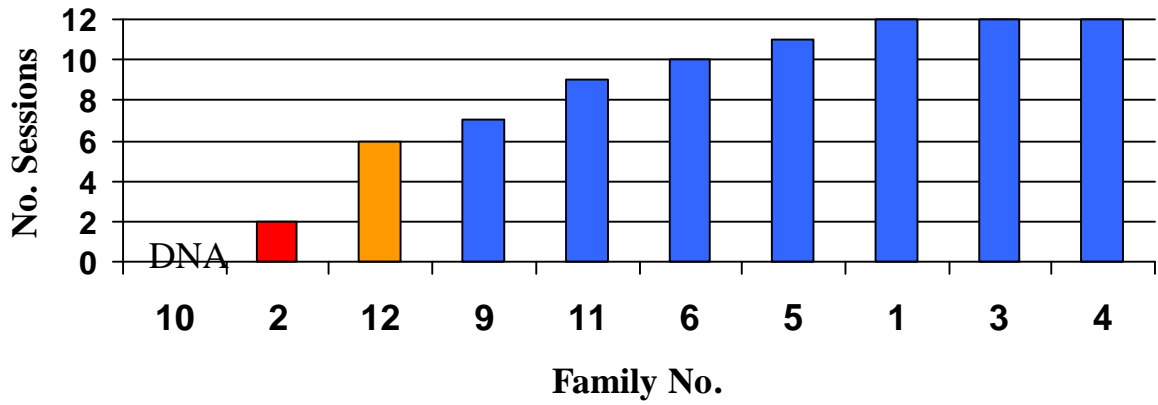
\* One family did not start Group 1 due to a family bereavement

Figure 6.4 – Weekly Attendance at Families for Health for Group 1 (Autumn 2005) & Group 2 (Spring 2006)

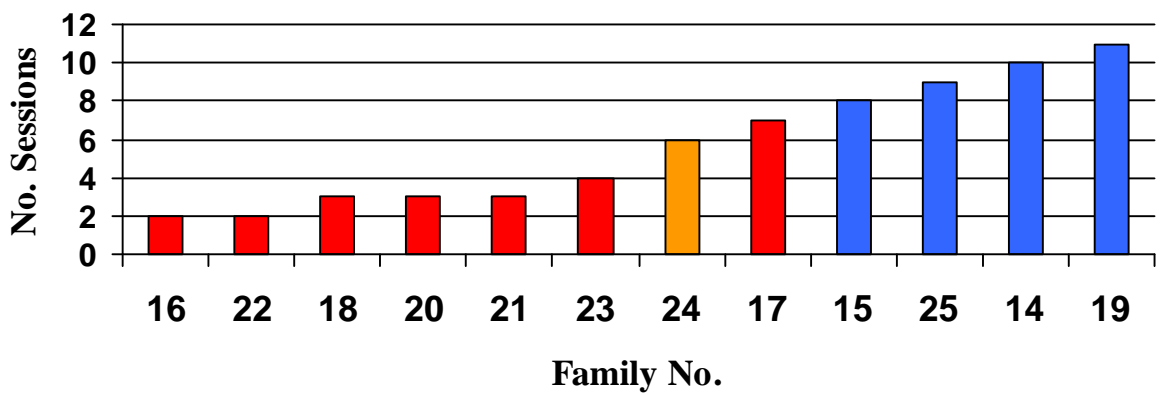


**Figure 6.5 – Number of sessions attended by each Family for Groups 1 and 2, along with their completion status (blue = completers, orange = partial completers, red = withdrew)**

**Group 1 (12 weeks maximum)**



**Group 2 (11 weeks maximum)**



## 6.5 Dose Delivered

The dose delivered or the 'amount' of the '*Families for Health*' programme that was provided by the intervention team has been assessed by various sources of data. I attended each session of both programmes, and observed that the intended 12-week programme was delivered as planned to the attending families, with a few exceptions. The trained facilitators delivered the programme in accordance with the detailed facilitators' handbooks, and were usually well prepared for the sessions.

I noted some enforced structural changes to the delivery of the programme, which are described in Table 6.5, along with an assessment of their likely impact. There was minimal change to the planned programme for Group-1. The changes were more profound for Group-2, with the programme having to be adapted to take account of the closure of the leisure centre one week and due to dwindling numbers of families who were attending. These adaptations appeared successful. Furthermore, due to a shortage of facilitators for the second group, the programme developer facilitated the parents' group on her own, whereas the original plan was to have two facilitators. The programme developer had expressed anxiety about facilitating the group on her own in week-1:

- *Can I hold together effectively a group of 15 parents on my own – no chance of dividing into 2 groups for max attentive facilitation. Daunted by large numbers.* (Week-1, Facilitator, Parents Group-2)

A sole facilitator with a large group is one of the factors that could be associated with the large number of families dropping out of Group-2. Perhaps too many families were recruited to the second group (12 families, 15 parents), but there remains a balance between the optimum size for facilitation and having a viable

group. The drop-out rate in Group-2 is explored in detail later. A more detailed discussion of the changes to the programme are also in Appendix XVII.

**Table 6.5 Enforced Changes to the Structure of the Programme**

	<b>Change</b>	<b>Interpretation of the likely impact</b>
<b>Group 1</b>	In Week-9 the leisure centre promised the swimming pool for the children’s activity taster, but this was unexpectedly not available. Another activity taster in the gym was substituted (multi-sports including uni-hoc, skipping, bouncy castle, short tennis).	The children were disappointed. Attendance dropped from 8 families in Week-9 to 4 families in Week-10 (Figure 6.4), which may have been associated with the cancellation of the swimming.
<b>Group 2</b>	One person facilitated the parents’ programme instead of two (due to difficulty with recruiting a facilitator). (The facilitator was the programme developer, who had already run Group 1 and is experienced at running parenting groups.)	The facilitator was experienced, thus minimising the impact, but she was concerned about delivering the group on her own. However, because the starting number of families was 12 with a potential for 15 parents, this was a large group for one person to facilitate.
	Due to the dwindling number of families attending from week 3, children and parents groups were combined for part of 2 sessions: Week-3 - making a rainbow out of fruit and vegetables (usually only children’s group) & family rules (usually only parents’ group) Week-6 - this included portion sizes (usually only parents’ group)	Joint sessions (parents and children) received some positive responses from parents and facilitators, but non-attendance of families was commented as adversely affecting group cohesion.
	In Week-9 the leisure centre was unexpectedly closed (asbestos removal). So, the programme was shortened to 11 weeks.	The core-content was covered, with the programme for weeks 10&11 combined together. Seemed fine.



## **6.6 Dose Received**

'Dose received' is defined as the extent to which participants 'actively engage' with the programme (Linnan and Steckler 2002), as the implementation takes place. Engagement was better on Saturday than Monday, as defined by both higher attendance (75% vs 52%) and lower number of withdrawals (1 family vs 7 families) (Section 6.4.3). In this section I have chosen to consider three aspects to assess active engagement by the parents. These are: the overall perception of the weekly sessions and the programme; the engagement with the weekly topics; and an assessment of the parents' engagement with the group process. The parents are the focus of this section because they are perceived to be the 'agents of change'.

The weekly feedback forms from parents enabled me to assess the extent of their engagement on a week-by-week basis, having the advantage of being completed at the end of each session obtaining 'real-time' ratings and comments, minimizing problems with recall. The use of such forms may have limitations. First, although they were completed anonymously, facilitators gave out and collected back the evaluation forms, and they may be subject to social desirability response bias. Second, the tedium of completing them at the end of the 2½ hour session may compromise the accuracy and depth of the data. Third, the week-by-week responses are based on the participants who continued to attend. Therefore, the weekly questionnaires are supplemented by data from the questionnaire completed by parents at the end of the 12-week programme, having an additional advantage of being completed once families have had chance to try out the new skills and knowledge. 10 parents (8 families) from Group-1 and 10 parents (8 families) from Group-2 completed the

end-of-programme questionnaire, and included responses from three families who had dropped out.

### 6.6.1 Overall Perception of Weekly Sessions and Programme

Table 6.6 shows the parents' weekly ratings of the programme. The overall summary showed that 72/85 (85%) responses from parents in Group-1 and 66/72 (92%) responses from parents in Group-2 rated the weekly sessions as 'Good' or 'Great'. This indicates that the parents *who attended* the sessions were on the whole happy with them. The final column of Table 6.6 shows that week-by-week there was little difference in the percentage who rated the session as either 'Good' or 'Great'. This is perhaps apart from week 3 which had a slightly lower session rating. There are only two very poor ratings from parents.

**Table 6.6 – Weekly Evaluation of Parents: How do you feel about today's session?**

Week	<i>Group 1 – Saturday Morning, Autumn 2005</i>					<i>Group 2 – Monday Evening, Spring 2006</i>					Both Groups % Good or Great
	<i>Awful</i> ☹	<i>Bad</i>	<i>OK</i> ☺	<i>Good</i>	<i>Great</i> ☺	<i>Awful</i> ☹	<i>Bad</i>	<i>OK</i> ☺	<i>Good</i>	<i>Great</i> ☺	
1	1		3	5	2			2	9	4	77%
2			1	6	4	1		1	6	4	87%
3			4	2	3					4	69%
4				5	4			1	3	5	94%
5			2	1	4				2	5	86%
6			2	3	2					4	82%
7				2	4				1	4	100%
8				1	6				2	4	100%
9				2	6			1	1	3	85%
10				1	3				1	4	100%
11				1	5	-	-	-	-	-	100%
<b>Total</b>	<b>1</b>		<b>12</b>	<b>29</b>	<b>43</b>	<b>1</b>		<b>5</b>	<b>25</b>	<b>41</b>	
<b>%</b>	<b>1%</b>		<b>14%</b>	<b>34%</b>	<b>51%</b>	<b>1%</b>		<b>7%</b>	<b>35%</b>	<b>57%</b>	<b>88%</b>

*NB. Evaluation not done in session 12 (completing end-of-programme evaluation instead). For Group-2, weeks 10 & 11 were combined (due to leisure centre closure one week).*

In the end-of-programme questionnaire, when asked about how they felt about the programme as a whole, parents gave similar positive responses. The ten parents from group 1 responded: OK (1), Good (5), Great (4); and the ten parents from group 2 responded: OK (2), Good (2), Great (6).

### **6.6.2 Engagement with Weekly Topics**

Each week two main topics were covered in the parents' programme (Chapter 5). On the weekly evaluation form, parents were requested to respond to the questions 'What did you find useful or enjoyable this week?' and 'What did you NOT find useful or enjoyable this week?' To assess whether the parents engaged with the weekly topics the qualitative responses to these questions were quantified (Caracelli and Greene 1993), by identifying the number of parents who mentioned these topics as useful or enjoyable (or not). Most topics received some positive comments from parents (Table 6.7), with two topics on food being cited most as being useful or enjoyable: portion sizes in week 6 (7/11 parents, 64%) and food labels in week 9 (12/13 parents, 92%). Furthermore, although not a 'topic' per se, the introduction to the programme in week 1 was mentioned as being useful or enjoyable by 19 of the 26 parents (73%). There were very few negative comments.

**Table 6.7 - Topics that parents found or did not find useful/enjoyable**

Week	Number of Parents completing evaluation		Main Weekly Topics	Times mentioned as 'useful' or 'enjoyable'		Times mentioned as NOT 'useful' or 'enjoyable'		% giving +ve comments
	Gp 1	Gp 2		Gp 1	Gp 2	Gp 1	Gp 2	
1	11	15	Introductions What is health? <b>Nurturing</b>	9 - -	10 - 1	2 - -	1 - -	73% - 4%
2	11	12	<b>Discipline &amp; praise</b> <b>Energy Balance(energy in,energy out)</b>	3 * 3	6 1	- -	- -	39% 17%
3	9	4	What our bodies need to eat <b>Family rules, family rewards</b>	3 2	2 3	- -	- -	38% 38%
4	9	9	Finding our personal power <b>Surviving at the supermarket</b>	2 6	5 - *	- 1	- -	39% 33%
5	7	7	Our eating habits (inc lunchboxes) <b>Choices...and consequences</b>	1 3	3 0	- -	- -	29% 21%
6	7	4	How much we eat (portions) <b>Building self-esteem</b>	5 1	2 -	- -	- -	64% 9%
7	6	5	Thinking about feelings <b>Active alternatives to the screen</b>	1 * 2	1 1	- 1	- -	18% 27%
8	7	6	Stress & what we can do about it <b>Coming to our senses (relaxation)</b>	- 3	3 2	- -	- -	23% 38%
9	8	5	Food labels: what do they mean? <b>Labelling our children</b>	8 2	4 1	- -	- -	92% 23%
10	4	5	A life of diets or healthy lifestyle? <b>Communicating: "I" statements</b>	- 1	2 -	- -	- -	22% 11%
11	6	(with Wk 10)	From problem to solution <b>Meeting the challenge (including special occasions)</b>	1 1	1 -	- -	- -	18% 9%

\* Parts not delivered: Group-1: Week-2 – Praise not covered in depth; Week-7 – Part of 'Thinking about feelings' section. Group-2: Week-4 - Surviving at the supermarket

To further explore the active engagement with the weekly topics, the end-of-programme questionnaire asked for parents' ratings (1 to 5) of how helpful they

had found 12 parenting skills topics (Table 6.8), five physical activity topics (Table 6.9) and 10 food topics (Table 6.10). Parents also also rated how confidently they were using these topics. Due to absence at sessions not all parents rated each topic, and in particular the families who had dropped out rated very few topics. The results are presented for both groups combined. The percentage of responses from parents which rated the various components as helpful (scoring 4 or 5) was high for parenting skills (84%), physical activity (79%), and food (83%) topics. The proportion of responses from parents which indicated that they were using these skills and knowledge confidently (scoring 4 or 5) was however lower, at 63% for parenting skills, 57% for physical activity topics and the highest for food topics at 73%.

**Table 6.8 How helpful have these parenting topics been, and are parents using the ideas confidently?**

	<i>How helpful?</i>					<i>Rate 4&amp;5 %</i>	<i>Using confidently?</i>					<i>Rate 4&amp;5 %</i>
	<i>Not</i> ☹		<i>Very</i> ☺				<i>Not</i> ☹		<i>Very</i> ☺			
	1	2	3	4	5		1	2	3	4	5	
Nurturing ourselves/our children...healthily			3	6	6	88%			6	4	5	60%
Giving praise				7	8	100%		1	3	6	6	75%
Boundaries, family rules		1	2	7	5	80%		2	5	7	2	56%
Family rewards		1	3	3	8	73%		2	6	-	7	47%
Finding our personal power			4	5	6	73%		1	5	6	3	60%
Choices & consequences			3	8	4	80%		2	4	7	2	60%
Building self-esteem			3	6	6	80%		1	4	9	2	69%
Thinking about children's feelings			1	7	7	93%		1	4	7	4	69%
Listening to children			1	6	8	93%			3	8	5	81%
Solutions to stress			2	9	4	87%		1	3	12	-	75%
Using 'I' statements			4	3	5	67%		2	7	3	1	31%
From problem to solution			1	10	4	93%		-	5	10	1	69%
<b>Parenting (12 items)</b>	<b>n</b>	-	<b>2</b>	<b>27</b>	<b>77</b>	<b>71</b>		-	<b>13</b>	<b>55</b>	<b>79</b>	<b>38</b>
	<b>%</b>	-	<b>1</b>	<b>15</b>	<b>44</b>	<b>40</b>	<b>84%</b>	-	<b>7</b>	<b>30</b>	<b>43</b>	<b>20</b>
												<b>63%</b>

**Table 6.9 How helpful have these healthy lifestyle physical activity topics been, and are parents using the ideas confidently?**

	<i>How helpful?</i>					<i>Rating 4&amp;5 %</i>	<i>Using confidently?</i>					<i>Rating 4&amp;5 %</i>
	<i>Not</i> ☹		<i>Very</i> ☺				<i>Not</i> ☹		<i>Very</i> ☺			
	1	2	3	4	5		1	2	3	4	5	
Exploring our motivation to change/sharing changes			2	10	3	87%		1	5	8	1	60%
Balancing act 1: energy in and energy out			2	9	4	87%		1	6	7	1	53%
Using our power to help children be more active			3	8	4	80%			3	9	3	80%
Using our power to be more active ourselves			4	7	4	73%			9	4	2	40%
Active alternatives to the screen ( TV, etc.)			5	6	4	67%			7	6	2	53%
<b>Activity Topics (5 items) n</b>	-	-	<b>16</b>	<b>40</b>	<b>19</b>		-	<b>2</b>	<b>30</b>	<b>34</b>	<b>9</b>	
<b>%</b>	-	-	<b>21</b>	<b>54</b>	<b>25</b>	<b>79%</b>	-	<b>3</b>	<b>40</b>	<b>45</b>	<b>12</b>	<b>57%</b>

**Table 6.10 How helpful have these healthy lifestyle food topics been, and are parents using the ideas confidently?**

	<i>How helpful?</i>					<i>Rating 4&amp;5 %</i>	<i>Using confidently?</i>					<i>Rating 4&amp;5 %</i>
	<i>Not</i> ☹		<i>Very</i> ☺				<i>Not</i> ☹		<i>Very</i> ☺			
	1	2	3	4	5		1	2	3	4	5	
Exploring our motivation to change/sharing changes			2	10	3	87%			5	6	3	64%
Balancing act 2: Food groups “plate”			2	7	6	87%		1	5	6	3	60%
Shopping: Surviving at the supermarket			2	3	9	86%			3	4	6	77%
When, how & why we eat: Healthy eating habits			4	5	6	73%			5	5	4	64%
Lunchboxes and snacks			3	5	7	80%			3	6	5	79%
How much we eat: Portions and portion sizes			3	3	8	79%			3	4	7	79%
Who’s in charge of what children eat		1	2	3	8	79%			2	7	5	86%
Food labels			3	4	9	81%		1	2	7	6	81%
A life of diets vs healthy lifestyle		1	2	5	7	80%		1	4	6	4	67%
Balancing act 3: Special occasions			1	12	3	94%			4	10	2	75%
<b>Food Topics (10 items) n</b>	-	<b>2</b>	<b>24</b>	<b>57</b>	<b>66</b>		-	<b>3</b>	<b>36</b>	<b>61</b>	<b>45</b>	
<b>%</b>	-	<b>1</b>	<b>16</b>	<b>38</b>	<b>45</b>	<b>83%</b>	-	<b>2</b>	<b>25</b>	<b>42</b>	<b>31</b>	<b>73%</b>

The comments made by parents about specific parenting, physical activity and food topics are detailed in Appendix XVIII, in order to further illustrate their engagement with the programme. This shows that parenting topics of giving praise; finding our personal power, family rewards, stress and relaxation and choices and consequences had received many positive comments from parents. Physical activity topics received less positive comments, with some parents indicating that they would have liked more physical activity on the programme (this will be returned to in Chapter 9). Parents had engaged particularly well with the topics on food, and in particular with the sessions on food labels, portion sizes and surviving at the supermarket. The programme developer agreed, citing a specific example on portion sizes:

- *I think initially they latched onto the food stuff most readily. It's the most teaching bit of it, if you like, it's less subtle than some of the other bits. And it's the most specific. You can say this is a portion of this, this is a portion size of that you have and they all say 'blimey no we have portions much bigger than that'. So they were astonished by what a standard portion size is, absolutely astonished. I think they valued the information and the trick is to give it to them in a way that isn't too much teaching. I had props, I had a computer mouse and tennis ball, a box of matches, a pack of cards and some dice. And I got them to guess, which of those objects represented a standard portion from each of the five food groups? And they were very surprised at how small they were.*  
(Group-1, Interview, Programme Developer)

### 6.6.3 Family Break Time with Children

The weekly family break, when the parents joined the children for a healthy snack and a game, also received many positive comments from parents and appeared to be an important element in the weekly programme.

The functions that the family break served were in three areas. First, comments in the early sessions included that the parent's seemed to be reassured by the family break because they were able to see that their children were having a good time: -

- *See the kids enjoying themselves (Group-2, Week-1)*
- *I was happy that X was interacting with other children with the same feelings as her and who have the same challenges.(Group-1, Week-1)*
- *Knowing that the children are happy, activity time. (Group-1, Week-2)*

Second, some parents responded that it was the games that they shared with the children in the mid-session break that they had found enjoyable:

- *The game with the children was really fun today. (Group-1, Week-4)*
- *Playing games with the children (Group-2, Week-7)*

One parent had found some of the games uncomfortable, although with one of the group's ground-rules being the right to opt-out, this had not been an issue for her:

- *Occasionally there would be a game I felt embarrassed to participate in but I just sat it out and it was never questioned why. (Group-2, Parent-14, End-of-programme)*

Third, there were positive comments from parents about the preparation of healthy snacks by the children:

- *Nice to see the children so excited about working with fruit. (Group-1, Week-4)*



- *Thought the snack idea was excellent to get the children to think healthy food was fun to produce rather than the usual crisps and pop. (Group-2, Week-1)*
- *They loved 'cooking' for us! (Group-1, Parent-9, End-of-programme)*

Fourth, many positive comments were made about the taste tests (crackers, breads, juices/smoothies) in three of the weeks. The first comment below reflects back the reasons why taste tests were included in the programme, that is to encourage children to try new foods.

- *The taste test was nice. It was nice to see the children trying things they didn't really think they would like. (Group-1, Week-8)*
- *Loved the homemade bread—will try the recipe at home but will have to resist the temptation to eat it all! (Group-2, Week-5)*

Three negative comments were received about not liking taste-tests and in particular smoothies.

- *I didn't like the smoothy!!! I was going to buy one [smoothie maker] now I am thinking twice—you may have just saved me £50.00!! (Group-2, Week-8)*
- *He was a bit dubious in his approach to healthy snack time but did try new things. (Group-2, Parent-14, End-of-programme)*

One parent made a valuable comment that they would have liked to prepare the healthy snacks for the children, and the children join them, which is a good thought for occasional weeks:

- *I would have liked to have made the children a healthy option and them to have come to us. (Group-1, Parent-3, End-of-programme)*

The family break was well received by the parents, and reinforced the main topics.

To summarise, taking the weekly and end-of programme evaluations together, there is evidence that parents have actively engaged with the majority of the weekly topics and the family break. Parents are increasing their knowledge and skills, in particular around food and parenting topics.

#### **6.6.4 Engagement with the Group from Weekly Evaluations**

Many positive comments on the weekly evaluation forms indicated that parents had engaged well with the group, which reinforced the benefits of a group-based programme. The stages of group development described by Tuckman (1965) of Forming, Storming, Norming, Performing and Adjourning is one model by which we can explore the transitions that parents may experience when involved with a group-based parenting programme. Although this model is used in the management of teams, I feel it can apply equally well to the development of parenting groups. The 'real time' comments made by participants in their weekly evaluation during implementation of the programme shows the two groups evolving through Tuckman's first four stages during the 12-week course (see Table 6.11).

In the early weeks there was a focus on 'forming' the group with parents' comments relating to getting to know each other, and of reassurance that other families have the same problems. Although acceptance of the group and trust were starting to build, some comments also showed that some parents were uncomfortable with the first week. In the 'storming' phase, the main comments were about the disappointment at the low attendance and also showed some challenge to the ideas of others, for example around diet sheets and mixed aerobics. The groups seemed to enter the 'norming' phase by around week-4 for Group-1 and week-6 for Group-2. This judgement was made according to their comments around the programme being fun, friendly, relaxed, and open. The 'performing' phase was reached with comments about the sharing and using of other parent's ideas; a focus on achievements; and some indication that the facilitators are in a support role. In summary, the parents actively

engaged in the group process, and this had evolved appropriately during the 12-week programme. The specific benefits of the group process will be explored further in Chapter 9.

**Table 6.11 – Responses from Parents of Group 1 and Group 2 in their weekly evaluations to reflect the stages in group development (Tuckman 1965)**

Stage	Group 1
Forming	<ul style="list-style-type: none"> <li>• <i>Getting to know everyone, knowing we are not alone! Sharing ideas / doubts. Listening to peoples ideas, being in a group where everyone has similar ideas and similar problems. (Week 2)</i></li> <li>• <i>Other people's openness about having problems with their children and realising that I'm not a complete failure (Week 2)</i></li> </ul> <p><b>Did not find useful or enjoyable:-</b></p> <ul style="list-style-type: none"> <li>• <i>Sharing personal things. (Week 1), Being put on the spot. (Week 1)</i></li> <li>• <i>I prefer to discuss ideas as a big group rather than going into smaller groups. (Week 1)</i></li> </ul>
'Storming'	<ul style="list-style-type: none"> <li>• <i>I think people asking for diet sheets wasn't very good because at such a young age I would hate my child to think she was on a diet. (Week 2)</i></li> <li>• <i>Some people not showing up, or late, you feel a little let down. (Week 3)</i></li> </ul>
Norming	<ul style="list-style-type: none"> <li>• <i>As the weeks progress it's becoming more relaxed and fun. (Week 4)</i></li> <li>• <i>We seem as a group a lot more open, it's fun. (Week 5)</i></li> <li>• <i>We feel more relaxed with each other in the group. (Week 8)</i></li> </ul>
Performing	<ul style="list-style-type: none"> <li>• <i>Thanks for being here every week and supporting us. (Week 7)</i></li> <li>• <i>The whole programme content is great and it's nice sharing experiences and achievements. (Week 8)</i></li> <li>• <i>Being in a friendly atmosphere makes you relax more enabling us to share our opinions and use other peoples ideas. (Week 10)</i></li> <li>• <i>Lots of great ideas from people. (Week 11)</i></li> <li>• <i>It's great to attend sessions where you leave feeling positive &amp; motivated.(Week 11)</i></li> </ul>
	Group 2
Forming	<ul style="list-style-type: none"> <li>• <i>All parents having the same issues &amp; we were able to share our concerns. (Week 1)</i></li> <li>• <i>Listening to other peoples opinions, learning other people struggle the way you do with their children and food, meeting new people. (Week 1)</i></li> <li>• <i>Only intended to come for 1<sup>st</sup> week to support partner, however I am intrigued and will be back next week! (Week 1)</i></li> </ul>
'Storming'	<ul style="list-style-type: none"> <li>• <i>It was a shame not so many turned up but the session was still a success. (Week 6)</i></li> <li>• <i>It's such a shame that so many appear to have fallen by the wayside. (Week 7)</i></li> <li>• <i>Mixed aerobics with children sounds great but I'm not sure it would work. Be good to check it out! (Week 2)</i></li> </ul>
Norming	<ul style="list-style-type: none"> <li>• <i>Sharing our ideas with each other (Week 6)</i></li> <li>• <i>The openness and honesty of the people involved is quite refreshing! (Week 7)</i></li> <li>• <i>The group was small and there was more chance for us all to voice opinion etc. We joined the children and I enjoyed it. (Week 6)</i></li> <li>• <i>Really like the way everyone is so friendly and willing to join in. (Week 8)</i></li> </ul>
Performing	<ul style="list-style-type: none"> <li>• <i>Talking to each other about things that work to encourage each other. (Week 7)</i></li> <li>• <i>Talking about tackling stress, getting everybody else's views on how I could deal with situations better than I do. (Week 8)</i></li> <li>• <i>I find it useful when we share what we have achieved this past week. Results leave us feeling positive about the week ahead. (Week 10/11)</i></li> <li>• <i>Really proud to be part of the programme. Well done to you all. (Week 10/11)</i></li> </ul>

## **6.7 Programme Fidelity**

The fidelity of the programme will now be assessed, defined as the *'extent to which the intervention was delivered as planned'* (Linnan and Steckler 2002).

This section will pull together the previous assessment in this chapter around recruitment, reach, dose delivered and dose received. Thereafter, an assessment of the higher drop-out rate for Group-2 will be made.

### **6.7.1 Overall comments**

We ran the *'Families for Health'* 12-week programme in Coventry with two groups of families with at least one overweight/obese child aged 7-11 years. The first group ran on Saturday mornings from September to December 2005 starting with 9 families. A second group ran on a Monday evening from January to April 2006 starting with 12 families. This was as planned, apart from the groups were run sequentially rather than concurrently, due to difficulties with recruiting families.

Assessment of reach showed that the programme attracted a broad range of families, with the socio-economic and ethnic make-up reflecting the population of Coventry. Attendance was much better on a Saturday morning (75% attendance, 1 family withdrew) than on Monday evening (52% attendance, 7 families withdrew). *'Families for Health'* was delivered broadly in accordance with the facilitators handbooks, with some deviations for Group-2. In the evaluation of dose received, the parents were shown to be actively engaged with the weekly topics and the group process. The main problem, however, was the large number of families who dropped out of the second group, which is explored below.

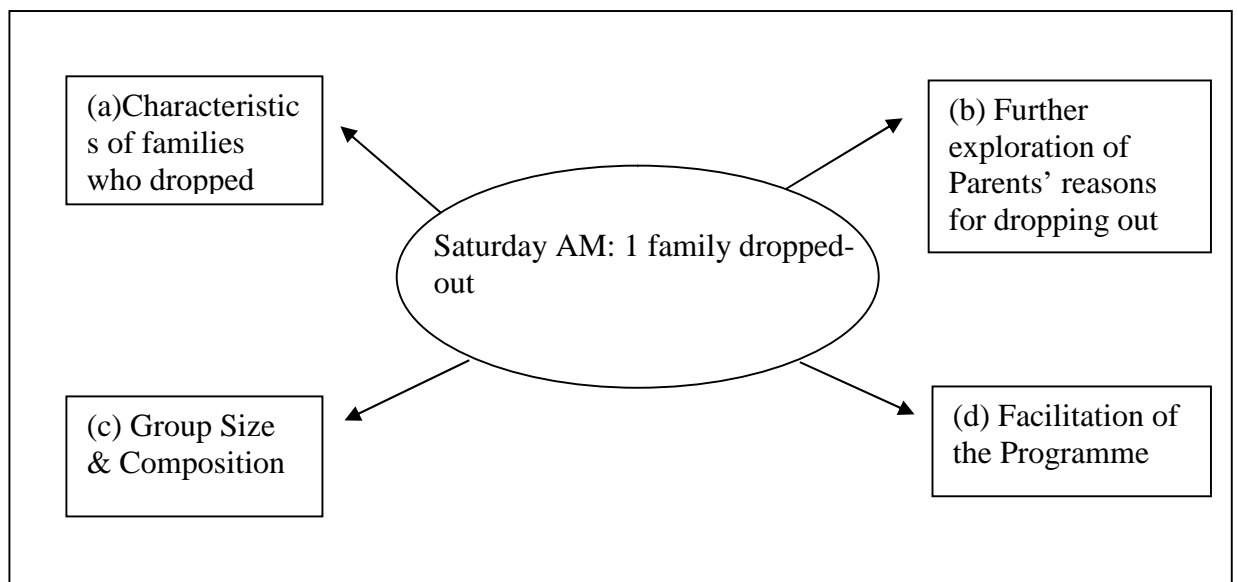
### 6.7.2 Families who Withdrew from the Programme

During the delivery of Group-2 on a Monday after school, a major concern was that 7 of the 12 families who started the programme dropped-out. The programme developer was 'bewildered' by the large number of families dropping out, because when she telephoned parents she had been reassured that they would be back:

- *People were always friendly and almost always absolutely clear with me that they would be back the following week. And had watertight, you know, really good reasons for why they hadn't managed to make it this time, but that they were enjoying the programme and they'd be back. And then that simply didn't happen. ... so I find that quite bewildering really.* (Programme Developer & Facilitator of Parents' Group, Interview, Group-2)

It is pertinent to explore the drop-out rate from Group-2 from many perspectives as indicated in Figure 6.6, to understand potential contributory factors.

**Figure 6.6. Exploration of the high drop-out rate in 'Families for Health' running on Monday evening after school (Group-2)**



### 6.7.2.1 Analysis of Families who Completed vs Dropped-out

The characteristics of each of the families who withdrew from the programme are in Table 6.12. As indicated previously in Section 6.4.3, four of the families dropping out from the second programme gave pragmatic reasons for withdrawing which made it difficult for these families to attend (Table 6.12). One family had an issue with the content and delivery of the programme.

**Table 6.12 – Characteristics of Families who Withdrew from the Programme, their reason for withdrawing and whether they were Interviewed**

Group	Family Number (number of children)	Sessions Attended	Socio-economic classification of family*	Family Structure	Phone call – Main reason for dropping out	Interview of Parent?
1	Family 2 (1)	2	Intermediate	Two-parent	Reason not ascertained	No
2	Family 16 (2)	2	Never worked / unemployed	Step family	New Baby in family	Step-Dad, also with children
2	Family 17 (1)	7	Routine & Manual	Single mother	Issue with programme	Mother, telephone
2	Family 18 (1)	3	Routine & Manual	Single mother	Domestic issue	Mother
2	Family 20 (1)	3	Intermediate	Step family	Mother got a new job, had to work late	Mother, also with child
2	Family 21 (1)	3	Routine & Manual	Single mother	Reason not ascertained	No
2	Family 22 (1)	2	Routine & Manual	Two-parent	Reason not ascertained	No
2	Family 23 (1)	4	Managerial & professional	Single mother	Difficult to get there by 5pm due to work	No

\* used 3 group (plus unemployed) socio-economic classification (ONS 2005)

I have analysed if those who dropped out of the programme were systematically different from those who completed the programme by comparing their socio-demographic and baseline characteristics in Table 6.13. Most strikingly, only 2 of the 13 families (15%) who self-referred after publicity in the local media dropped out; whereas 3 of the 5 families referred by a health professional; and all 3 of the families who came to the second programme following

recommendations by friends/family, dropped-out. Although these are small numbers, the data suggests that responding to publicity in the media is a measure of motivation towards their commitment to the programme. There also appeared to be a lower percentage drop-out from families of managerial/professional classification and from two-parent families, although again these are small numbers. Drop-out rates also appeared higher if parents' scores on the short depression-happiness scale (Joseph et al 2004) indicated depression. These *may* be contributory factors.

**Table 6.13 - Baseline Characteristics of the 18 'Completers' (15 fully engaged, 3 partially engaged) vs 9 Drop-outs**

		<b>Completers' (incl partial)</b>  <b>13 families (18 children)</b>	<b>'Drop-outs'</b>  <b>8 families (9 children)</b>  <b>n (% drop out)</b>	<b>p</b>
Family Type	Two parent family Single Mother Step Family	7 (78%) 5 (56%) 1 (33%)	2 (22%) 4 (44%) 2 (67%)	
Socio-economic classification of family	Managerial/professional Intermediate Routine & Manual Never worked/unemployed	4 (80%) 3 (60%) 5 (56%) 1 (50%)	1 (20%) 2 (40%) 4 (44%) 1 (50%)	
Source of Referral of Family	Health Professional Media (self refer) Family/friends (self refer)	2 families (40%) 11 families (85%) -	3 families (60%) 2 families (15%) 3 families (100%)	
Gender of child	Males Females	6 (67%) 12 (67%)	3 (33%) 6 (33%)	
Age of Child	Mean (SD)	9.3 (1.9)	9.2 (2.0)	0.948
BMI z-score of children	Mean (SD)	2.76 (0.63)	2.76 (0.53)	1.000
Quality-of-Life (Child's perspective)	Mean (SD)	62.0 (17.1)	69.2 (14.0)	0.285
Parents Mental Health	SDHS Score 9 or less* SDHS 10 or more	3 (43%) 10 (71%)	4 (57%) 4 (29%)	

\* Indicative of depression (Joseph et al 2004): 2 parents from Group-1 and 5 parents from Group-2

### 6.7.2.2 Further exploration of Parents' reasons for dropping out

A parent from four of the seven families who withdrew from the second programme was willing to be interviewed as indicated in Table 6.12. In addition to the 'main reason' that these families had given for them withdrawing from the programme, the interviews identified underlying and other additional reasons.

#### ***Timing and Length of the Programme after School***

Although one mother indicated that personal reasons were the main reasons for dropping out, the timing of the session on a Monday after school (5pm to 7:30pm) was a significant problem for her:

- *More personal reasons really to do with[ ], because we were both enjoying the programme. It was awkward being after school, I'll be honest with you. I mean it wasn't too bad when I had somebody else here [home] but with it being the time that it was, it was very, very rushed because I had to get the other children back here and they had homework to do as well and to take Child-18 off and do what we had to do, by the time we get back at night it was too late to do anything anyway with the other children. So, it was awkward not having somebody else doing things with the other ones. [ ]...it became quite awkward to get her [from school] and spend time with just one of them when I'm the only parent, the sole carer really. (Mother-18, Interview)*

She also indicated that the timing was an issue for other families:-

- *I know everybody was finding it hard, [ ] it's the traffic because everybody else was coming out of school, you didn't even have time to give the children a drink. They were hungry, they were grotty. You were tired and hungry yourself. It was hard. Because it's city centre and because of the time it was quite busy. Yeah it was a bit hard, I mean a lot harder than I thought actually. (Mother-18, Interview)*

Furthermore, another mother indicated that she had taken a new job and that her working hours made it difficult to continue to attend. But on further exploration, she also commented about the length of the programme:-

- *It was work, I had to work late. No that was the only reason, just work I just couldn't get out of it, because we're short staffed at*



*work at the minute. Yeah I think it's just a shame that we stopped you know, we did come a few weeks and then we stopped. [ ] It's quite stretched out in the two & half hours I think, you could have done it in a lot less time. About an hour and a half I think would be plenty. Yeah, so all the parents said it, we all speak to each other you know, it was just so long. Just that he was getting tired a lot as well you know, like because it was so late by the time we got home. I think if it was on a weekend it would have been a lot better, definitely. (Mother-20)*

The interaction with this mother and her 7 year-old child in the interview does indicate that the finish time of 7:30pm was too late at least for the younger children:

- Parent: *Well, it finishes at half seven doesn't it. (Mother-20)*
- Child: *Well that's nearly my bed time so I think it finishes quite late. I think it was a bit too long because at the end I got a bit tired.(Child-20)*

Although they did not withdraw, the family who was defined as a 'partial completer' in Group-2 because they attended irregularly (attending sessions at the start with the mother, sessions at the end with the father, missing many of the middle sessions) would have dropped out if the father hadn't intervened.

The mother also cited the duration of the programme as her reason for stopping attending, due to her requirements to get somebody to babysit her other child:-

- *Well the main reason was because of, not the time that it was on, but the length of time that it was on for. It's just being a single parent obviously I had to get somebody to have my other child. [ ] If I could have been home for half six, seven o'clock it would have been ok. Five o'clock wasn't a problem to start, it was just I wasn't getting home until eight o'clock, that was the only problem. I mean we both enjoyed going, I loved going because I loved talking to everyone. (Mother-24)*

Running this 2½ hour programme on a Monday evening after school in the city centre proved problematic for several families, indicating that this is likely to be a major contributory factor in the high drop-out rate for Monday evening.

### ***Issues with the Content of the Programme***

As indicated, one family who withdrew from Group-2 in week nine, having attended seven weeks of the programme, withdrew because her child wasn't enjoying the programme. She also indicated that she was unhappy as well, not feeling that her opinions were being respected:

- *Child-17 was not enjoying it, not getting anything out of it, not learning things from talking. I had been dragging Child-17 there and I thought it wasn't worth it anymore. Bad comments [about the programme] were not welcome by [name of facilitator], who only wanted to hear positive things. I found [name of facilitator] overbearing and override what I said. [Facilitator] didn't respect what I had to say, 'I know what I'm talking about, you don't' was her attitude' (Mother-17)*

Family-16 gave a new baby as the reason for dropping out after only two weeks, due to time constraints. Due to the new baby the father was attending with the children. I interviewed the father, and it became clear that the content was not as expected. They had expected more physical activity, and felt patronised :-

- *It was, time constraints were difficult and the benefits were not what I expected. I thought it was meant to be something more about fitness. That [new baby] like pushed the point more, it would have to be a lot more beneficial, you would have to see that time going, ah you know, more useful, in that sense. Seemed like an excuse to teach the parents and not the children. [ ] It seemed a lot of stuff I already covered and I thought it would be more, you know, more fitness for the kids. If you had the parents and children together, you could like tell the children something but without being direct and patronise parents. (Father-16)*

These were the only two participants who withdrew from the programme (out of the ones that were willing to be interviewed) who had expressed negative feelings about the content of the programme.

### 6.7.2.3 Size and Composition of the Group

The second group started with a larger number of families than the first group (Group-1: 9 vs Group-2: 12 families), two more parents (Group-1: 13 vs Group-2: 15 parents), although the number of children in the groups were the same (Group-1: 14 (including one 'normal' weight sibling) vs Group-2: 14 children).

One parent who withdrew from the programme added that she thought the size of the second group was too large:

- *I think it was just the timing for me, I think the programme itself was really, really good and I was really impressed with it and it was just sort of maybe the size of the group. [ ] It was a bit too big really I think the first few weeks, there was quite a lot of people. (Mother-18)*

Furthermore, some parents who continued to attend the programme commented that they appreciated the smaller group when families failed to attend:

- *Smaller group appeared to be more comfortable, but that's not to say when everyone is available that it is not. (Parent, Week-3, Group-2)*
- *It was nice to work with the children for a longer time because the small group allowed this. (Parent, Week-3, Group-2)*
- *The group was small and there was more chance for us all to voice opinion etc. (Parent, Week-6, Group-2)*

The second group also had a large range of ability amongst the parents, which the programme developer felt may have contributed to two families dropping out:

- *I'm not surprised that we lost XXX [parent], I think she really struggled to keep up with the group. And we did have a big range of ability in the group and I think that makes it much harder to run the group because you are trying to meet the needs of people who are very different in terms of their educational background and their ability to comprehend what's going on. And I think that will have been an issue for two families. (Group-2, Interview, Programme Developer)*

#### 6.7.2.4 Facilitation of the Parents' and Children's Groups

As indicated in Section 6.5, the Programme Developer facilitated the parents' group on her own for the second group. In week-1 she had expressed anxiety about being the sole facilitator for the size of the group, and reiterated this at interview as a contributory factor for the large number of families who dropped out:

- *I think it was too many, there were fifteen parents in the group to start with and I seem to remember saying beforehand 'eik', fairly loudly. If you start off with kind of fifty percent more than is the recommended number for a parent group, I think you're more likely to lose some of the parents, particularly with one facilitator, not two. So there's me on my own with fifteen parents, and the less confident ones are likely to kind of fall by the wayside. Having said that one of the least confident ones didn't fall by the wayside, but I think it is easy for parents to get kind of slightly overwhelmed and I think that's probably what happened to X and X. (Group-2, Interview, Programme Developer/ Facilitator of Parents Group)*

One impact of having only one facilitator are that informal discussions with parents are less easy:

- *One of the things that is often useful if you are running these kind of groups is having a chance to chat with parents outside the group if there is any particular issue you want to follow-up or if you think you are not managing to meet their needs, or if they are looking worried but they are not talking much in the group. I often didn't have a chance to talk to parents individually and every now and again I think that would have been very helpful. It was a bit easier with two facilitators definitely [in group-1]. I would not ever recommend having only one facilitator running a group. It's not good practice for all sorts of reasons and so yes my job was harder. (Group-2, Interview, Programme Developer/Facilitator of Parents Group)*

The programme developer had many other views on the reasons for the large number of families who dropped out, including the time of year (January to March), the timing and location, and the facilitation of the children's group:

- *Well the things that we have identified are you know, it was a cold dark long second half of the winter. I think that makes a difference*

*to people. There was a point at which there was a lot of illness in Coventry and Birmingham. And if you've got some people ill in the family one week and some people ill in the family another week and you've missed two weeks and then you are feeling a bit rotten yourself, actually you've lost the momentum. It's really difficult to come back again. After that, we aren't sure about the whole thing of doing it after school in a central location because transport for some people is a problem, childcare for one person was a problem, family difficulties, new jobs, clearly one person in the group was upset with me that I need to know more about. But he [the child] was also not enjoying the programme and I think, one for me potentially quite big factor was that the children's group was just not well enough run. (Group-2, Interview, Programme Developer)*

The programme developer had cited the facilitation of the children's group as a potential problem in her evaluation of week-3, when many families failed to attend. She expanded at interview, stating that the programme is only as good as its messengers:

- *I am concerned that v kind but weak and unclear leadership of children's group will jeopardise programme. (Week-3, Programme Developer/ Parents Group Facilitator, Group-2)*
- *If we go any further with this, however good your message, however good a programme you've got, it's never any better than the quality of the messengers. (Group-2, Interview, Programme Developer)*

When I commented that some of the children were flagging a little by the end of the 2½ hours, and the length may be a contributory factor, she commented:

- *Yes and I think it's really hard to know whether they're flagging because they're just going to flag at the end of a school day or whether it was just not quite lively enough. They weren't quite engaged enough, and there was certainly the times that I was downstairs that quite a lot of energy being expended because the facilitators were wondering what to do next and the children were just running about a lot, in a slightly unfocused way. Their energy wasn't harnessed terribly effectively. And I think for some of the children that will have felt a bit overwhelming, a bit tiring, a bit unsafe and that will make them flag more. Whereas if you have got a really good balance of more reflective activities, a game being played quite quickly and then you get on with the next thing and then there is another quick game so the pace is tighter than it was, I think they might have felt differently. (Group-2, Interview, Programme Developer)*

The age range of the children in Group-2, as two 13 year olds were included, was also seen as an extra challenge for the facilitators:

- *If you've got children who are thirteen in a group that has been designed for seven to eleven year olds actually the needs of some of the younger children are probably going to get slightly overlooked in the effort to make sure that somebody who is older can be included. And I think seven to eleven is already a tall order, and seven to thirteen is probably unrealistic. We should have stuck to our boundaries about age.* (Group-2, Interview, Programme Developer)

To explore this further I will refer to the comments made by the facilitators when they were asked whether the 3-day training had prepared them for the reality of delivering the programme. There was a mixed response, with two facilitators from the children's group for Group-1 being generally positive:

- *The training was a perfect introduction to the style of facilitation which was required and the techniques which we are using (reward systems etc).* (Facilitator, Children's Group-1).
- *The training was really important, it gave us the opportunity to practice some of the activities. Just having gone through the training and believing in it, helps in delivery.* (Facilitator, Children's Group-1).

But two facilitators had some reservations that the training was sufficient, with the implication that it could never be unless you were already an experienced facilitator of groups. This included one of the facilitators for the children's group, who explained that they felt insufficiently experienced at running groups of this sort.

- *The training/preparation was good, but honestly looking back over the programme it didn't (and probably couldn't) prepare you for facilitating groups of children of varying ages/abilities. Facilitators for this programme need to (in my opinion) be very experienced in working with children in this type of environment. I'm not sure I was experienced enough. The training can't prepare you for the children's personalities or what sort of week they have had! But it does focus on empathy/understanding.* (Facilitator, Children's Group-2)

- *A much larger group [of parents] than I have been used to, which the training would not have been able to change. (Facilitator, Parents' Group-1)*

The facilitators that came forward to deliver the groups had all been assessed for their suitability by the programme developer and myself, yet some factors had probably been missed:

- *I think we failed to spot that in credentials that looked on paper really good, that both the facilitators had experience of working with groups of children in school but it didn't emerge beforehand or during the training which I have to take responsibility for, that they had never been alone with groups of children. They had gone in to teach them, a teacher or a TA was in the room and dealing with behaviour, so they'd never actually had to cope with a group of children and they had been teaching in school but not doing facilitative work. And I think that made a big difference. (Group-2, Interview, Programme Developer)*

#### **6.7.2.5 Summary**

This analysis has shown that there were many potential contributory factors for the high drop-out rate in Group-2. Drawing on the reasons that families gave, probably the most significant factor was the length (2½ hours) and timing (after school) of the programme making it difficult for some families to continue. Another related factor was that it was run in a central venue, at a busy time of day, making traveling difficult. The level of self-motivation to attend may have also been a factor with several families dropping out who had been encouraged by friends or health professionals to attend. Socio-economic and educational characteristics of some families; the larger size of the second group; and related to this the facilitation of the parents and children's group, may have all been additional factors.

## Chapter 7

### Outcome Evaluation

#### 7.1 Introduction

This chapter describes the short-term (end of the programme and 9-month follow-up) and longer-term (2-years) outcomes of the *'Families for Health'* intervention, including sections on body composition of the children, psychosocial health of the children, parents' mental health, family relationships, and lifestyle changes relating to healthy eating and physical activity. Qualitative and quantitative data are presented because this provides both illumination of the quantitative data, and the opportunity to triangulate the findings from the two types of data to assess the degree to which findings converge (Denzin 1978), thereby enhancing the validity of the results. Finally, I focus on 'extreme' cases i.e. on the children who had a large reduction or increase in BMI z-score.



## 7.2 Uptake and Attrition

Of the 27 children who started, 15 (56%) completed the programme (attending more than half the sessions), 3 (11%) children were classified as partial-completers (although they attended half of the sessions, their attendance was irregular), and 9 (33%) children dropped out.

**Attrition:** In the 'before-and-after' evaluation, I sought follow-up data on all families whether they completed the programme or not, in order for an 'intention to treat' analysis to be carried out. Twenty two out of the 27 children (16 of the 21 families) contributed data both at the end of the programme (3 months) and at the 9-month follow-up, and this included all the families who had completed or partially-completed the programme and 3 families (4 children) who had dropped out. I was unable to follow-up one family from the first group and four families from the second group who had dropped out. The flow of families through the pilot groups and evaluation has been shown previously in Figure 6.3.

Nineteen of the 22 children (13 of the 16 families) who had completed the 3 and 9-month follow-up data collection were also followed up at 2-years. Of the 3 families (3 children) not followed up at 2-years, one family declined to take part because their child had just started secondary school and this had posed new problems with regards to her obesity; one family had moved house and were now living over 200 miles away making follow-up difficult; and the final family was not contactable on the telephone numbers / address given. The 2-year follow-up data from the 19 children are presented separately, because the baseline means are different.

### 7.3 Characteristics of Parents and Children who were Interviewed

The characteristics of the 13 parents who were interviewed at the end of the programme are described in Table 7.1. Six were from Group 1 and seven were from Group 2, and included a range of family types, and whether they completed the programme or not. The interviews have been described in Chapter 4.

**Table 7.1 – Characteristics of Parents who were Interviewed**

<b>Family Number (interviewee(s))</b>	<b>Group: 1 (Sat) or 2 (Mon)</b>	<b>Completer or Drop Out</b>	<b>Number of Sessions Attended</b>	<b>Number of Children in programme</b>	<b>Family Structure</b>	<b>Socio-economic Classification *</b>
Family 1 (Mother)	1	Completer	12	2	<i>Single mother</i>	<i>Never worked / unemployed</i>
Family 3 (Mother)	1	Completer	12	2	<i>Two-parent</i>	<i>Routine &amp; Manual</i>
Family 4 (Mother)	1	Completer	12	1	<i>Single mother</i>	<i>Intermediate</i>
Family 5 (Mother)	1	Completer	11	1	<i>Two-parent</i>	<i>Routine &amp; Manual</i>
Family 6 (Mother)	1	Completer	10	1	<i>Single mother</i>	<i>Intermediate</i>
Family 12 (Mother)	1	Partial Completer	6	2	<i>Two-parent</i>	<i>Routine &amp; Manual</i>
Family 14 (Mother)	2	Completer	10	1	<i>Two-parent</i>	<i>Managerial &amp; Professional</i>
Family 16 (Father, children)	2	Dropped out	2	2	<i>Step family</i>	<i>Never worked / unemployed</i>
Family 17 (Mother, by phone)	2	Dropped out	7	1	<i>Single mother</i>	<i>Routine &amp; Manual</i>
Family 18 (Mother)	2	Dropped out	3	1	<i>Single mother</i>	<i>Routine &amp; Manual</i>
Family 19 (Mother & Father)	2	Completer	11	1	<i>Step family</i>	<i>Managerial &amp; Professional</i>
Family 20 (Mother, child)	2	Dropped out	3	1	<i>Step family</i>	<i>Intermediate</i>
Family 24 (Mother)	2	Partial Completer	6	1	<i>Single mother</i>	<i>Intermediate</i>

\* used 3 group (plus unemployed) socio-economic classification (ONS 2005)

All children who attended the last week of the programme took part in a group interview, along with one family who were interviewed at home. In total, there were five group interviews with 3 to 5 children in each (Table 7.2). The data presented is from the 16 overweight/obese participant children.

**Table 7.2 Group Interviews of the Children**

	No. (gender)	Children's Code	Age range
Group 1, Younger children	5F	1A, 3B, 6, 11, 5B*	7 to 8
Group 1, Older children	3F, 1M	3A, 1B, 4, 5	9 to 12
Group 2, Younger children	2F, 1M	25A, 24, 19	7 to 9
Group 2, Older children	3M	14,15, 25B	10 to 13
Group 1, Family at home	3F	12A, 12B, 12C*	7 to 9
Total Interviewed	18 (13F, 5M)		7 to 13
Overweight/Obese only	16 (11F, 5M)		7 to 13

\* *Siblings with 'normal' BMI who attended the programme*

#### **7.4 Changes in Measures of Body Composition**

The measures of body composition of the 22 children followed up for 9-months are presented in Table 7.3, and for the 19 children followed up at 2-years in Table 7.4. The last column in these tables (and subsequent tables on other variables) gives the probability for differences seen between the two groups (Saturday morning and Monday evening). There were no significant group differences for the measures of body composition and I have therefore presented data for the combined sample only.

#### **7.4.1 BMI and BMI z-score**

The BMI z-score shows a significant reduction from baseline by -0.18 (95% confidence interval (CI) -0.30 to -0.05,  $p=0.008$ ) at 3-months. This difference was maintained at 9-months (-0.21, 95% CI -0.35 to -0.07,  $p=0.007$ ) and 2-years (-0.23, 95% CI -0.42 to -0.03,  $p=0.027$ ) (Tables 7.3, 7.4). However, absolute BMI ( $\text{kg}/\text{m}^2$ ) did not change significantly at the end of the programme or the 9-month follow-up (Table 7.3), and increased significantly from baseline to the 2-year follow-up ( $1.27 \text{ kg}/\text{m}^2$ , 95% CI 0.09 to 2.44,  $p=0.037$ ) (Table 7.4).

#### **7.4.2 Waist and Percentage Body Fat**

Two other measures of overweight - waist z-score, % body fat – also showed significant reductions at 9-months (Table 7.3), but these reductions were not significant at 2-years (Table 7.4). Similar to the increase in absolute BMI, waist circumference increased significantly from baseline to 2-years (3.4cm, 95% CI 0.5 to 6.3,  $p=0.024$ ) (Table 7.4).

#### **7.4.3 Height**

The programme did not adversely affect linear growth. Height increased significantly, as would be expected (Tables 7.3, 7.4). Height expressed as a z-score did not change significantly (Table 7.3).

**Table 7.3 - Summary of body composition measurements at baseline (0 months), end-of-programme (3 months) and nine month follow-up, in 22 children with follow-up data to 9-months (intention to treat analysis)**

	0-months Mean (SD) (n=22)	3-months Mean (SD) (n=22)	9-months Mean (SD) (n=22)	0-3 month change (n=22)		0-9 month change (n=22)		Any Difference Group 1 vs Group 2?	
				Mean (95% CI)	p value	Mean (95% CI)	p value	0-3 month p value	0-9 month p value
BMI z-score	2.75(0.63)	2.58(0.73)	2.55(0.68)	-0.18 (-0.30 to -0.05)	0.008	-0.21 (-0.35 to -0.07)	0.007	0.620	0.953
BMI (kg/m <sup>2</sup> )	26.0 (4.4)	25.6 (4.8)	25.9 (4.6)	-0.48 (-1.04 to 0.08)	0.090	-0.11 (-0.80 to 0.58)	0.737	0.892	0.848
Waist z-score	3.33(0.58)	3.16(0.67)	3.13(0.67)	-0.19 (-0.30 to -0.07)	0.003	-0.21 (-0.34 to -0.08)	0.004	0.239	0.670
Waist (cm)	86.4 (13.1)	84.9 (12.9)	86.3 (12.5)	-1.73 (-3.14 to -0.32)	0.02	-0.23 (-2.3 to 1.8)	0.813	0.397	0.588
% Body Fat	37.7 (5.5)	36.8 (6.1)	34.9 (6.0)	-1.03 (-2.72 to 0.66)	0.212	- 2.90 (-4.98 to -0.82)	0.01	0.518	0.467
Fat Free Mass (kg)	31.3 (8.3)	31.9 (8.4)	34.7 (8.7)	0.66 (0.11 to 1.21)	0.020	3.46 (2.72 to 4.21)	<0.001	0.269	0.397
Height (cm)	138.5 (10.9)	140.2 (10.8)	143.1 (10.7)	1.75 (1.32 to 2.18)	<0.000	4.64 (4.0 to 5.2)	<0.000	0.582	0.275
Height z- score	0.645 (0.88)	0.642 (0.92)	0.613 (0.88)	-0.003 (-0.07 to 0.06)	0.912	-0.032 (-0.11 to 0.05)	0.415	0.475	0.251
Weight (kg)	50.9 (15.2)	51.35 (15.8)	54.1 (15.9)	0.45 (-0.54 to 1.43)	0.356	3.19 (1.78 to 4.6)	<0.000	0.786	0.513
Weight z- score	2.42 (0.79)	2.28 (0.89)	2.24 (0.83)	-0.15 (-0.24 to -0.05)	0.006	-0.18 (-0.30 to -0.06)	0.004	0.981	0.541

**Table 7.4 - Summary of body composition measures at baseline, end-of-programme (3 months), 9-months and 2-year follow-ups in 19 children who were followed up for 2-years (intention to treat analysis)**

	0-months Mean (SD)	3-months Mean (SD)	9-months Mean (SD)	2-years Mean (SD)	0-2 years change		Any Difference Group 1 vs Group 2? 0-2-years p value
					Mean (95% CI)	p value	
BMI z-score	2.70(0.64)	2.52(0.76)*	2.50(0.71)*	2.47(0.80)*	-0.23 (-0.42 to -0.03)	0.027	0.843
BMI (kg/m <sup>2</sup> )	26.0 (4.7)	25.6 (5.2)	26.0 (4.9)	27.3 (5.6)*	1.27 (0.09 to 2.44)	0.037	0.504
Waist z-score (n=18)	3.22 (0.56)	3.04 (0.66)*	3.00 (0.66)**	3.03 (0.68)	-0.18 (-0.38 to 0.01)	0.060	0.847
Waist (cm) (n=18)	85.7 (14.0)	84.1 (13.7)*	85.0 (13.0)	89.1 (12.2)*	3.4 (0.5 to 6.3)	0.024	0.543
% Body Fat	37.5 (5.5)	36.5 (6.3)	34.7 (6.1) *	36.5 (9.0)	-0.9 (-4.2 to 2.4)	0.559	0.755
Fat Free Mass (kg)	31.8 (8.8)	32.4 (8.9)	35.2 (9.3) ***	39.1 (10.0)***	7.3 (5.8 to 8.8)	<0.001	0.187
Height (cm)	139.2 (11.5)	140.9(11.4)***	143.7(11.4)***	150.4 (11.0)***	11.2 (9.8 to 12.6)	<0.000	0.026
Height z-score	0.60 (0.90)	0.59 (0.93)	0.55 (0.88)	0.53 (0.83)	-0.07 (-0.21 to 0.07)	0.291	0.099
Weight (kg)	51.6 (16.0)	51.9 (16.8)	54.7 (17.0)***	62.9 (19.3)***	11.3 (8.1 to 14.5)	<0.000	0.322
Weight z-score	2.36 (0.81)	2.21 (0.92)	2.18 (0.86)	2.23 (0.98)	-0.13 (-0.33 to 0.06)	0.166	0.348

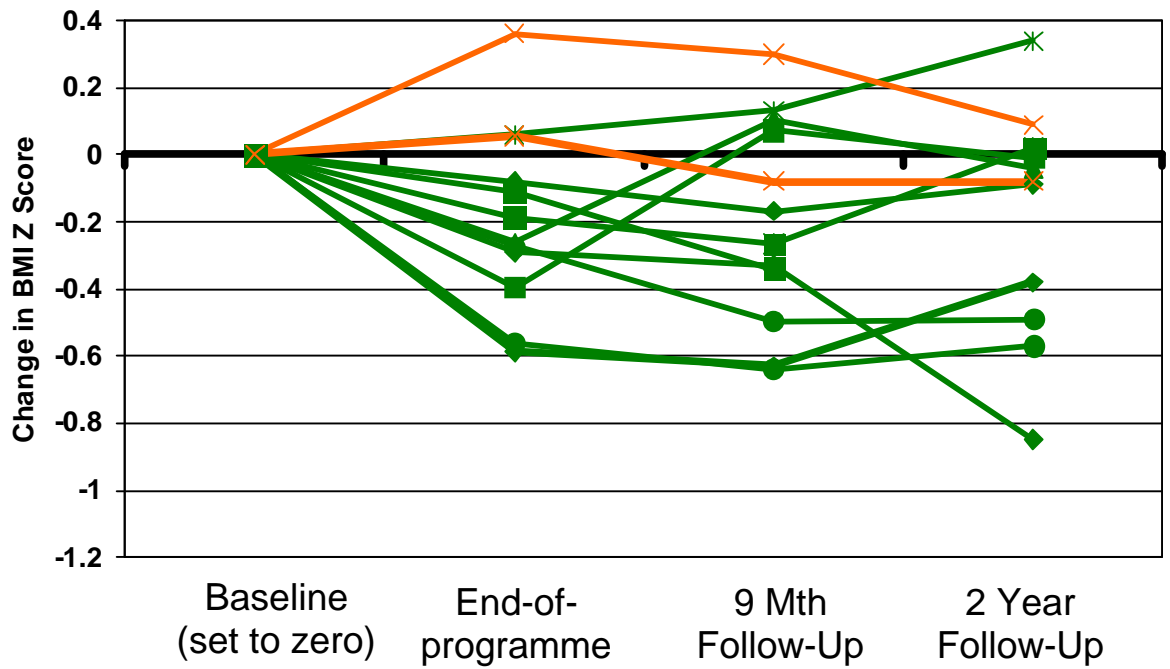
Different from baseline: \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

#### **7.4.4 Changes in BMI z-score for Individuals**

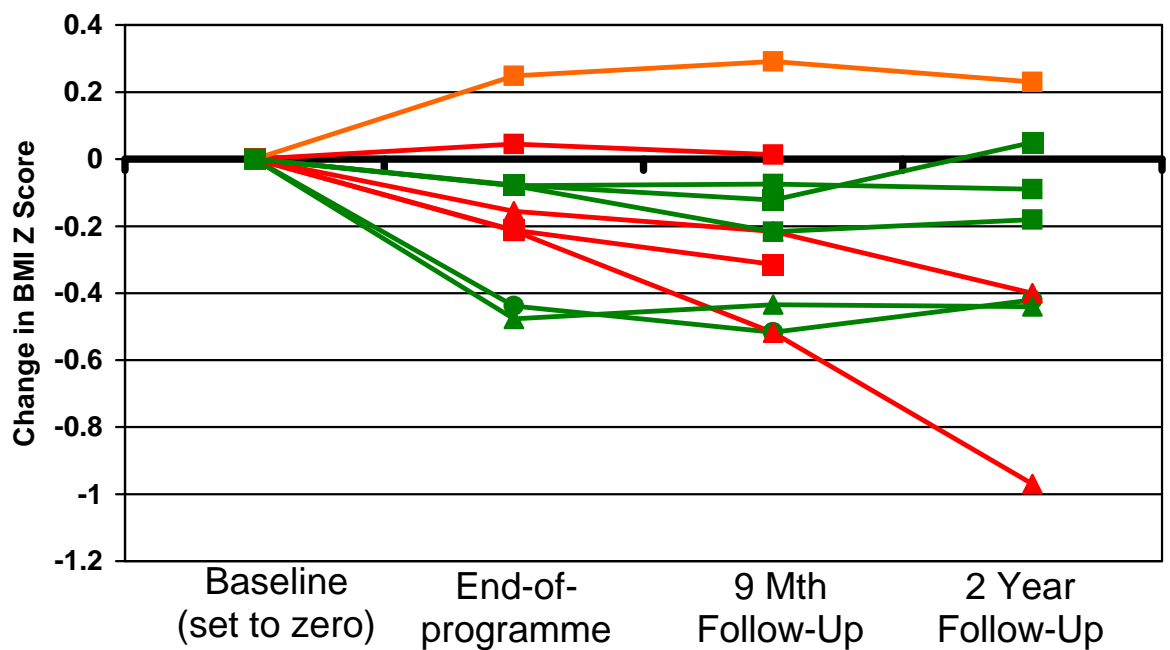
Figure 7.1 shows the change in BMI z-score for each child, split by group. These graphs indicate whether the children completed, partially-completed, or dropped-out of the programme. Three of the four children who had dropped-out of the second programme (red lines), showed a reduction in BMI z-score similar to or greater than the mean change (Figure 7.1b). The two children who dropped-out of the programme, but who continued to show a decline in BMI z-score at the 2-year follow-up, were from the same family (Family-16), and this is discussed later in section 7.12. Two of the three children who were partially engaged with the programme (partial completers) showed increases in BMI z-score (orange lines). One child who completed the programme but had showed a large increase in BMI z-score from the end-of-programme to 9-months (Figure 7.1a) had taken oral steroids for asthma.

**Figure 7.1 – Change in BMI z-score for each child from baseline (set to zero) to the end-of-programme (3 months), 9-month and 2-year follow-ups, for the 15 completers (green), 3 partial completers (orange) and 4 children who had dropped-outs (red), arranged by group.**

(a) Group 1



(b) Group 2





Analysis of the children's individual changes shows that 17/22 (77%), 16/22 (73%) and 14/19 (74%) children showed a decrease in BMI z-score at the end of the programme, after 9-months and 2-years, respectively. However, the level of change which is considered to be clinically significant is a reduction of at least 0.5 BMI z-score (Reinehr and Andler 2004). Table 7.5 shows that this level of change was achieved by two children by the end of the 12-week programme, in four children by the nine-month follow-up and in three children after 2-years.

**Table 7.5 – Magnitude of change in BMI z-score for each child from baseline to the end-of-programme (3 months), 9-month and 2-year follow-ups, to assess for clinically significant changes**

Group	Change in BMI z-score from baseline	3-months (End-of-programme) (n=22)	9-month follow-up (n=22)	2-year follow-up (n=19)
I	Increase (or no change)	5	6	5
II	Decrease <0.25	9	6	6
III	Decrease $\geq 0.25$ to <0.5	6	6	5
IV	<b>Decrease <math>\geq 0.5</math> *</b>	<b>2</b>	<b>4</b>	<b>3</b>

\* Defined as a clinically significant change (Reinehr and Andler 2004)

An alternative way to explore the change in BMI is to examine whether any children moved between obese (BMI  $\geq 98^{\text{th}}$  centile), overweight (BMI  $\geq 91^{\text{st}}$  to  $< 98^{\text{th}}$  centile) and 'normal' (BMI  $< 91^{\text{st}}$  centile) categories. I have applied the cut-offs used for recruitment, which are recommended for use in the treatment of childhood obesity (SIGN 2003). This gives useful additional information because a change in -0.5 BMI z-score would not equate to achieving either an 'overweight' or 'normal' weight status in children who were severely obese at baseline; but may do so in children who were overweight or with more modest obesity. Alternatively, children who are close to an overweight or obese cut-off

may change category with a lesser reduction in BMI z-score. Table 7.6 shows that three children changed obesity category by the end of the 12-week programme, three children by the nine-month follow-up and two children after 2-years. Some of these children are the same as those who achieved a reduction in BMI z-score of -0.5. Overall, four children at the end of the programme, five children after 9-months and three children at 2-years, showed either a change of obesity category and/or a reduction of BMI z-score of at least -0.5.

**Table 7.6 – Change in Category of Obesity and Overweight for each child at the end-of-programme (3 months), 9-month and two-year follow-ups**

	End-of-programme (3-months) (n=22)	9-months follow-up (n=22)	2-year follow-up (n=19)
<b>OBESSE Category at Baseline</b> (BMI $\geq$ 98 <sup>th</sup> centile)			
Stayed in Obese Category ( $\geq$ 98 <sup>th</sup> centile)	18	17	15
Moved to Overweight Category ( $\geq$ 91 <sup>st</sup> & $\leq$ 98 <sup>th</sup> centile)	1	2	0
Moved to 'Normal' Weight Category ( $<$ 91 <sup>st</sup> centile)	0	0	1
<b>OVERWEIGHT at Baseline</b> (BMI $\geq$ 91 <sup>st</sup> & $\leq$ 98 <sup>th</sup> centile)			
Moved to Obese Category ( $\geq$ 98 <sup>th</sup> centile)	0	0	0
Stayed in Overweight Category ( $\geq$ 91 <sup>st</sup> & $\leq$ 98 <sup>th</sup> centile)	1	2	2
Moved to 'Normal' Weight Category ( $<$ 91 <sup>st</sup> centile)	2	1	1

## **7.5 Psycho-Social Health of Children**

Children's quality-of-life (Varni et al 2001) and self-esteem (Harter 1985) were measured by standardised self-reported questionnaires. No significant group differences (Group 1 vs Group 2) were indicated for any of these measures (Tables 7.7 and 7.8), so the results are presented for the combined sample.

### **7.5.1 Children's Quality-of-life**

At baseline the mean score for the Pediatric Quality-of-Life questionnaire (PedsQL) (all 23 questions) (Varni et al 2001) for the 28 overweight/obese children recruited to the programme was 65.3 for the child's self-report and 67.7 for the proxy parent-report. These values are lower than scores for 'healthy' children from South Wales, UK (83.9 child-report, 84.6 parent-report) (Upton 2005) and the USA (83.0 child-report, 87.6 parent-report) (Schwimmer 2003). They are also slightly lower than mean scores for children with chronic diseases including those recovering from cancer (75.7 child-report, 71.0 parent-report) (Upton 2005), but are consistent with scores for obese children in USA (67.0 child-report, 63.3 parent-report) (Schwimmer 2003) and Glasgow (64.7 parent-report) (Hughes et al 2007). Obese children in Australia had higher scores (74.0 child-report, 75.0 parent-report) (Williams 2005).

Parent-report data showed that each aspect of the children's quality-of-life improved significantly at the end of the '*Families for Health*' programme (3 months), although the improvements at 9-months were not significantly different from baseline (Table 7.7). Significant improvement in physical functioning was also reported by children at both time-points, but the improvement in other aspects of quality-of-life were not statistically significant (Table 7.7). However,

at 2-years children's quality-of-life, with respect to all components measured, had improved significantly for both parent- and child-reports (Table 7.8).

The children's rating of their health (Rabin and Charro 2001) did not show any statistically significant changes from baseline at any of the time-points (Tables 7.7 & 7.8).

### **7.5.2 Children's Self-Esteem**

Children's self-esteem (Harter 1985) did not change significantly from baseline for any of the six domains, either at the end-of-programme or 9-month follow-ups (Table 7.9). This questionnaire was not completed at 2-years.

**Table 7.7 – Summary of children’s quality-of-life, from the parents’ and the children’s perspectives, at baseline (0 months), end-of-programme (3 months) and nine month follow-up, in 22 children with follow-up data (intention to treat analysis)**

	0-months Mean (SD) (n=22)	3-months Mean (SD) (n=22)	9-months Mean (SD) (n=22)	0-3 month change (n=22)		0-9 month change (n=22)		Any Difference Group 1 vs Group 2?	
				Mean (95% CI)	p value	Mean (95% CI)	p value	0-3 month p value	0-9 month p value
<b>Child’s Quality-of-life (PEDS QL) – from Parent’s Perspective (Range 0-100)</b>									
All 23 Qs	69.1 (11.8)	78.0 (9.2)	75.1 (12.9)	9.0 (4.9 to 13.0)	<0.001	6.7 (-0.9 to 14.4)	0.08	0.479	0.185
Physical Health	70.1 (14.8)	79.8 (12.1)	77.6 (17.1)	10.0 (2.9 to 17.1)	0.009	8.2 (-0.9 to 17.3)	0.075	0.686	0.550
Emotional/ Social/School	68.6 (13.3)	77.1 (10.3)	73.8 (12.2)	8.5 (3.8 to 13.2)	0.001	5.8 (-2.1 to 13.6)	0.138	0.207	0.102
<b>Child’s Quality-of-life (PEDS QL) – from Child’s Perspective (Range 0-100)</b>									
All 23 Qs	64.9 (17.0)	70.2 (17.8)	71.6 (17.2)	5.1 (-2.8 to 13.0)	0.189	7.0 (-1.2 to 15.2)	0.087	0.616	0.459
Physical Health	63.6 (17.8)	73.7 (15.5)	74.1 (17.4)	9.7 (0.0 to 19.3)	0.049	11.1 (0.6 to 21.6)	0.04	0.951	0.329
Emotional/ Social/School	65.6 (18.1)	68.3 (21.7)	70.3 (18.9)	2.7 (-6.2 to 11.5)	0.534	4.8 (-3.1 to 12.8)	0.214	0.502	0.631
<b>How good is your health today ? - Child’s rating</b>									
0 to 100% Rating	65.6 (23.9)	69.6 (24.6)	79.1 (18.6)	4.0 (-4.6 to 12.6)	0.344	13.9 (-0.5 to 28.4)	0.057	0.798	0.188

**Table 7.8 – Summary of children’s quality-of-life, from the parents’ and the children’s perspectives at baseline (0 months), end-of-programme (3 months), nine month and 2-year follow-ups, in 19 children who were followed up for 2-years (intention to treat analysis).**

	0-months Mean (SD)	3-months Mean (SD)	9-months Mean (SD)	2-years Mean (SD)	0-2-years change		Any Difference Group 1 vs Group 2?
					Mean (95% CI)	p value	0-2-years p value
<b>Child’s Quality-of-life (PEDS QL) – from Parent’s Perspective (Range 0-100)</b>							
All 23 Qs	69.0 (12.1)	78.9 (9.2) ***	75.3 (13.4)	80.8 (14.2)**	11.9 (4.8 to 19.0)	0.003	0.518
Physical Health	69.9 (14.8)	79.4 (12.5) *	78.0 (17.6)	84.7 (15.6)**	15.1 (4.7 to 25.5)	0.008	0.832
Emotional/ Social/School	68.5 (13.6)	78.7 (9.8) ***	73.9 (12.9)	78.7 (15.8)**	10.1 (3.3 to 16.9)	0.007	0.205
<b>Child’s Quality-of-life (PEDS QL) – from Child’s Perspective (Range 0-100)</b>							
All 23 Qs	61.8 (15.2)	67.5 (17.5)	68.9 (16.7)	73.6 (15.8)**	11.8 (4.0 to 19.7)	0.005	0.450
Physical Health	60.9 (16.8)	71.2 (15.1)	71.4 (17.0)	76.6 (15.7)**	15.8 (4.9 to 26.6)	0.008	0.699
Emotional/ Social/School	62.3 (16.2)	65.5 (21.9)	67.6 (18.6)	72.0 (17.4)*	9.7 (2.1 to 17.3)	0.015	0.372
<b>How Good is your Health Today (0-100%)</b>							
Rating scale (0-100%)	64.5 (23.7)	69.4 (25.7)ns	78.4 (18.8)ns	67.5 (19.6)	2.9 (-8.9 to 14.8)	0.608	0.219

Different from baseline: \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Table 7.9 – Summary of children’s self-esteem scores at baseline (0 months), end-of-programme (3 months) and nine month follow-up, in 22 children with follow-up data (intention to treat analysis)**

	0 months Mean (SD) (n=22)	3-months Mean (SD) (n=22)	9-months Mean (SD) (n=22)	0-3 month change (n=22)		0-9 month change (n=22)		Any Difference Group 1 vs Group 2?	
				Mean (95% CI)	p value	Mean (95% CI)	p value	0-3 month p value	0-9 month p value
<b>Child’s Self-Esteem (Self-Perception Profile for Children) (Range 1-4)</b>									
Scholastic Competence	2.66 (0.88)	2.67 (0.60)	2.72 (0.84)	0.01 (-0.26 to 0.27)	0.953	0.06 (-0.22 to 0.34)	0.657	0.109	0.774
Social Acceptance	2.54 (0.68)	2.55 (0.68)	2.58 (0.91)	0.01 (-0.24 to 0.26)	0.960	0.03 (-0.31 to 0.38)	0.851	0.358	0.229
Athletic Competence	2.33 (0.77)	2.38 (0.56)	2.39 (0.62)	0.04 (-0.24 to 0.31)	0.781	0.06 (-0.34 to 0.46)	0.753	0.771	0.611
Physical Appearance	2.24 (0.85)	2.17 (0.85)	2.30 (0.92)	-0.08 (-0.46 to 0.31)	0.689	0.06 (-0.43 to 0.54)	0.810	0.972	0.261
Behavioural Conduct	2.89 (0.89)	2.89 (0.73)	3.06 (0.72)	0.0 (-0.38 to 0.38)	0.987	0.14 (-0.31 to 0.59)	0.512	0.986	0.712
Global Self Worth	2.62 (0.96)	2.68 (0.61)	2.76 (0.89)	0.06 (-0.25 to 0.37)	0.687	0.14 (-0.37 to 0.64)	0.578	0.405	0.707

### 7.5.3 How Children Feel About Themselves

In response to the question in the group interviews *'How do you feel about yourself now: better, worse or the same?'* 12 of the 16 participant overweight/obese children reported that things were better at the end of the programme; three children replied that they felt the same; although one child indicated that they now felt worse (Table 7.10). The quotations from the 12 children who indicated that they felt better have been subdivided into improvements to physical health (3 children) and to mental well-being (9 children) in Table 7.10, although there may be some overlap. Children's comments about physical health related to improved fitness and eating more healthily. Comments about mental health included children feeling more confident and proud, liking themselves and their appearance more, and that others had noticed changes.

As shown previously (section 7.5.2), self-esteem showed no change, whereas the majority of children reported in the group interviews that they were feeling better about themselves, which seems inconsistent. To explore this further, Table 7.10 also gives individual end-of-programme scores, presented as a change from baseline, for the global self-worth domain of self-esteem; children's self-rating of their overall quality-of-life; and children's BMI z-score.



**Table 7.10 Responses to ‘How do you feel about yourself now: better, worse or the same?’ in the Children’s End-of-Programme interview.**

		Change from Baseline to EOP		
		Global self-worth*	Overall QoL**	BMI z-score
<b>Better:- Improvements to physical health</b>				
1B	<i>Feel a bit better because I am eating more healthily.</i>	-0.50	0	-0.39
3B	<i>I feel good in a way because now I am got a bit fitter. And I have done more activities, sometimes I even ask my Dad if he will come and play football with me. I feel better because I’ve stopped eating sweets all the time and feels better for me because I used to feel sick and have a headache and now I haven’t got one.</i>	-0.67	15.2	-0.19
6	<i>I feel much better, in a healthy way.</i>	-0.83	-2.2	-0.56
<b>Better:- Improvements to mental well-being</b>				
1A	<i>I feel more proud of myself than when, I went, I went to ‘Families for Health’.</i>	0.83	-1.1	-0.08
3A	<i>Um, well um oh I feel confident now, I feel more confident, um it probably made me, that’s probably why I got better at maths.</i>	0.67	46.7	0.06
11	<i>I feel more healthier and I feel more better about myself.</i>	0.83	16.3	-0.26
12A	<i>I feel a bit better. I feel like I have lost a bit of weight because, the other night we went to the Hotel and I wore my rock and roll skirt and I had a gap between my skirt and I had to hold it up a little bit.</i>	0.67	-6.5	0.06
12B	<i>I think I am doing really well on it. Better. Because, when I’m wearing some things, there’s a big gap in my trousers.</i>	-1.00	-38.0	0.36
14	<i>Better, even my teacher thinks it is something much more different than what it is and much more harder so she gives me lots of praise and I don’t really need it, and I’m losing weight. So your teacher’s noticed? (Interviewer) Yeah, and my friends &amp; my mum.</i>	0.50	-6.5	-0.44
24	<i>Well before the programme I didn’t like how I looked um about my weight so I sorted it out and lost a few pounds, so I am very happy about my weight now.</i>	1.33	26.1	0.25
25A	<i>I didn’t like myself before, now I do. I used to not listen to my Mum but now I do and I actually like myself because, when that day when we did the kites, I thought of good things and now I’ve still got it and then and now I know the things I’m good at. When I did them kites XXXX and XXXX (facilitators) gave me some ideas.</i>	1.00	-1.1	-0.08
25B	<i>I feel a little bit different. More confident, happy if people say stuff about me. I tell them not to. Like when I’m confident you get to stick up for yourself.</i>	0	25.0	-0.08
<b>The Same</b>				
4	<i>Same. I think you just learn a bit better. I’m top at maths and I’m top at science.</i>	-0.83	-2.2	-0.27
5	<i>Eh, I feel the same.</i>	-0.33	-8.7	-0.11
15	<i>I’m feeling exactly the same than before the programme.</i>	0.67	8.7	-0.08
<b>Worse</b>				
19	<i>I liked myself before but now I hate myself. Because I don’t know anything and I’m dumb.</i>	-1.00	-3.3	-0.48

\* ‘Global self-worth’ domain of self-esteem (Harter 1985)

\*\* Child-report of overall quality of life (all 23 items) (Varni et al 2001)

Seven of the nine children who indicated at interview that they had experienced improvements in their mental well-being, also showed large improvements in their global self-worth (Table 7.10). The children who said that they felt either the same or worse, and those who mentioned improvement in physical health but not mental health, on the whole had worse global self-worth scores. These differences in scores cancel each other out so that there is no overall change in global self-worth. There was no discernable pattern between the children's comments and the change in quality-of-life and BMI z-scores.

#### **7.5.4 How Children feel at School**

In response to the question at interview *'How do things feel for you at school now: better, worse or the same?'*, ten of the 16 children reported that things were better after the programme, and gave a wide range of examples including improved academic achievement, more friendships, and praise from the teacher (Table 7.11). There were also comments about increased physical activity, consistent with the perceived improvement in physical health on the quality-of-life questionnaire. Four children responded that things were the same for them at school although the comments from three of these children indicated some improvement. One child responded that it was worse, 'Awful' (Child-19), but did not expand on this response. One child did not comment. Alongside the children's quotations I have included selected quantitative data in Table 7.11, related to aspects of school-life. There was no noticeable pattern between the two datasets, the qualitative and quantitative data do not seem to converge.

**Table 7.11 Responses to ‘How do things feel for you at school now: better, worse or the same?’ in the Children’s End-of-Programme interview.**

		Change from baseline to EOP			
		Schola- stic* (self- esteem)	Social Accept- ance** (self- esteem)	Emotional /Social /School*** (PedsQL)	BMI z- score
<b>Better: Improvement in academic performance</b>					
1A	<i>I feel more proud of myself because I’ve heard expression in my reading.</i>	0.5	0.5	1.7	-0.08
4	<i>I feel better because I’m doing better at science than I was.</i>	0.0	0.17	-5.0	-0.27
25A	<i>Better because now I used to not concentrate on my work but now I’m more focused on my work and if someone says anything about me I just ignore them and I use my personal power not to talk to the person next to me.</i>	-1.0	0.17	3.3	-0.08
<b>Better: Relationships with other pupils, teachers</b>					
6	<i>Better because I am having lots more friends and I’m having more energy.</i>	0.17	0.0	-5.0	-0.56
12B	<i>Better. Because when um, before we did our talent show I was in lots of dances with Carla.</i>	-0.5	0.17	-45.0	0.36
25B	<i>Better because my teacher thinks more of me and my friends think more of me now.</i>	0.5	-0.83	25.0	-0.08
<b>Better: Improved lifestyle (Physical Activity / Healthy Eating)</b>					
1B	<i>I think it is better because we have like more like activities at our school.</i>	0.17	-0.33	0.0	-0.39
3A	<i>Stronger. When I’m at school right and I was in about Year 4 Mr Ducky (talking object) said I wasn’t very fit. I thought I was but I have started to get myself fitter.</i>	1.33	0.0	48.3	0.06
12A	<i>Better. Because I am running around a lot now.</i>	0.17	-0.17	-6.7	0.06
3B	<i>Better. Um, it’s better because now I, its better now because I used to ask my Mum for unhealthy things for my packed lunch, but now I ask for real things.</i>	-0.83	-0.17	-3.3	-0.19
<b>The Same</b>					
5	<i>The same, absolutely the same.</i>	0.0	-0.67	-6.7	-0.11
14	<i>Nothing’s really changed except the teacher. She just thinks it’s really good that I’m on it.</i>	-0.5	0.50	-3.3	-0.44
15	<i>About the same. Quite a few people who I haven’t seen for a while um, have noticed that I have been losing weight.</i>	-0.17	0.63	11.7	-0.08
24	<i>Well people used to call me names about my weight but they still do now but I just go away and ignore them and not go and tell Miss.</i>	-0.17	0.17	38.3	0.25
<b>Worse</b>					
19	<i>Awful</i>	0.67	1.67	-20.0	-0.48

\* ‘Scholastic competence’ of self-esteem: child’s perception of ability at school (Harter 1985)

\*\*‘Social Acceptance’ of self-esteem: degree to which children feel popular (Harter 1985)

\*\*\*Psycho-social score for quality of life, which includes 5(of 15) items about school(Varni 2001)

There are reasons why the quantitative and qualitative data sets in Tables 7.10 and 7.11 may not converge. First, there are questions regarding the validity of the quantitative data. There were nine children aged 7 years at baseline who completed both the self-esteem and quality-of-life questionnaires, and were given support to do this. These questionnaires are, however, designed for children from age eight. In particular, the Self-Perception Profile for Children is considered 'inappropriate' for children under eight because they may not understand the question format; some of the words may not be understood (e.g. popular, smart, good-looking); and 'global self-worth' as a person is a difficult concept at this age (Harter 1985). Five of the children for whom data is presented in Tables 7.10 & 7.11 were aged seven years at baseline (1A, 3B, 6, 12B, 24), and their measures of self-esteem in relation to their quotations may therefore be unreliable. Second, group interviews with the children may have elicited different responses to those that would have been elicited in individual interviews. On at least two occasions children seemed to 'copy' what a previous participant had said (e.g. Child-12B on Table 7.10 followed on from her sibling Child-12A), giving a socially acceptable answer within the group situation.

#### **7.5.5 Potential for Harm to Psycho-Social Health of Children**

One child (Child-19) indicated in the interview that he felt worse at the end of the programme, both in response to how he felt about himself (Table 7.10) and how things felt at school (Table 7.11). These responses were consistent with his decline in global self worth (-1.00) (Table 7.10) and with the decline in the psycho-social aspects of quality of life (-20) (Table 7.11), but inconsistent with the 'social acceptance' domain of self-esteem which improved markedly (+1.67)

(Table 7.11). Despite showing an improved BMI z-score (-0.48) the psychosocial health of this child has declined, which may be related to other aspects of the child's life or to the programme. I return to this family in section 7.7.

### **7.5.6 Summary**

Questionnaire data showed that from the parents' perspective all aspects of children's quality-of-life improved significantly at the end of the '*Families for Health*' programme (3 months) whereas only physical functioning improved significantly from the children's perspective. However, children's quality-of-life had improved significantly at 2-years for all components and for both parent- and child-reports. The questionnaire data on children's self-esteem did not change significantly from baseline for any of the six domains, either at the end-of-programme or 9-months.

The interview data at the end of the programme was more positive than the data obtained from the standardised questionnaires, suggesting that the programme had improved how children felt about themselves and how they felt at school. A combined analysis of the quantitative and qualitative data showed that children who described their mental health as improving (qualitative data) also had improved outcomes for global self-worth (quantitative data), despite the mean scores for self-esteem not changing.

## **7.6 Parents' Mental Health**

Parental mental health, as measured by the Short Depression-Happiness Scale (SDHS) (Joseph et al 2004), improved significantly by the end of the programme (3 months). This improvement was maintained at 9-months (Table 7.12), but not at 2-years (Table 7.13).

Joseph et al (2004) suggests that a SDHS score below 10 might be indicative of clinically relevant depression. Seven of the 21 parents from the families who started the programme had a score of 9 or below at baseline; two from Group 1 who both completed the programme and five from Group 2 of whom 4 dropped out and one was a 'partial-completer'. This may indicate that parental mental health is associated with completion of the intervention, and may have contributed to the increased drop-out rate from Group 2. Figure 7.2 shows the SDHS scores for each parent with follow-up data, split by group.

**Table 7.12 – Summary of parent’s mental health scores at baseline (0 months), end-of-programme (3 months) and nine-month follow-up, for the 16 parents with follow-up data (intention to treat analysis)**

	0-months Mean (SD) (n=22)	3-months Mean (SD) (n=22)	9-months Mean (SD) (n=22)	0-3 month change (n=22)		0-9 month change (n=22)		Any Difference Group 1 vs Group 2?	
				Mean (95% CI)	p value	Mean (95% CI)	p value	0-3 month p value	0-9 month p value
<b>Parents Mental Health (Short Depression-Happiness Scale) (Range 0 to 18)</b>									
Score (16 Parents)	10.9 (4.5)	13.5 (3.8)	13.3 (3.5)	2.63 (0.69 to 4.56)	0.011	2.38 (0.07 to 4.68)	0.045	0.134	0.174

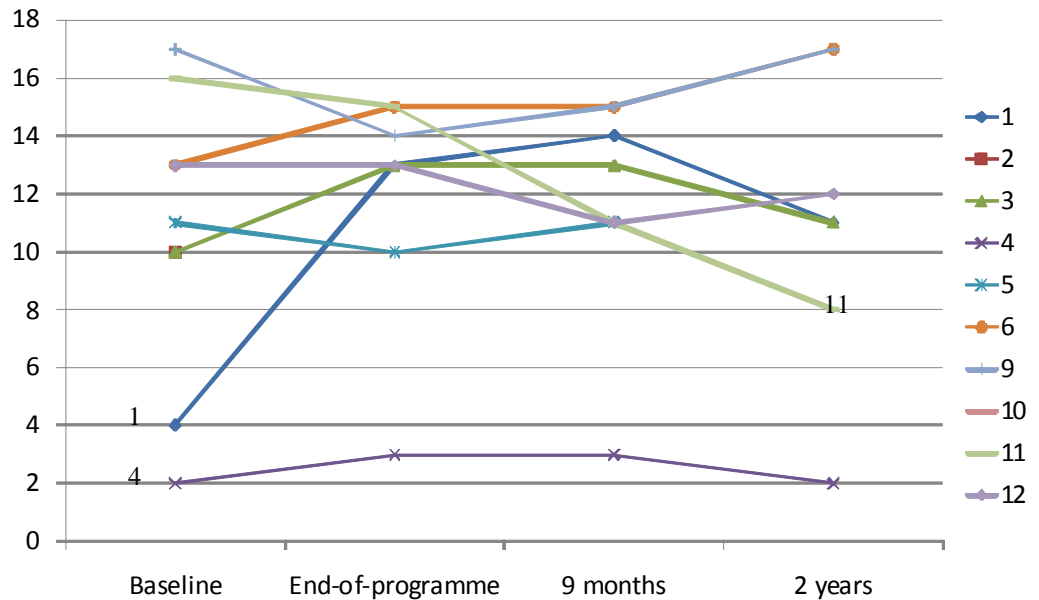
**Table 7.13 – Summary of parent’s mental health at baseline (0 months), end-of-programme (3 months), nine-month and 2-year follow-ups, for 13 parents who were followed up for 2-years (intention to treat analysis)**

	0-months Mean (SD)	3-months Mean (SD)	9-months Mean (SD)	2-years Mean (SD)	0-2-years change		Any Difference Group 1 vs Group 2?
					Mean (95% CI)	p value	0-2-years p value
<b>Parents Mental Health (Short Depression-Happiness Scale – Joseph) (Range 0 to 18)</b>							
Score (13 Parents)	11.54 (4.61)	13.62 (4.11)*	13.31 (3.86)	11.77 (4.23)	0.23 (-1.91 to 2.37)	0.818	0.838

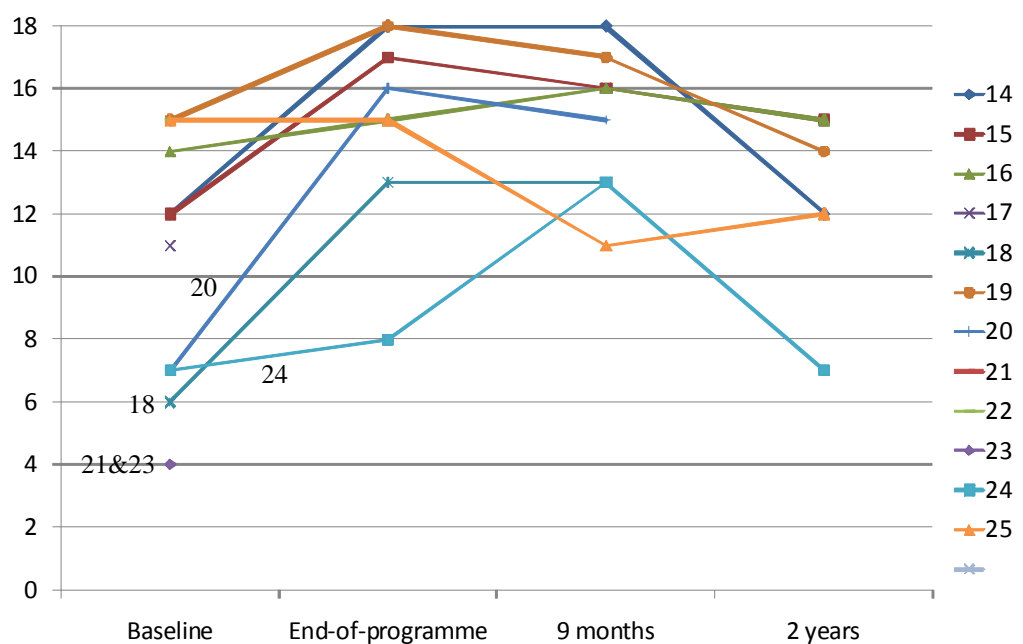
Different from baseline: \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Figure 7.2 Parents' mental health scores (Short Depression Happiness Scale), arranged by group. (Scores of <10 may be indicative of mild but clinically relevant depression)**

**(a) Group 1**



**(b) Group 2**





The two parents from Group 1 (Mother-1 and Mother-4) who completed the programme and had SDHS scores indicative of depression at baseline (less than 10) showed contrasting responses. Mother-1 had an SDHS score of 4 at baseline, rising to 13 at the end-of-programme, 14 by 9-months, and 11 at 2-years, indicating sustained improvement (Figure 7.2a). The interview data suggests that the focus of the programme on nurturing oneself was something that this parent had found difficult, but that she had enjoyed the group and had improved the relationship with her children, also passing an assignment for a child-care course.

- *The leaders are fab and so jolly, which makes us feel at ease and feel good in ourselves. (End-of-programme questionnaire, Mother-1)*
- *You know you're supposed to look after yourself, I do find that quite hard. Even though you are saying you know you want to do it, it doesn't always happen. [ ] I find it quite hard to sort of think of me first in a sense, its still always kids. Whether it's because I have got five of them I don't know. I mean the solutions for stress I mean was it that one, which was the one that was um, where you do the relaxing thing, is that the stress one? Breathing exercises and things like that. I mean at the moment it helped a little bit but it's not something I sit and do. (Mother-1)*
- *It is hard I'll tell you, but I've sent it (assignment) now, I've e-mailed it and I have passed my other one. I got my grades so I was quite chuffed that that came through. (Mother-1)*

Second, Mother-4 had the lowest mental health score of the group at baseline (2), which did not improve at the three follow-up points (Figure 7.2a). In the end-of-programme questionnaire and the interview she acknowledged the support from the group and facilitators, and stated an intention to try make improvements in the New Year to her own health, but this appears not to have manifested itself in improved mental well-being.

- *At the beginning I was a lot lower in myself. I have been supported all the way by the group and instructors. My opinions have been*

*valued and parents in the group have tried some of the things I had suggested.* (Mother-4, End-of-programme Questionnaire)

- *I've had a lot of support and made some nice new friends. [ ] I'm going to try and do more in the New Year, physically, myself. Yes exercise-wise I'm going to do some different things and try and get out a bit more, structure back into my life, start going up instead of coming down.* (Mother-4, Interview)

Three of the five parents from Group 2 who had SDHS scores below 10 at baseline contributed data at follow-up (Figure 7.2b). While two of these had dropped out of the programme, both showed large improvements in SDHS i.e. above 10 at each follow-up time-point (Mother-18: 6 at Baseline, 13 at end-of-programme, 13 at 9-months; Mother-20: 7 at Baseline, 16 at end-of-programme, 15 at 9-months). Personal reasons may account for these improvements in SDHS scores for these two parents, and unlikely to be attributable to the 'Families for Health' programme. The third parent who was a 'partial-completer', showed no change in SDHS at 3-months, an improvement at 9-months, but no improvement at 2-years (Mother-24: 7 at Baseline, 8 at end-of-programme, 13 at 9-months, 7 at 2-years).

Although I did not inquire specifically about parents' mental health in the interviews, there are some comments that indicate that improvement in the SDHS for some parents may have been due to the programme. For example, Mother-14 showed an increase in her SDHS score from 12 at baseline to 18 (maximum) at the end-of-programme, which was sustained at 9-months (18) but decreased back to baseline at 2-years (12). In the following section she describes improvements to family relationships, but she also cited two specific changes to herself which may account for the large improvement. She now felt

able to function and feel more comfortable in a group, had joined another group to address her own weight issues, and was also planning to get a job.

- *I was a bit taken aback at first with the group meeting you know the way it was. Cos being a shy person it was a bit daunting at first for me but I think it helped me, really gave me a bit more confidence to talk out, because I wouldn't dream of doing that before. But ah, I'm in another group similar now so I'm, I haven't got into that with the same way I went into this one because now I can just talk and not feel silly. (Mother-14)*

She added later in the interview:

- *I think I basically found it all useful in some way you know like I mean even the things I didn't like at first like the group meetings that turned out to be useful for me, because at some stage this year I'm hoping to go and get a job and just to be able to sit and not feel as bad as I did and speak out without feeling the way I did I've got something useful out of that as well. In a group I'd go to pieces so I felt, I felt quite confident at the end of it so it's definitely helped me a lot. (Mother-14)*

Mother-6 showed a sustained improvement in SDHS from 13 at baseline, to 15 at both the end-of-programme and 9-months, to 17 at 2-years. She indicated at interview that the programme had given her increased confidence in her parenting role, which may in part account for her improved mental health.

- *I just feel a lot more confident really about what I'm doing as a parent for Child-6 and XXXX [son] as well actually ... this little reward thing we had going [stickers]. As people we are very sort of critical of ourselves, and focus on what we're not doing, especially if your child's a little overweight shall we say, that you blame yourself you know. But when you identify the small little things that you do and then you see the difference you know it's like a confidence boost for me today seeing Child-6's measurements. I could see her shape was changing but I didn't realise just how different it was and we've not done anything drastic to do that. Tiny little changes, reducing portions, playing you know having a bit of quality time you know so it's given me faith that actually I'm not, I'm not too bad, you're not doing such a bad job, you know and it's just nice. It's a good thing. 'Little steps, big changes' it's called. (Mother-6)*

It is also important to note that none of the parents who were previously at or above the threshold of 10 on the SDHS at baseline went below this threshold either at the end-of-programme or 9-month follow-up, although one parent (Mother-11) did drop below 10 at the 2-year follow-up (Figure 7.2a). This parent was not interviewed.

To summarise, the improvement in the mean mental health scores of the parents at the end-of-programme and 9-month follow-up appears to be attributable to a combination of factors including the benefits of the programme for some parents, and other factors that are external to the programme for other parents. There was no evidence of an adverse affect of the *'Families for Health'* programme on parent's mental well-being. The findings suggest, however, that parents with poor mental well-being at baseline are probably less likely to complete the programme.

## **7.7 Family Relationships**

This section focuses on the relationships between parents and their children, and then on other family relationships such as that between siblings, and of the parent with their partner. It draws on three sources of data, namely the child-parent relationship scale which provided quantitative data (Pianta 1992) and the interviews with both parents and children.

### **7.7.1 Parent-child Relationships**

The relationship between parents and children improved significantly at the end of the programme (mean difference 0.3, 95% CI 0.06 to 0.55), although the improvement was no longer statistically significant at 9-months (Table 7.14) and 2-years (Table 7.15).

In response to the question *'How do things feel for you at home now: better, worse or the same?'* 9 of the 16 children responded that things were better, and some gave examples including that they were having healthier food, they were behaving better and were having less arguments with siblings. Five children replied 'the same', and one child indicated that it was worse. One child (Child-19) did not respond. The interviews with parents gave examples of how the parenting skills from the programme had improved the relationship with their child. Themes emerged around improved discipline, increased family time and praise.

**Table 7.14 – Summary of the relationship between parents and children at baseline (0 months), end-of-programme (3 months) and nine month follow-up, in 22 children with follow-up data (intention to treat analysis)**

	0-months Mean (SD) (n=22)	3-months Mean (SD) (n=22)	9-months Mean (SD) (n=22)	0-3 month change (n=22)		0-9 month change (n=22)		Any Difference Group 1 vs Group 2?	
				Mean (95% CI)	p value	Mean (95% CI)	p value	0-3 month p value	0-9 month p value
<b>Child-Parent Relationship Scale (higher is better) (Range 1-5)</b>									
15 Q	3.85 (0.71)	4.15 (0.48)	4.08 (0.78)	0.31 (0.06 to 0.55)	0.018	0.22 (-0.07 to 0.52)	0.128	0.873	0.607

**Table 7.15 – Summary of the relationship between parents and children at baseline (0 months), end-of-programme (3 months), nine month and 2-year follow-ups, in 19 children who were followed up for 2-years (intention to treat analysis).**

	0-months Mean (SD)	3-months Mean (SD)	9-months Mean (SD)	2-years Mean (SD)	0-2-years change		Any Difference Group 1 vs Group 2?
					Mean (95% CI)	p value	0-2-years p value
<b>Child-Parent Relationship Scale (Pianta) (higher is better) (Range 1-5)</b>							
15 Q	3.86 (0.75)	4.14 (0.50)*	4.10 (0.75)*	4.08 (0.76)	0.21 (-0.03 to 0.46)	0.086	0.506

Different from baseline: \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

### **7.7.1.1 Improved discipline**

Parents indicated that they now responded in a calmer way to poor behaviour in their children, using a variety of techniques including 'time-out', ignoring bad behaviour, praise of the child and relaxation exercises.

- *You know its just silly things, I mean I'm not saying we never do shout again 'cos you still have the odd days where you can't change yourself completely, but its changed an awful lot. Just remembering how I sort of stand back first and like if one of them like Child-1B is at the age where tantrums, you know, slamming the door, storming upstairs and before I would go behind her and still carry it on and I went fine, stay upstairs then and I left her and she come down after on her own. I just left her and let her calm down. So I ignored it and I just came in the room and then she came down and she actually sort of said sorry and that was it, it was finished. Whereas before I would have been stomping up the stairs still going on at her. (Mother-1)*
- *I've found dealing with the children when they play up a lot easier. Take things more calmer because my three girls are very, very hyperactive and they do wind me up very, very quickly. And I have found that a lot of the sitting down, relaxing and taking a deep breath, looking at it in perspective before actually just flying off the handle. (Mother-12)*
- *For me it was the stress you know um, simple things like going shopping and not shouting and screaming at them. You showed us how to sort of calm things down and turn it in to like a role play sort of aspect um, praising as well. I don't really praise Child-5 as much as what I should do and, you know, instead of shouting at them and being a nag, praise them more. So that was good. (Mother-5)*

### **7.7.1.2 Increased family-time leading to closeness**

Several parents indicated that they had increased the time they spent with their children, and that this had increased feelings of closeness between parents and children. The increase in family-time sometimes involved an increase in physical activity, which is discussed in section 7.9.

One parent attributed increased closeness with her children to having more 'one-to-one' time with each child. This is consistent with the improvement in the

parent-child relationship score for one of her children (1A: 3.73 at baseline to 4.2 at end-of programme), although not for her other child (1B: 3.93 at baseline to 3.87 at end-of programme). Both children indicated that they felt things were better at home, although for different reasons: one child gave the reason that they were eating more healthily at home and the other child due to improved relationship with her sibling.

- *I'm a lot closer, probably more trying sort of to do them sort of individually whereas before they sort of you know they were all fighting together and I would snap and it wasn't easy really but now I try to spend a bit of time, even if it is just going to the shop up the road, I maybe leave the two younger ones and go with just Child-1B on my own. Or do it the other way round, do you know what I mean, sort of get a bit of individual time with them, that I wasn't doing before. And it does make a difference. 'Cos that is what they want isn't it, telling you what they have got to tell you. And then when you have got three of them trying to tell you the same thing. It might only be ten minutes but that ten minutes makes a difference. [ ] Trying to build their self confidence, it's like you say honouring their feelings as well, you know and listening to them. (Mother-1)*

The joint interview with the Mum and Dad from Family-19 is an interesting dialogue, with the 'Families for Health' programme perceived to have been a catalyst in bringing this family closer together. Giving the child more of their time and more praise were both cited as being important.

- Mum: *It's brought us closer because we sort of give him, I give him more time and I think XXXX (Dad) gives him more praise. And both of those things were not particularly natural before the club ['Families for Health']. Today for example just before Child-19 was going we had got a million and one jobs to do but I actually sat down and played a game with him, a game of cards, a shoot-out cards because it was what he was doing. And before club I would have just said 'oh, let me just do this, let me go and make the beds, let me go and do this, that and the other' and before I know it he would have been gone and I would have been left here sort of devastated and upset that I hadn't done anything with him and that I had made all the beds. Whereas now we left the beds, played a game of shoot-out, sat down with him, had the time with him and then when he went, I went and made the beds. It's changed sort of my shift in that what's important is not making the beds and the*



*important thing is actually playing with him and he went off really happy didn't he. (Mother-19)*

Dad: *I had expectations and found it difficult to say well done for putting his washing away, to me it's a natural thing to do but like XXXX (Mum) was saying she's got to become more tolerant and give more time and I have become more understanding what praise does. (Father-19)*

Mum: *So it has gone way, way, away from healthy eating it's gone to family life so you know not just a healthy eating programme it's about life skills, about parenting skills, about all sorts of things. (Mother-19)*

Dad: *It's made us, because we have always been close, quite close knit but it's made us more of a family unit. Because we're not a natural family as such, we're an extended family if you like, it has been very beneficial in so much as like, Child-19 does see me in this role, where he accepts you know, that I am the Dad and I accept that he's the son. My expectations are now what I put in to him rather than what I expect him to already have. And I think he has bought into that in a great way hasn't he, because there's no doubt about it he's, we've always been loving, now he's loving to us and particularly to myself as well. And I'm not saying that's just come about in the last twelve weeks, that's come about over a period of time but this has certainly been a catalyst to bring him further forward a lot quicker. (Father-19)*

The father from Family-19 felt that 'choices and consequences' was a very useful tool, giving his son some power in making decisions, rather than just enforcing.

- *I think to have something as simple as choices and consequences explained to you in the manner that it was, and then to actually apply it that for me that was one of the highlights of attending this course because it is so simple to shift the onus of power to Child-19 and you let him make the choice as opposed to enforcing something. We've had so many silly little examples whereby 'alright mate you've got a choice now you can do a, b, or c but consider what the reactions to a, b and c will be' and that is fantastic piece of armoury in a parent, if you want to call it armoury. (Father-19)*

The parent-child relationship score increased from 3.73 at baseline to 4.27 at the end of the programme for Child-19, and thus converges with the parents' views at interview. However, this child evaded the question about how things

were at home, so it is not possible to see if his views converged with the parents, albeit he had said that he felt worse about himself and felt things were also worse at school (section 7.5.5).

Family-4 also indicated that they were trying to spend more time as a family. However, this parent was less sure that an improvement in the relationship with her child had occurred, and this uncertainty was echoed by her child when asked about how things felt at home. However, the parent-child relationship score showed an improvement from a very low baseline score of 2.2 to 2.8 at the end-of-programme, although the scores went back to below baseline at the later follow-up periods.

- *We're trying to set time for each other, whereas before it was so easy to say 'oh go upstairs and play on your own', so now we're trying to make time for each other, and have some family-time together. Which I suppose, like we're having a game of monopoly or he brings his compendium down and we play a few games or go up and watch a DVD together. So we are trying to spend more time, quality time together rather than we're trying not to argue as much. Whether that helps, is happening but we said we are going to sit down over the next few days and make some rules out to start the New Year and hopefully start it off on a positive note rather than a negative one, so I've learnt that from going there I think. (Mother-4)*

She added later in the interview:

- *At times I feel that we've gone forward um, because he can be really, really good and then at times when we do have a lot of arguments, but um I think once we have sat down and made a few rules because that's, that was the week I missed when you did your reward chart. (Mother-4)*

Her child responded in the group interview about how things felt at home:

- *'Better'. When asked in what way, 'Um, don't know.'* (Child-4)

### 7.7.1.3 Praise

Increasing the praise given by parents to their children was another theme likely to be of importance in improving the relationship between parents and children, with many parents indicating that they had rarely given their child any praise prior to the programme.

In Family-3, the mother indicated that her children were better, and this is consistent with the quotation from Child-3A who said at interview that she was now better behaved. Child-3A had the largest improvement of the group in the parent-child relationship score, from 3.2 at baseline to 4.53 at the end-of-programme. The mother indicated that one difference was that she was using praise very liberally, describing the changes as follows:

- *They have, they have changed they have got more better. I never used to give them enough praise but I have been giving them more praise, even if it is just a little bit. I mean I said to Child-3A this morning just for literally picking a bowl up and taking it into the kitchen 'oh brilliant, well done Child-3A' and she said it wasn't much was it and I said 'no but it was good for what you did, thank you'.* (Mother-3)

In response to the question about how she felt at home, Child-3A said:

- *Things are better thank you. Because I went to this thingy-mejig, healthy families. I'm behaving a bit more. I'm behaving a bit better and I'm eating more healthily.* (Child-3A)

The mother from Family-6 also indicated that giving praise had improved her child's behaviour and had made food changes easier to implement. The parent-child relationship score also improved (from 4.07 at baseline to 4.47 at the end-of-programme) which is consistent with the following quotation from Mother-6.

- *Giving praise is good, I found that's worked quite well, as well. That's diffused quite a few potential outbursts shall we say either from a food point of view but also behaviour. I was one of these parents, it's*

*quite easy to leave your kids to it if they're being quiet, go away, go off and do something rather than spending a few minutes saying 'absolutely brilliant, well done aren't you being good' and you know just sort of focusing on that and not just coming back in when they're fighting and pulling each other's hair. Again, just little bits of praise they're more inclined to try new things or do something a bit differently, for example a MacDonald's would be a good one, you know. Can I have a MacDonald's, no not today Child-6, you know you had one two weeks ago you have to wait, she accepts that, so then she gets a lot of praise because she has accepted your decision. (Mother-6)*

Parent 14 also indicated that she had not praised her son previously, and that praise had been very effective in encouraging her son.

- *Well, giving praise that was just something that I never did, I just used to give him cuddles and everything but I was more critical. Now I praise him all the time, you know after every little thing he does I give him praise and encouragement you know. I see he glows when he gets it and I know it pushes him on. (Mother-14)*

However, the parent-child relationship score was very high at baseline (4.93) and was slightly reduced at the end-of-programme (4.67). At interview, her son indicated that things were “the same” at home, but did not expand.

### **7.7.2 Other Family Relationships**

Two families who had more than one child on the programme indicated that they had seen an improvement in the relationship between the siblings. For Family-3 this improvement was attributed by the parent to both children going on the programme together and seeing how other siblings behaved:

- Mum: *Oh the relationship between Child-3A and Child-3B has changed dramatically actually, because they were fighting constantly all the time, which they don't do now. (Mother-3)*

Interviewer: *Do you think that is attributable to the programme?*

Mum: *I think because we went on the programme together. I think so they were having to do it, go there every week together, they were seeing other children and they were behaving as well, so it was, they were getting a social sort of life from, from*

*watching others as well. And Child-3A seems to have grown a little bit more confident and but she has also grown as well, I'm older I don't need to do fighting. She has come out with that once or twice. I should have known, I shouldn't have done that, rather than lashing out. (Mother-3)*

The improvement in her relationship with her sister was attributed by the child to the parent controlling what is watched on television:

- *I've stopped arguing with my sister partly because we normally see the telly and it like gets our brain working into like nasty things and getting wound up but now my Mum has banned us from the handset and we are not allowed the handset, 'cos we got our head mixed up with all the stuff now, we haven't fought in a couple of days. (Child-3B)*

The improvement in the relationship between siblings was less pronounced for Family-1, but better than before the programme. The Mum attributed the improvement to increased effort on her part ensuring her children had some quality one-to-one time with her, as shown in a previous quotation.

- *Well that, I mean they still are a little bit at each others throats but I think that is probably because they are both going through the same thing to be honest, do you know what I mean. I find that Child-1A is more of a teenager in her moods than what Child-1B is, but it is better than it was, it was just a nightmare before. (Mother-1)*

The child supported this improvement:

- *I feel, I feel more betterer at home because I don't, I don't argue with my sister as much. (Child-1A)*

The relationship between a child on the programme and his older sister was also improved, as was the relationship between the mum and her husband.

- *It is changing because she [sister] can see a change in him and she's got more respect for him and like they'll go to the gym together twice a week now, whereas they never done anything together so it's changed in that respect. She likes the new him, she hated seeing him sat there stuffing himself all the time, so she likes the fact that he's changed. She couldn't see it for a while but she can see it now and she's really quite proud of him. (Mother-14)*
- *I think definitely we've all got more pride in Child-14 for this for all his changes and the fact that he has welcomed it and carried it on. So, I think everyone's relationship with Child-14 has improved, obviously*

*mine and my husband is improving as well, because I'm much happier. I haven't got the guilt that I had you know because basically I was killing Child-14 and I was responsible for it. That's the way I see it because my ways were bad and it was down to me that he was eating that way and his activities level were so low because mine were so low and if I wouldn't go anywhere he wouldn't go anywhere so everything has changed and I'm a happier person so my relationship is better. (Mother-14)*

These changes were attributed to coming on the programme:

- *I was looking for something, I needed something, I couldn't do it on my own. I kept trying and failing and I needed just a focus, I needed motivation and I knew after five weeks on the programme I knew that it was working and I knew that I was changing and I worked harder at it then and I know I'm not going to go back now. (Mother-14)*

One child indicated that the relationship with her brother, who was too young to attend the programme, was worse due to his behaviour. He has, however, since been diagnosed with autism, and this problem is therefore unlikely to be attributable to the programme.

### **7.7.3 Summary**

The quantitative data showed an improvement in parent-child relationships at the end of the programme and broadly converged with the interview data, which showed examples of improvements in the relationships between parents and their children, siblings and partners.

## **7.8 Lifestyle Changes – Healthy Eating**

This section focuses on the lifestyle changes in relation to healthy eating. Data from questionnaires on measures related to the eating environment and to healthy eating are reported in Table 7.16 for the 22 children followed up for 9-months and in Table 7.17 for the 19 children followed up at 2-years. Three areas were examined using both quantitative and qualitative data: the eating style of families; the eating ‘stimulus exposure’ at home incorporating what food is provided by parents; and fruit and vegetable consumption. Other themes from qualitative data included children becoming more responsible over what they ate and barriers to healthy eating.

**Table 7.16 – Summary of healthy eating measures, at baseline (0 months), end-of-programme (3 months) and nine month follow-up in 22 children with data (intention to treat analysis)**

	0 months Mean (SD) (n=22)	3 months Mean (SD) (n=22)	9-months Mean (SD) (n=22)	0-3 month change (n=22)		0-9 month change (n=22)		Any Difference Group 1 vs Group 2?	
				Mean (95% CI)	p value	Mean (95% CI)	p value	0-3 month p value	0-9 month p value
<b>Child's scores for Family Eating and Activity questionnaire (Golan 1998b) - (lower is better for the four domains)</b>									
Stimulus Exposure	9.7 (3.4)	6.8 (2.7)	6.8 (3.1)	-3.1 (-4.6 to -1.6)	0.001	-3.3 (-5.0 to -1.5)	0.001	0.939	0.809
Eating Related to Hunger	3.4 (1.4)	3.5 (1.5)	3.0 (1.9)	0.2 (-0.8 to 1.1)	0.672	-0.4 (-1.2 to 0.5)	0.364	0.990	0.811
Eating Style/Rites	23.8 (5.4)	18.1 (6.3)	17.8 (5.6)	-6.2 (-9.5 to -3.0)	0.001	-6.2 (-8.9 to -3.6)	0.000	0.471	0.224
<b>Child's Fruit &amp; Veg Consumption (Day in the Life Questionnaire) (Edmunds and Ziebland 2002)</b>									
Portions	1.7 (1.3)	1.8 (1.8)	2.4 (1.6)	0.1 (-0.7 to 0.9)	0.777	0.7 (-0.2 to 1.5)	0.119	0.945	0.344

**Table 7.17 - Summary of healthy eating measures at baseline, end-of-programme (3 months), nine month and 2-year follow-ups in 19 children who were followed up for 2-years (intention to treat analysis)**

	0 months Mean (SD)	3 months Mean (SD)	9-months Mean (SD)	2-years Mean (SD)	0-2-years change		Any Difference Group 1 vs Group 2?
					Mean (95% CI)	p value	0-2-years p value
<b>Child's scores for Family Eating and Activity questionnaire (Golan 1998b) - (lower is better for all domains)</b>							
Stimulus Exposure	9.5 (3.3)	6.3 (2.0) ***	6.5 (3.1) **	7.9 (2.5)*	-2.0 (-3.5 to -0.5)	0.015	0.256
Eating Related to Hunger	3.3 (1.5)	3.4 (1.5)ns	3.1 (1.9)ns	2.8 (1.8)	-0.4 (-1.7 to 0.9)	0.549	0.288
Eating Style/Rites	23.5 (5.3)	17.8 (6.5)**	17.4 (5.9)***	17.7 (7.3)***	-6.0 (-9.0 to -3.1)	0.0008	0.553
<b>Child's Fruit &amp; Veg Consumption (Day in the Life Questionnaire) (Edmunds and Ziebland 2002)</b>							
Portions	1.6 (1.3)	1.8 (1.9) ns	2.7 (1.6) *	1.8 (1.5)	0.11 (-0.75 to 0.96)	0.792	0.660

Different from baseline: \*p<0.05, \*\*p<0.01, \*\*\*p<0.001



## 7.8.1 Changes to Eating Style

The Family Eating and Activity questionnaire (Golan 1998b) showed that children had developed significant improvements in 'eating style' in the home at the end of the programme, which were sustained to 9-months (Table 7.16) and two years (Table 7.17). The 'eating style' sub-scale includes questions about where and with whom eating takes place and the taking of second helpings. Interview data from parents show that the changes to the 'eating style' in the family focused mainly on eating at a table rather than in front of the television, and having meals at set times with the whole family, as illustrated below.

### 7.8.1.1 Eating at a Table

Several parents reported in the interview that they had bought a dining table, and were eating at the table rather than eating while watching the television.

- *We bought this [pointing at table] because we didn't have a table, so that made a difference. Before, we were just eating it watching the telly. [ ] It wasn't that we didn't have conversation 'cos we did, we used to still talk, but it's just it's all in one place and because xxxxxxxx which is the 4 year-old would sort of wander around and not sit and eat and that has changed a little bit, she still likes to wander a little bit but it's not as bad. (Mother-1)*
- *The nice thing that we have started doing since the programme, we've had a dining table so that's in the back room so there's no television while you're eating. (Mother-6)*

One parent described how eating at the table had increased the communication in the family, although this appeared to be an uncomfortable transition period:-

- *Two weeks ago we finally got the table and chairs so they are now sitting in there to eat and it's been hard for them to eat because we never used the other table and chairs but I'm making them do it. They didn't know what to do with themselves, they really didn't, all sitting facing each other, they didn't know how to act you know because they'd sit and watch TV. So they are talking more at the table, so at mealtimes you take note of what you're eating more, instead of just shoveling it in because the telly is on, so their mealtimes have changed. (Mother-14)*

One family had introduced a reward system to bring about the change in eating at a table, thus using parenting skills to effect change:-

- *There were so many different ideas like the Jenga blocks. We took that one on board and every time we sat at the table as a family we had a Jenga block, so that was a good one. (Mother-19)*
- *It did make it clear as well, that you know you get a reward for a certain thing now but once that has been rewarded 'x' amount of times then it's set in stone, it's now part of the lifestyle if you like. Eating at the table is now not reward-able, it's natural you know. That's not to say that we don't have a treat or knock it on the head for a day. This weekend for instance because it was our wedding weekend we let Child-19 have breakfast on the settee yesterday, but it was made very clear this is a treat. Come Monday it's back to normality not a treat day. So that's not to say that everything is cast in stone, but pretty much we have reversed it. Rather than sitting at the table being the odd one, sitting at the table is now the normal one and sitting on the settee is an odd one, that is a treat as opposed to not what we want. (Father-19)*

#### **7.8.1.2 Family Meals**

One parent reported that eating at the table had also encouraged set meal times where the family eats together, improving family logistics and having the additional benefit of reducing snacking:-

- *It makes us more eat the same sort of time. We've made it set times now as well [as well as sitting at the table]. It's sort of changed everything in a sense that, right we are going to eat at this time. You know and that's, and that's helped a lot. It was getting to that stage that... I was cooking something different for us, then somebody would walk in and I would have to do it for them and that's probably why I would just pick whilst I was doing it. I never really sat and ate a meal. ... I think it has helped Child-1A in just her eating habits to be honest. Given nothing else, just her eating habits 'cos she was just coming in and out all the time and munching this that and the other and it did stop it. (Mother-1)*

Changes in eating style reported by these four families at interview were reflected in improved (i.e. lower) scores on the 'eating style/rites' domain of the Family Eating and Activity questionnaire (Golan 1998b) for four of the five children in the end-of-programme questionnaire (reduction from baseline:

Child-1A: -13; Child-1B: -10; Child-6: -13, Child-19: -5). For Family-14 the child's score increased by +1 at the end of the programme, although in the interview it is implied that the table had just been obtained and it is likely that the completion of the end-of-programme questionnaire pre-dated the acquisition of the table. Therefore, the quantitative and qualitative data around the changes to eating style appear to be consistent, with the qualitative data providing examples of how eating style had changed.

### **7.8.2 Changes to Stimulus Exposure (unhealthy foods)**

The Family Eating and Activity questionnaire (Golan 1998b) also showed that children were significantly less exposed to unhealthy foods in the home ('stimulus exposure') at the end of the programme, which was sustained to 9-months (Table 7.16) and two years (Table 7.17). To illuminate the reduction to the exposure of children to unhealthy snacks, several sub-themes emerged from interviews with parents, including the provision of healthier options in the home, the introduction of 'treat days' to restrict access to unhealthy snacks and a reduction in portion sizes. Parents felt they were more 'in charge' of what food was provided for their children.

#### **7.8.2.1 Changes to what is available / offered at home**

Many parents reported making changes to what food and snacks were available at home in their interviews. New knowledge around food labels was perceived to be important in enabling parents to make healthier choices when shopping.

- *I mean snacks and things have all changed, we don't buy you know like biscuits or cakes really. [ ] I thought I knew it all basically you know, what to do and everything and I think I shop quite healthy anyway but I just didn't really check food labels to see what, what was in it. I mean I give things to Child-14 that I thought was fine like say, a tin of beans and I'd give him a whole tin and I'd*

*think that was healthy. And it was only when doing this course and seeing how much sugar is in these things which I think is healthy, that makes you check more now. You know because you just don't know unless you read what's actually going into these things, you see low fat yoghurt and you think that's alright and until you read you can see a difference in different brands of how much sugars and different things are in them. (Mother-14)*

- Mum: *The things we buy are different, like you say we've changed the bread, we also changed crisps so that we don't have proper crisps, its all Quavers, French Fries or Skips. (Mother-19)*

Dad: *Anything less than a hundred calories in a bag. (Father-19)*

Mum: *Yeah so we are looking at the labels. (Mother-19)*

Dad: *And again the amount of crisps we consumed has dramatically reduced. (Father-19)*

Mum: *Yeah, he is only allowed one packet a day and if he has it in his lunch box that's it. (Mother-19)*

Dad: *A lot of the stuff we used to buy wasn't particularly bad anyway, like we've always had low calorie soft drinks so um, that has never been an issue has it? I think the biggest change is lower calorie crisps and the wholemeal bread rather than white bread.(Father-19)*

- *Surviving the supermarket, making the choices and getting the kids to make the choices. With having the food labeling its sort of made us really think about what we are putting in the trolley as well. Until we did the food labeling we didn't really know what we still had in our cupboards that still had quite a lot of sugar in. Yeah, because I wouldn't have known what to look for. You know what I mean, I know there's so many calories and that's probably what I really looked at to be honest is the calorie content. But I didn't really look at how much portion is fat, how much was sugar and, some of them don't have it on there, don't tell you how much sugar is in it but there was some that did and like you say it does shock you. So it has made us change what we we're buying as well. (Mother-1)*

This parent, in addition to changing what was bought, also indicated that she had changed where foods were kept in the home:

- *You know you're the one that's the parent so you've got to say you can have this or you can't have this or whatever. So there was a lot of times they did sort of help themselves, they would go in the cupboard and they'd have whatever they wanted and I thought oh,*

*you know, its not really the way to be, so I used to lock it up. Well not lock it up but you know what I mean it was sort of where they couldn't reach. (Mother-1)*

Some parents were also more aware of 'balancing' different foods throughout the day offering only a healthy option if a less healthy option had been consumed. Stickers seemed to be an important motivator.

- *If they've had something a bit unhealthy for dinner, I don't know maybe they have had a MacDonaldis or something, Child-6 will say oh can I have some pudding now. I say right it's a healthy choice you can have a banana, an apple or some raisins. [ ] Because I've thought well maybe she doesn't need that if she's had a picnic or something at her grandparents house or you know they've had chips or something, well they don't need another big meal they can have a snack in the evening, have some sandwiches, with some fruit. [ ] Reinforcing it with Child-6 when she has identified a healthy choice she will come up and say oh mummy I have had a healthy choice today can I have a sticker. So we are keeping it in her head, not sort of lecture her about it but remind her oh yes well if you have such and such, if you do have this chocolate bar you have to have a healthy choice later. (Mother-6)*

This was supported by data from the interview with the child.

- *I have learnt that I shouldn't eat junk food because if I do I will only get bigger. I've changed, I've changed um eating junk food like chocolate, sweets and smarties and I'm only having them once a day, when I'm having like a treat. I've learnt how not to have junk food and just have normal food like apples, bananas and raisins. (Child-6)*

One parent indicated that improvement in the relationship between parent and child had made it easier for the parent to improve the child's diet, and another parent was using a parenting technique (sticker chart) to effect change:

- *I am basically in charge of what he eats but he makes it so easy for me. He doesn't put me under any pressure.*

When asked if he used to put her under pressure, she replied:

*Oh yeah. He'd start on the way home from school basically you know 'what am I having when I get in, I can't wait for teatime', you know 'can I have crisps'. And I'd give in for an easy life and it just doesn't happen now you know, he's really good. (Mother-14)*

- *We've still got a sticker chart for trying different foods. (Mother-19)*

The same four families (five children) who reported changes to eating style in the interview (see section 7.8.1 above) were also those that reported changes to what food was available and offered at home. The changes to 'stimulus exposure' reflects this, with all five children showing an improved (i.e. lower) score of between -2 and -4 at the end of the programme (similar to the group mean of -3.1). Therefore, the quantitative and qualitative data around the changes to stimulus exposure appear to be consistent.

With regards to the change in the level of obesity, four of these five children achieved reductions in the BMI z-score units by the end of the programme which were in excess of the group mean of -0.18: Child-1A: -0.08; Child-1B: -0.39; Child-6: -0.56; Child-14: -0.44; Child-19: -0.48. Apart from Family-1, these reductions were either sustained or lowered further at the 9-month and 2-year follow-up points. Making changes to both 'eating style' in the family and 'stimulus exposure' in the home is likely to be an important part of the effectiveness of the programme.

#### **7.8.2.2 Designated 'Treat days'**

Several parents and children from four families commented on the introduction of 'treat days', restricting the child's consumption of unhealthy snacks to particular days of the week (Table 7.18). The session on family rules was cited by one parent as the origin for the restriction of sweets, showing integration of the parenting skills with changing lifestyle (Family-3). The two children from this family also mentioned this restriction in their separate interviews, showing their acceptance of it.

**Table 7.18 Parents' and Children's Interview data about 'Treat Days', in relation to Change in Stimulus Exposure and BMI z-score.**

		Change from Baseline to EOP		
		Stimulus Exposure	BMI z-score	
Group 1	<i>I have used the boundaries, the family rules you know with them, only allowed to eat sweets on a Friday. Um like I've been saying rather than like choose a sweet I say well, rather than a sweet why don't you choose a book or a magazine, rather than have a sweet. (Mother-3)</i>			
	<i>When we used to get home from school we used to have sweets every day but now we have stopped that. And we're only allowed to eat sweets on a Friday. (Child-3A)</i>	-3	0.06	
	<i>I made a change from, we were like eating junk food all night and stuff like that but now sweets we're only allowed one day a week and sometimes we have girls nights out, um, like go out and have choose a video and watch it. (Child-3B)</i>	-3	-0.19	
Group 2	<i>He goes by the chart now that we made up for him. And he does keep with like the sweet days and the crisp days, he doesn't ask any other days for them. Yeah, you have two crisps days don't you now. Rather he used to have crisps everyday for school. He only has it twice a week now. I'd never even thought about doing that before until XXXX [facilitator] said that. (Mother-20, Dropped-out)</i>	2	-0.21	
	<i>Child: We learnt not to eat too much sweets every day and started having treat days so we don't have sweets every single day. Interviewer: So which days do you not have sweets then? Child: Monday, Wednesday, Thursday, Friday &amp; Sunday. Interviewer: And which days do you have sweets then? Child: Tuesday and Saturday. (Child-24)</i>	-8	0.25	
	<i>I stopped eating chocolate, I'm only allowed to eat</i>	25A	-4	-0.08
	<i>it on Wednesday and Saturday. (Child-25B)</i>	25B	-4	-0.08

The boundaries around food are part of the 'stimulus exposure' item on the Family Eating and Activity questionnaire. Table 7.18 includes the change in this variable from baseline to the end-of-programme, which showed improvement for five of the six children whose parents restricted unhealthy snacks to 'treat days'. The change in BMI z-score for these six children is interesting. At the end of the programme only 2 of the 6 children had a reduction in BMI z-score from baseline which was similar to the group mean (Child-3B: -0.186; Child-20:

-0.21), whereas the other four children showed very small changes or increases in BMI z-score (Table 7.18). However, three children had reasonable reductions in BMI z-score by the 9-month follow-up (Child-3B: -0.265; Child-20: -0.314; Child-25A: -0.217). These four families were different to those that indicated they had changed their eating style and the food provided in the home. It may be that parental restriction using 'treat days' is not as effective as broader changes to eating style and to what food is provided at home.

### 7.8.2.3 Portion Sizes

Some parents also referred to a realisation that their children's portion sizes were too big and indicated having reduced these.

- *I think it has made me more aware now as well about what he has eaten, you know, especially portion size, that's another thing that I really come away with. I've started using smaller plates as well, what XXXX [name of facilitator] said you know for the portions. (Mother-20, family who dropped out)*
- *I'll tell you, the portions, really started looking at that now. Um, before you know you just sort of give the kids stuff willy nilly, not actually think you know what you're giving them is actually a bit too much. And it's quite shocking when you saw the size of portion a child should have compared to what you give them. Even when you go out for a pub meal, the size of the portions for the kids is ridiculous really when you look at it. You know, so I think that's helped me quite a lot, probably why Child-6 has sort progressed so well. [ ] You know from a family point of view and budgets it helps keep the cost down, you're not wasting so much food because you are just being sensible with your portions as well. (Mother-6)*
- *Um, just Child-4's attitude to change I think before towards food and that he's not going to die if he doesn't eat all the time. And the amount of food he does eat, from one of the weeks where we did portions, because I was reading ahead in the folder I realised that I was putting too much food on his plate so it wasn't all down to Child-4, the fact that he was getting bigger, some of it was my fault. (Mother-4)*



#### 7.8.2.4 Special Occasions

Special occasions can lead to an increased consumption of unhealthy snacks.

Families from the second group found ways to restrict the number of Easter eggs.

- *I don't want to deprive him totally so I've bought him one half the size he'd normally have [Easter egg] and so now that's it. He'll just have the one this year and he's accepted all of it. (Mother-14)*
- *I think, I mean he's definitely sort of grabbed it with both hands because for Easter we put on the back of his Coventry City top "Wise and 25" instead of an Easter egg and he was more than happy with that. And he knows that he's going to get one Easter egg from his Grandma. (Mother-19)*

#### 7.8.3 Increase in Fruit and Vegetable Consumption?

According to a one-day diary (Day in the Life) completed by the children (Edmunds and Ziebland 2002), fruit and vegetable consumption did not change significantly at 3-months, 9-months or 2-years (Tables 7.16, 7.17). The limitations of this questionnaire include that only one day of food intake is recorded and that it requires to be completed retrospectively for 'yesterday' which has to be a school day, as reported previously (section 4.9.3).

Consistent with the lack of a significant change in fruit and vegetable consumption, there were only a few references in the interviews to increasing fruit and vegetable consumption, with this parent and child dyad giving a consistent message:

- *Yeah, I mean we're eating a lot more vegetables and Child-3A really likes, she makes a soup once a week. Which she likes doing sometimes, I've now counted we had ten different vegetables in it. I think we had every sort of vegetable you could get in one soup. (Mother-3)*

- *I've learnt that the food that you didn't have to do anything to it, all you have to do is wash it and I have made like these things at home, made faces with fruit and vegetables for breakfast for my Mum, and she really likes it, so I've learnt how to make them.* (Child-3B)

However, the number of fruit and vegetable portions in their 'Day in the Life' questionnaire remained the same at 4 portions for Child-3A at each time-point; and decreased for Child-3B from 3 portions at baseline to zero portions at 3-months and 2 portions at 9-months. However, the 3-month questionnaire was completed related to a Friday (i.e. the day preceding the 'Families for Health' intervention for Group 1) which is the designated 'treat day' for this family (see section 7.8.2). It is possible that less fruit and vegetables would be consumed on that day, making this day unrepresentative of the rest of the week.

The following family group is less consistent in their interviews, with the parent indicating that lunch boxes now contained fruit whereas the group interview with the children from this family implied an absence of fruit in the home. However, the child had been having more fruit at school.

- *On the food side they have changed a great deal with the packing up for school and things like that they have changed things to fruit rather than chocolate bars and things like that. Lunch boxes, yeah lunch boxes at lunch time. And they are taking more fruit for break times now as well.* (Mother-12, partial completer)

- *I changed eating chocolate to bananas.* (Child-12B)

*Since when have you been eating bananas? We haven't even got any fruit?* (Child-12C, 'normal' weight sibling)

*Yeah, we had them at school.* (Child-12B)

*That's right.* (Child-12C, 'normal' weight sibling)

Children from Family-12 reported low fruit and vegetable consumption. Child-12A had one portion at baseline, decreasing to zero portions at both the end-of-

programme and 9-months. Child-12B had no portions at baseline rising to one portion at both the end-of-programme and 9-months. I also observed at interview that the children had free access to chocolate in the home after school. The reason for the discrepancy in the parents interview and the other data *may* be social-desirability response bias on the part of the parent.

The lack of reference to increasing fruit and vegetable intake in interviews is consistent with questionnaires completed by the children, in which fruit and vegetable consumption did not change significantly despite the large focus on this on the programme.

#### **7.8.4 Children in Charge of what is eaten**

Another theme that emerged from the interview data was that the parents thought that their children were taking greater responsibility for food choices.

- *He's trying to be more sensible about what he eats especially in the coming up to Christmas. I'm saying you know that there's not going to be too many restrictions in place because from what XXXX [facilitator] said about empowering the children, so he is in charge now of what goes in his mouth. And if he over eats then he's got to pay the consequences. [ ] The labels as well, Child-4 was actually looking at stuff and when we go shopping especially when his Dad's with us and he points it out to his Dad, and he does tell his Dad to get more healthy food in, which is good. That's got to be a bonus, because that's where our big bone of contention was really because that's where he tended to put the weight on more. He was either staying the same here or losing weight and then when he went to his Dad's that's when he was gaining the weight. Whereas now he is coming back from his Dad's and he's not putting any weight on, he's stayed the same so he's obviously learnt something from it. (Mother-4)*
- *He's very good about food choices now anyway, I mean he won in school, he won an Easter egg the other day and he came out with two and he was so proud he was showing everyone. My sister was with us that day, and we got to the car and he said here you go they're for you. So you know he's so good. (Mother-14)*

- *She'll still talk about you know different foods and she's more aware of what she's putting in her. The advert with Jamie Oliver was on, you know with the fajitas and the peppers, and she went "oh, I want to try one of them, because I tried the peppers at my group" and she was telling me "oh they taste nice" and things like that. (Mother-18, Dropped-out)*

Furthermore, interview data from the children themselves indicated that they were taking some responsibility for improving their diet. In particular, the second quotation from a 13-year old indicated that they were extending this responsibility to other settings outside of the home:

- *I've stopped eating bad foods, lots of bad foods and starting to eat more low fat stuff.*

When asked which bad foods he had stopped eating, he replied:  
*Chocolate bars and crisps and stuff like that. (Child-14)*

- *I stopped eating at school as well as my packed lunch, I was getting stuff from the canteen as well. (Child-15)*

### **7.8.5 Potential Barriers to Healthier Eating**

A few parents reported difficulties with providing healthy eating options because their child did not like the healthier alternatives or the alternatives which were more acceptable to the child were not much healthier. For example, one family indicated that despite getting her child to try vegetables, this had not led to an increase in consumption which was confirmed in the 'Day in the Life' questionnaire.

- *I mean Child-6 won't eat vegetables but, we tried, I tried some though and praised her for at least trying. (Mother-6)*
- *Even some of the cereals I haven't took them away completely because its not that easy to take everything away but I've sort of limited how much they had, whether they had the chocolately ones or whatever in that way. Because I have only got two [children] that like porridge, so you know, it's easy saying they go onto porridge, but if they are not going to eat it. They're not going to eat it, but like a lot of times I'll do toast for Child-1A, even a bagel. I mean I always thought they were high in calories, I don't know why I just got this impression, but bagels aren't that bad they are quite low in fat so I mean I'll say to her instead of having that chocolately cereal have a bagel. (Mother-1)*

- *Cereals he has coco pops but there's no sugar on them now. (Father-19)*

*No sugar or anything and we did look at all the cereal labels didn't we to try and see, we bought the mini size ones so he could try one of each but then we realised that they weren't any better than coco pops so really for you know, one bowl of coco pops to start him off on the day wasn't really the end of the world. (Mother-19)*

The above quotation indicates these parents being realistic about what changes were possible. However, the comment made by their child in the group interview suggests that large changes were made to the other meals of the day.

- *Child-19: First I ate chocolate for breakfast, lunch and tea, and dinner.*

Interviewer: *And what do you do now?*

*Child-19: Ok, I eat coco-pops for breakfast and something different for lunch, dinner and tea.*

There were unexpected consequences to trying new foods. The changes to the lunch box put Child-19 at risk of teasing, and reduced the likelihood of him modifying the food taken to school in future.

- *Dad: Well sometimes, one issue we have found is that some of the stuff we put in his lunch box, peer pressure at school is he's decided I don't like these and he only doesn't like them because of the wrapping that they are in or whatever, kids have a bit of a laugh. (Father-19)*

*Mum: Yeah, we sent him some bread sticks didn't we and he came back and he, he'd got the mickey taken out him so he wouldn't have them. (Mother-19).*

*Dad: It wasn't that he didn't like them, what he didn't like was the fact that they were wrapped up in Winnie the Pooh. Bread sticks, looked at them and saw the calories on these are quite low, I'll get some for him to try. But you know, even as young as they are it only took one little girl to turn around and take the mickey, "oh I don't like them". So as much as he may try, he won't put himself in a position where he's vulnerable. Which is good, which is good enough to a degree. (Father-19)*

In the group interview in response to the question whether things had changed at school, Child-19 had replied “Awful”, and although he did not expand, this experience with his lunchbox may be associated with adverse experiences at school for him. In spite of these barriers, this child’s BMI z-score was reduced at the end of the programme by -0.48, and the reduction was maintained at 9-months (-0.43) and 2-years (-0.44).

One parent talked about the mixed-messages from a grandparent which were not helping the efforts of the family, despite the grandparent having enrolled the family in the programme.

- Mum: *Again smaller portions. She gets a saucer now and she gets like a kiddies portion, or she does here anyway. I’m hoping that me Nan’s going to become more aware and seeing as it’s me Nan that signed us up there’s no point me doing it, especially, then me Nan coming. She does have her three times a week. [ ] One minute her Nan is telling her that she needs to cut down and do this, that and the other, and then next minute she is taking her to the sweet shop on the way home again. (Mother-5)*

Interviewer: *So have you talked to your Nan much about it?*

Mum: *No, I’ll probably do that today when I go down. Everyone’s got to do it, yeah. (Mother-5)*

### **7.8.6 Summary**

Triangulation of the data from questionnaires with qualitative data show that both data types indicate that families have made changes to their eating environment, both in terms of eating style and the provision by parents of healthier food options. These data also show that children were taking more responsibility for their food choices, although fruit and vegetable intake was not increased. Interview data from some parents demonstrated the use of some parenting techniques in bringing about changes to healthy eating in the family.

## **7.9 Lifestyle Changes – Physical Activity**

This section focuses on physical activity. Data from questionnaires and measurements related to physical activity are reported in Table 7.19 for the 22 children followed up for 9-months and in Table 7.20 for the 19 children followed up at 2-years. There were some *differences* between the groups for some of the measures relating to physical activity, and I have therefore presented the analysis for the groups separately as well as combined where relevant. Changes in physical activity were examined by both quantitative and qualitative data.

### **7.9.1 Physical Activity Measures of Children - Questionnaire**

Results from the Family Eating and Activity questionnaire (Golan 1998b) show that children became significantly less sedentary at the end-of-programme, 9-month (Table 7.19), and 2-year (Table 7.20) follow-ups. This is based on the balance of the score for activity and inactivity ('inactivity/activity' balance) reported by their parents. Analysis of the individual components showed that the hours of television viewing (Q1) had declined significantly at the end of the programme and at the 9-month and 2-year follow-ups, whereas the change in the hours of physical activity per week (Q3) did not change significantly from baseline. The improvement in 'inactivity/activity' balance on the questionnaire is likely to have come more from a decline in TV watching than from an increase in physical activity.

There was a significant group effect for the inactivity/activity balance at the 9-month follow-up in comparison with baseline (mean difference between Groups

1 & 2 = 9.8, 95% CI 0.1 to 19.4,  $p=0.049$ ). Further analysis showed that the change in 'inactivity/activity' balance was not significantly different for Group 1 (-1.9, 95% CI -8.7 to 5.0,  $p=0.57$ ), whereas Group 2 showed a much improved and statistically significant inactivity/activity balance (-11.6, 95% CI -18.5 to -4.8,  $p =0.003$ ). This may reflect seasonal differences: For Group 1, baseline measurements were taken in August / early September and 9-month follow-up in March, and for Group 2 baseline measurements were taken in mid-Winter (January) and the 9-month follow-up measurements were taken in early September, where a more favourable climate might account for the less sedentary scores at follow-up.



**Table 7.19 – Summary of physical activity measures at baseline (0-months), end-of-programme (3-months) and nine-month follow-up in 22 children with data (intention to treat analysis)**

	0-months Mean (SD) (n=22)	3-months Mean (SD) (n=22)	9-months Mean (SD) (n=22)	0-3 month change (n=22)		0-9 month change (n=22)		Any Difference Group 1 vs Group 2?	
				Mean (95% CI)	p value	Mean (95% CI)	p value	0-3 month p value	0-9 month p value
<b>Child's scores for Family Eating and Activity questionnaire (Golan 1998b) - (lower is better for the four domains)</b>									
Inactivity/ Activity	14.1 (13.2)	7.4 (13.6)	8.8 (10.3)	-8.5 (-13.9 to -3.2)	0.004	-6.8 (-12.1 to -1.4)	0.017	0.866	<b>0.049</b> \$
Q1. TV (hrs/wk)	18.80 (10.97)	15.45 (9.52)	14.45 (10.40)	-4.21 (-7.55 to -0.88)	0.017	-5.39 (-9.44 to -1.34)	0.012	0.459	0.097
Q3. Activity (hrs/week)	5.75 (4.51)	8.05 (8.19)	5.93 (2.80)	3.15 (-1.08 to 7.39)	0.133	0.35 (-1.67 to 2.38)	0.715	0.799	0.077
<b>Child's Habitual Activity by Accelerometer (Actigraph) *</b>									
MVPA- Freedson (mins/day)	59.3 (34.8)	60.6 (30.7)	62.3 (33.7)	2.7 (n=20) (-9.1 to 14.6)	0.620	4.0 (n=19) (-8.8 to 16.8)	0.521	<b>0.028</b> \$	0.871
MVPA- Puyau (mins/day)	15.9 (11.7)	17.2 (10.5)	17.9 (11.2)	1.6 (n=20) (-2.2 to 5.4)	0.387	2.6 (n=19) (-3.1 to 8.3)	0.351	0.088	0.745
Step count (steps/day)	7361 (2743)	7871 (2171)	8859 (2140)	654 (n=20) (-630 to 1937)	0.292	1571 (n=19) (519 to 2623)	0.007	0.097	0.930

\$ Explored for differences between groups; MVPA=Moderate & vigorous physical activity ; \* Mean data only on 18 children who had at least 4 days of records at each time-point, differences done on n=20 for 0 to 3 month change and n=19 for 0-9 month change.

**Table 7.20 Summary of physical activity measures at baseline, end-of-programme (3-months), nine-month and 2-year follow-ups in 19 children who were followed up for 2-years.**

	0-months Mean (SD)	3-months Mean (SD)	9-months Mean (SD)	2-years Mean (SD)	0-2-years change		Any Difference Group 1 vs Group 2?
					Mean (95% CI)	p value	0-2 years p value
<b>Child's scores for Family Eating and Activity questionnaire (Golan 1998b) - (lower is better for all domains)</b>							
Inactivity/Activity	15.2 (13.8)	10.0 (10.9)*	9.9 (10.6)*	6.2 (9.4)**	-9.6 (-14.7 to -4.6)	0.0014	0.952
Q1. TV (hrs/wk)	19.4 (11.7)	16.6 (9.7)	15.5 (10.8)	12.1 (7.8)	-7.3 (-11.0 to -3.7)	0.001	0.319
Q3. Activity (hrs/week)	5.6 (4.7)	6.3 (4.6)	5.8 (2.9)	6.5 (4.4)	0.8 (-1.2 to 2.8)	0.405	0.279

Different from baseline: \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

### **7.9.2 Physical Activity Measures of children - Accelerometers**

Objective measurements of physical activity were also made at baseline, at the end of the programme and at the 9-month follow-up (Table 7.19); they were not carried out at 2-years in order to reduce respondent burden.

The average daily step count was unchanged at the end of the programme, but increased significantly at the 9-month follow-up from baseline (Table 7.19). However, there was no significant change in the average minutes spent per day in moderate & vigorous physical activity (MVPA) after the programme, calculated using either the Freedson equation (Freedson et al 2005, Trost et al 2006) or the cut-point of 3200 counts.min<sup>-1</sup> (Puyau et al 2002) (Table 7.19). What is very striking is the difference in the mean MVPA calculated with these two methods. For example, I found a group mean at baseline of 59.3 minutes vs 15.9 minutes for the Freedson (Trost et al 2006) and Puyau et al (2002) methods, respectively. Using these two methods would result in different conclusions as to whether individual children reach the recommended 60 minutes of moderate intensity physical activity per day (Chief Medical Officer 2004).

The two groups (Groups 1&2) differed in their response at the end of the programme for the calculations of MVPA according to the Freedson equation (mean difference between groups = -23.6 mins, 95% CI -43.9 to -3.2, p=0.028). Further analysis showed that Group 1 actually reduced their mean daily MVPA from 71 minutes in September to 64 minutes at the end of the programme in December (mean difference -8 mins, 95%CI -22 to 5.9, p=0.22), although this wasn't statistically significant; whereas Group 2 showed a

significant increase from 40 to 55 minutes (mean difference 15.5 mins, 95%CI 0.7 to 30.4,  $p=0.042$ ) from baseline in January to the end-of-programme in April. Again this may reflect a seasonal effect, with less activity in Winter (Riddoch 2007). Chapter 10 gives further analysis of the strengths and difficulties experienced in using the accelerometer in this study.

The improvement in the inactivity/activity balance on the questionnaire was not supported by changes in the objective measures of physical activity using the accelerometer, and is likely to be more of a reflection of a reduction in television viewing. The lack of change in the time children spent doing moderate and vigorous physical activity from the accelerometer is consistent with the lack of change in the hours spent being physically active on the questionnaire (Golan 1998b). The increase in step-counts by the 9-month follow-up may indicate that children were becoming more active in daily living, although this activity may not have been of sufficient intensity to be classified as moderate or vigorous.

### **7.9.3 Changes in Physical Activity made by Families**

Parents responded in different ways to the encouragement to increase opportunities for physical activity for their child that could be sustained outside of the programme, and to reduce screen-time. The themes which emerged from the interviews at the end of the programme focused on a realisation by parents of the impact they had on their child's physical activity, and of various ways families had increased physical activity including structured exercise, physical activity during play at home and school, and active transport rather than using the car. Some parents commented that the programme itself was not sufficiently

active and this will be returned to in Chapter 9, Users and Providers Perspectives.

### **7.9.3.1 Realisation that Parent's Physical Activity Influences the Child**

Some of the comments made by the parents about physical activity indicated a change in their attitude towards family activities, and a realization that their own physical activity influenced the physical activity of their child.

- *You know I thought as a family we were quite alright at the time and when I did the course I had to look back at things I had done right at the beginning which I thought were ok and looking back I thought we were we leading such a bad life. Like they say about family activities, getting together as a family and doing things together, and I thought we always do, we all go to the pictures together, we all go for a meal and it was all things where you don't do anything you just sit and you eat, and eat and sit, and I thought you know we were so unhealthy we didn't do anything. We didn't walk anywhere, treats were food treats. And I learnt to see that is so wrong. [ ] It was down to me that he was eating that way and his activities level were so low because mine were so low and if I wouldn't go anywhere he wouldn't go anywhere, so everything has changed. (Mother-14)*
- *I have made a promise to myself in the New Year that we'll, we'll try and do more activities together so we will have an hour in the park or we will try swimming you know. Because kids they learn from the parents and if as a parent you can't be bothered to take your child out at all, oh I've got to do the jobs around the house you know, that rubs off on the child. They don't have jobs to do but oh I can watch telly, you know, you don't realise what an influence you have on your children. (Mother-6)*

### **7.9.3.2 Structured Exercise**

Two children from Group 2 mentioned in the interviews that they were joining a gym, although they hadn't done so by the end of the programme.

- *I'm starting at the gym on Wednesday. It's in the Ricoh arena, it's a children's gym, eight to sixteen, there's an adults gym on top and you can look at football matches from the top because there's a big, there's a big window you can see it. And probably be packed because then you can go on a running machine to look at the match.*

*You can run around the pitch, there's a hydraulic shower, there's a dry sauna and a wet sauna and a fish tank with no fish. (Child-14)*

- *Going to start a gym next week as well. It's one right next to my house called Chillies. (Child-25B)*

By the time one of their parents was interviewed their child was actually attending the gym (Child-14). This mother described gym membership as a 'reward' for her child, using a newly acquired parenting skill to bring about lifestyle change. The exercise at the gym had replaced a period when the child would have usually watched television, and the mother was very positive about how this had changed his outlook.

- *Family rewards we had them but they were all wrong and far too often, for no reason. They involved food and no activity... it was not a reward it was just a way of life. But now we work out things that will involve doing something like the gym. That's you know a constant thing for him now, he loves it so he's rewarded. One of us will take him everyday whereas you know that again some families wouldn't be able to do that because of work but I can fit it in. [ ] He's a different child you know, he's happy, he's motivated, he's, he's just oh I don't know he's ecstatic about his new outlook I think. You know his activity is just everything, like the telly was his life, and he can just leave it now you know. He'd come in from school and that would be him until he had the telly between four and six every night, that was his time here to have the telly. Now he'll go to the gym at that time and he accepts, he doesn't moan, he doesn't you know. I still allow him his games things in the evening because I think well he's had his activities today, he's stuck to his diet so that is his time then I think, you know everyone has got to have time out and I think balance as well. (Mother-14)*

The mother of Child-14 had previously made the link between her own physical activity and that of her child, and she criticised herself saying that family-based activities did not involve any physical activity (section 7.9.3.1). Therefore, it is disappointing that her main response to increasing physical activity of her child was a gym membership, rather than a family-based activity. By the 9-month follow-up the gym membership had ceased, although he was now going to judo

instead. This child's results showed a large improvement in the activity/inactivity balance on the Golan questionnaire from baseline (-17 at end-of-programme, -18.5 at 9-months, -20 at 2-years), and in the minutes per day spent doing moderate/vigorous activity recorded by the accelerometer from only 3 minutes at baseline to 20 minutes at the end of the programme, although down to 10 minutes by 9-months using a cut-point of 3200 counts.min<sup>-1</sup> (Puyau et al 2002). The child's BMI z-score was reduced from baseline at each follow-up (-0.438 at the end-of-programme, -0.517 at 9-months, -0.42 at 2-years). This family had also made profound changes in healthy eating as previously shown, indicating that the combination of improving healthy eating and physical activity in previously very inactive children is important in improving the primary outcome.

Another parent from Group 2 and two children from Group 1 reported that they had joined other structured exercise classes. The first quotation shows that the parent has been very surprised by her child's positive response because her expectations had been based on her own negative experience as a child.

- *She wanted to go to gymnastics and I thought gymnastics for Child-18! Child-18 probably loves it more than those two [siblings who also go]. Even though she's not able to do the things, she's really keen and really eager and she loves going every week. I really thought Child-18 would feel quite conscious because they wear a leotard, you've got to be quite agile to do things and Child-18, I mean, I was bit like Child-18 at school, I didn't like sport, and yet she really, really enjoys it, she loves it. (Mother-18, dropped-out)*
- *I have started a drama thing on Wednesday. (Child-1B)*
- *I have changed my lifestyle by, um I have changed it by going to this place where, where you go dancing you, where you dance and do exercise and then at the end you have a meal what has fruit and soup. (Child-3B)*

### 7.9.3.3 Unstructured Play / Family-time

Other families also discussed the value of an increase in unstructured play or physical activity as a family. The parents from the following two families were taking responsibility for increasing the physical activity of their child which was an alternative to TV, thus reducing screen-time as an added bonus.

- *Whereas before they would probably sit in front of the television for a couple of hours, but because of the programme their Dad would rather take them and the dog down to the park for an hour. So that has changed. (Mother-5)*
- *You're strict with yourself, say look the washing up can wait, they're being good, they're being playful, join in, let's have a family moment. They work off some of the bad stuff they might have had because we're running up and down the room like lunatics. [ ] And from coming in from their grandparents into the house and sort of between dinner time and bath time we can actually manage a quite a long stint without the television on just by playing, whether it's throwing the ball up the stairs and letting it bounce down or chasing each other round or having a dance. (Mother-6)*

These quotations are consistent with the improvement in the 'inactivity/activity' balance observed using Golan's (1998b) questionnaire. For Child-6, the inactivity/activity balance improved at the end of the programme (-11.5), and was sustained to 9-months (-16), and was consistent with increased average daily MVPA using the accelerometer (7.7 minutes at baseline, 15 minutes at end-of-programme, and 22 minutes at 9-months). This child had shown a large reduction in BMI z-score at the end of the programme (-0.56), which was sustained to 9-months (-0.64) and 2-years (-0.57). It is of note that Family 6 is one of the families that indicated at interview that they had made profound changes to eating style and stimulus exposure in the home as well. Changes by parents to both healthy eating and physical activity also seem to be important factors influencing the outcomes achieved by this family.



For Child-5, the 'inactivity/activity' balance improved at the end-of-programme (-34), although this was not sustained to 9-months (+4), compared with baseline. However, these questionnaire measures are not wholly consistent with the accelerometer data which showed that MVPA was 20 minutes per day at baseline, falling to 14 minutes at the end of the programme, but increased to 25 minutes by 9-months using a cut-point of 3200 counts.min<sup>-1</sup> (Puyau et al 2002). This could be due to underestimation by the accelerometer because at interview the parent mentioned that her child did not want to wear the accelerometer at school (see Chapter 10). Child-5 had shown only a small reduction in BMI z-score by the end of the 12-week programme (-0.11). Interview data showed that the father and child were disappointed with the lack of change, and the family seemed committed to increase their effort but would have liked a follow-up programme. This child showed a reduction in BMI z-score of -0.34 by the 9-month follow-up, however, indicating that the changes were starting to have an effect. This family declined the 2-year follow-up.

- *XXXX [Dad] was a bit disappointed that Child-5 sort of stayed the same or put a little bit of weight on so he's more concerned about her exercising more. So we are taking her out for bike rides, we're making her go on a scooter and she's walking a lot more and um he is watching her portions very closely. I think even she is a bit disappointed so she's starting to say no I am full. Whereas before she would just carry on. So I don't think she took it on board while we were doing it but now that we have finished she's disappointed in herself, like she'd like to wear nice pretty dresses especially at Christmas and she can't because of her size, so she's disappointed. So if she could do it again I think she would be more aware now. Well, maybe not the twelve weeks but like a couple of weeks. Yeah, maybe not straight away, like a little break and then bring them back again, and do it like that. Because she would be more aware and I think she would get a lot more out of it the second time. (Mother-5)*

Furthermore, Mother-1 also indicated that she encouraged active play in the house spending more time with the family, and also stated an intention to go swimming in the future as a family activity.

- *Well yeah I mean, I mean they we do a lot of more. We do sort of like dance around because we don't go very far, we just dance in a different room and just be stupid really. But it's getting time with them at the same time in a way. So in that way I mean it, but we have sort of said um, after Christmas when Christmas is out the way, that every Sunday we are going swimming. So we have said that every Sunday that's what we are going to do now. That's our activity as a family. (Mother-1)*

However, in other families the motivation to increase physical activity seemed to be coming more from the children. In addition to going to gymnastics the mother of Child-18 reported that she was in the garden on the trampoline. The BMI of these two children, however, did not change (Child-3A: +0.06 end-of-programme; +0.13 9-months; Child-18: +0.05 end-of-programme; +0.01 9-months).

- *One night I asked my Dad if we could go out running, like if he could take me for a walk. I said come on we need to jog round the block now and he said, you go on but don't go too far because I can't jog. Then I said OK, OK. I have had enough of you, you've got to jog with me, so he didn't listen to me, so we went up to the end of the road I jogged round a field a bit and then he timed me and I got 2 ½ minutes. (Child-3A)*
- *Yeah and every night she goes out on the big trampoline in the garden.' She's like "Mum I'm going to go out to do my exercise 'cos it's light" and every night she's in the garden on the trampoline, she loves it. (Mother-18, dropped-out)*

Two children also reported doing more running around at playtime at school.

- *I have playtimes at school but at one play I only used to run around. In the last two I used to stand around and just watch everybody but now I run around at playtimes and when I get home from school, I go out and run around with my friends. (Child-24)*

- *I used to um, stand around just watching everyone playing, but now I actually join in with my friends and I don't actually play outside because I've got a dog outside and I haven't got any friends on my street. Eh, but I do inside, like after I have ate anything, I do like star jumps, press ups and stuff like that. (Child-25A)*

Lastly, the free pedometer given out on the programme was mentioned as a motivator by two parents for getting their children to do more physical activity.

- *When she first got the step thing. She was going up and down the stairs, I've done loads of steps today. So she really did use that an awful lot you know. (Mother-1)*
- *And that step thing that they were given as well since he kept using that he does a lot more. Definitely he wants to get the steps up. (Mother-20)*

#### **7.9.3.4 Active Transport**

There were also some references in interviews to making transport more active, and building more activity into everyday living.

- *We were at Kenilworth today and to go, we went I can't remember where it was, but we walked instead of going in the car. (Child-12A)*
- *While I've been coming I've been changing the route I come home and whenever I go up to Wales I'm always out on my bike more. On the way home from school, I walk the long way round. (Child-15)*

The concept of balancing 'energy-in' against 'energy-out' was also seen as important in encouraging the children from Family 5 to cycle home rather than be picked up by car, and the message is consistent between the parent and child dyad.

- *So you know, it's a balancing thing I know they're at their Nan's and I know they are probably feeding their faces so they will ride their bikes home. So it will balance the two out. (Mother-5)*
- *I used to always like reading, riding my bike and then I found out that was also exercise [riding bike] and now I've started going on my bike often. (Child-5)*

#### **7.9.4 Summary**

Triangulating the findings from the Family Eating and Activity questionnaire with the interview data show that both sources of data indicate that families have made changes to their 'inactivity/activity' balance. Several families gave examples at interview of new structured exercise or unstructured play, some of which was replacing TV time. Physical activity of a moderate intensity did not increase however, according to both the questionnaire and the accelerometer.

The data suggests that parents who take responsibility for increasing their child's physical activity, in combination with being the agents of change to improve eating style and stimulus in the home, achieve a sustained reduction in BMI z-score in their children. However, by the end of the programme a few families had only stated their intentions to increase physical activity, and had not put this into practice whilst the programme was running.

## 7.10 Extreme Case Analysis

Finally, I conducted an analysis of ‘extreme’ cases, firstly focusing on the families with children who have shown the largest reductions in the BMI z-score, and then on children who have shown increases.

### 7.10.1 Children with Large Reductions in BMI z-score

Five children from four families showed reductions in the BMI z-score greater than -0.5 for at least one of the follow-up time-points (Table 7.21).

**Table 7.21 Children who had a Change in BMI z-score >-0.5**

Child	Age at start	Sex	Socio-economic classification	Sessions attended	Baseline BMI z-score	Change in BMI z-score from baseline...		
						End-of-Programme	9-month follow-up	2-year follow-up
6	7	F	Intermediate	10	3.33 (obese)	-0.56	-0.64	-0.57
9A	11	M	Managerial & Professional	7	2.12 (obese)	-0.29	-0.33	-0.85
9B	7.5	F	- ditto -	7	1.79 (over-weight)	-0.59	-0.63	-0.38
14	10	M	Managerial & Professional	10	2.52 (obese)	-0.44	-0.52	-0.42
16B	13	F	Never worked / unemployed	2 (withdrew)	1.97 (over-weight)	-0.21	-0.52	-0.97

*Overweight: BMI  $\geq 91^{st}$  to  $< 98^{th}$  centile, Obese: BMI  $\geq 98^{th}$  centile (Cole et al 1995)*

Both Family-6 and Family-14 had engaged fully with the programme. The parents from these families were both interviewed and the quotations given in the previous sections have illustrated the marked changes they had made. It seems likely that these account for the changes in their child’s BMI z-score:

**Family-6** comprised a 7 year old girl who attended Group 1 with her mother, a single parent, and was of ‘intermediate’ socio-economic classification. She was the only child on the programme who had achieved a reduction from baseline in

BMI z-score of greater than -0.5 at each time-point (Table 7.21). The interview with the mother showed the extent to which she engaged with every aspect of the programme. She explained that her confidence had increased in her role as a parent, and she was using new parenting skills such as a sticker chart and giving more praise to her children to bring about lifestyle change in the family. Their lifestyle changes included alteration to the eating style, with the family now sitting around a table to eat and not in front of the television; and the food provided had changed, with a new focus on 'balancing' to ensure that healthy options were provided if something unhealthy had been eaten that day, and on reducing portion sizes. Family-based activity had replaced some television viewing, and they intended to increase family-based activity further. The interview with the child showed she was a willing participant.

**Family-14** comprised a 10 year old boy who attended Group 2 with his mother, and were a managerial / professional two-parent family. Child-14 achieved a reduction in BMI z-score of  $>-0.5$  at 9-months (Table 7.21). In the interview the mother had shown a marked change in attitude, with a realization that their lifestyle was poor and that she felt responsible for it. The child was praised more, and family relationships improved. Lifestyle changes included eating at a table and not in front of the television, reduced availability of snacks at home and the child being enrolled in a gym also resulting in less television watching. The mother had worked hard at the changes, and she had also benefitted by having increased her confidence in a group situation, improving her mental well-being. The child was supportive of the changes.

For the other two families whose children showed a reduction in BMI z-score  $> -0.5$ , I cannot be certain that the improvements are attributed to the programme.

**Family-9** was a managerial/professional two-parent family who attended Group 1. Both their children achieved a reduction in BMI z-score of greater than 0.5 at some stage during the follow-up (Table 7.21). The girl (9B) showed improvements of  $> -0.5$  BMI z-score at the end of the programme and at 9-months. Of note, the 11 year old boy (9A) showed a marked change of  $-0.85$  BMI z-score at the 2-year follow-up going from being 'obese' at baseline to being in the 'healthy' BMI category. He had not shown such marked changes at the 3 and 9-month follow-ups. This highlights one of the main limitations of a 'before-and-after' study design, being the lack of a control group, making it difficult to know whether any changes are due to the intervention or due to other changes occurring at the same time (Britton and Thorogood 2004), such as the onset of puberty in this boy.

This family attended only 7 of the 12 sessions. Due to a family holiday the children did not participate in the interview and the parents were not interviewed, although the mother completed the end-of-programme questionnaire. Her comments indicated that the programme was not what they had wanted, but also indicated that her children had become more receptive and had made changes towards eating more healthily which may have contributed to the successful outcomes in her children:

- *As a family we were hoping for more physical activities together during this time. The emphasis however, was more on the emotional impact of obesity on family life and solutions to that. While it was well conducted from the latter point of view, it was not that applicable for our family. However it was nice to make so many new friends. [ ]*

*They have become more receptive to trying out fresh veg etc and groan less when we restrict sweets etc. Thinking about how much and what they should eat and relying less on 'ready meals'. Less eating out as well. (Mother-9)*

**Family-16** had two girls on the programme, supported by their dad who was unemployed. They only attended for two sessions after which they dropped-out. It is therefore curious that the largest reduction in BMI z-score at the 2-year follow-up was from Child-16B, who was aged 13 at the start of the programme. This suggests that there may be something unusual with this family and merits some exploration. Her BMI z-score was 1.97 at recruitment dropping to a z-score of 1.00 at the 2-year follow-up, taking her from 'overweight' to the 'normal weight' category for her age and gender. This change had been progressive over the 2-years (Table 7.21). This family had dropped out because of the arrival of a new baby, but also because the programme was not as expected, there being insufficient physical activity. Not surprisingly, when asked about any changes seen, the dad said they were unlikely to be due to the programme:

- *It's hard to say if it's a direct result of the programme. There's things we had already started implementing really before the programme started. (Father-16, dropped-out)*

The family were interviewed together, and this exchange highlights an authoritarian style of parenting (Darling and Steinberg 1993), with a focus on discipline:-

- *A lot of the stuff we have already changed... comfort eating has gone. You know they do jobs don't ya, 'cos they like structure. I don't like to give 'em a choice. They like to have structure, like Saturday they have to do their bedroom. (Father-16)*
- *Every Saturday we've got until half-twelve to do the bedroom. (Child-16)*
- *But she [Mother] told Child-16A that she's got to do the bedroom before half past twelve, the time limit was like that and if they didn't do it, the consequence of that is going to be a whole week the same*



*time [to bed] as XXX [4 year old]. I had put little pieces of paper with numbers on in places in the bedroom. (Father-16)*

- *We found all of them but then he really annoyed me 'cos he said there was twelve but there was actually only eight. (Child-16)*
- *But there was twelve. I didn't put them all out. (Father-16)*
- *He left four of them downstairs. Now we know all the places where to go. What we will do is pick the mattress up and Hoover under our bed and everything and move all the cupboards. (Child-16)*

The first quotation also focuses on some restriction on what is eaten. When I weighed the girl at the two year follow-up, I recall that the parents were encouraging her not to lose any more weight, saying that she sometimes goes without meals, suggesting that the weight loss *may* be associated with eating problems. This highlights the need to include a tool to check for eating disorders in children undergoing weight management interventions. In addition, a tool to examine parenting style at baseline and any changes in parenting style may be a useful addition to the research measurements, if an RCT was to be implemented. Finally, the data also highlights the need for a control group as children can improve their BMI status without it being attributed to the intervention under investigation.

### 7.10.2 Children with an Increase in BMI z-score

Three children showed an increase in the BMI z-score greater than 0.2 for at least one of the follow-up time-points (Table 7.22).

**Table 7.22 Children who showed an increase in BMI z-score**

Child	Age at start	Sex	Socio-economic classification of family	Sessions attended	Baseline BMI z-score	Change in BMI z-score from baseline...		
						End-of-Programme	9-month follow-up	2-year follow-up
3A	10	F	Routine & manual	12	3.26 (obese)	0.06	0.13	0.34
12B	7	F	Routine & manual	6 (partial completer)	2.35 (obese)	0.36	0.30	0.09
24	7	F	Intermediate	6 (partial completer)	2.41 (obese)	0.25	0.29	0.23

**Family-3** comprised a 10 year old girl (3A) who attended every session of Group 1 with her mother and 7 year old sister (3B), and were of 'routine and manual' socio-economic classification. The increase in Child-3A's BMI z-score became marked by the 2-year follow-up. Her sister had shown a reduction in BMI z-score of -0.27 at the 9-month follow-up, but had not sustained the improvement to 2-years (change in BMI z-score of 0.02). Interview data showed that this family had restricted sweets to 'treat days' as shown previously in Table 7.18, and had seen improvements in the relationship within the family.

- *It has helped us spend more time together, listen more and appreciate each other more. (End-of-programme, Mother-3)*

Although there was no formal qualitative data collection at the 2-year follow-up, the mother had said to me when I visited their home that they would have benefitted from follow-up sessions in order to maintain the changes.

**Family-12** and **Family-24** were the two families who were defined as 'partial completers' because both had attended the 6 sessions required to be defined

as 'completers', but their pattern of attendance was irregular and suggests that neither family had engaged particularly well with the programme. Family-12 attended very few of the sessions in the second half of the programme due to the mothers work. The child from Family-24 attended with her mother for the first three sessions, after which she stopped attending and then attended with her father for the last three sessions (the mother and father were separated). Neither family mentioned major lifestyle changes.

### **7.11 Summary of Chapter**

This chapter has described the short-term (end-of-programme, 9-month) and longer term (2-year) outcomes of the '*Families for Health*' intervention from the 'before-and-after evaluation'. The primary outcome measure, the change in children's BMI z-score from baseline, showed a significant reduction of -0.18 (95% CI -0.30 to -0.05,  $p=0.008$ ) at the end of the programme, which was sustained to 2-years. There were also other health-related changes in children's quality-of-life, parent-child relationships, parents' mental health and lifestyle changes around eating and activity. Qualitative data have illuminated the quantitative data showing the types of changes made, and triangulation showed that convergence of the two types of data was good on the whole (Denzin 1978), enhancing the validity of the findings.

Finally, a focus on 'extreme cases' was made, including four families whose children had improved BMI z-score by  $\geq -0.5$ , showing that parenting skills were instrumental to bring about the necessary changes to lifestyle, but also that some improvements are unlikely to be attributed to the programme, highlighting the need for a control group in subsequent investigations.

## Chapter 8

### Economic Evaluation

#### 8.1 Introduction

Health promotion interventions compete with the treatment of disease for scarce health resources. To assist with the allocation of resources, economic evaluation should be considered alongside outcome evaluation in the evaluation of health promotion interventions (Stevens 2004). Economic evaluation is defined as *'the comparative analysis of alternative courses of action in terms of both their costs and consequences'* (Drummond et al 1997). A 'full' economic evaluation therefore has two characteristics: first, to identify the costs (inputs) and consequences (outputs), and second, to use these in a comparison of two or more alternative courses of action (Table 8.1). Using these two characteristics of economic evaluation, Table 8.1 identifies several other evaluation scenarios in which these aspects are not both present and these are as such described as 'partial' economic evaluations.

**Table 8.1 Types of Health Care Economic Evaluation, distinguishing FULL from PARTIAL economic evaluations. (The type of economic evaluation of the *'Families for Health'* intervention is indicated in red).**

		Are both costs (inputs) & consequences (outputs) examined?		
		NO		YES
		Only Consequences	Only Costs	
Is there comparison of 2 or more alternatives?	NO	PARTIAL Outcome description	PARTIAL Cost description	<b>PARTIAL</b> <b>Cost –outcome description</b>
	YES	PARTIAL Efficacy or effectiveness evaluation	PARTIAL Cost analysis	FULL Cost-minimisation analysis Cost-effectiveness analysis Cost-utility analysis Cost-benefit analysis

Adapted from Drummond et al (1997), p10.

Four main types of ‘full’ economic evaluation are identified, in which costs are usually identified in the same way (i.e. in monetary terms), but vary in the way the consequences (outputs) are expressed, and how they are compared with the costs, as detailed in Table 8.2.

**Table 8.2 Types of Full Economic Evaluation**

<b>Economic Evaluation</b>	<b>Measurement of Consequences</b>	<b>Comparison of costs &amp; consequences</b>
Cost-minimisation analysis	Requires consequences to be equivalent between alternatives.	Least costly option is the most efficient.
Cost-effectiveness analysis	Natural or physical units: identify single measure of effect to summarise the benefits. e.g. change in BMI z-score, life years gained.	Cost per unit of effect.
Cost-utility analysis	Healthy years e.g. quality adjusted life years (QALYs) gained, or variant e.g. disability adjusted life years (DALYs)	Cost per additional QALY gained. (Can be used across treatment areas).
Cost-benefit analysis	Consequences are valued in monetary units (requires monetary valuation on benefits of intervention i.e. how much willing to pay to receive that improvement in health)	Decision based on net benefit (cost minus benefit)

Sources: Drummond and Jefferson (1996); Drummond et al (1997)

There is a paucity of evidence about the cost-effectiveness of interventions for the treatment of childhood obesity, with only one study identified by both the National Institute for Health and Clinical Excellence’s guidance (NICE 2006a) and the updated Cochrane review (Oude Luttikhuis et al 2009). This is a cost-effectiveness study of family-based treatment by Goldfield et al (2001).

One of the objectives of this PhD was *‘To estimate the costs of the intervention’*. In this study the design of the economic evaluation is a ‘cost-outcome description’, which is a ‘partial’ economic evaluation (Table 8.1). Although both inputs and outputs have been examined, no comparison has been made to an

alternative treatment. In this chapter the direct and indirect costs (see definitions in Box 8.1) of both delivering the *'Families for Health'* intervention and for families to attend the programme have been estimated. The direct NHS costs of delivering the intervention are then related to the change in BMI z-score at the 9-month follow-up.

**Box 8.1: Definitions of Direct and Indirect Costs**

**Direct costs:** The value of those resources directly involved in providing health care, such as the time of health care professionals, medicines, equipment etc. and patients' costs (e.g. travelling time and expenses) to receive treatment.

**Indirect Costs:** The impact of illness and treatment on paid and non-paid work time (and the ability to work) and leisure time.

*Source: Office for Health Economics (2009)*

## 8.2 Direct Costs to Provide the Intervention

Table 8.3 describes the direct costs to the NHS of running two *'Families for Health'* groups, including the cost of the facilitator's time to deliver the intervention, the venue, and the consumables, but excluding the cost to recruit and train facilitators (because this is a non-recurring cost) and the costs to recruit families (as these were not determined, though not considered particularly high because the media advertising was free). In Coventry, the total cost was around £5,400 to run one course of the group-based programme, working out at just over £500 for each family or £400 per child.

**Table 8.3 Direct Costs to the NHS to run the 'Families for Health' Programme in the two Pilot Groups in Coventry**

	<b>Group 1</b>	<b>Group 2</b>	<b>Total</b>
<b>Venue</b>			
Hire of Coventry Leisure Centre – Gym & Room (4 hrs/week)	£100 per week x12 = £1,200	£100 per week x11* = £1,100	£2,300
<b>Facilitators</b>			
4 facilitators @ £15 per hour** x 5 hours each week, to include preparation and set-up	12 weeks x 5hrs =60hrs x £15 x 4 facilitators = £3,600	11 weeks x 5hrs =60hrs x £15 x 4 facilitators = £3,300	£6,900
Leisure Centre employees: run 3 activity sessions–1½ hr @£18/hr	£18 x 1.5hrs x 3 weeks = £81	£18 x 1.5hrs x 3 weeks = £81	£162
<b>Equipment</b>			
Equipment to run programme	£200	(from Group 1)	£200
Pedometers – 1 per child	15@£6.50 = £97.50	15@£6.50 = £97.50	£195
Kites – 1 per family (for end)	8 @£3.89 = £31.12	8 @£3.89 = £31.12	£62.24
Equipment for family snack time/ taste tests etc	£104.20	(used from Group 1)	£104.20
Food for programme activities and snack-time	£181.94	£173.86	£355.80
Other consumables e.g. flip-chart paper, marker pens, paper	£50	£50	£100
<b>Handbooks</b>			
Printing of facilitator handbooks – 2 parents, 2 childrens for each group @ £15 each	£60	£60	£120
Printing cost of Parents' Workbook @ £8 each	12 x £8 = £96	14 x £8 = £112	£208
Printing cost of Children's Workbook @ £5 each	15 x £5 = £75	15 x £5 = £75	£150
<b>Total</b>	<b>£5,776.76</b>	<b>£5,080.48</b>	<b>£10,857.24</b>
Number of Children started	13	14	27
Number of families started	9	12	21
Cost per child	£444.37	£362.89	£402.12
Cost per family	£641.86	£423.37	£517.01

\* Venue closed for 1 week due to repairs

\*\* Estimate from the hourly charge of a Health Visitor who facilitated the parent's group, with the assumption that other facilitators were paid similarly. (NB. Salary costs unavailable for each facilitator)

### 8.3 Costs to Families to Attend 'Families for Health'

Sixteen families completed the economics questionnaire at the end of the programme (Appendix XIII), with the direct and indirect costs summarised in Table 8.4.

**Table 8.4 Costs to families to attend 'Families for Health' (16 families who completed the economics questionnaire)**

	<b>Group 1 (n=8 families)</b>	<b>Group 2 (n=8 families)</b>	<b>Total (n=16 families)</b>
<b>DIRECT COSTS</b>			
<b>Travel Costs</b>			
Mileage costs (25p/mile)	£175.00	£96.25	£271.25
Car Parking	£134.00	£60.50	£194.50
Public transport (bus)	£63.00	£23.10	£86.10
<b>Total</b>	<b>£372.00</b>	<b>£179.85</b>	<b>£551.85</b>
<b>Cost per family</b>	<b>£46.50</b>	<b>£22.48</b>	<b>£34.49</b>
<b>Items Bought</b>			
Clothes	£29 (2 families)	£30 (2 families)	£59 (4 families)
Training shoes	£10 (1 family)	£25 (1 family)	£35 (2 families)
Food	£224 (5 families)	£72 (4 families)	£296 (9 families)
<b>Total</b>	<b>£263</b>	<b>£127</b>	<b>£390</b>
<b>Cost per family</b>	<b>£33</b>	<b>£16</b>	<b>£24</b>
<b>Parents' Time</b>			
Travel time (to and from venue)	55.7 hrs	42.5 hrs	98.2 hrs
Time at Programme (all parents, not just those who completed questionnaire)	235 hrs	197.5 hrs	432.5 hrs
<b>Total</b>	<b>290.7 hrs</b>	<b>240 hrs</b>	<b>530.7 hrs</b>
<b>Hours per family</b>	<b>36.3 hrs</b>	<b>30 hrs</b>	<b>33.2 hrs</b>
<b>INDIRECT COSTS</b>			
<b>Other Costs</b>			
Lost Earnings as a result of attending FFH	24.5 hrs of work (one Mum)		24.5 hrs of work (one Mum)
Carers time to look after younger children whilst at FFH	2 families (65 hours) (all unpaid)	2 families (18 hours) (all unpaid)	4 families (83 hours) (all unpaid)



### 8.3.1 Direct costs to Families

Direct costs comprise the costs incurred by families who receive treatment i.e. to attend *'Families for Health'*. Travel costs were the highest direct monetary cost at £34 per family (Table 8.4). The mode of transport was private car for 12 families, bus for 2 families and a mix of private car and bus for 2 families, with two families occasionally walking as well. One parent commented on the cost of the car park near the leisure centre:

- *Car parking costly but good to be able to use the baths.* (Parent-19, End-of-Programme Questionnaire)

A few families had bought new clothes and footwear as a result of their attendance. Furthermore, nine of the 16 families had spent money on food that they would not have otherwise bought, as an additional cost of a healthy diet. These additional costs averaged at £24 per family (Table 8.4), making the total spent to attend *'Families for Health'* at £58 per family. A major direct cost to families is also the time for travel to and from the venue, and the 2½ hours each week to attend, which averaged at 33 hours per family (Table 8.4).

However, none of the parents mentioned increased costs of a healthy diet as an issue in their interviews, and two parents actually mentioned that focusing on reducing portion sizes and reducing snacks had reduced the food budget:

- *You know from a family point of view and budgets it helps keep the cost down, you're not wasting so much food because you are just being sensible with your portions as well.* (Mother-6, Interview)
- *We are all more aware of health and nutrition. The cupboards contain food we need not food we WANT. There are no sugary snacks and nobody has missed them. The food bill has dropped as has the takeaway treats.* (Mother-14, End-of-programme questionnaire)

The interview with the programme developer also indicated that she thought that several families had reduced their expenditure on food:

- *Some of them changed their shopping habits. Several of the families said their food bills had gone down as they were buying more healthy food, they were much more thoughtful about what they were eating. I think it was Parent-14 said her food bill had gone down by £30.00 a week. And I think it's partly that, although they are buying more of the healthy food, they are buying less food and they are buying less in way of unnecessary treaty kind of food because they've decided they simply didn't want it in the house. (Programme Developer, Interview)*

When I reported to the programme developer that several families had indicated that they had spent money on food they wouldn't have otherwise bought, such as fruit and vegetables, she responded that these increases could be balanced by decreased expenditure in other areas:

- *But in some families it may be balanced by buying much less in the way of cakes and biscuits and chocolate bars and crisps and that sort of treat, fizzy drinks. And just eating less, I mean one or two of the families the portion sizes were huge, vast amounts of food were being cooked or a lot of ready meals were being bought, which are relatively expensive compared you know with making lentil soup. (Programme Developer, Interview)*

The discrepancy between the economics questionnaire in which nine families reported spending more money on food and these comments from interviews about reduced expenditure on food could be due to the way the question was asked in the economics questionnaire. For example, the questionnaire asked about their expenditure on food that they 'wouldn't have otherwise bought', which does not allow families to indicate what savings they may have made in other areas i.e. on less takeaways, reduced 'treats'. A refinement to the questionnaire could include a question about whether their expenditure on food went up overall, remained the same or went down.

### 8.3.2 Indirect Costs to Families

Indirect costs of attending '*Families for Health*' include the impact on paid and non-paid work and on leisure time. As shown in the previous section, families invested considerable amounts of their own time to attend (an average of 33 hours per family), but only one mother said that she had given up paid employment (24.5 hours) to come on the programme (Table 8.4). In the interviews one parent indicated that extended hours at work forced their family to withdraw, with economic factors playing a part in this decision:

- *It was work, I had to work late. No that was the only reason, just work I just couldn't get out of it, because we're short staffed at work at the minute.* (Mother-20, dropped-out, interview)

For a small number of families, the time involved in attending the programme was perceived to be too great an intrusion on leisure time:

- *Each session was too long, and it was hard to devote almost the whole morning of Saturday, when we were working full-time for the rest of the week.* (Mother-9, End-of-programme questionnaire)

The length and duration of the programme will be explored further in the next chapter on users' perspectives.

Additionally, four families had to provide alternative care for their younger children whilst they attended the programme, which was provided by unpaid carers totalling 83 hours (Table 8.4). One of these families dropped out of the programme and one was defined as a 'partial completer'. Interview data from this latter parent suggested that the duration of the sessions made it difficult to arrange childcare, and that this was the reason she had difficulty attending:

- *Well the main reason was because of, not the time that it was on, the length of time that it was on for. Yes, it's just being a single parent obviously I had to get somebody to have my other child. If it had been four, you know, if I could have been home for half-six, seven o'clock it would have been ok. Five o'clock wasn't a problem to start,*

*it was just I wasn't getting home until eight o'clock, that was the only problem.* (Mother-24, Interview, partial-completer)

I asked her if free childcare would have made a difference, and she indicated that it would and that 2½ hours would not then have been too long. For at least two families a creche may have made a difference to their attendance, and should be considered if the programme is run again.

These findings are a reminder of the significant direct and indirect costs incurred by families to attend *'Families for Health'*.

#### **8.4 Cost-Outcome Description**

The perspective taken in this section is that of the NHS, taking the direct costs incurred to provide the intervention and relating these to the primary outcome: the change in BMI z-score at the 9-month follow-up.

The analysis follows the method of the cost-effectiveness analysis of family-based treatment for childhood obesity by Goldfield et al (2001). This study is a small randomised controlled trial (31 families) from Epstein's group in the US, which compared the cost-effectiveness of two different protocols for the delivery of family-based behavioural treatment (FBBT): mixed treatment (a combination of group-based and individualised treatment) versus group-based treatment only. The input costs were the direct costs incurred by the health service in both recruiting families and providing treatment, which was much more expensive for mixed treatment than group-based treatment (mixed:\$1,391 per family vs group only: \$491per family) . The measures of benefit used in the economic analysis were the reductions in BMI z-score and percentage overweight, and these were

shown to be similar between groups (i.e. overall -0.64 reduction in BMI z-score). Cost-effectiveness was defined as the reduction in both BMI z-score and percentage overweight in children at 12 months follow-up divided by the total cost of treatment, providing a measurement of improvement per dollar spent. Group-based treatment was shown to be significantly more cost-effective than mixed treatment (decrease of BMI z-score units of 0.001 vs 0.0004 per dollar spent, respectively). Cost-minimisation analysis could have been employed in this study due to the equivalence in consequences between groups, but the authors chose to do a cost-effectiveness analysis.

I have aimed to repeat the analysis of Goldfield et al (2001), although the details of their analysis are not totally clear. For example, it is not stated how children who increased their BMI z-score were included in the analysis, although they did state that if children *'did not show a decrease in percentage overweight, they were treated as unsuccessful and values were set to zero, rather than having a negative cost'* (Goldfield et al 2001, p1846). This could over-estimate the benefits, and so I have done this analysis without re-setting any increases in BMI z-score to zero.

The cost-outcome description of *'Families for Health'* is presented in Table 8.5. First, the changes in BMI z-score at 9-months for all 22 children with data were summed. Second, the sum of the reduction in BMI z-score was divided by the total direct NHS costs of running the intervention (from Table 8.3), to provide a measure of improvement per pound spent. To facilitate interpretation, this was expressed as a reduction of -0.41 BMI z-score units per £1000 spent. The

results were also expressed as the cost per unit change in BMI z-score, estimated at £2440 (Table 8.5).

**Table 8.5 - Cost-Outcome Description: Relating Costs to Run the Programme to Changes in BMI z-score**

	Group 1 (n=12)	Group 2 (n=10)	Both Groups (n=22)
<b>Direct Costs to run Programme</b>			
NHS	£5,777	£5,080	£10,857
<b>Output: Change in BMI z-score</b>			
Sum of changes in BMI z-score for children at 9mths vs baseline	-2.34	-2.11	-4.45
<b>Cost-Outcome Description</b>			
Change in BMI z-score per £1,000	-0.41	-0.42	-0.41
Cost per unit change in BMI z-score	£2,469	£2,408	£2,440

### 8.5 Comparison of Costs with Other Obesity Treatment Programmes

A comparison of the results of the cost-outcome description of *'Families for Health'* with the results from the study by Goldfield et al (2001) from the US, shows that the cost to run their 'group only' intervention was £330 per family, which is less than *'Families for Health'* at £517 per family for this similar length group-based programme. (The price year was not reported in their paper, and therefore I have used the rate of exchange for dollars to pounds for January 2001 of £1 = \$1.49 (i.e. year of paper) (Tax Free Gold, undated)). The effectiveness of Goldfield's intervention was also reported to be better with a mean reduction of -0.64 in BMI z-score in children from baseline to 12 month follow-up, compared with a mean reduction of -0.21 in BMI z-score from baseline to 9-month follow-up for *'Families for Health'*. The group only arm of the US family-based behavioural treatment was therefore much more cost-effective, with a reduction of -1.49 BMI z-score per £1000 spent, compared with

a reduction of -0.41 BMI z-score per £1000 spent for '*Families for Health*'. Explanation for this discrepancy could be that the changes in BMI z-score in children which showed an increase were reset to zero in the US study thus exaggerating the improvements. Therefore, although I have compared the results there are methodological reasons why they may not be comparing like with like, and caution is needed with interpretation.

Comparison of the costs of delivering '*Families for Health*' with the costs of delivering other UK childhood obesity programmes should be made, although this data is not widely available. The direct costs to the NHS to run the '*Families for Health*' programme of £402 per child appears in line with the £400 quoted for a place for one child on MEND in Bristol (Bristol City Council 2009). NICE has also estimated the costs of group-based parenting programmes for treating children with conduct disorders to range from £500 to £720 per family (NICE 2006b). Therefore the costs of the current parenting intervention of £517 per family are also in-line with, or lower than, other parenting interventions.

The cost per unit change in BMI z-score and/or reduction in BMI z-score per £1,000 has not been reported for other UK programmes, as far as I am aware. This study therefore provides data on the costs of the '*Families for Health*' intervention and a description of the costs in relation to outcomes against which other obesity treatment programmes can be compared. This partial economic analysis is, however, limited.

Recent developments in the field of health economics in relation to childhood obesity include an Australian project ('ACE-Obesity') which has assessed the

cost-effectiveness of 13 different prevention and treatment interventions, in order to inform policy in Australia (Hall et al 2006, Haby et al 2006). This project has developed new methodology to compare cost-effectiveness across different interventions, indicating the use of disability-adjusted life years (DALYs) saved over a child's lifetime as the outcome measures to assess health benefit. Six interventions, including a Swedish family-based programme for obese children, were considered both cost-effective and cost-saving. The family-based treatment was estimated to cost \$4,000 per DALY saved (95% confidence interval \$3,000 to \$8,000). Its low reach but large change in BMI per person made this an affordable intervention. However, the majority of the medical, social and economic burden are in adulthood (Government Office for Science 2007). One of the assumptions in this analysis is that the reduction in children's BMI will be maintained over the life of the child. Therefore, cost effectiveness will depend on the intervention changing behaviour after treatment has stopped, so that changes are sustained.

Although there are methodological uncertainties, future research of interventions to manage childhood obesity should include cost-effectiveness alongside effectiveness analyses (NICE 2006a, Oude Luttikhuis et al 2009).



## Chapter 9

### User and Provider Perspectives

#### 9.1 Introduction

The revised MRC framework for the development and evaluation of complex interventions places emphasis on optimising both the intervention and evaluation prior to decisions about whether to proceed to a randomised controlled trial (Campbell 2007). This pilot of the *'Families for Health'* intervention is therefore important to identify changes that could be made to the programme in order to make it more acceptable to families and/or to make it more effective.

The process evaluation (Chapter 6) showed that the intervention was broadly implemented as intended and was received by the families as planned, apart from the large drop-out of families from the Monday evening group. In this chapter users and providers perspectives are addressed, focusing on what the target audience liked and what changes were suggested, by using qualitative data from parents, children and the programme developer. The aspects addressed include the venue, the length of the programme, the duration of each session, the content, the group-based nature of the programme and whether parents' and children's groups should be separate or combined.

## 9.2 Venue

The venue for *'Families for Health'*, a leisure centre in central Coventry, received some positive comments from parents about its central location and facilities. The children's venue was a gym on the ground floor and the parent's room was on the fourth floor, both at the farthest end of the leisure centre.

- *Fine, it was central for most people to get to and we got exercise going up the stairs.* (Mother-1, End-of-programme Q)
- *It was great especially when the children were able to use the facilities as a Group.* (Mother-11, End-of-programme Q)
- *Plenty of room for them to run around and yeah it's great.* (Mother-20, Interview, dropped-out)
- *Apart from the distance from the front door to where it was, the venue was fine, because the car park was across the road.* (Mother-24, Interview)

However, there were some difficulties expressed:-

- *Other things on in next room, sometimes hard to hear people talk.* (Mother-1, End-of-programme Q)
- *A good central location but the Centre let the programme down when they messed up the swimming session.* (Mother-6, End-of-programme Q)
- *Car parking costly but good to be able to use the baths.* (Father-19, End-of-programme Q)
- *Not too bad if it was a different time again. Because it's city centre and because of the time [Monday 5pm], it was quite busy [on roads]. Yeah it was a bit hard, I mean a lot harder than I thought actually.* (Mother-18, Interview, dropped-out)

The programme developer commented that the venue would be improved if the children's and parents' rooms were closer.

- *I think I would like to have a venue where the two groups are much closer together than where they were. That would make a huge difference, the logistics, we did a great job with a difficult venue.* (Interview, Programme Developer, Group-2)

Having the programme in a leisure centre may have also raised expectations of some families that it was *all* about exercise, and the programme developer suggested schools as alternative venues.

- *It might have worked against us in terms of their expectations having it there [at the leisure centre]. If you were running a group in a school, most schools have a school hall and you could import a bouncy castle and some gym equipment. And some schools have a swimming pool or a swimming pool nearby, but that would get more complicated. (Interview, Programme Developer, Group-2)*

One parent also suggested that a school would be a good venue, or to offer the programme via schools:

- *I think it's something they ought to take into schools.[ ] Particularly the Year-3 children, looking at these seven and eight year olds, some of them were massive. I just thought if teachers could identify that some children in school needed this, then they could you know go via that route and ask parents if they could be involved, that would be fantastic. So not changing the programme but maybe the way it's offered. (Mother-19, Interview)*

To summarise, the leisure centre as a venue was good but not ideal and alternative community based venues such as schools could be considered for future programmes.

### **9.3 Length of the 12-week Course**

Most responses in the end-of-programme questionnaire indicated that a 12-week course felt about right, although a number implied that they would have liked a longer course, with follow-up sessions (Table 9.1). Two parents said that they thought the course was too long, both from the Monday evening programme (Group-2), including one parent who had dropped-out.

**Table 9.1 Data from the End-of-Programme about the Duration (12-weeks) of the Programme**

	<b>Comments relating to Duration of Course (12-weeks)</b>
<b>About Right</b>	<p><i>Group-1</i></p> <ul style="list-style-type: none"> <li><i>Very good but would be good if the group met again in about 6 months time to see if things had worked for them. (Mother-5)</i></li> <li><i>I think 12-weeks was good and everything had enough time to be explained clearly. (Mother-11)</i></li> <li><i>It would not have worked so well if not run for that amount of weeks. (Mother-12)</i></li> </ul> <p><i>Group-2</i></p> <ul style="list-style-type: none"> <li><i>The 12 weeks were needed as there was a lot of ground to cover and some of us took longer to come out of our shells than others. (Mother-14)</i></li> <li><i>I didn't personally intend to attend the whole course, I only attended the 1<sup>st</sup> in a support role, needless to say I was intrigued and didn't miss one. (Father-19)</i></li> </ul>
<b>Too Short</b>	<p><i>Group-1</i></p> <ul style="list-style-type: none"> <li><i>I felt that we needed longer. (Mother-1)</i></li> <li><i>I could have just kept on going as I met some good friends, but both my children were a little fed up with it but also made some good friends and we are now keeping in touch and hopefully going out at least once a month, or so. (Mother-3)</i></li> </ul> <p><i>Group-2</i></p> <ul style="list-style-type: none"> <li><i>I wish it could go on for longer – can we have a revisit course later on!!! (Mother-19)</i></li> </ul>
<b>Too Long</b>	<p><i>Group-2</i></p> <ul style="list-style-type: none"> <li><i>Perhaps just a little too long. Maybe a break of a couple of weeks e.g. 4 weeks then 2 weeks break to put ideas into place, then 4 more weeks. (Mother-15)</i></li> <li><i>Wouldn't know because I wasn't there that long. It probably would have dragged for me as it wasn't very active. (Father-16, dropped-out)</i></li> </ul>

One parent expanded at interview on the need for follow-up sessions:

- I don't think she took it on board while we were doing it but now that we have finished she's disappointed in herself, like she'd like to wear nice pretty dresses especially at Christmas and she can't because of her size, so she's disappointed. So if she could do it again I think she would be more aware now. Well, maybe not the twelve weeks but like a couple of weeks. Yeah, maybe not straight away, like a little break and then bring them back again, and do it like that. Because she would be more aware and I think she would get a lot more out of it the second time. (Mother-5, Interview)*

To summarise, the duration at 12-weeks seemed to be about right but follow-up

sessions should be considered in future programmes to enhance sustainability.

#### **9.4 Length of Sessions (2½ hours)**

There was no consensus from the parents on the length of each session, although one parent from Group-1 and four parents from Group-2 indicated that they thought 2½ hours was too long (Table 9.2). These included three parents who had dropped out of Group-2 on a Monday evening and the family who was defined as a 'partial completer'. Three of these families had the youngest children (7-years) on the programme. Two parents from Group-1, however, indicated that they thought the sessions needed to be longer, one to incorporate more physical activity. However, a number thought the 2½ hours was about right for the content.

To summarise, this suggests the length of the session was reasonably well received, but was perhaps too long on a weekday after school, especially for those families with younger children. A programme of this length needs to be run at a weekend.

**Table 9.2 Data from the End-of-Programme about the Length of each Session (2½ hours)**

	<b>Comments relating to Length of each Session (2½ hrs)</b>
<b>About Right</b>	<p>Group-1</p> <ul style="list-style-type: none"> <li>• <i>It did seem a long time but when you're there it flew by. I think just because the course content, because of how the day was structured, going down to see the children half way through it was just enough time. I suppose a little awkward finding care for XXXX [younger child] during that time you know but once we got into the routine it was ok, it wasn't too bad. (Mother-6)</i></li> </ul> <p>Group-2</p> <ul style="list-style-type: none"> <li>• <i>The length of the session was about right for the topics covered. There was always the learning / group side, healthy snack time and having fun with the children time. (Mother-14)</i></li> <li>• <i>At first I felt that 2½ hours was too long but I understand the need for sessions of such length. The structure of the sessions was fine. (Mother-15)</i></li> <li>• <i>Just right to fit it all in (maybe a later start time as it was a rush to get out of work). Nice to have a break with the children in the middle. (Mother-19)</i></li> <li>• <i>I never found myself clockwatching so the length of time must be ok. The structure was fine, always interesting. (Father-19)</i></li> </ul>
<b>Too Short</b>	<p>Group-1</p> <ul style="list-style-type: none"> <li>• <i>I see making it a bit longer, an extra half an hour or something, Because it does go quite quick, actually I was quite surprised how the time went. It didn't seem 2½ hours when you're there but I just thought exercise, either with the kids. (Mother-1)</i></li> <li>• <i>Could be slightly a little longer to allow for the time taken out to have a break. (Mother-4)</i></li> </ul>
<b>Too Long</b>	<p>Group-1</p> <ul style="list-style-type: none"> <li>• <i>Each session was too long, and it was hard to devote almost the whole morning of Saturday, when we were working full-time for the rest of the week. (Mother-9)</i></li> </ul> <p>Group-2</p> <ul style="list-style-type: none"> <li>• <i>The only thing that would need to be different is the length of time. Just shorter sessions.[as childcare difficult to arrange after school] (Mother-24)</i></li> <li>• <i>I found 2½ hours a little excessive. Maybe one hour would be better, not breaking up into separate groups. (Mother-17, dropped-out)</i></li> <li>• <i>It was a long time. It was so late by the time you got there and by the time you got home. (Mother-20, dropped-out)</i></li> <li>• <i>It was a bit of an awkward time [after school]. Too long. You know, maybe I could have managed the time a bit. I could have continued if it had been on a Saturday and you know to try and get somebody to do things that I do after school is really difficult. Whereas to try and get somebody in to just watch them for half an hour is, another couple of hours is quite easy but when you have got and I mean Child18 has got SATS and everything else, so she has quite a bit of homework to do every night so. (Mother-18, dropped-out)</i></li> </ul>
<b>Varied</b>	<p>Group-1</p> <ul style="list-style-type: none"> <li>• <i>Sometimes dragged on, sometimes there wasn't enough time. (Mother-5)</i></li> </ul>

## 9.5 Content of the Programme

The varied content of the programme, including parenting, healthy eating and physical activity topics, was received very positively by the parents (see also Section 6.6 in Chapter 6).

### 9.5.1 Different to Expectations

The balance of the various topics was referred to very positively at interview, and this contrasts with some parents' original expectations that it would be mainly focused on healthy eating and diet:

- *I think if it had just been on healthy eating it would have been boring. It was all good, it was well balanced. Like I said we thought it was all going to be all diet and blah, blah, blah and it wasn't. It was stress and how to cope with the stress and different bits and pieces, which was good. (Mother-3)*
- *I think it worked really well. Um, you seemed to cover a whole sort of range, not just sort of healthy eating but like without realising it, it's like positive parenting as well. (Mother-6)*

For Family-19 it was the parenting aspects of the programme that captured their interest, with weight loss and healthy eating felt to be small pieces of the jigsaw and an added advantage to the other benefits:

- *And I would say 'Families for Health' it's not just about food. In fact it has only been a small part about food and about weight loss. It's been about families that's number one, good parenting it's been about, keeping together as a family, it's been about rules, it's been about general family life and the actual weight loss has been sort of underneath if you like, it's not been that important. Everything else has sort of just slotted in, it's almost like a jigsaw, losing weight is one little corner of the jigsaw. There was so many other jigsaw pieces that fit together to make the programme that, that the weight loss hasn't been the ultimate thing, it's been a perk really. (Mother-19)*

Although Family-19's initial expectation was that the programme was exercise-based because it was run at a leisure centre, this was not an issue for them when it turned out not to be because their child was already very active:

- *I thought it was going to be a lot more exercise based, my impression of it having sort of read the leaflet was that they were going to go to the Sports Centre and they were going to go swimming and they were going to have a go at karate, judo and abseiling, all those sorts of different activities and try and encourage them to be more, more active. Which wasn't necessarily what Child-19 needed because he did do a lot of activities anyway, but that was my impressions and then when I actually sort of read the literature in depth and having had a conversation with you it was more, educational based wasn't it. (Mother-19)*

However, some families had expected more physical activity, with Family-16 giving the lack of physical activity as one of the reasons for dropping out. Although the information sheets had given details of the programme, the fact that it was held at a leisure centre had falsely raised their expectations about the amount of structured exercise. The lack of structured physical activity is one exception to the positive comments about the content of the programme.

### **9.5.2 Parents' Perspective on Physical Activity**

The physical activity within the children's programme mainly focused on playing a variety of short games interspersed within each weekly session, and there were also three one-hour 'Activity Tasters' in Weeks 9, 10 and 11. The parents also played some games in their programme and during the family break with the children. However, in the weekly evaluation a persisting theme was that some parents would have liked more physical activity for themselves and their children, especially Group-1.



- *I would enjoy more physical activity/games during sessions please. (Group-1, Week-2)*
- *More active with the children. (Group-1, Week-4)*
- *It would be nice to do something extra each week with exercise, games etc. (Group-1, Week-8)*
- *More activities with the kids, as a good example. (Group-2, Week-2)*

In the week preceding the three 'Activity Tasters' for the children one parent commented very positively about this.

- *I think the idea to let children do activities over the next three weeks is a wonderful idea and I'm sure the children will find it great. It's nice they have opportunities to use the pool as a group meeting. (Group-1, Week-8)*

When children took part in the 'Activity Tasters' there were many positive comments by the parents in their weekly evaluation forms. In particular, the last two comments mirror the main purpose of the 'Activity Tasters', to find activities for the children/family which could be sustained after the programme:

- *The swimming was a treat for the children. (Group-1, Week-11)*
- *Kids loved the swimming, enjoyed watching them having fun. (Group-1, Week-11)*
- *Children were very excited about castle (bouncy); swimming next week will be fab. (Group-2, Week-9)*
- *Also seeing how willingly the children joined in with the swimming. (Group-2, Week-10/11)*
- *The children seemed really motivated by the swimming and I am sure we will be doing that as a reward activity. (Group-2, Week-10/11)*
- *Looks like the splash pool could become a family activity. (Group-2, Week-10/11)*

In the end-of-programme feedback, four parents commented that future programmes should include more physical activity. Some indicated that the focus on games was insufficient and they would like more structured physical activity. These parents all had an older child on the programme (11-13 years).

## More Physical Activity for Parents

- *I feel that the adults should do more activity, either with or without the children, personally I prefer with the children. (End-of-Programme questionnaire, Mother-1)*

This mother expanded at interview:

- *I would have liked more activity. Either with the kids or on our own, you know doing a bit more. Yeah, because I felt that we weren't doing a lot. I mean maybe the kids felt a bit differently downstairs. As far as I know they did a lot more games and they were more active, we felt we weren't active. I mean we did a couple of games but it wasn't really physical, if you know what I mean. (Mother-1, Interview)*

## More Physical Activity as a Family

- *It could have been more 'active' even for the adults. As a family we were hoping for more physical activities together during this time. (End-of-Programme Q, Mother-9)*

## More Physical Activity for the Children

- *Greater, structured physical activity for the children. Games are brilliant, building confidence, teamwork, fun etc but maybe a little more than this is needed? (End-of-Programme Q, Mother-15)*
- *I wished it was more active with the kids. I think everybody would have benefited. (Father-16, dropped-out)*

Two parents offered suggestions about how to increase the physical activity, involving promoting other activities at the leisure centre much more and making greater use of the pedometer that was given to children in Week-4. The programme developer took this latter suggestion on board for the second group by amending the weekly physical activity record in the children's activity books to include a column for the number of steps each day.

- *I would have thought they would have promoted other activities more. I just remember Child-16A had when she started school a big leaflet and it had girls football at so and so times and I thought you could have given that out at the beginning. They could have pushed a lot of activities. You know, showing the activities in a leaflet and*

*ask the kids if it was a perfect world and you could do any of them, what would you like to do. (Father-16, Interview, dropped-out)*

- *Should try to encourage the children to use it [pedometer] more because Child-F4 just thought it was for a couple of days and then that was it. You know if you gave it to them the first week and then got them to wear it the whole time and then by the end you would see how much they have improved I think. (Mother-4, Interview)*

### **9.5.3 Children's Perspective on Physical Activity**

Children's responses to the question regarding the 'good things' about the programme and what they have 'not liked' are summarised in Tables 9.3 and 9.4, respectively. The 'good things' were in three categories: Many children said they had enjoyed the games and the 'activity tasters' (bouncy castle, jungle junction, swimming); making new friends; and the family break time. The comments about what the children have 'not liked' included two references to not being able to go swimming (Table 9.4). Other themes include that they didn't like listening to 'teachers' (three comments were from boys), particularly for Group-2, and completing the research questionnaires.

The children were not asked what changes they would have liked with the programme, although one child (aged-13) was present with her father at interview and agreed that there should be more structured exercise:

- *More P.E., instead of games, and more fitness things. Probably something like, probably football and tennis or badminton or something. Get a little net out or something. (Child-16B)*

**Table 9.3 Interview data from children about the good things about the 'Families for Health' programme.**

	<b>What have been the good things about the programme ?</b>
Games and 'Taster Activities'	<p><i>Group-1</i></p> <ul style="list-style-type: none"> <li><i>The good things about the programme are the games and snack time. The good things about the programme is the activities we did in the last four weeks, like swimming, jungle junction and the bouncy castle and today we are having a party. (Child-1B)</i></li> <li><i>The best thing that I thought about this was the games. (Child-4)</i></li> <li><i>I like it because you have lots of fun and you have lots of activities. (Child-6)</i></li> <li><i>Playing the games. (Child-11)</i></li> </ul> <p><i>Group-2</i></p> <ul style="list-style-type: none"> <li><i>Yeah. All of the games. (Child-14)</i></li> <li><i>Um, we play games and we went swimming and we had the bouncy castle out. And today we're having a party. (Child-19)</i></li> <li><i>Meeting new people, playing football and playing all the activities and being able to play games. (Child-25B)</i></li> </ul>
Making new Friends / People are friendly	<p><i>Group-1</i></p> <ul style="list-style-type: none"> <li><i>Everybody's friendly. (Child-3A)</i></li> <li><i>The best bit about our group is that we always stick together and there's no-one to hurt you and if your friendly then they usually come to you and help you. (Child-3B)</i></li> <li><i>Most people are friendly and I like the games. (Child-5)</i></li> </ul> <p><i>Group-2</i></p> <ul style="list-style-type: none"> <li><i>Meeting new people, I mean meeting loads of new people. (Child-15)</i></li> <li><i>Um, the good things are that, good to make new friends and now I know what things I can do in my life. (Child-25A)</i></li> </ul>
Family Break / Food Preparation	<p><i>Group-1</i></p> <ul style="list-style-type: none"> <li><i>I like it when we prepare snacks altogether. (Child-1A)</i></li> <li><i>The good thing about the programme is that the adults come in and play this game and then they have to go back for about 5 minutes while we prepare the snack, then they come back down and we have another quarter of an hour and then they come back down to pick us up. (Child-3B)</i></li> <li><i>The best bit I liked was making the bread. (Child-12A)</i></li> <li><i>The best bit would be, where we do a game altogether. (Child-12B)</i></li> </ul>
Other	<p><i>Group-2</i></p> <ul style="list-style-type: none"> <li><i>The health club helps us to get healthy and be fit. It's called 'Families for Health' because the family comes. (Child-24)</i></li> </ul>

**Table 9.4 Interview data from children about what they have not liked about the ‘Families for Health’ programme.**

	<b>What have you not liked about the programme?</b>
Games and ‘Taster Activities’	<p><i>Group-1</i></p> <ul style="list-style-type: none"> <li><i>I find it hard when we are doing the words because I didn’t really, I’m not that good at spelling. (Child-3B) (NB reference to alphabet arm games)</i></li> <li><i>Some people like push you and land and fall on you. And people getting hurt. (Child-5)</i></li> <li><i>I didn’t like it because of all the balloons kept popping and when balloons pop it just makes me scared. (Child-6) (reference to the game of ‘balloon tennis’)</i></li> <li><i><b>Not</b> going swimming. (Child-12A)</i></li> </ul> <p><i>Group-2</i></p> <ul style="list-style-type: none"> <li><i>Sometimes when there’s lots and lots of children everyone starts messing around and you can’t get on with what you want to do. Like one day, like nearly all the boys they kept on messing about, and we couldn’t play a decent game on the bouncy castle and that sort of thing I don’t like. (Child-25A)</i></li> <li><i><b>Not</b> being able to go swimming and bouncy castle. (Child-25B)</i></li> </ul>
Listening to Teachers	<p><i>Group-1</i></p> <ul style="list-style-type: none"> <li><i>Some of it was boring. Ah, some bits were ....XXXX [facilitator] said we were going to do this and then there was a bit of a pause and then XXXX [facilitator] told us what to do and that was boring. (Child-4)</i></li> </ul> <p><i>Group-2</i></p> <ul style="list-style-type: none"> <li><i>Ah, the teaching part. Just being taught. (Child-14)</i></li> <li><i>That we have to listen to the teachers. (Child-19)</i></li> <li><i>That we had to share stuff and we had listen to the teachers. So you don’t get to do what we want. (Child-24)</i></li> </ul>
Questionnaires (research)	<p><i>Group-1</i></p> <ul style="list-style-type: none"> <li><i>The thing I didn’t like about the programme was when we had to do at the start we had to do the paperwork and then we had to do it all over again. (Child-11)</i></li> </ul> <p><i>Group-2</i></p> <ul style="list-style-type: none"> <li><i>... and we had to do that stupid questionnaire. (Child-19)</i></li> </ul>
Family Break / Food Preparation	<p><i>Group-1</i></p> <ul style="list-style-type: none"> <li><i>Sometimes I didn’t like the food we had at snack time. Smoothies. Crackers. (Child-1B)</i></li> <li><i>When one week we didn’t have carrots. I love carrots. (Child-12B)</i></li> </ul>
Other	<p><i>Group-2</i></p> <ul style="list-style-type: none"> <li><i>Missing some of the sessions. (Child-15)</i></li> </ul>
Nothing	<p><i>Group-1</i></p> <ul style="list-style-type: none"> <li><i>I like all of it. (Child-1A)</i></li> <li><i>He says there’s nothing wrong with it here and I agree with him so we’re just going to stay friends. (Talking via Sideways the duck) (Child-3A)</i></li> </ul>

#### 9.5.4 Programme Developer's Perspective on Physical Activity

In the interview with the programme developer after the second group, I commented that some parents felt that there should have been more structured exercise for themselves, as well as for their children, and asked for her views. The programme developer stated her rationale for the focus on games in the 'Families for Health' programme, in that the children would not enjoy 'exercise', however, I have already shown that some parents did not share this view.

- *I think what I had thought at the beginning was that some of these children would really not enjoy exercise with a big E and if you could get them enjoying group games it would be a spring board into their discovery that actually group exercise was a tolerable thing. So then they might enrol for something else. It wasn't true of all the children but there were one or two who you know, will not do games at school, won't go on residential because they won't change their clothes in front of other kids. And that's the group I was kind of catering for. So I think we haven't entirely cracked the exercise element of the programme. (Interview, Programme Developer, Group-2)*

The programme developer had used the physical location of the parents' room on the fourth floor and the children's gym on the ground floor to encourage parental physical activity, promoting an increase in activity within daily living:

- *...just the idea that you can do little changes that are worth making. So at the beginning of the programme almost all the parents took the lift. And my ambition was by the end of the programme to get them all going up the stairs instead. And by week four they were all going up the stairs and they got rewarded for it. At the end of the programme they went up the stairs much faster than they had at the beginning. (Interview, Programme Developer, Group-1)*

The programme developer was undecided about a change towards more structured physical activity in the programme:

- *Quite ambivalent, I think some families would love it, some families would be seriously put off by it and I don't know what we would drop. [ ] If we can get the families thinking that being active as a family is a*

*good idea, there are lots of things they can access that they don't need an intervention in a way. I would be happy to be over ruled on that but I don't see how we could do it in the time really. I had to drop some topics from the parents group anyway.*(Interview, Programme Developer, Group-2)

Two options were added by the programme developer on how the things could be changed:

- *One is to make sure when we are recruiting that we are clear, even clearer [that the programme does not focus on structured exercise]. And make it clear about what other forms of structured activity are available, that they can go and tap into. And maybe encouraging them even more than we did, to embark on something while they are doing the programme, except that for every single family, time was the big stress issue. (Programme Developer)*
- *And you could structure a different programme, which would be more like the MEND programme that really focuses on exercise and diet, but then you need to do a little bit of sort of self-esteem and praise stuff within that, but you wouldn't be able to do as much on the relationships stuff, just because there isn't time. (Programme Developer)*

### **9.5.5 Summary**

To summarise, the balance of 'games' versus 'structured exercise' needs further consideration. For some parents, the three activity tasters for the children in weeks 9,10 and 11 were 'too little, too late', and they would have also liked some more structured physical activity for themselves. The children had enjoyed the games and activity tasters. The programme developer neither embraced nor rejected the possibility of more structured physical activity on the programme, but warned that this would have to be at the expense of other aspects, such as social and emotional development.

## 9.6 Benefits of a Group-based Programme

In the section on 'dose received' in Chapter 6 (Section 6.6.3) the comments from the parents in their weekly feedback showed the groups evolving through the four stages of group development (Tuckman 1965). This section further explores the group process, analysing the emerging themes from the end-of-programme questionnaires and the interviews with parents to explore what elements were important.

### 9.6.1 Relationship between Facilitators and Parents

The relationship between facilitator and parents is an important factor in the participation of parents in parenting groups (NSW Department of Community Services 2005, Barlow and Stewart-Brown 2001). The overall impression of the parents, including those parents who dropped out, was that the sessions had been well organised and facilitated.

- *The sessions were always planned out and I felt privileged to be a part of it. Everybody was very pleasant and I never felt under pressure to say or do anything I didn't want to do. We were never rushed and everything was explained fully. (Mother-14)*
- *Things were clearly laid out with the session outlines on the wall. The handouts were clearly designed and enabled you to write your own ideas in. The leaders were very knowledgeable and eager to help. Pace was just about right, relaxed but busy. (Mother-19)*
- *The whole course was well thought out. It was well planned. (Father-16, dropped-out)*

There were recurring comments from parents about the quality of the leadership, and the warmth and competence of the facilitators.

- *The leaders are fab and so jolly, which makes us feel at ease and feel good in ourselves. (Mother-1, End-of-programme Q)*



- *Very well run. The leaders were always pleasant and made you feel important and special. (Mother-3, End-of-programme Q)*
- *We really enjoyed it. I really did enjoy everybody's company, all the leaders with the kids and you know, in our group, the parents group. I just thought you were all really welcoming and really pleasant to be with. And if you had a problem you didn't feel uncomfortable talking about it. (Mother-3, Interview)*
- *Everything was explained fully, we were made to feel at ease from day one, you all felt like individuals as well as part of a group. The leaders have been very caring and supporting all the way. (Mother-4, End-of-programme Q)*
- *Fantastic, they have been great, they presented each session well and easily adapted things to suit the session if needed. I loved the varying reward system too. (Mother-6, End-of-programme Q)*
- *Brilliant. Everyone was really friendly, they were great with the kids as well. [Facilitator] was really good as well with us, she explained things. (Mother-20, End-of-programme Q, dropped-out)*
- *The groups were run very well, informative and well paced. The session leaders were both welcoming and supportive. (Father-24, End-of-programme Q)*
- *Everything was professionally run, leaders were great, cannot ask for any better than them. (Mother-25, End-of-programme Q)*

One mother expressed how she had felt supported by the group facilitators, rather than being taught or judged in her role as a parent and 'agent of change', and that she had autonomy over the changes she makes:

- *You know I think if somebody said oh, it included parenting skills they'd probably think you know you're going to tell me I'm doing this wrong. But because of how it's all presented, parenting changes you make you've chosen to do yourself and it's not until you reach the end that you realise that there really is some practical parenting, oh what's the word, tips, if you like. And because it's not sort of thrust in your face as a parenting thing you don't feel on edge about it. You don't feel you're being judged, you just see it as an aid, to help you achieve your goal at the end, it's really nice. (Mother-6)*

Later in the interview she added that by choosing the changes to make, they hadn't felt difficult to do:

- *I liked the fact that you touched on the subjects, you touched on what you should be eating but it wasn't like you were being brainwashed, you weren't being told you are doing something wrong. I liked the fact that you focused on like the rewards really, actually helped you identify the little things that you can do that make the difference. It seemed a bit weird to start off with, the reward scheme that XXXX had going and XXXX [facilitators] with the baskets, you know, you thought this is a bit weird. As you'd go along it sort of trained you just to think that something like, oh coming up the stairs this morning, I ran up oh I'd get a reward, well actually that makes a difference. You know its not a whole lifestyle change, throwing everything out your cupboards and all that, its looking at what you've got and allowing you to make changes yourself but realising why you're doing them, not because you've been bullied into it. [ ] I didn't realise you know just making those small changes would have such a big impact. It hasn't felt like work, that's the nice thing, you haven't had to make huge changes, really push yourself into it, you've found yourself just doing stuff like reducing the portions, playing. Well they don't seem huge, but then you think of your rewards and you think well yeah it's a little change. So, thoroughly enjoyed it, sing its praises to anybody as well. (Mother-6)*

### **9.6.2 Mirroring of concerns by other parents**

In the group, parents were reassured that other families were experiencing the same problems with their child's weight, and that they were not alone in wanting to deal with this:

- *The ability to meet and chat with other people who had the same issues. (Mother-19, End-of-programme Q)*
- *The first couple of sessions we did, it was a bit strained because we didn't know each other and it was a bit hard. But as the time went we all got on quite well you know and it did make a difference. Because everybody was sort of going there for the same things and the same reasons, we were all thinking of our kids and our families. (Interview, Mother-1)*
- *It was strange meeting new people for the first time you know, whether that's personal or if everybody felt the same, but going on my own without a partner was a bit daunting. But no, such a nice group and once you get the people who go on a regular basis you strike up a rapport you know and you can talk and just passing comments you realise oh, you know, they're in exactly the same boat as me and you find you get a bit of a friendship going and it's a nice sort of support structure as well. (Interview, Mother-6)*

### 9.6.3 Group Provided Safe Environment to contribute

The importance of having a safe and comfortable environment in which to participate was mentioned by many parents, enabling members to be open with each other. One parent highlighted the setting of the ground rules as being important to establish a safe environment.

- *The atmosphere was always good, everyone was friendly and made you feel welcome, everyone felt confident to share their ideas and everyone was very thoughtful and considerate of how other people were feeling. (Mother-11, End-of-programme Q)*
- *Very good atmosphere, the whole group made me welcome, also listened to me and shared their own experiences openly. (Father-24, End-of-programme Q)*
- *Felt at ease, safe to talk in group. (Mother-5, End-of-programme Q)*
- *I think the establishment of the rules which everybody contributed to put those that wanted to buy into it at ease. That was a great idea to set your own format if you like, because everybody had an opportunity to say well, I personally wouldn't like to be discussing such and such in front of people I don't really know. And I think by establishing those rules, the people that bought into it, it gave you the confidence to talk about personal issues in the confidence that it wasn't going to go anywhere. We were all like minded people. So I think we were all very relaxed, particularly as the group got smaller. (Father-19, Interview)*

Group members also mentioned that they were allowed to participate at the level that they felt comfortable with, given 'the right to pass'.

- *You are allowed to voice your opinions if you want to, if you don't want to then obviously you can remain silent. (Interview, Mother-12)*
- *It was always very relaxed and if I didn't want to do something I never felt pressurised. If I needed to escape I'd just go, I mean the games bit. I'm not so good because I didn't want to run around because of the size of me. Some of the games I actually enjoyed doing them you know so it's just trying things and doing them. [ ] I know for the first three weeks I probably struggled because I was insecure about myself. (Interview, Mother-14)*

#### 9.6.4 Parents felt supported by other parents

A recurrent theme in the comments made by parents was that the group had enabled parents to share ideas to help solve each others problems.

- *It was a really good group, I mean in the beginning I expected it to be like at school you know, all sat at desks but it wasn't. It was nice, it was friendly, it was all sat round and you got to know each other, and it was good. Supported each other, that was nice. Because I've had a lot of support and made some nice new friends. (Interview, Mother-4)*
- *Talking in a group about problems I have within my family helped enormously because everybody had at least one idea to solve the problems. Sharing ideas was invaluable to me. (Mother-14, End-of-programme Q)*
- *I think seeing how a lot of the parents had come aware of things that you know, or, aware of something because I've said something, you know so I've made an input. You can see the light on their faces as they realise something and then they go and come back the following week and say they've implemented it. [ ] It probably made the whole thing looked at less severely, a bit more you know there's something that can be done and there is people that want to do something about it and you're not there on your own sort of effort and that's good. (Interview, Father-16, Dropped-out)*

However, in Group-2, some parents felt let down by other parents not attending, and one parent recommended getting parents to sign a contract.

- *Like the next time you must say to people 'are you ready for this, are you going to welcome it?' Almost like a contract to do it sort of thing, you know. Because you've given a few weeks it was easy to drop out, if you just stayed there a few more weeks you really get into it and you can see where it's going, and you can see if you're following the programme that it works. (Interview, Mother-14)*

#### 9.6.5 Summary

The parents thought that the group-based programme had been facilitated well, and had provided a safe environment in which to contribute. The rapport with the facilitators, that other parents had the same issues and the support from other parents all contributed to the benefits of a group-based programme.

## **9.7 Structure of the Programme**

### **9.7.1 Same Topics Each Week for Parents and Children**

Parents commented on the benefits of the parallel children's and parents' groups addressing the same topics each week in order to facilitate a common understanding at home.

- *When you did talk about it you knew that you had been doing similar things so it was sort of like putting a hole, having a hole and sticking something in it that fits. (Mother-4)*
- *You could come back and talk about it. So you could say 'oh what did you do Child-6' and she'd tell you. Oh, 'we did the same' and 'what do you think we should do?' (Mother-6)*
- *Some days we'd come back and we wouldn't talk about it until maybe a day or two later but Child-14 was already doing things that he'd done you know, like especially the personal power and stuff like that. It was good 'cos he knew what I was meaning, like the picture of the food portions and stuff like that, he'd know about that already so it weren't like I had to talk it over with him, he knew things already. (Mother-14)*

The implication is that it made it easier for the parent to implement changes.

The next section examines whether the learning of the children and parents should always be in separate groups.

### **9.7.2 Combining of Children's and Parents' Groups?**

Due to falling numbers of families attending Group-2 the children and parents were combined together for part of two of the sessions (Chapter 6, Section 6.5).

In the weekly feedback from parents there were several positive comments about these combined sessions:

- *Being with the children was really enjoyable. (Group-2, Week-3)*
- *The group was small and there was more chance for us all to voice opinion etc. We joined the children and I enjoyed it. (Group-2, Week-6)*
- *It was nice to work with the children for a longer time because the small group allowed this. (Group-2, Week-3)*

In the interviews, several parents from both Groups 1 and 2 felt that the time with the children in the family break was not long enough and that they would have liked to have done more of the programme together (Table 9.5). Their reasons included that they felt separated (Mother-1, Father-16); that they would have liked to play more of the games together so they could be played at home (Mother-4); and the joint sessions were more enjoyable (Mother-17). Additionally, as seen previously in Table 9.3, several children mentioned the 'family break' with their parents as a good aspect of the programme.

**Table 9.5 Interview data from parents about wishing for more combined sessions with parents and children**

	<b>Comments from Parents</b>
<b>Group-1</b>	<i>I felt we didn't spend a lot of time with the kids. I didn't think it was very long with them but I can understand why. I felt like I was away from them. I would have quite liked to have spent a bit more time with them, and doing it more together. I know there certain things you can't do, like when we are trying to praise them, that is something we have got to learn on our own. ( ) We were both doing the balancing, maybe doing that together as a group? Because there was a couple of times when she said that they were doing the same things downstairs and I thought 'well why couldn't we just do it together'? (Mother-1, Interview)</i>
	<i>It would have been nice if we could have all had the fun times together, rather than just go down for like the odd ten minutes [for the mid-way family break]. Because I mean, you get the book at the end with the list of the games, but if we could actually play them together to start with, because sometimes I didn't know what they were. Yeah, so if it was a bit longer and we had time to join in the games, because Child-4 is like an only child, he's got no-one to play with in the house, and it would it was more helpful to see how he played really. Because he doesn't do a lot of playing, except with his thumbs. I would have liked it to be a bit longer because it was after they had done the snacks and then we had only got a little time to play. I would have liked a bit longer to be with them, I think. (Mother-4, Interview)</i>
<b>Group-2</b>	Dad-16: <i>These two was disappointed that I wasn't actually participating in what they were doing.</i> Child-16: <i>I felt a bit scared.</i> Dad-16: <i>Yeah, they wanted me to come, come on you, come and do this, that's what they wanted. Combined activities more, parents and children, not to separate so much because it's sort of by separating them you've created a difference. And you know the parents, it's not very nice to patronise parents but you can when you direct your questions at the kids and while you're doing that the parents can be listening. (Family-16, Interview, dropped-out)</i>
	<i>Child-17 liked it and enjoyed it more when the 2 groups did the learning together. (Mother-17, Interview, dropped-out)</i>

However, some parents were mindful of the benefits of having separate groups for children and parents (Table 9.6), including the need to learn different knowledge and skills (Mother-1, Table 9.5); the children had their own space away from parents with added benefits of increasing their confidence (Mothers 4,6 & 12); the learning had to be at different levels (Mother-4); and the discussions by the parents were more appropriate and productive in a parents-only group (Mothers 6,12 &14).

**Table 9.6 Interview data from parents supporting the rationale for separate groups for parents and children**

	<b>Comments from Parents</b>
<b>Group-1</b>	<i>I think the children didn't feel under pressure knowing that they might have been scrutinized with the parents watching them, how they behaved and so. ( ) Obviously we have got to be taught different things to what the children have and you've got to sort of aim at their intellect rather than try and give them too much information and vice versa for us. We would have been bored if we were having to learn it in children's style. (Mother-4)</i>
	<i>Especially for the children having their own group as well 'cos Child-F6 was very shy when she first started, very clingy and a lot of the other parents said that she was very, very clingy to me and not inclined to sort of stray from me very much but by the end she was here there and everywhere. I think it's nice to be able to speak about things without your children being there because you know, if we phrase something in a certain way they might misunderstand what we are sort of saying. It's a good confidence boost for them as well, you know. (Mother-6)</i>
	<i>I think I tend to find that children will open up better when the parents aren't there. And basically I suppose it works the same with parents because there are things that you might want to voice but you don't want to upset the children by saying it in front of them. And I suppose it works the same on the children, they might want to say something and they don't want to upset, you know, their parents. (Mother-12)</i>
<b>Group-2</b>	<i>I mean we could discuss in our group our little problems, anything that we had concerns over we could discuss between ourselves and we'd get answers from each parent you know that helped us, but if our children had been in that group we probably couldn't have done that because we wouldn't embarrass them or whatever in front of them. (Mother-14)</i>

The programme developer supported more combined sessions between children and parents, but reiterated the reasons for still having mainly separate groups.

- *I think for some aspects of the programme it's a very good idea doing separately. The children get a chance to have their own voice*

*heard, sort of, innocent of whatever the family relationships maybe and the parents get a confidential space to talk about their concerns about the children, which it might not be appropriate for them to air in front of the children. Having said that some of the activities that we did together when the groups were very small, worked beautifully and I probably want to look at balancing the programme a bit differently another time. ... I think there are some things, if we could just get the timing right, that it would be good fun to build on doing more together. (Interview, Programme Developer, Group-2)*

When I asked which bits worked well when the groups were combined together, the programme developer replied:-

- *Um, family rules I seem to remember, when we talked about the idea of rules separately and then came together and they actually planned rules with our support in the families, I think that worked really well. And we did the fruit & veg rainbow didn't we together and that was just great fun and really nice for the parents to see how we were working with the children and what they were doing. (Interview, Programme Developer, Group-2)*

To summarise, the rationale of the programme developer for 'Families for Health' to have separate groups for children and parents was generally supported by parents. However, additional to the family break, there is support from both the parents and the programme developer to have some more elements of the programme combined for the parents and children, where appropriate. This could include physical activity sessions.

## **9.8 Summary**

The parents and children were on the whole very positive about the 'Families for Health' group-based programme. Some small changes were suggested which included exploring schools as an alternative venue; having follow-up sessions to enhance the sustainability of changes; running the 2½ hour programme only at a weekend; and exploring the possibility of including more physical activity and some sessions with children and parents together.



## Chapter 10

### Validity of Accelerometer Data

#### 10.1 Introduction

Accelerometers provide an objective measure of habitual activity which is not dependent on self-report. They measure movement by measuring acceleration, which in turn is used to measure the intensity of physical activity. Research with accelerometers for monitoring physical activity has escalated since the mid-1990s (Troiano 2005).

Although accelerometers provide an objective measure of physical activity, their use can be problematic. In Chapter 7, I highlighted two issues with their use. First, that different methods of calculating moderate and vigorous physical activity (MVPA) yielded very different results (Freedson et al 2005, Trost et al 2006, Puyau et al 2002), although these two methods reassuringly gave the same conclusion with regards to changes in habitual activity over time. Accelerometers have been used to monitor whether children are reaching the recommended minimum of *'at least 60 minutes of at least moderate intensity physical activity each day'* (Chief Medical Officer 2004). It is recognised that the large differences in minutes of MVPA for children between studies is likely to be due to different cut-points of accelerometer counts used to define MVPA (Riddoch et al 2007). Second, habitual activity is likely to be seasonal, and thus any changes brought about by a programme may be distorted by seasonal changes, *unless* a 12-month follow-up is performed. This was not done in the current study.

There are published reviews which document issues with the use of accelerometers (e.g. van Sluijs 2007, Reilly et al 2008, Corder et al 2007). Their use in intervention studies has been demonstrated in a systematic review, in which 12 of 57 RCTs of interventions promoting physical activity in children and adolescents used accelerometers to measure change in physical activity (van Sluijs 2007). Using accelerometers in intervention studies poses potentially greater challenges around validity and reliability.

This chapter presents further data from the current study on the validity of the measurements from accelerometers in terms of: first, compliance with wearing the monitor and in completing the activity diary; second, an assessment of unmonitored or 'over-monitored' activity. This section provides new insight to what is in the published literature by including both interview data with parents, and some analysis of the accelerometer alongside the diary.

## **10.2 Compliance Data from Accelerometers and Daily Diaries**

The results presented in Chapter 7 were for children who had worn the monitor for at least 4 days, as this is the *minimum* duration required to obtain a reliable measurement of habitual physical activity (reliability of 0.80) (Troost et al 2005). 20 of the 22 children had worn the monitor for at least four days at both baseline and the end-of-programme, and 19 of the 22 children had paired data to compare the 9-month follow-up with baseline.

I had requested that children wear the monitor for 7 days, including both weekend days, and to complete a concurrent diary. Table 10.1 shows that just over half of the children wore the monitor for all 7 days, 70% wore it for two

weekend days and over 90% of children wore it for the minimum of 4 days. With regards to monitor reliability, we only had one failure of the monitor. The diaries were also completed well for around 60% of records, with the other diaries either being completed poorly (missing days and/or lacking detail) or were not returned. On balance this is probably reasonably good compliance.

**Table 10.1 – Compliance of Children with Wearing the Accelerometer and Completing the Diary**

		<b>Baseline (n=28)</b>	<b>End-of- programme (n=22)</b>	<b>9-month follow-up (n=22)</b>
<b>Number of Days Worn</b>	1	1 * (3.5%)	0	1 (4.5%)
	2	0	0	1 (4.5%)
	3	1 (3.5%)	1 (5%)	0
	4	0	2 (9%)	1 (4.5%)
	5	4 (14%)	0	2 (9%)
	6	7 (25%)	8 (36%)	5 (23%)
	7	15 (54%)	11 (50%)	12 (54.5%)
	<b>At least 4 days</b>	<b>26 (92.9%)</b>	<b>21 (95.5%)</b>	<b>20 (90.9%)</b>
<b>Diary completed adequately</b>	Good	19 (68%)	14 (63.5%)	12 (55%)
	Poor	6 (21%)	5 (23%)	10 (45%)
	None	3 (11%)	3 (13.5%)	0
<b>Weekend Days</b>	0 days	2 (7%)	1 (5%)	3 (14%)
	1 days	4 (14%)	8 (36%)	4 (18%)
	2 days	22 (79%)	13 (59%)	15 (68%)

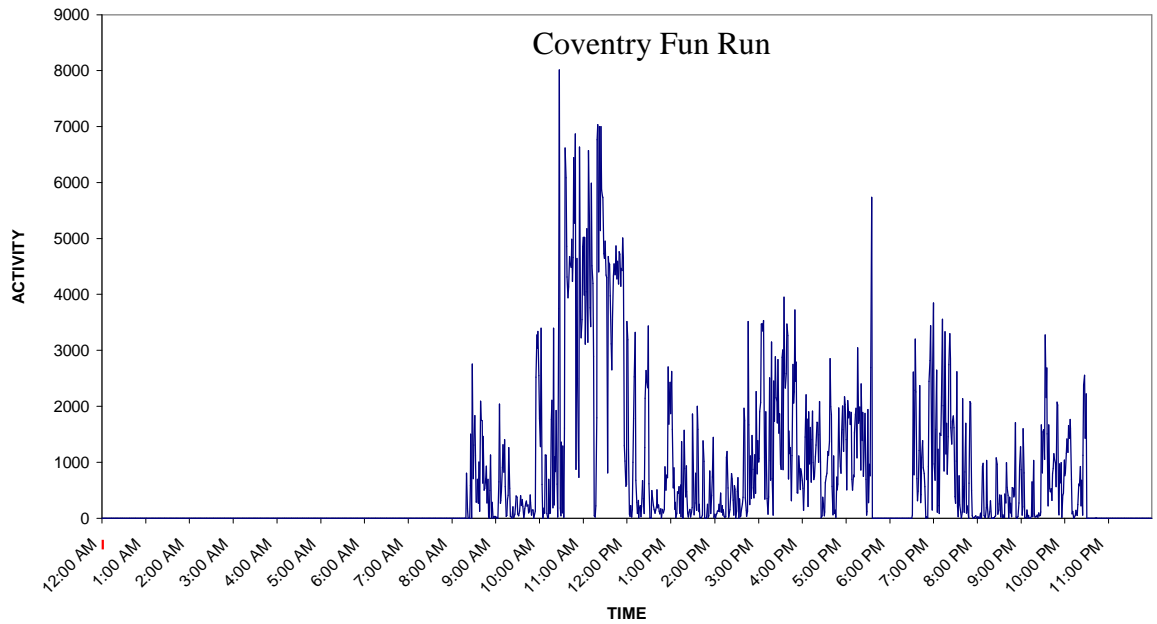
\* monitor failure on a child who otherwise completed the programme/research

The diaries were examined alongside the accelerometer outputs. On occasions, usually at the weekend, very low levels of activity were recorded which were verified by the diary, giving confidence that the child had the monitor on and that the low levels of physical activity are correct. The diaries were also useful to explore peaks in the activity counts, giving information about the activity being undertaken. An example of an accelerometer output is shown in Figure 10.1, where the diary indicated that the child was taking part in a fun run. It was a great tool to measure this achievement, who according to her mother, would never have participated in a fun run before coming on the programme.

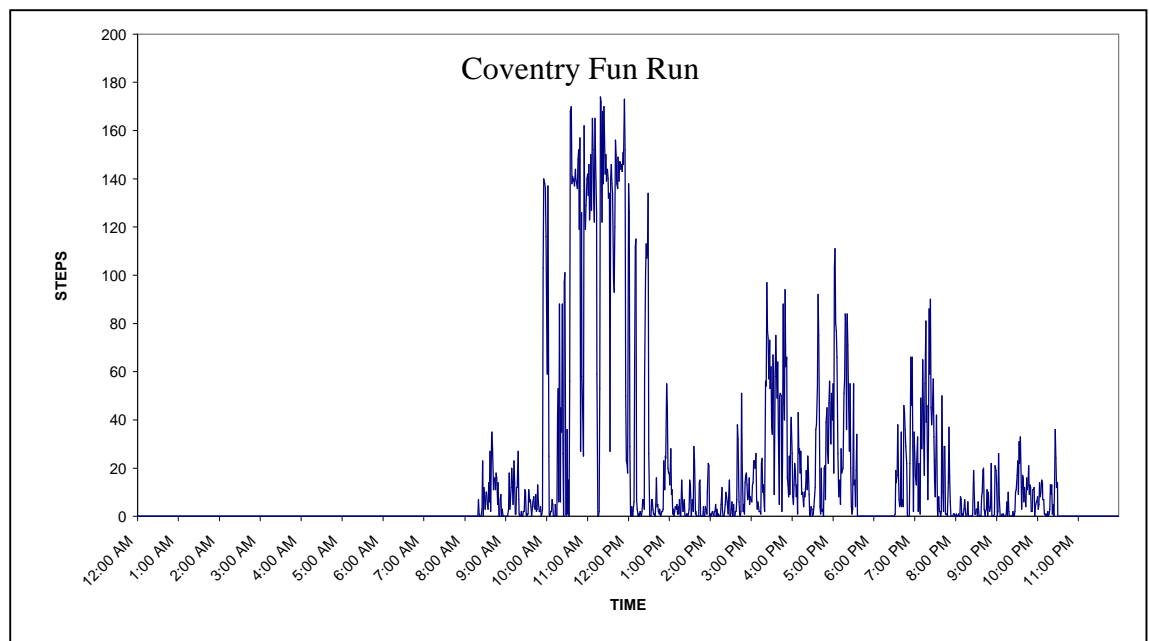
However, I also noted that some diaries didn't tally well with accelerometer records, for example, of the time the monitor was put on or taken off. This raises questions about the compliance with the monitoring requirements.

**Figure 10.1 – Record from the Accelerometer at the 9-month follow-up of Child 1A whose diary indicated that they took part in the Coventry Fun Run on 25<sup>th</sup> June 2006, 10am to 12 noon.**

(a) Activity Counts



(b) Steps



(Summary for day: 213 (Freedson) or 93 (Puyau) mins MVPA; & 22,843 steps)

### **10.3 'Unmonitored' Activity**

There are two reasons why activity may go unmonitored by the accelerometer. First, due to the measurement abilities of the uniaxial accelerometer, and second, with children not being willing to wear them.

#### **10.3.1 Functioning of Uniaxial Accelerometers**

A known limitation with uniaxial (vertical) accelerometers is that they underestimate activities that do not involve vertical movement of the trunk (e.g. cycling) (Corder et al 2007). The diaries highlighted the wide range of activities in which children partake that may be partially or wholly unmonitored by uniaxial accelerometers (Table 10.2). Riding a bike is a common activity which will not be picked up adequately. Furthermore, scooter riding, roller blading and ice-skating all figure in children's range of activities, and are also not likely to be counted adequately. We also asked them not to wear the monitor when swimming due fears about possible malfunction. Therefore, the accelerometer is likely to be missing or under reporting some of the physical activity undertaken by the children in the current study.

**Table 10.2 – Children’s Activity from their diary that is likely to be partially or wholly unmonitored by the Uniaxial Accelerometer**

		<b>Baseline (n=25 with diaries)</b>	<b>End-of-programme (n=19 with diaries)</b>	<b>9-month follow-up (n=22 with diaries)</b>
Bike Riding	1 day	2 children	1 child	4 children
	2 days	2 children	-	-
	3 days	2 children	1 child	-
	4 days	-	-	1 child
	5 days	-	-	1 child
	6 days	-	-	-
	7 days	1 child	1 child	-
Scooter Riding	1 day	-	2 children	1 child
	2 days	3 children	1 child	-
	3 days	1 child	-	-
Roller Blading / Ice skating	1 day	2 children	-	1 child
Swimming	1 day	5 children	3 children	8 children
	5 days	1 child	-	-
<b>Episodes of ‘Unmonitored’ Activity</b>		<b>46</b>	<b>18</b>	<b>24</b>

### **10.3.2 Children not wearing the Accelerometers**

Additionally, the accelerometers are missing out on some physical activity that the children were actually doing due to children not wearing them.

#### **10.3.2.1 Stigma of Wearing Accelerometers at School**

When I was collecting the monitors from their homes several parents said that their child had not wanted to wear the monitor at school. One boy (aged-11) said that the accelerometer had caused him to be bullied by another pupil: ‘*you are wearing it because you are fat*’. Parents raised similar issues in interviews around their children (principally girls) being unwilling to wear the accelerometer at school, due to stigma and bullying. The first quotation shows the child being given permission by a parent not to wear it at school for this reason:

- *Um, well the activity monitor, I found she didn't really get a lot of use out of it because she didn't want to take it to school with her, she didn't want people knowing that she was wearing it. So she only really wore it when she was at home and you were only talking about a couple of hours between coming home and going to bed again and a lot of it, 'cos of the weather and different bits and pieces, she has been sitting. And again, you know he [friend on programme] did take it to school though, but maybe it's a girl thing. To be honest her Dad turned around and said she couldn't take it to school because it could get damaged or broken. But I suppose he said that but maybe he was thinking he didn't want people saying stuff about her. (Mother-5, Girl aged-9)*
- *They forget, they do tend to forget about it once it is on. Which is what you want, yeah. But it is just getting them to put it on. It's Child-3A more than Child-3B, Child-3B's quite happy to put it on. School could have a lot to do with it, she is conscious because of her weight and because her t-shirt is quite tight that it is going to be showing. She was conscious of going out with it on. But I said once she'd put her coat on you can't see it and once your t-shirt is over it you can't see it anymore. But at school she was conscious of having it on. (Mother-3, 3A: Girl aged-10, 3B: Girl aged-7)*

This parent, however, indicated that once the programme was discussed at school the barrier to wearing it lessened, but still remained a problem during sport at school, due to embarrassment.

- *At school she took her certificate in at the end to show the teacher. And the teacher spoke to the whole class, look Child-3A has been doing this, would you like to talk about you know what you've been doing. So Child-3A got to talk about and she got to tell them that she had this monitor on to monitor her activities and nobody has actually mentioned a word to her since. I think that's why she's not bothered now about wearing it now at school. She is bothered about wearing it during the activities like netball and things because she is frightened her t-shirt is going to come up and because it is other classes, it's not just her own class. She took it off for netball and football. And she has got netball practice tonight. I did ask her today if she could wear it for netball tonight, I said it's only for practice, everybody knows you now, nearly everybody knows that you have got it on so. So she said she might. (Mother-3, Group-1, Girl aged-10)*

The children who do not wear them at school will therefore have less days of recordings, or will have unmonitored activity on days that are included. The monitors may also have an unintended consequence of further stigmatising the children and putting them at risk of bullying.

### 10.3.2.2 *Danger to Others*

Interview data confirms that one boy was forbidden to wear the accelerometer when participating in organised sport. He was not allowed by the coach to play rugby with the monitor on, because it is a contact sport and the monitor may hurt another child. Additionally, this child was not able to wear the monitor during swimming, with the accelerometer also missing this activity.

- *Haven't had problems with them, no I thought they were really good, the only problem was that with some of the activities that Child-4 does um, he can't really wear it so you're not really getting the data for him when he's doing the activities. Because he can't wear it when he's swimming and he was going swimming most mornings, he can't wear it when he is playing rugby so you haven't really got a true reading of when he has done his activities. (Mother-4, Group-1, Boy aged-10)*

However, to give some balance, some children did wear the monitor very conscientiously, including during sport (football for this child), and this was perceived to have accentuated the importance of the programme for him:

- *I think wearing the monitors to start with made Child-19 aware that it was serious, you know that there was a reason for doing it, he never once didn't wear it, he never once said he couldn't wear it or threw a tantrum, even when he went to his Dad's. And his Dad wasn't particularly supportive of the whole thing.... even on the weekends when he was playing football with his Dad, as you know, he wore it. When we went to watch him [play in a football match] I said have you got your monitor on, and he was like 'yeah' and showed it, so he took it seriously, he knew it was serious. (Mother-19, Group-2, Boy aged-8)*



## 10.4 Over-monitored Activity?

There was some evidence from interview data and the accelerometer outputs that for some children the level of activity may have been 'over-monitored'.

### 10.4.1 More active than usual?

One parent noticed that her child was more active when she had the monitor on, and therefore may not be an accurate level of her habitual activity.

- *Yeah, the activity monitors 'cos they sort of think, oh I've got these on, I've got to do some. No in a way I think they tried to be active.'* Asked if she thought her child had become more active than usual, she replied: *'It did I think. I think she was sort of trying to run around a bit more. I mean the last time that she had it on at the very beginning she was going up and down the stairs. Instead of sitting around maybe she has done a jig here and there.* (Mother-1, Group-1, Girl aged-7)

This is a recognised affect, and to minimise this the monitors were only set to record the day after the children were asked to wear them.

### 10.4.2 Trampolining

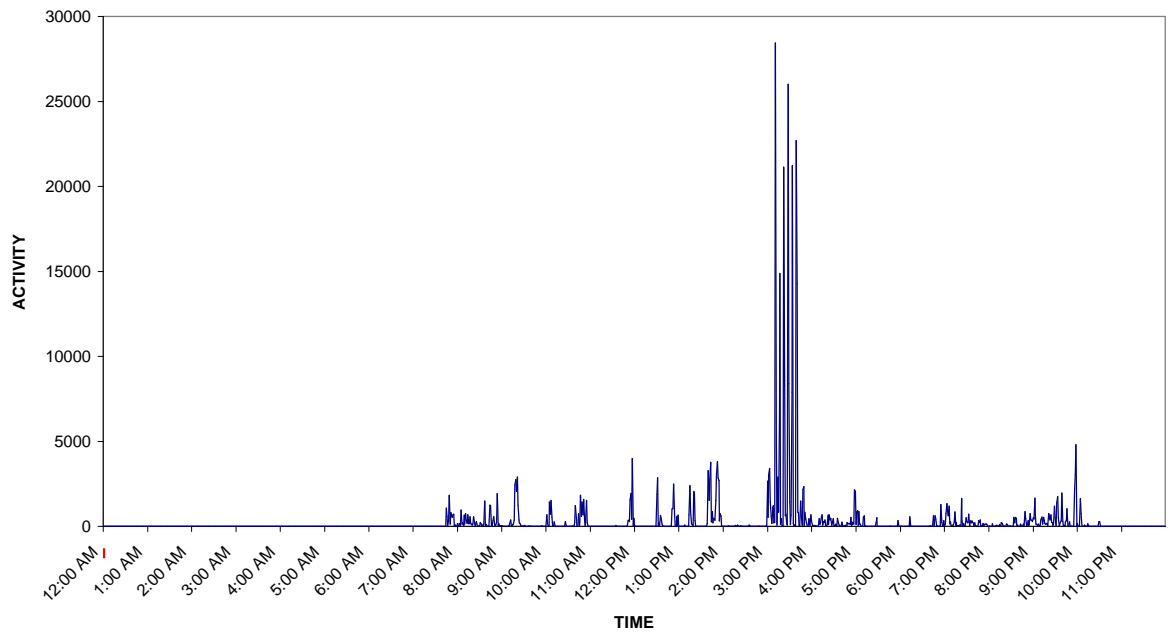
For a number of children very high peak activity counts (counts/min) were noted on their graph of their activity counts for some days. For example, in the record in Figure 10.2a this participant had very high readings between 3-4pm, almost reaching 30,000 activity counts. The steps were, however, not exaggerated (Figure 10.2b). An activity count greater than 9317 counts/min is considered very heavy activity (>9METS) for an adult (Swartz et al 2000). Therefore these activity counts were particularly high and needed exploring. Examining the diary showed that this child was participating in trampolining at school (Appendix XI). The physics of trampolining have been previously analysed giving a peak acceleration of 4G in a man (Irvine 2005), although to my knowledge the impact has not been considered before on the results from accelerometers in children.

Four children had specifically mentioned trampolining in their diary, giving evidence that this is a common activity for children. At least two other children had trampolines in their gardens. In one diary '*playing in garden*' was recorded at the time when there were very high peak counts on the accelerometer record, and they *may* have been trampolining at that time.

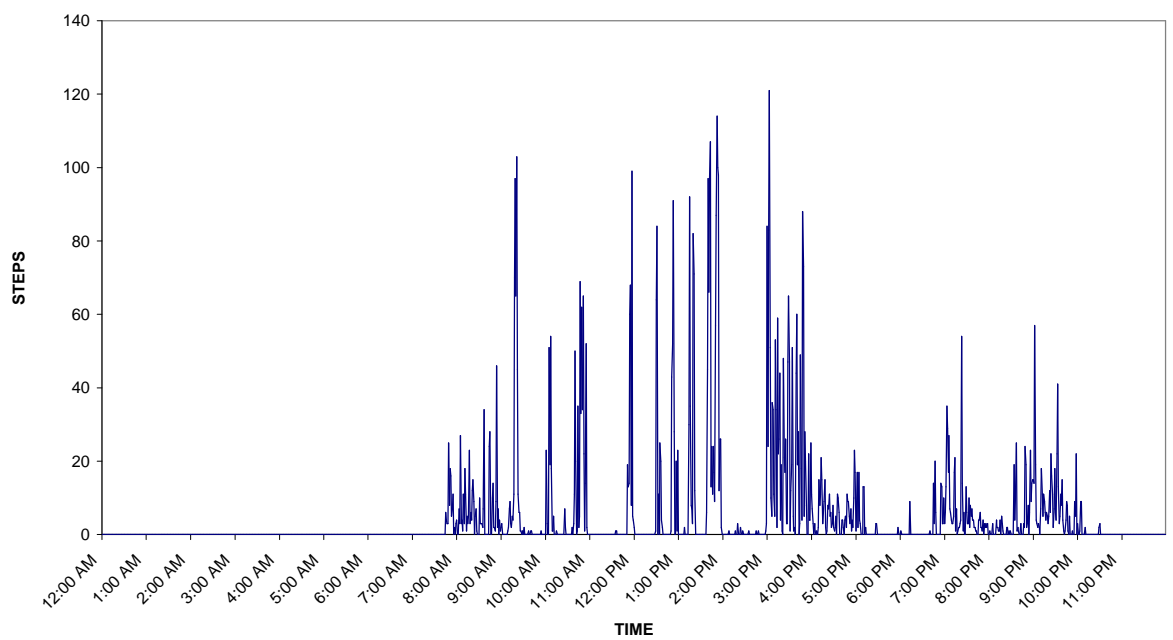
These findings suggest that it is important that trampolining is given a specific column on the daily diary in future. Furthermore, trampolining negates the use of summary measures using raw activity counts i.e. total daily activity counts or counts/min. These are standard summary measures used by some researchers (Riddoch 2007) and have not been used in the current study for this reason. Trampolining could also affect the number of minutes spent in MVPA, because even very gentle trampolining would take a child to an activity count that would equate to MVPA.

**Figure 10.2 – Record from the Accelerometer at the 9-month follow-up of a Child (16B) whose diary indicated that they were trampolining between 3pm and 4pm**

**(a) Activity Counts**



**(b) Steps**



## 10.5 Improvements and Alternatives to using Accelerometers

Two parents complained that the elastic belt holding up the accelerometer was too obtrusive, and one parent suggested a clip would be better.

- *I think she did feel a bit embarrassed at first. I think when you tightened it a bit the thing [remaining elastic belt] came down, we tried to sort of shove it in the one together, she was alright after. (Mother-1, Group-1, Girl aged-7)*
- *I think because of the belt. You know like the pedometers maybe if it was something like that. [clip] When you've got the belt its more 'ugh', you've got this big thing that goes right the way around you, and sometimes it flaps down, trying to tuck it. (Mother-3, Group-1, Girls 10 and 7)*

I had opted for the elastic belts from the manufacturer because we thought they would stay on better, but other attachments should be explored for future use. Another parent discussed using a fitness test, rather than the activity monitor, as she felt that this would provide more accurate data. Fitness tests may be worth considering as an additional measurement, but they do not measure habitual physical activity.

- *I think from a children's point of view, a fitness test in a fun way may be more productive than a monitor purely because you are relying on the children wearing the monitors, not getting teased at school, filling the diary out. You know, and I think things like the Jungle Junction, I mean I don't know what you had in mind for the fitness monitoring but I think from a child's point of view going into a new environment if it's in a fun way you'd get probably more results. (Mother-6, Group-1, Girl aged-7)*

## 10.6 Summary

Although accelerometers are recognised as an objective measure of physical activity, the analysis of the diary records and interview data suggest some possible issues with the validity of their use with children who are obese. Uniaxial monitors may not be picking up some of the activity due to the wide range of activity in which children partake, and may be missing out on activity because some children who are obese may be less willing to wear them, particularly at school. There is also some evidence to suggest that the wearing of monitors at school may put the children at risk of stigma and bullying. Trampolining leads to very high activity counts, and therefore caution must be exercised in the interpretation of accelerometer outputs in children where this is a relatively common activity.

In future studies the accelerometer should be continued to be supplemented by a diary in order to aid interpretation, and the wearing of accelerometers needs to be made more acceptable, in particular to girls, in order to improve data accuracy and minimise unintended risks.

## Chapter 11

### Discussion and Conclusions

#### 11.1 Introduction

*'Families for Health'* is a new family-based programme for the treatment of obesity in 7-11 year olds, offered in a community setting. It differs from other programmes currently being researched in the UK in offering more emphasis on parenting, relationships skills and emotional and social development, as well as lifestyle change. The objectives of the research are summarised in Box 11.1. The development of the programme, described in Chapter 5, met the first objective. The second objective was met through the piloting of the programme with 21 families, including 27 children, running two groups at Coventry Leisure Centre.

#### **Box 11.1 - Objectives**

- (1) To develop a new group-based intervention for childhood obesity (*'Families for Health'*), combining elements from parenting education programmes, child programmes & obesity treatment programmes.
- (2) To pilot the intervention in the community with families of overweight or obese children in the age range 7-11 years in order to:-
  - Evaluate its acceptability to families.
  - Evaluate the short term (3-months and 9-months) and longer term (2-years) impact on children and parents.
  - Estimate the costs of the intervention.
  - Inform the design of a randomised controlled trial (RCT).

There are a number of issues that merit further discussion in this final chapter, if further research or broader implementation is to be carried out. These include recruitment and retention of families, comparison of the main outcomes with other published work, review of potential adverse effects, the methodological strengths and weaknesses, suggested changes to the intervention and recommendations for future research.

## **11.2 Recruitment and Retention of Families**

The process evaluation, described in Chapter 6, has shown that the '*Families for Health*' programme was delivered broadly as planned, although there were two main issues: difficulty with recruitment and a high drop-out rate in one group.

Despite using several different recruitment strategies, we were unable to recruit sufficient families to run two groups of '*Families for Health*' concurrently, with the two groups having to be run sequentially. Unpaid publicity in the local media proved to be the most effective recruitment strategy, with articles in the Coventry Evening Telegraph proving to be particularly productive. Referral via health professionals was less effective, but there were several factors that may account for this. First, I was only permitted by Coventry's Primary Care Research Network to approach 15 General Practices who were not already involved in research projects, so as not to over-burden General Practices or their patients. These were likely to have been the practices that were least interested in research. Furthermore, the attempt at 'universal' recruitment from three general practice databases highlighted that such practices cannot systematically identify children who are overweight or obese from their practice

lists because BMI is not routinely measured, and this is therefore not an appropriate way to identify children. Second, the timing of the recruitment in June and July 2005 was difficult particularly for school nurses, because this approached the end of term, making it difficult for them to contribute effectively to recruitment. Recruitment of families by health professionals, such as school nurses, is now a more viable option as a result of the National Child Measurement Programme, with Primary Care Trusts now expected to *'proactively follow up on children identified as being underweight, overweight or obese'* (Cross Government Obesity Unit 2009, section 1.5.4, p8).

The finding that self-referral via the media was the most effective recruitment strategy contrasts with the findings of Raynor et al (2009), who found that "active" recruitment methods, using referral by a paediatrician and mailshots targeted to families with obese children, were more effective and cost-effective in enrolling and randomising families into an RCT than "passive" recruitment methods such as newspapers, television, fairs, and schools from which participants self-identified. "Passive" recruitment methods were, however, better at retaining families from enrollment to randomisation. This latter point is consistent with our higher completion rates in families who had referred themselves following articles in the local media. Self-referral may indicate intention to change (Prochaska et al 1992).

The poor recruitment rates need further exploration. This may reflect in part that more than half of parents do not recognise when their child is overweight or obese (Parry et al 2008) and therefore they cannot be expected to be seeking treatment. However, the poor recruitment rates may also reflect a reluctance of



parents to take part in this family-based treatment programme, or treatment programmes in general. Possible reasons could be: First, parents' may fear that they will be judged and blamed for their child's obesity and be reluctant to engage in a family-based programme which has an emphasis on parenting (O'Dea 2005). Only 13.9% of parents of children aged 2-8 years indicated that they would be interested in attending a generic group-based parenting programme, but rising to 23.8% when a child in the family had a behaviour problem (Patterson et al 2002), although this study did not focus on parenting programmes for the treatment of obesity. Second, the length of time involved (2.5 hours per week for 12 weeks) could be perceived as an excessive commitment by some families, and not possible within their complex lives, with greater priorities to deal with (Chamberlin et al 2002). Third, a lack of readiness to change may preclude the uptake of the intervention, according to the stage of changes of change model (Prochaska 1992). Fourth, parents may be unwilling to put their child into a treatment programme fearing that this starts a life of diets and risk of eating disorder (personal communication).

The overall drop-out rate in the pilot of *'Families for Health'* of 33% is within the range for other childhood obesity treatment interventions (NICE 2006a). Our pilot showed that timing of sessions may have influenced attendance and completion, with Saturday morning (11% dropped-out) much better than Monday evening (58% dropped-out), largely due to practicalities of attending this 2½ hour programme after school. The implication of this is that the programme needs to be run at a weekend or modified in duration to make it acceptable to families to attend after school.

Intensive interventions addressing the treatment of childhood obesity such as *'Families for Health'* are likely to have a low reach because groups can only take up to around 12 families. However, the programme would need to be scaled up considerably if reach was to increase, but this would only be worthwhile if families wanted this type of intervention. Further research is proposed later in the chapter, around recruitment and whether parents want this type of intervention.

### **11.3 Review of Main Outcomes with Published Work**

The majority of parents found the parenting approach acceptable, and appear to have benefitted in two main ways. Firstly, the group-based delivery of *'Families for Health'* was received very well by parents as outlined in Chapter 9. Parents explained that they were reassured by finding that other parents had the same issues with their child's weight, that they felt supported by other parents and by the facilitators, and that the group provided a safe environment in which to contribute. These findings confirm those of other evaluations of the benefits of group-based parenting programmes (Barlow and Stewart-Brown 2001). Secondly, the parenting approach provided parents with the 'tools' to enable them to become 'agents of change' in the family in terms of lifestyle issues. The parenting skills provided information about how to make the changes, which appeared to be as important as the information about what to change. Triangulation of the quantitative and qualitative data showed that the families had made changes to their eating environment, both in terms of their eating style and the provision of healthier food. The use of new parenting skills to bring about some of the lifestyle change was evident in Chapter 7.

In terms of the primary outcome, *'Families for Health'* achieved a significant reduction in BMI z-score of -0.21 (95% CI -0.35 to -0.07, p=0.007) at 9-month follow-up, which was sustained to 2-years (-0.23, 95% CI -0.42 to -0.03, p=0.027), which is encouraging. This *may* underestimate the benefit because children referred to hospital outpatient clinics without a specific intervention have been shown to increase their BMI by 0.2 z-score over this timescale (Rudolf et al 2006). Although these benefits are difficult to assess without a control group, and some of the changes are probably not directly attributable to the programme, it is still worthwhile to compare these results with other UK-based interventions aimed at similar aged children (Table 11.1). These studies have been described previously (Chapter 2).

**Table 11.1 Change in BMI z-score with *'Families for Health'* compared with other UK-based Interventions for the Treatment of Childhood Obesity (NB. \*For other studies, changes over time are shown for intervention and standard care groups separately, and NOT between groups [intervention vs control], to enable comparison with the current study)**

Intervention	Comparator	Follow-up	* Mean/median difference in BMI z-score, (95%CI), p value
<i>'Families for Health'</i>	None, Before-and-after study	3 months: 9 months: 2 years:	-0.18 (-0.30 to -0.05), p=0.008 -0.21 (-0.35 to -0.07), p=0.007 -0.23 (-0.42 to -0.03), p=0.027
One-to-one behavioural treatment, Glasgow / Edinburgh (Hughes et al 2008)	Standard dietetic care, using RCT design	12 months: Behavioural treatment: Standard care:	N/A (-0.22 to -0.04) , N/A N/A (-0.26 to -0.08), N/A
Mandometer (eating retraining), Bristol (Ford et al 2010).	Standard care, using RCT design	12 months: Mandometer: Standard care:	-0.36 (-0.46 to -0.27), N/A -0.14 (-0.22 to -0.05), N/A
MEND (Mind, Exercise, nutrition, Do it!) (Sacher et al 2010)	Waiting list control, using RCT design	6 months: Intervention Group: 12 months: Intervention Group:	-0.30 (-0.36 to -0.23),p<0.0001 -0.23 (-0.33 to -0.13),p<0.0001
WATCH IT (Rudolf et al 2006)	None, Before-and-after study.	6 months:	-0.07 (not given), p<0.01

N/A – not available in the paper.

In Table 11.1 the results for BMI z-score for the *'Families for Health'* intervention looks at change over time from baseline. These results cannot be compared directly to studies showing differences in changes over time between groups (intervention vs control) obtained from randomised control trial designs. Therefore 'within group' changes in BMI z-score are instead extracted and presented for other UK interventions in Table 11.1, to facilitate direct comparison. The change in BMI z-score with *'Families for Health'* is similar to that described for MEND for 8-12 year old children at 12 months follow-up of -0.23 (95% CI: -0.33 to -0.13),  $p < 0.0001$  (Sacher et al 2010). Thus the mean reduction in BMI z-score with *'Families for Health'* appears at least comparable with and better than some other published evaluations, perhaps with the exception of a 12-month intervention with a Mandometer aimed at re-training eating behaviour (Ford et al 2010).

It is, however, questionable whether the change in BMI z-score of -0.23 at 2-years with *'Families for Health'* is sufficient or not. Reinehr and Andler (2004) indicate that a reduction of at least 0.5 BMI z-score is required before the change has clinical significance. In the families attending *'Families for Health'*, only four of the 22 children assessed at 9-months, and three of the 19 children assessed at 2-years, achieved a 0.5 reduction in BMI z-score. Furthermore, a similar number of children saw an improvement in obesity category over time (i.e. movement between obese, overweight, 'healthy' BMI categories). Although some children made marked changes, a greater proportion of children made changes that were not of clinical significance. Lobstein et al (2004) argues that seriously obese children are likely to remain so even with intensive treatment

interventions, and our results support this. The majority of the change in BMI z-score had occurred by the end of the programme (3-months), with this change being sustained rather than improved further to the 2-year follow-up. Absolute BMI and waist circumference (mean) had also increased significantly by the 2-year follow-up. Children on treatment programmes who are severely obese need to maintain a continuing decline in BMI z-score after the programme has ended, rather than just sustaining the change as in the current study, if they are to achieve clinically significant changes. It may be unrealistic to expect a 12-week programme to continue to improve outcomes after the programme has ended. It is possible that follow-up sessions are needed to improve effectiveness.

#### **11.4 Potential Adverse Effects**

The authors of the Cochrane review (Oude Luttikhuis et al 2009) called for future trials to report potential for harm of interventions, as well as the benefits. They identify three aspects for exploration: linear growth, psychological well-being and eating disorders. The first two have been examined in the current study. First with regards to linear growth, the z-score for height was not significantly different over the two-year follow-up period compared with baseline, suggesting that children continued to grow at the expected rate after the '*Families for Health*' intervention (Chapter 7). Thus, there was no adverse effect detected on linear growth.

In terms of psychological well-being, the children's quality-of-life from the parents' perspective improved significantly at the end of the '*Families for Health*' programme and at 2 years (Chapter 7). From the children's perspective, the

physical functioning domain of quality-of-life improved significantly at the end of the programme and 9-month follow-up, and all aspects of quality-of-life improved at 2-years. The mean scores for children's self-esteem did not, however, change significantly from baseline for any of the six domains. Overall, the mean scores show no adverse affect on psychological well-being. In a larger study it would also be worthwhile exploring the relationship between the change in BMI z-score in individual children with their changes in psychological measures, in order to examine if children with no improvement in their BMI z-score after an intervention are adversely affected in any way.

### **11.5 Methodological Strengths of the Study**

The main strength of the current pilot study is that it used a mixed-methods approach, enabling a detailed process evaluation to gauge the fidelity of the delivery of the intervention (Chapter 6), an outcome evaluation (Chapter 7) and a basic economic evaluation (Chapter 8). The evaluation has been comprehensive, and was largely consistent with the standard evaluation framework for weight management interventions (Roberts et al 2009). The quantitative study incorporated a wide range of outcome measures, including measures of weight / body composition, lifestyle and psychosocial measures. The qualitative research methods have detailed the changes made by the families enabling triangulation with the quantitative data (Chapter 7) and have provided evidence of the participants' views of the programme and how it might be improved (Chapter 9).

A second strength is that intention-to-treat analysis was employed, obtaining and analysing follow-up data on 22 out of 27 (81%) children who started the

programme, including four children who had dropped-out. However, five children (19%) were not followed-up because they declined to participate further. Less than half of the interventions in the Cochrane systematic review used intention-to-treat analysis, and are therefore likely to overestimate benefits (Oude Luttikhuis et al 2009). Follow-up at 2-years was also a strength, providing evidence that changes are sustainable over time.

### **11.6 Main Limitations of the Study**

There were three main limitations of the study: the lack of a control group; the absence of formative evaluation in the development of the programme; and timing of the follow-up measurements.

The lack of a control group in this 'before-and-after' evaluation is the main limitation, and restricts the conclusions that can be drawn. As previously acknowledged in Chapter 3, the lack of a control group makes it difficult to know whether any changes are due to the intervention or due to other temporal changes (Britton and Thorogood 2004). For example, as children reach puberty, it is not possible to measure what would have happened without the intervention. However, the purpose of the pilot was not to provide definitive evidence of effectiveness but to explore the likely effectiveness and acceptability of the programme, and this has been achieved.

I had originally intended to carry out formative evaluation of the intervention with potential users. Due to difficulty in accessing families with obese children aged

7 to 11 via the paediatric obesity clinic (clinics were either cancelled or children were not within the required age range) and because of time constraints (i.e. needing to finalise an intervention to be evaluated), this formative evaluation did not take place. The formative evaluation might have improved the intervention that was developed and/or the timing of its delivery.

On hindsight, I should have carried out a 12-month follow-up rather than following up families at 9-months, so that the 'before-and-after' data collection occurs at the same time of year. This is because seasonal variations impact on physical activity (Riddoch 2007) and on weight gain (Gillis et al 2005). Furthermore, 6-month and 12-month follow-ups would permit better comparison with other obesity treatment interventions reported in the Cochrane review (Oude Luttikhuis et al 2009). A 12-month follow-up is also deemed 'essential' in the new evaluation framework for weight management interventions (Roberts et al 2009).

Finally, interviews with parents at a later follow-up time-point would also have been useful. At the 9-month follow-up visit (for measurements and questionnaires) some parents told me in conversation that they had found it difficult to sustain the changes they had made, and that follow-up sessions of '*Families for Health*' would have been useful. These comments were not recorded. An interview to explore the potential barriers to maintaining the changes would have provided useful additional data, in terms of programme modification.



The Medical Research Council (MRC) framework for the development and evaluation of complex interventions places emphasis on optimising both the evaluation and intervention prior to decisions about whether to proceed to a randomised controlled trial (Campbell 2007). The next section discusses the potential changes to the intervention, and then recommendations are made for future research.

### **11.7 Suggested Changes to the '*Families for Health*' Intervention**

The process evaluation (Chapter 6) and the users perspectives (Chapter 9) showed that the parents and children were on the whole positive about the '*Families for Health*' group-based programme. However, the pilot study was important to identify changes that could be made to this family-based programme, to make it more acceptable to families and/or to make it more effective, in accordance with the MRC framework (Campbell 2007).

First, the programme content needs to be re-assessed in terms of the accessibility of its messages to a wide-range of socio-economic groups. Second, running the 2½ hour programme only at a weekend rather than after school would increase the acceptability of the programme, and may minimise non-completion. Third, having follow-up sessions may enhance the sustainability of changes. A suggestion is that four follow-up sessions could be offered to families: at one, three, six and nine months after completion of the programme. Fourth, some parents would have liked more physical activity within the programme for themselves and their children, but this needs to be chosen so that it has the potential to be sustained after the programme. For

example, a local walk; a local activity class; activity requiring minimal equipment which can be done in the home; and making physical activity a part of everyday life, such as walking to school, could be considered.

Finally, the inclusion of some joint sessions would meet parents' desires for some sessions with children and parents together in one group. This point is interesting because when the programme was being developed the research from Golan and Crow (2004b) indicated that treating the parent alone leads to better outcomes for the children's BMI than treating both the parent(s) and child. In the pilot many parents commented that it was beneficial that their children were covering the same topics, leading to shared understanding and easier implementation of lifestyle change. This suggests the value of building in a few combined sessions with parents and children together, although keeping the majority of the sessions as separate groups.

## **11.8 Recommendations for Future Research**

The '*Families for Health*' programme is a promising new childhood obesity intervention which has the potential to make a difference to individual families with children who are overweight or obese. This programme warrants further piloting, further research on recruitment, further consideration of a 'parent-only' *versus* the current 'family-based' intervention, and potentially, evaluation in a randomised controlled trial.

### **11.8.1 Further Piloting**

It is important to know whether the results in Coventry can be replicated in other areas, with one concern being whether the programme can be run as successfully without the direct assistance of the programme developer, thereby reflecting 'real life' delivery (Nutbeam 1998). Additional piloting has already been conducted in Portsmouth and Warwickshire, where delivery was carried out by local facilitators.

Portsmouth PCT have delivered '*Families for Health*' since January 2008, running the programme on Saturday mornings, and offering a cooking course as a follow-up. Portsmouth have subsequently shortened the programme to 8-weeks, because the families in their first group indicated that 12-weeks was too long and the logistics favoured running a shorter programme. Outcome assessments were conducted initially by myself but are now being carried out locally by Portsmouth University. We await their evaluation. It is of interest that the programme was adapted very quickly by Portsmouth to an 8-week intervention. This has enabled me to learn about what may happen to an intervention when it is implemented more widely (Nutbeam 1998).

Warwickshire PCT ran two pilots of the shortened 8-week programme on Saturdays from September to November 2008. The internal report showed that nine families started the two groups, with difficulties again with recruitment (Lewis et al 2009). The children's BMI z-scores were not significantly reduced at the end of the 8-week programme (mean change =  $-0.02$ ,  $p=0.678$ ). The programme was, however, very well received by parents. The recommendations included using alternative recruitment methods, and the introduction of monthly follow-up sessions in an attempt to increase effectiveness (Lewis et al 2009). Changes were measured after only 8 weeks, and on small numbers, so that the lack of significant change in BMI z-score is not surprising, but could also indicate that an 8-week intervention is too short to be effective. Future research is needed to establish the potential of the 8-week intervention.

### **11.8.2 Research around Recruitment**

As previously discussed, recruitment of families to the two Coventry pilots was difficult. The additional pilots in Portsmouth and Warwickshire also had difficulty recruiting families, and anecdotal evidence suggests that most other childhood obesity treatment group-based interventions have also had difficulty. This also indicates that recruitment to an RCT may be problematic, and this may be made worse by families being reluctant to consent to randomisation.

Two approaches could be used to research this issue. First, conduct research on the best ways to recruit families to childhood obesity treatment interventions in the UK, and also to identify in larger samples whether the method of recruitment is linked to the outcome. This research could be completed within

existing NHS services for the treatment of childhood obesity, and utilise the distinction between "active" (i.e. healthcare referral) and "passive" (resulting in self-referral) means of recruitment (Raynor 2009).

Second, a survey or interview with parents could be conducted to explore whether they would attend a family-based intervention which was group-based and had an emphasis on parenting. A survey of parents of children aged 2-8 years indicated that only 13.9% said 'yes' that they would be interested in attending a generic group-based parenting programme, but this rose to 23.8% when a child in the family had a behaviour problem (Patterson et al 2002). Similar research with families with a child who is obese would be useful in order to gauge the proportion of families who would be interested in attending group-based support involving parenting for childhood obesity, and exploration of reasons for those who would not.

Third, an alternative approach is to ask families in interviews or focus groups about the type of support they would find helpful. This may identify alternative forms of delivery which are more acceptable than a group-based approach in the community e.g. an internet based programme may be a possible option. A difficulty may be around recruiting sufficient families for this type of consultation, as was seen in Solihull, where only four children were recruited to a consultation about future services (Haisman et al 2005).

### **11.8.3 'Parent-only' versus the current 'family-based' intervention**

There are two randomised controlled trials from outside of the UK which now suggest that a 'parents-only' focus is an effective alternative to 'family-based' treatment of childhood obesity (Golan et al 2006a, Janicke et al 2008). Indeed, Golan et al (2006a) states that the parents-only approach was more effective. In the current study, *'Families for Health'* has been delivered as a family-based intervention, with both parents and children attending the group-based programme. However, the parents' group focused on parenting skills, with parents considered to be the 'agents of change' to bring about the required changes in lifestyle. *'Families for Health'* could therefore be adapted easily to a 'parent-only' model, which would be simpler to deliver, requiring fewer resources (i.e. half the number of facilitators, materials, facilities) and would avoid the need for an age-appropriate children's intervention, possibly making a parent-only intervention applicable to a wider age range (e.g. 2 to 11 years). This is worthy of further exploration.

#### **11.8.4 Randomised Controlled Trial (RCT)**

A potential next stage of the research is to test how well this programme works in a more rigorous study design. An RCT is now needed to investigate the programme's effectiveness and cost-effectiveness. There maybe a need to first of all carry out a small pilot RCT, to test out changes made to the programme and whether families are willing to be randomised, before moving on to a definitive RCT. This stage would be important given the difficulties we had with recruitment.

Since completing the pilot I submitted a full proposal for a randomised controlled trial to the Wellcome Foundation, of which I will give brief details (funding was not obtained, however). The proposed design is a mixed-methods three-centre RCT with a 12-month follow-up, with 120 families randomly allocated between two arms, either to receive the '*Families for Health*' intervention or 'usual care' (but offered the programme later i.e. 'waiting list' control). The effect size was taken from the pilot, powered to detect a reduction of -0.2 in BMI z-score at 12-months in comparison with usual care. The study protocol also includes an analysis of cost-effectiveness.

The pilot has highlighted three areas where the evaluation should be carried out differently in future research. First, some different self-completion questionnaires should be used. Although the Family Eating and Activity Questionnaire (Golan 1998b) was useful in assessing inactivity/activity balance, it was limited in its assessment of sedentary behavior other than television viewing. Alternative validated measures of physical activity and sedentary time

should be chosen (Hillsdon 2009). Furthermore, the Day-in-the-Life questionnaire relied on one day of food intake which may not be representative of the rest of the week (Edmunds and Ziebland 2002). Second, new software for the analysis of data from MTI accelerometers should be used (MRC Epidemiology Unit 2009), making analysis less subjective and less time consuming. I recommend using an accompanying activity log/diary but would include a column for trampolining (Chapter 10).

Third, future research should also include an assessment of parenting style. One way of measuring parenting style is to assess how parents vary on the dimensions of warmth and nurturance versus control (Darling & Steinberg 1993). Authoritative parents are warm and responsive but are appropriately controlling. Authoritarian parents are emotionally cold and unresponsive, and also over-controlling. Permissive parents impose little control and exhibit overly indulgent (warm) or neglectful (emotionally cold) parenting. Assessing parenting style is important because children of authoritarian, permissive or neglectful mothers are up to five times more likely to be overweight than children of mothers with an authoritative style (Rhee et al 2006). Golan (2006b) has also shown that permissive parenting interferes with weight loss. This may in part be explained by authoritative parents being more likely to monitor their children's food intake (Hughes et al 2005). Parenting style could be an important moderator of change in BMI z-score, and therefore should be assessed in future studies.



## 11.9 Conclusions

*'Families for Health'* has been developed as a family-based group intervention for 7-11 year-old children who are overweight or obese, based in a community setting. Parents and children attend separate groups, with the parents' group focusing on parenting skills as well as lifestyle change. Parents were given the main responsibility for change within the family. The programme involves training local facilitators.

Piloting of the intervention showed that families who attended the programme found it helpful and supportive, appreciating both the content (parenting, healthy eating and physical activity aspects) and the group-based delivery. Recruitment of families was difficult which was of concern, but was most effective via self-referral following publicity in the local media. Attendance and completion was better with families who self-referred, but was also related to the day of the week being better on a Saturday morning than a Monday evening. This indicates that the programme needs to be delivered at a weekend.

The 'before-and-after' evaluation of *'Families for Health'* found a mean change in BMI z-score in children from baseline that is better than or comparable with other childhood obesity treatment interventions in the UK, and was sustained to a 2-year follow-up. Although most children were progressing towards a healthier weight, these changes were not always large enough to be of clinical significance. By the end of the programme, families were making behavior and lifestyle changes, particularly around the family eating environment. Follow-up sessions may improve the sustainability of these changes and the programme's

effectiveness. Other improvements were found with children's quality-of-life, the relationship between children and their parents, and parents' mental health. The cost to run the *'Families for Health'* intervention at £517 per family or £402 per child is in-line with other childhood obesity treatment interventions or generic parenting interventions.

*'Families for Health'* is a promising new childhood obesity intervention which has the potential to make a difference to help families with children who are overweight or obese, impacting on obesity and other health outcomes. This programme warrants further development and potentially, evaluation using a randomised controlled trial.

## References

- Adamo KB, Prince SA, Tricco AC, Connor-Gorber S, Tremblay M (2009) A comparison of indirect versus direct measures for assessing physical activity in the pediatric population: A systematic review. *International Journal of Pediatric Obesity*, **4** (1), 2-27.
- Altman DG (1991) *Practical Statistics for Medical Research*. (1<sup>st</sup> Edition), London: Chapman and Hall / CRC.
- Armstrong R, Waters E, Moore L, Riggs E, Cuervo LG, Lumbiganon P, Hawe P. (2008) Improving the reporting of public health intervention research: advancing TREND and CONSORT. *Journal of Public Health*, **30**, 103-109.
- Baker JL, Olsen LW, Sorensen TIA. (2007) Childhood body-mass index and the risk of coronary heart disease in adulthood. *N. Engl. J. Med.*, **357**, 2329-2337.
- Baranowski T, Simons-Morton B, Hooks P, Henske J, Tiernan K, Dunn JK, et al. (1990) A center-based program for exercise change among black-American families. *Health Educ Q*, **17** (2), 179-196.
- Barker M, Swift JA (2009) The application of psychological theory to nutrition behaviour change. *Proceedings of the Nutrition Society*, **68**, 205–209.
- Barlow J, Parsons J (2003) Group-based parent-training programmes for improving emotional and behavioural adjustment in 0-3 year old children. *Cochrane Database of Systematic Reviews*, Issue 2. Art. No.: CD003680. DOI: 10.1002/14651858.CD003680.
- Barlow J, Stewart-Brown S. (2000) Behaviour problems and parent education programs. *Developmental and Behavioral Pediatrics*, **21**, 356-370.
- Barlow J, Stewart-Brown S. (2001) Understanding parenting programmes: parents' views. *Primary Health Care Research and Development*, **2**, 117-130.
- Barlow SE, Dietz WH (1998) Obesity evaluation and treatment: Expert Committee Recommendations. *Pediatrics*, **102**(3), 1-11.
- Baron RM, Kenny DA (1986) The moderator-mediator variable distinction in social psychology research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, **51**, 1173-1182.
- Basham P, Luik J. (2008) Is the obesity epidemic exaggerated? Yes. *BMJ*, **336**, 244-5.
- Bavolek SJ. (2005) Research and validation report of...The Nurturing Parenting Programs. (dated 09/28/05)  
[http://www.nurturingparenting.com/research\\_validation/a4\\_main\\_r&v\\_article.pdf](http://www.nurturingparenting.com/research_validation/a4_main_r&v_article.pdf)  
(accessed 9/12/2009)

- Beattie A. (1991) Knowledge and control in health promotion: a test case for social policy and social theory. In Gabe J, Calnan M and Bury M Eds. (1994) *The Sociology of the Health Services*, London: Routledge.
- Beech BM, Klesges RC, McClanahan B, Slawson D, Nunnally C, McLain-Allen B, et al (2003) Child- and parent- targeted interventions: The Memphis GEMS pilot study. *Ethnicity and Disease*, **13** (Suppl. 1-40).
- Berenson GS (1998) Association between multiple cardiovascular risk factors and atherosclerosis in children and young adults. *N Engl J Med*, **338**, 1650 – 1656.
- Berkey CS, Rockett HRH, Field AE, Gillman MW, Frazier AL, Camargo CA, Colditz GA (2000) Activity, dietary intake, and weight changes in a longitudinal study of preadolescent and adolescent boys and girls. *Pediatrics*, **105** (4), e56.
- Bradburn NM (1978) Respondent Burden. University of Chicago. [http://www.amstat.org/sections/SRMS/proceedings/papers/1978\\_007.pdf](http://www.amstat.org/sections/SRMS/proceedings/papers/1978_007.pdf) (accessed 9/12/2009)
- Brambilla P, Manzoni P, Sironi S, Simone P, Del Maschio A, di Natale B. (1994) Peripheral and abdominal adiposity in childhood obesity. *Int. J. Obesity*, **18**, 795-800.
- Bristol City Council (2009) MEND. Leisure and Culture Department. [www.bristol.gov.uk/ccm/content/Leisure-Culture/Sports-Clubs-and-Centres/mend.en](http://www.bristol.gov.uk/ccm/content/Leisure-Culture/Sports-Clubs-and-Centres/mend.en) (accessed 9/12/2009)
- Britton A and Thorogood M (2004) Chapter 5: Evaluating interventions. Experimental study designs in health promotion. In: Thorogood M and Coombes Y. (Eds.) *Evaluating health promotion. Practice and Methods* (2<sup>nd</sup> Ed.), Oxford: Oxford University Press, pp 57-72.
- Brunt H, Lester N, Davies G, Willaims R (2008) Childhood overweight and obeity: is the gap closing the wrong way? *Journal of Public Health*, **30**(2), 145-152.
- Bryman A. (2006) Integrating quantitative and qualitative research: How is it done? *Qualitative Research*, **6**, 97-113.
- Bryman A. (2007) Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research*, **1** (1), 8-22.
- Cameron JW (1999) Self-esteem changes in children enrolled in weight management programs. *Issues in Comprehensive Pediatric Nursing*, **22**, 75-85.
- Campbell M, Fitzpatrick R, Haines A, Kinmonth AL, Sandercock P, Spiegelhalter D, Tyrer P. (2000) Framework for design and evaluation of complex interventions to improve health. *BMJ*, **321**, 694-696

- Campbell NC, Murray E, Darbyshire J, Emery J, Farmer A, Griffiths F, Guthrie B, Lester H, Wilson P, Kinmouth AL. (2007) Designing and evaluating complex interventions to improve health care. *BMJ*, **334**, 455-459.
- Caplan R, Holland R (1990) Rethinking health education theory. *Health Education Journal*, **49** (1), 10-12.
- Caprio S, Hyman LD, McCarthy S, Lange R, Bronson M, Tamborlane WV. (1996) Fat distribution and cardiovascular risk factors in obese adolescent girls: importance of the intraabdominal fat depot. *Am. J. Clin. Nutr.*, **64**, 12-17.
- Caracelli VJ, Greene JC. (1993) Data analysis strategies for mixed-method evaluation designs. . In: V.L. Plano and JW Creswell (Eds), *The Mixed Methods Reader* (pp 231-250), 2008. London: Sage Publications.
- Chamberlin LA, Sherman SN, Jain A, Powers SW, Whitaker RC. (2002) The challenge of preventing and treating obesity in low-income, preschool children. *Arch Pediatr Adolesc Med*, **156**, 662-668.
- Chen X, Beydoun MA, Wang Y (2008) Is sleep duration associated with childhood obesity? A systematic review and meta-analysis. *Obesity*, **16**, 265-274.
- Child Growth Foundation. (2002) Girls and boys BMI charts. Harlow Printing Ltd, South Shields.
- Chinn S, Rona RJ (2001) Prevalence and trends in overweight and obesity in three cross sectional studies of British children, 1974-94. *BMJ*, **322**, 24-6.
- Clark HR, Goyder E, Bissell P, Blank L, Peters J (2007) How do parents' child-feeding behaviours influence child weight? Implications for childhood obesity policy. *Journal of Public Health*, **29**, 132-141.
- Chief Medical Officer (2002) Obesity-defusing the health time bomb. CMO Annual Report. *Health Check. On the State of the Public Health*. Department of Health, pp36-45  
[http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/@dh/@en/documents/digitalasset/dh\\_4081860.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4081860.pdf) (accessed 9/12/09)
- Chief Medical Officer (2004) At least five a week. Evidence on the impact of physical activity and its relationship to health. A report from the Chief Medical Officer. London: Department of Health.
- Cole TJ (1979) A method for assessing age-standardised weight-for-height in children seen cross-sectionally. *Ann Hum Biol*, **6**, 249-268.
- Cole TJ, Freeman JV, Preece MA. (1995) Body Mass Index reference curves for the UK, 1990. *Archives of Disease in Childhood*, **73**, 25-29.
- Cole TJ, Bellizzi MC, Flegal KM, Dietz WH (2000) Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ*, **320**, 1-6.

Cole TJ, Faith MS, Pietrobelli A, Heo M (2005) What is the best measure of adiposity change in growing children: BMI, BMI %, BMI z-score or BMI centile? *European Journal of Clinical Nutrition*, **59**, 419-425.

Connor Gorber S, Tremblay M, Moher D, Gorber B (2007) A comparison of direct vs. self-report measures for assessing height, weight and body mass index: a systematic review. *Obesity Reviews*, **8**(4), 307-326.

Coombes Y (2004) Chapter 3: Evaluating according to purpose and resources. Strengthening the evidence base incrementally. In: Thorogood M and Coombes Y. (Eds.) *Evaluating health promotion. Practice and Methods* (2<sup>nd</sup> Ed.), Oxford: Oxford University Press, pp 27-39.

Corder K, Brage S, Ekelund U (2007) Accelerometers and pedometers: methodology and clinical application. *Curr Opin Clin Nutr Metab Care*, **10**, 597-603.

Coventry City Council (2001) 2001 Census Statistics.  
<http://www.coventry.gov.uk/ccm/navigation/community-and-living/coventry-statistics/2001-census-statistics/>  
(accessed 9/12/2009)

Coventry Health Profile (2008). Produced by Department of Health and Association of Public Health Observatories  
<http://www.apho.org.uk/resource/item.aspx?RID=52335> (accessed 9/12/2009)

Creswell JW, Plano Clark VL, Gutmann ML, Hanson WE. (2003) Advanced mixed methods research designs. In: V.L. Plano and JW Creswell (Eds), *The Mixed Methods Reader* (pp161-196), 2008, London: Sage Publications.

Cross Government Obesity Unit (2009) Healthy Weight, Healthy Lives: National Child Measurement Programme Guidance for Primary Care Trusts 2009/10.  
[www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/documents/digitalasset/dh\\_103360.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_103360.pdf) (accessed 9/12/2009)

Crowther R, Dinsdale H, Rutter H, Kyffin R. (2007) Analysis of the National Childhood Obesity Database 2005-06 A report for the Department of Health by the South East Public Health Observatory on behalf of the Association of Public Health Observatories. January 2007.  
[http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH\\_063565](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_063565) (accessed 9/12/2009)

Dahlgren G, Whitehead M (1991) Policies and strategies to promote social equity in health. Stockholm: Institute of Future Studies.

Daley AJ, Copeland RJ, Wright NP, Roalfe A, Wales JK (2006) Exercise therapy as a treatment for psychopathologic conditions in obese and morbidly obese adolescents: a randomised, controlled trial. *Pediatrics*, **118**(5), 2126-2134.

Daniels SR, Khoury PR, Morrison JA (2000) Utility of different measures of body fat distribution in children and adolescents. *Am. J. Epidemiol.*, **152**, 1179-1184.

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

Davey Smith G, Morris J. (1994) Increasing inequalities in the health of the nation. *BMJ*, **309**, 1453-1454.

Denzin NK (1978) *The Research Act: A theoretical introduction to sociological methods*. New York: McGraw-Hill.

Department for Education and Skills (2005a) *Extended schools: Access to opportunities and services for all. A prospectus*. (p16)  
[www.teachernet.gov.uk/doc/8509/Extended-schools%20prospectus.pdf](http://www.teachernet.gov.uk/doc/8509/Extended-schools%20prospectus.pdf) (accessed 9/12/2009)

Department for Education and Skills (2005b) *Excellence and Enjoyment: Social and Emotional Aspects of Learning (SEAL). Guidance*. Ref: DfES 1378-2005 G  
<http://nationalstrategies.standards.dcsf.gov.uk/node/65859> (accessed 9/12/2009)

Department of Health (1992) *The Health of the Nation – a strategy for health in England*. London: HMSO.

Department of Health (1998) *Smoking Kills. A White Paper on Tobacco*. 20 November 2008. London: The Stationery Office.

Department of Health (1999) *Saving Lives: Our Healthier Nation*. 5 July 1999. London: The Stationery Office.

Department of Health (2004a) *Choosing Health: Making healthier choices easier. Public Health White Paper*.  
[www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4094550](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4094550) (accessed 9/12/2009)

Department of Health (2004b) *At least five a week. Evidence on the impact of physical activity and its relationship to health. A report from the Chief Medical Officer*. London: Department of Health.  
[www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4080994](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4080994) (accessed 9/12/2009)

Department of Health (2006a) *Choosing Health: Obesity Bulletin, Issue 1, May 2006*. [www.dh.gov.uk/en/PublicHealth/Healthimprovement/Obesity/DH\\_4134457](http://www.dh.gov.uk/en/PublicHealth/Healthimprovement/Obesity/DH_4134457) (accessed 9/12/2009)

Department of Health (2006b) *Measuring childhood obesity: Guidance to Primary Care Trusts*  
[//www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4126385](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4126385) (accessed 9/12/2009)

Department of Health (2006c) Obesity Care Pathway and Your Weight, Your Health. 4 May 2006  
[http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4134408](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4134408) (accessed 9/12/2009)

Department of Health (2007) Supporting healthy lifestyles: the National Child Measurement Programme Guidance for 2006–07 school year  
[http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_073786](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_073786) (accessed 9/12/2009)

Department of Health (2007) Legislative changes to the National Child Measurement Programme (NCMP)  
[http://www.dh.gov.uk/en/Publichealth/Healthimprovement/Healthyliving/DH\\_080606](http://www.dh.gov.uk/en/Publichealth/Healthimprovement/Healthyliving/DH_080606) (accessed 9/12/2009)

Department of Health (2008a) Healthy Weight, Healthy Lives. A cross government strategy for England. 23 January 2008.  
[http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_082378](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_082378) (accessed 9/12/2009)

Department of Health (2008b) Standard Contract (General Medical Services )  
[http://www.dh.gov.uk/en/Healthcare/Primarycare/PrimaryCareContracting/GMS/DH\\_4125638](http://www.dh.gov.uk/en/Healthcare/Primarycare/PrimaryCareContracting/GMS/DH_4125638) (accessed 9/12/2009)

Department of Health (2008c) Healthy Weight, Healthy Lives: Commissioning weight management services for children and young people. 7 November 2008.  
[http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_090113](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_090113) (accessed 9/12/2009)

Deshmukh-Taskar P, Nicklas TA, Morales M, Yang S-J, Zakeri I, Berenson GS. (2006) Tracking of overweight status from childhood to young adulthood; the Bogalusa Heart Study. *European Journal of Clinical Nutrition*, **60**, 48-57.

Des Jarlais DC, Lyles C, Crepaz N; TREND Group. (2004) Improving the reporting quality of nonrandomized evaluations of behavioral and public health interventions: the TREND statement. *Am J Public Health*, **94**, 361-6.

Des Jarlais DC, Lyles C, Crepaz N (2004) Letter: Des Jarlais et al respond. *Am J Public Health*, **94**, 1474-1475.

Dietz WH, Gortmaker SL (1985) Do we fatten our children at the television set? Obesity and television viewing in children and adolescents. *Pediatrics*, **75**, 807-812.

Dixey R, Rudolf M, Murtagh J. (2006) WATCH IT: obesity management for children: a qualitative exploration of the views of parents. *International Journal of Health Promotion*, **44** (4), 131-137.

Dixon-Woods M, Agarwal S, Young B, Jones D, Sutton A. (2004) Integrative approaches to qualitative and quantitative. London: Health Development Agency.



Dowda M, Dishman RK, Pfeiffer KA, Pate RR. (2007) Family support for physical activity in girls from 8<sup>th</sup> to 12<sup>th</sup> grade in South Carolina. *Prev Med*, **44**, 153-90.

Drake AJ, Smith A, Betts PR, Crowne EC, Shield JPH (2002) Type 2 diabetes in obese white children. *Archives of Disease in Childhood*, **86**, 207-208.

Drummond MF, O'Brien B, Stoddart GL, Torrance GW. (1997) (2nd Edition). *Methods for the economic evaluation of healthcare programmes*. Oxford: Oxford University Press.

Drummond MF, Jefferson TO. (1996) Guidelines for authors and peer reviewers of economic submissions to the BMJ. *BMJ*, **313**, 275-283.

Dzewaltowski DA, Estabrooks PA, Klesges, Glasgow RE (2004) TREND: An important step, but not enough. *Am J Public Health*, **94** (9), 1474.

East Leeds PCT (2006) R&D annual reports by NHS organisations in England for 2006. Y23 Q12: Trends Treatment and Prevention of Childhood Obesity <http://www.nrr.nhs.uk/2006annualreports/ProgrammeSameIDRecords.asp?Code=Y23+Q12&Title=Trends+Treatment+and+Prevention+of+Childhood+Obesity> (accessed 21/2/08)

Ebbeling CB, Pawlak DB, Ludwig DS (2002) Childhood obesity:public-health crisis,common sense cure. *Lancet*, **360**, 473-82.

Edmunds L (2002) A study to explore the perceptions, strategies and help seeking behaviours of the parents of overweight children, for the NHS Executive SE Region, March 2002.

Edmunds LD, Ziebland S (2002) Development and validation of the Day in the Life Questionnaire (DILQ) as a measure of fruit and vegetable questionnaire for 7-9 year olds. *Health Education Research*, **17** (2), 211-220

Edwards C, Nicholls D, Croker H, Van Zyl S, Viner R, Wardle J (2006) Family-based behavioural treatment of obesity: acceptability and effectiveness in the UK. *Eur J Clin Nutr*, **60**, 587-92

Ehtisham S, Barrett TG, Shaw NJ (2000) Type 2 diabetes mellitus in UK children – an emerging problem. *Diabet Med*, **17** (12), 867-871.

Einzig H (1999) Review of the field: current trends; concepts and issues in Parenting Education and Support, New opportunities. Eds: Wolfendale S, Einzig H, London: David Fulton Publishers.

Ells L, Campbell K, Lidstone J, Kelly S, Lang R, Summerbell C (2005) Prevention of childhood obesity. *Best Practice and Research – Clinical Endocrinology and Metabolism*, **19** (3), 441-454.

- Epstein LH, Valoski, Wing RR, McCurley J. (1990) Ten-year follow-up of behavioural, family-based treatment for obese children, *JAMA*, **264**, 2519-23.
- Epstein LH, Valoski A, Wing RR, McCurley J. (1994) Ten-year outcomes of behavioural family-based treatment for childhood obesity. *Health Psychology*, **13**, 373-383.
- Epstein LA, Paluch RA, Gordy CC, Dorn J (2000) Decreasing sedentary behaviors in treating pediatric obesity. *Archives of Pediatrics and Adolescent Medicine*, **154**, 220-226.
- Ewles L, Simnett I (1995) Promoting health. A Practical Guide (3<sup>rd</sup> Edition), London: Bailliere Tindall.
- Faith MS, Scanlon KS, Birch LL, Francis LA, Sherry B (2004a) Parent-child feeding strategies and their relationships to child eating and weight status. *Obesity Research*, **12** (11), 1711-1721.
- Faith MS, Berkowitz RI, Stallings VA, Kerns J, Storey M, Stunkard AJ. (2004b) Parental feeding attitudes and styles and child body mass index: Prospective analysis of a gene-environment interaction. *Pediatrics*, **114** ( 4), e429-e436.
- Family Links (2006) The Nurturing Programme for Schools. [www.familylinks.org.uk/resources/index.htm](http://www.familylinks.org.uk/resources/index.htm) (accessed 9/12/2009)
- Family Links Website (2009) The Nurturing Programme. [www.familylinks.org.uk/nurturing/index.htm](http://www.familylinks.org.uk/nurturing/index.htm) (accessed 9/12/2009)
- Fayter D, Nixon J, Hartley S, Rithalia A, Butler G, Rudolf M et al (2007) A systematic review of the routine monitoring of growth in children of primary school age to identify growth related conditions. *Health Technology Assessment*, **11**(22).
- Feise RJ (2002) Do multiple outcome measures require p-value adjustment? *BMC Medical Research Methodology*, **2**, 8.
- Ferguson B, Merrick D, Evans S, Halliday S, Donnaghy J, Streather M, Riley N, Cresswell T. (Undated) Indications of Public Health in the English Regions. 5: Child Health. Section 4.2: Obesity in Children aged 2-10 (p50).
- Ferraro KF, Thorpe RJ, Wilkinson JA. (2003) The life course of severe obesity: Does childhood overweight matter? *Journal of Gerontology: Social Sciences*, **58B** (2), S110-S119.
- Fishbein M, Ajzen I (1975) *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fisher JO, Birch LL (2002) Eating in the absence of hunger and overweight in girls from 5 to 7 y of age. *Am J Clin Nutr*, **76**(1), 226-231.

Floodmark CE, Sveger Y, Nilsson-Ehle P (1994) Waist measurement correlates to a potentially atherogenic lipoprotein profile in obese 12-14 year old children. *Acta Paediatr*, **83**, 941-945.

Food Standards Agency. (2001) The Balance of good health. Information for educators and communicators.

<http://www.food.gov.uk/multimedia/pdfs/bghbooklet.pdf> (accessed 9/12/2009)

Ford AL, Bergh C, Sodersten P, Sabin MA, Hollinghurst S, Hunt LP, Shield JPH (2010) Treatment of childhood obesity by retraining eating behaviour: randomised controlled trial. *BMJ*, **340**, b5388, doi10.1136.

Francis LA, Birch LL (2005) Maternal weight status modulates the effects of restriction on daughters' eating and weight. *Int J Obesity*, **29** (8), 942-949.

Freedman DS, Serdula MK, Srinivasan SR, Berenson GS (1999) Relation of circumferences and skinfold thicknesses to lipid and insulin concentrations in children and adolescents: the Bogalusa Heart Study. *Am J Clin Nutr*, **69**, 308-317.

Freedman DS, Kettel Khan L, Dietz WH, Srinivasan SR, Berenson GS (2001) Relationship of childhood obesity to coronary heart disease risk factors in adulthood: The Bogalusa Heart Study. *Pediatrics*, **108** (3), 712-718.

Freedman DS, Khan LK, Serdula MK, Dietz WH, Srinivasan SR, Berenson GS. (2005) Racial differences in the tracking of childhood BMI to adulthood. *Obesity Research*, **13**(5), 928-935.

Freedson P, Pober D, Janz KF (2005) Calibration of accelerometer output for children. *Med. Sci. Sports Exerc*, **37** (11 Suppl), S523-S530.

Freeman JV, Cole TJ, Chinn S, Jones PRM, White EM, Preece MA. (1995) Cross-sectional stature and weight reference curves for the UK, 1990. *Archives of Disease in Childhood*, **73**, 17-24.

French J, Adams L (1986) From analysis to synthesis. Theories of health education. *Health Education Journal*, **45** (2); 71-74.

Gabbay J, (1998) Our healthier nation. Can be achieved if the demands allow it. *BMJ*, **316**, 487-488.

Gately PJ, Cooke CB, Barth JH, Bewick BM, Radley D, Hill AJ. (2005) Children's residential weight-loss programs can work: a prospective cohort study of short-term outcomes for overweight and obese children. *Pediatrics*, **116** (1), 73-77.

Gibbs J, Underdown A, Stevens M, Newbery J, Liabo K. (2003) Group based parenting programmes can reduce behaviour problems of children aged 3-12 years. What Works for Children group. Evidence Nugget.

Gillis L, McDowell, M, Bar-Or O. (2005) Relationship between summer vacation weight gain and lack of success in a pediatric weight control program. *Eat Behav*, **6**(2), 137-143.

Golan M, Weizman A, Apter A, Fainaru M (1998a) Parents as the exclusive agents of change in the treatment of childhood obesity. *Am J Clin Nutr*, **67**, 1130-5.

Golan M (1998b) Reliability and validity of the family eating and activity habits questionnaire. *European Journal of Clinical Nutrition*, **52** (10), 771-777.

Golan M, Crow S. (2004a) Parents are key players in the prevention and treatment of weight related problems. *Nutrition Reviews*, **62** (1), 39-50.

Golan M, Crow S (2004b) Targeting parents exclusively in the treatment of childhood obesity: long-term results. *Obesity Research*, **12**, 357-361.

Golan M, Kaufman V, Shahar DR (2006a) Childhood obesity treatment: targeting parents exclusively v. parents and children. *Br. J. Nutr.*, **95** (5), 1008-1015.

Golan M. (2006b) Parents as agents of change in childhood obesity – from research to practice. *International Journal of Pediatric Obesity*, **1**(2), 66-76.

Goldfield SG, Epstein LH, Kilanowski CK, Paluch RA, Kogut-Bossler B. (2001) Cost-effectiveness of group and mixed family-based treatment for childhood obesity. *Int J Obes Relat Metab Disord*, **25**(12), 1843-1949.

Golley RK, Perry RA, Magarey A, Daniels L. (2007a) Family-focused weight management program for five- to nine-year-olds incorporating parenting skills training with healthy lifestyle information to support behaviour modification. (Case study) *Nutrition & Dietetics: The Journal of the Dietitians Association of Australia*.

[http://www.accessmylibrary.com/coms2/summary\\_0286-33023081\\_ITM](http://www.accessmylibrary.com/coms2/summary_0286-33023081_ITM) (accessed 9/12/2009)

Golley RK, Magarey AM, Baur LA, Steinbeck KS, Daniels LA. (2007b) Twelve-Month Effectiveness of a Parent-led, Family-Focused Weight-Management Program for Prepubertal Children: A Randomized, Controlled Trial. *Pediatrics*, **119**, 517-525.

Gortmaker SL, Must A, Perrin JM, Sobol AM, Dietz WH. (1993) Social and economic consequences of overweight in adolescence and young adulthood. *New Eng. J. Med.*, **329**, 1008-12.

Government Office for Science (2007) Foresight. Tackling Obesities: Future choices.

<http://www.foresight.gov.uk/OurWork/ActiveProjects/Obesity/Obesity.asp> (accessed 9/12/2009)

Grainger C. (2007a) Coventry Teaching Primary Care Trust and Coventry City Council. Annual Report of the Director of Public Health 2007/8. [http://www.coventrypct.nhs.uk/documents/misc/public\\_health\\_0708.pdf](http://www.coventrypct.nhs.uk/documents/misc/public_health_0708.pdf) (accessed 9/12/2009)

Grainger C. (2007b) Coventry Health Profile. Coventry Teaching Primary Care Trust and Coventry City Council. <http://www.coventry.gov.uk/ccm/content/social-services-%26-housing-directorate/health/coventry-health-profile---2007.en;jsessionid=b9MeRBxsrPC5> (accessed 9/12/2009)

Green J, Thorogood N. (2004) Qualitative methods for health research. London: Sage.

Green J (2000) Editorial. The role of theory in evidence-based health promotion practice. *Health Education Research*, **15**(2), 125-129.

Greene JC, Caracelli VJ, Graham WF. (1989) Towards a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, **11**, 255-274.

Guba EG, Lincoln YS (1994) Competing paradigms in qualitative research. Chapter 6. In:- The Handbook of Qualitative Research. Denzin NK and Lincoln YS, London: Sage.

Gunnell DJ, Frankel SJ, Nanchahal K, Peters TJ, Davey Smith G. (1998) Childhood obesity and adult cardiovascular mortality: a 57-y follow-up study based on the Boyd Orr cohort. *Am. J. Clin. Nutr.*, **67**, 1111-1118.

Gustafson SL, Rhodes RE. (2006) Parental correlates of physical activity in children and early adolescents. *Sports Med*, **36**, 79-97.

Haby MM, Vos T, Carter R, Moodie M, Markwick A, Magnus A, Tay-Teo K-S, Swinburn B. (2006) A new approach to assessing health benefit from obesity interventions in children and adolescents: the assessing cost-effectiveness in obesity project. *International Journal of Obesity*, **30**, 1463-1475.

Haisman N, Matyka KA, Stanton A. (2005) Lessons from an unsuccessful local attempt to tackle childhood overweight and obesity. *Archives of Diseases in Childhood*, **90**, 984-985.

Hall DMB, Cole TJ (2006) What use is the BMI? *Arch Dis Child*, **91**, 283-286.

Hall R (2006) ACE-Obesity. Assessing cost-effectiveness of obesity interventions in children and adolescents. Summary of results. Melbourne: Victorian Government Department of Human Services. [www.health.vic.gov.au/healthpromotion/downloads/ace\\_obesity.pdf](http://www.health.vic.gov.au/healthpromotion/downloads/ace_obesity.pdf) (accessed 9/12/2009)

Hancox RJ, Poulton R. (2006) Watching television is associated with childhood obesity: but is it clinically important? *International Journal of Obesity*, **30**, 171-175.

Hardy J (1981) Cited in Beattie A (1991) Knowledge and control in health promotion: a test case for social policy and social theory. In J Gabe, M Calnan and M Bury (eds) (1994). *The sociology of the health services*, London: Routledge.

Hardy R, Wadsworth M, Kuh D. (2000) The influence of childhood weight and socioeconomic status on change in adult body mass index in a British national birth cohort. *International Journal of Obesity*, **24**, 725–734.

Harnack L, Himes JH, Anliker J, Clay T, Gittelsohn J, Jobe JB, Ring K, Snyder P, Thompson J, Weber JL. (2004) Intervention-related bias in reporting of food intake by fifth-grade children participating in an obesity prevention study. *American Journal of Epidemiology*, **160** (11), 1117-1121.

Harter S. (1985) *Manual for the Self-Perception Profile for Children*, University of Denver.

Harvey-Berino J, Rourke J. (2003) Obesity prevention in preschool Native-American children: A pilot study using home visiting. *Obes Res*, **11**(5), 606-611.

Herbert JR, Clemow L, Pbert L, Ockene IS, Ockene JK (1995) Social desirability bias in dietary self-report may compromise the validity of dietary intake measures. *International Journal of Epidemiology*, **24**, 389-398.

Hillier A. (2008) Childhood overweight and the built environment: Making technology part of the solution rather than part of the problem. *ANNALS, AAPSS*, **615**, 56-82.

Hillsdon M. (2009) Tools to measure physical activity in local level weight management interventions: a rapid review. National Obesity Observatory. [www.noo.org.uk/uploads/doc721\\_2\\_PA\\_measurement\\_tools\\_review.pdf](http://www.noo.org.uk/uploads/doc721_2_PA_measurement_tools_review.pdf) (accessed 9/12/2009)

Hoare P, Elton R, Greer A, Kerley S. (1993) The modification and standardization of the Harter self-esteem questionnaire with Scottish school children. *European Child and Adolescent Psychiatry*, **2**(1), 19-33.

House of Commons Health Committee (2004) Obesity. Third Report of Session 2003-04. Volume 1. <http://www.publications.parliament.uk/pa/cm200304/cmselect/cmhealth/23/23.pdf> (accessed 9/12/2009)

Hughes SO, Power TG, Orlet Fisher J, Mueller S, Nicklas TA (2005) Revisiting a neglected construct: parenting styles in a child-feeding context. *Appetite*, **44**(1), 83-92.

Hughes AR, Farewell K, Harris D, Reilly JJ (2007) Quality of life in a clinical sample of obese children. *International Journal of Obesity*, **31**, 39-44.

Hughes AR, Stewart L, Chapple J, McColl JH, Donaldson MD, Kelnar CJ, Zabihollah M, Ahmed F, Reilly JJ (2008) Randomized, controlled trial of a best-practice individualized behavioural program for treatment of childhood overweight: Scottish Childhood Overweight Treatment Trial (SCOTT). *Pediatrics*, **121** (3), e539-e546.

Hunt C. (2003) *The Parenting Puzzle: How to get the best out of family life*. Oxford, UK: Family Links, 2003.

Hunt LP, Ford A, Sabin MA, Crowne EC, Shield JPH (2007) Clinical measure of adiposity and percentage fat loss: which measure most accurately reflects fat loss and what should we aim for? *Arch Dis Child*, **92**, 399-403.

Information Centre (2006) *Statistics on obesity, physical activity and diet: England, 2006*. ISBN: 1-84636-094-3  
[www.ic.nhs.uk/webfiles/publications/obesity/StatisticsOnObesity201206\\_PDF.pdf](http://www.ic.nhs.uk/webfiles/publications/obesity/StatisticsOnObesity201206_PDF.pdf)  
(accessed 9/12/2009)

Information Centre (2008) *National Child Measurement Programme: results from the 2006/07 school year*.  
<http://www.ic.nhs.uk/pubs/ncmp0607>(accessed 9/12/2009)

Information Centre (2009) *Statistics on obesity, physical activity and diet, England, February 2009*.  
<http://www.ic.nhs.uk/webfiles/publications/opan09/OPAD%20Feb%202009%20final.pdf>  
(accessed 9/12/2009)

Irvine T (2005) Human vibration on a trampoline. *Vibrationdata*, April 2005 Newsletter, 2-6. [www.vibrationdata.com/Newsletters/April2005\\_NL.pdf](http://www.vibrationdata.com/Newsletters/April2005_NL.pdf) (accessed 9/12/2009)

Israel AC, Stolmaker L, Andrian CAG (1985) The effects of training parents in general child management skills on a behavioural weight loss program for children. *Behavior Therapy*, **16**: 169-180.

Janicke DM, Sallinen BJ, Perri MG, Lutes LD, Huerta M, Silverstein JH, Brumback B (2008) Comparison of parent-only vs family-based interventions for overweight children in underserved rural settings. *Arch Pediatr Adolesc Med*, **162** (12), 1119-1125.

Jebb SA, Rennie KL, Cole TJ (2004) Prevalence of overweight and obesity among young people in Great Britain. *Public Health Nutrition*, **7**(3), 461-465.

Jebb SA, Siervo M, Murgatroyd PR, Evans S, Fruhbeck G, Prentice AM (2007) Validity of the leg-to-leg bioimpedance to estimate changes in body fat during weight loss and regain in overweight women: a comparison with multi-compartment models. *Int. J. Obes (Lond)*, **31**(5), 756-762.

- Jefferson T, Demicheli V, Mugford M (1996) *Elementary Economic Evaluation in Health Care*. London: BMJ Publishing Group.
- Jeffery RW, Sherwood NE. (2008) Is the obesity epidemic exaggerated? No. *BMJ*, **336**, 244-5.
- Jick TD (1979) Mixing qualitative and quantitative methods: Triangulation in action. In: V.L. Plano and JW Creswell (Eds), *The Mixed Methods Reader* (pp107-118), 2008, London: Sage Publications.
- Jordan A, Robinson TN. (2008) Children, television viewing, and weight status: summary and recommendations from an expert panel meeting. *ANNALS, AAPSS*, **615**, 119-132.
- Joseph S, Linley PA, Harwood J, Lewis CA, McCollam P. (2004) Rapid assessment of well-being: The Short Depression-Happiness Scale (SDHS). *Psychology and Psychotherapy. Theory Research and Practice*, **77**, 463-478.
- Jotangia D, Moody A, Stamatakis E, Wardle H. (2005) Obesity among children under 11. Publications Statistics. [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH\\_4109245](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_4109245) (accessed 9/12/2009)
- Kazdin A, Siegel T, Bass D (1992) Cognitive problem solving skills training and parent management training in the treatment of antisocial behaviour in children. *J. Consulting & Clinical Psychology*, **60**, 733-747.
- Kinra S, Nelder RP, Lewwedon GJ (2000) Deprivation and childhood obesity: a cross sectional study of 20,973 children in Plymouth, United Kingdom. *J. Epidemiol. Community Health*, **54**, 456-460.
- Kipping RR, Jago R, Lawlor DA (2008a) Obesity in children. Part 1: Epidemiology, measurement, risk factors, and screening. *BMJ*, **337**, 922-927.
- Kipping RR, Jago R, Lawlor DA (2008b) Obesity in children. Part 2: Prevention and Management. *BMJ*, **337**, 984-989.
- Kirkpatrick S. (2005) *Family Links Pilot Evaluation Study*. Oxford: Health Services Research Unit.
- Kirkwood B. (2004) Editorial. Making public health interventions more evidence based. *BMJ*, **328**, 966-967
- Kohl HW, Hobbs KE (1998) Development of physical activity behaviours among children and adolescents. *Pediatrics*, **101** (3), 549-554.
- Kremers SP, Brug J, de Vries H, Engels RCME (2003) Parenting style and adolescent fruit consumption. *Appetite*, **41**, 43-50.
- Labonte R, Robertson A. (1996) Delivering the goods, showing our stuff: The case for a constructivist paradigm for health promotion research and practice. *Health Education Quarterly*, **23**, 431-447.



Laitinen J, Power C, Jarvelin MR (2001) Family social class, maternal body mass index, childhood body mass index, and age at menarche as predictors of adult obesity. *Am J Clin Nutr*, **74**, 287-94.

Laitinen J, Power C, Ek E, Sovio U, Jarvelin MR (2002) Unemployment and obesity among young adults in a northern Finland 1966 birth cohort. *Int J Obes Relat Metab Disord*, **26**, 1329-1338.

Lake JK, Power, C, Cole TJ. (1997) Child to adult body mass index in the 1958 British birth cohort: associations with parental obesity. *Arch Dis Child.*, **77**, 376-380.

Lake J (2009) The development of surveillance and screening for childhood obesity in the UK. *Critical Public Health*, **19**(1), 3-10.

Latner JD, Stunkard AJ (2003) Getting worse: the stigmatisation of obese children. *Obes Res*, **11**, 452-56

Lee Y, Mitchell DC, Smiciklas-Wright H, Birch LL (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.

Leger LA, Mercier D, Gadoury C, Lambert J (1988) The multistage 20 metre shuttle run test for aerobic fitness. *J Sports Sci*, **6**, 93-101.

Lewis N, Robertson W, Garman K, Stewart-Brown S (2009) Evaluation of 'Families for Health' in Warwickshire. University of Warwick.

Linnan L, Steckler A (2002) Process evaluation for public health interventions and research (Chapter 1) In: Process evaluation for public health interventions and research. Steckler A, Linnan L. (Editors) 1<sup>st</sup> Edition, San Francisco: Jossey-Bass. <http://catalogimages.wiley.com/images/db/pdf/0787959766.01.pdf> (accessed 9/12/2009)

Lobstein T, Baur L, Uauy R. (2004) Obesity in children and young people: a crisis in public health. *Obesity Reviews*, **5** (Supplement 1), 4-85.

Lobstein T, Jackson-Leach R. (2006) Estimated burden of paediatric obesity and co-morbidities in Europe. Part 2. Numbers of children with indicators of obesity-related disease. *International Journal of Pediatric Obesity*, **1**(1), 33-41.

Lobstein T. (2006) Preventing child obesity – an art and a science. *Obesity Reviews*, **7**(Suppl. 1), 1-5.

Lobstein T, Jackson-Leach R. (2007) International comparisons of obesity trends, determinants and responses. Evidence Review. Foresight Tackling Obesity: Future Choices. ([http://www.foresight.gov.uk/Obesity/06\\_part\\_03.pdf](http://www.foresight.gov.uk/Obesity/06_part_03.pdf)) (accessed 28/9/2009)

- Mahoney LT, Burns TL, Stanford W, Thompson BH, Rost CA, Lauer RM. (1996) Coronary risk factors measured in children and young adult life are associated with coronary artery calcification in young adults: The Muscatine Study. *J Am Coll Cardiol*, **27** (2), 277-284.
- Marshall SJ, Biddle SJH, Gorely T, Cameron N, Murdey I (2004) Relationship between media use, body fatness and physical activity in children and youth: a meta-analysis. *International Journal of Obesity*, **28**, 1238-1246.
- Mattocks C, Ness A, Deere K, Tilling K, Leary S, Blair SN, Riddoch C. (2008) Early life determinants of physical activity in 11 to 12 year olds: cohort study. *BMJ*, **336**, 26-29
- Maziak W, Ward KD, Stockton MB (2008) Childhood obesity: are we missing the big picture? *Obesity Reviews*, **9**, 35-42.
- McCarthy HD, Jarrett KV, Crawley HF. (2001) The development of waist circumference percentiles in British children aged 5-16.9 years. *European Journal of Clinical Nutrition*, **55**, 902-907.
- McCarthy HD, Ellis SM, Cole TJ. (2003) Central overweight and obesity in British youth aged 11-16 years: cross sectional surveys of waist circumference. *BMJ*, **326**, 624-626.
- McCarthy HD, Cole TJ, Fry T, Jebb SA, Prentice AM. (2006) Body fat reference curves for children. *International Journal of Obesity*, **30**, 598-602.
- McLaren L (2007) Socioeconomic status and obesity. *Epidemiologic Reviews*, **29**, 29-48.
- McLean N, Griffin S, Toney K, Hardeman W (2003) Family involvement in weight control, weight maintenance and weight-loss interventions: a systematic review of randomised trials. *Int J Obes Relat Metab Disord*, **27** (9), 987-1005.
- Medical Research Council (2000) A framework for development and evaluation of RCTs for complex interventions to improve health. <http://www.mrc.ac.uk/Utilities/Documentrecord/index.htm?d=MRC003372> (accessed 9/12/2009)
- Milburn K, Fraser E, Secker J, Pavis S. (1995) Combining methods in health promotion research: some considerations about appropriate use. *Health Education Journal*, **54**, 347-356.
- Moher D, Schulz KF, Altman DG. (2001) The CONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomised trials. *Lancet*, **357**, 1191-1194.
- Moher D, Jones A, Lepage L. (2001) Use of the CONSORT statement and quality of reports of randomised trials: a comparative before-and-after evaluation. *JAMA*, **285**, 1992-1995.

- Morgan DL. (2007) Paradigms lost and pragmatism regained. Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, **1** (1), 48-76.
- Mossberg HO (1989) 40-year follow-up of overweight children. *Lancet*, **2**, 491-493.
- MRC Epidemiology Unit (2009) MTI accelerometer analysis software (MAHUffe) [www.mrc-epid.cam.ac.uk/Research/PA/Downloads.html](http://www.mrc-epid.cam.ac.uk/Research/PA/Downloads.html) (accessed 9/12/09)
- Mulvihill C, Quigley R (2003) The management of obesity and overweight: an analysis of reviews of diet, physical activity and behavioural approaches. London: Health Development Agency.
- Mulvihill C, Németh A, Vereecken C (2004) Body image, weight control and body weight. In:- Currie C, Roberts C, Morgan A, Smith R, Settertobulte W, Samdal O, Barnekow Rasmussen V (eds.) 2004. Young People's Health in Context: international report from the HBSC 2001/02 survey. WHO Policy Series: Health policy for children and adolescents Issue 4, WHO Regional Office for Europe, Copenhagen.  
<http://www.hbsc.org/publications/reports.html> (accessed 9/12/2009)
- Murphy E, Dingwall R, Greatbatch D, Parker S, Watson P. (1998) Qualitative research methods in health technology assessment : a review of the literature. Health Technology Assessment Vol **2**, No. 16.  
<http://www.hta.ac.uk/pdfexecs/summ216.pdf> (accessed 9/12/2009)
- Murtagh J, Dixey R, Rudolf M. (2006) A qualitative investigation into the levers and barriers to weight loss in children: opinions of obese children. *Arch Dis Child*, **91**, 920-923.
- Must A, Jacques PF, Dallal GE, Bajema CJ, Dietz WH. (1992) Long term morbidity and mortality of overweight adolescents. A follow-up of the Harvard Growth Study of 1922-1935. *N Engl J Med*, **327**, 1350-1355.
- Naidoo J, Wills J. (2000) Health Promotion – Foundations for Practice. London: Bailliere Tindall.
- National Audit Office (1996) Health of the Nation: A Progress Report. London: HMSO.
- National Audit Office (2001) Tackling Obesity in England.  
[www.nao.org.uk/publications/nao\\_reports/00-01/0001220.pdf](http://www.nao.org.uk/publications/nao_reports/00-01/0001220.pdf) (accessed 9/12/2009)
- National Audit Office (2006) Tackling Child Obesity – First Steps  
[http://www.nao.org.uk/publications/nao\\_reports/05-06/0506801es.pdf](http://www.nao.org.uk/publications/nao_reports/05-06/0506801es.pdf) (accessed 9/12/2009)
- National Statistics (2001) Census 2001, Coventry, Population Pyramid  
<http://www.statistics.gov.uk/census2001/pyramids/pages/00cq.asp> (accessed 9/12/2009)

National Institute for Health and Clinical Excellence (NICE) (2006a) Obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children. NICE clinical guideline 43 <http://www.nice.org.uk/CG043> (accessed 9/12/2009)

National Institute for Health and Clinical Excellence (NICE) (2006b) Conduct disorder in children - Parent-training/education programmes. NICE technology appraisal guidance 102. [www.nice.org.uk/TA102](http://www.nice.org.uk/TA102) (accessed 9/12/2009)

NHS Choices (2009) Behind the headlines. Your guide to the science that makes the news. [www.nhs.uk/news/Pages/Newsglossary.aspx](http://www.nhs.uk/news/Pages/Newsglossary.aspx) (accessed 20.1.09)

NHS Executive (1997) Responsibilities for meeting Patient Care Costs associated with Research and Development in the NHS. *Health Service Guidelines*, HSG(97)32 (29 May 1997) [http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Healthserviceguidelines/DH\\_4018353](http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Healthserviceguidelines/DH_4018353) (accessed 9/12/2009)

Norgate R, Trail M, Osborne C (2008) Staff and pupil perspectives of the Family Links Nurturing Programme: An evaluation of the Andover Programme. Research and Evaluation Unit, Hampshire Educational Psychology Service, Hampshire County Council. [www.familylinks.org.uk/nurturing/research.htm](http://www.familylinks.org.uk/nurturing/research.htm) (accessed 9/12/2009)

NSW Department of Community Services (2005) Parenting programs: what makes them effective? Research to Practice Notes. Centre for Parenting and Research, New South Wales, Australia.

Nurturing Parenting Program (2008) Nurturing Parenting Program Validation Studies 1983-2008. (dated 06/05/08) [www.nurturingparenting.com/research\\_validation/a9\\_np\\_validation\\_studies.pdf](http://www.nurturingparenting.com/research_validation/a9_np_validation_studies.pdf) (accessed 9/12/2009)

Nutbeam D. (1998) Evaluating health promotion – progress, problems and solutions. *Health Promotion International*, **13**, 27-44.

O'Dea JA (2005) Prevention of child obesity: 'First, do no harm'. *Health Education Research*, **20**, 259-265.

Office for Health Economics (2009) Glossary. [www.ohe.org/page/glossary.cfm](http://www.ohe.org/page/glossary.cfm) (accessed 9/12/09)

Office for National Statistics (2005) The National Statistics Socio-economic classification. User Manual. [http://www.statistics.gov.uk/methods\\_quality/ns\\_sec/downloads/NS-SEC\\_User.pdf](http://www.statistics.gov.uk/methods_quality/ns_sec/downloads/NS-SEC_User.pdf) (accessed 9/12/2009)

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**, 100-106.

Osgood J, James K (2006) Parent Support in Sure Start North West Kensington & Golborne: an evaluation of the Family Links Nurturing Programme. Institute for Policy Studies in Education.

Oude Luttikhuis H, Baur L, Jansen H, Shrewsbury VA, O'Malley C, Stolk RP, Summerbell CD (2009) Interventions for treating obesity in children. *Cochrane Database of Systematic Reviews* 2009, Issue 1. Art. No.: CD001872. DOI: 10.1002/14651858.CD001872.pub2.

Parenting UK website, [www.parentinguk.org](http://www.parentinguk.org) (accessed 9/12/2009)

Parry LL, Netuveli G, Parry J, Saxena S (2008) A systematic review of parental perception of overweight status in children. *Journal of Ambulatory Care Management. Ambulatory Care Developments in the United Kingdom*. **31**(3), 253-268.

Parsons TJ, Power C, Logan S, Summerbell CD (1999) Childhood predictors of adult obesity: a systematic review. *International Journal of Obesity*, **23**, Suppl 8, S1-S107.

Parsons TJ, Manor O, Power C. (2006) Physical activity and change in body mass index from adolescence to mid-adulthood in the 1958 British cohort. *International Journal of Epidemiology*, **35**, 197-204.

Parsons TP, Manor O, Power C (2007) Television viewing and obesity: a prospective study in the 1958 British birth cohort. *European Journal of Clinical Nutrition*, online publication 22 August 2007, doi: 10.1038/sj.ejcn.1602884

Patterson J, Mockford C, Barlow J, Pyper C, Stewart-Brown S (2002) Need and demand for parenting programmes in general practice. *Arch Dis Child*, **87**, 468-471.

Petrie J, Bunn F, Byrne G. (2007) Parenting programmes for preventing tobacco, alcohol or drug misuse in children <18: a systematic review. *Health Education Research*, **22** (2), 177-191.

Pianta RC (1992) Child-Parent Relationship scale., University of Virginia, USA. <http://www.virginia.edu/vprgs/CASTL/files/Child-ParentRelationshipScale.pdf> (accessed 9/12/2009)

Pietrobelli A, Faith MS, Allison DB, Gallagher D, Chiumello G, Heymsfield SB (1998) Body mass index as a measure of adiposity among children and adolescents: a validation study. *J. Pediatr.*, **132**, 204-210.

Platt S, Gnich W, Rankin D, Ritchie D, Truman J, Backett-Milburn K. (2004) Chapter 6: Applying process evaluation: learning from two research projects. In: Thorogood M and Coombes Y. (Eds.) *Evaluating health promotion. Practice and Methods* (2<sup>nd</sup> Ed). Oxford: Oxford University Press, pp 73-89.

Pope C, Ziebland S, Mays N. (2000) Qualitative research in health care. Analysing qualitative data. *BMJ*, **320**, 114-6.

Power C, Lake JK, Cole TJ. (1997) Body mass index and height from childhood to adulthood in the 1958 British birth cohort. *Am J. Clin Nutr*, **66**, 1094-1101.

Prochaska JO, DiClemente CC, Norcross JC. (1992) In search of how people change. *Am Psychol*, **47**, 1102-4.

Procter KL, Rudolf MC, Feltbower RG, Levine R, Connor A, Robinson M, Clarke GP (2008) Measuring the school impact on child obesity. *Social Science and Medicine*, **67** (2), 341-349.

Puyau MR, Adolph AL, Vohra FA, Butte NF (2002) Validation and calibration of physical activity monitors in children. *Obesity Research*, **10**, 150-157.

Rabin R, de Charro F (2001) EQ-5D: a measure of health status from the EuroQol Group. *Ann Med*, **33**(5), 337-43.

Rawson D (1992) The growth of health promotion theory and its rational reconstruction. In: Bunton R, MacDonald G. (Eds.), *Health Promotion Disciplines and Diversity*, London: Routledge.

Raynor HA, Osterholt KM, Hart CN, Jelalian E, Vivier P, Wing RR (2009) Evaluation of active and passive recruitment methods used in randomized controlled trials targeting pediatric obesity. *International Journal of Pediatric Obesity*, **4** (4), 224-232.

Reber AS (1995) *The Penguin dictionary of psychology*. (2<sup>nd</sup> ed.) London: Penguin Books.

Reilly JJ, Methven E, McDowell ZC, Hacking B, Alexander D, Stewart L, Kelnar CJH (2003) Health consequences of obesity. *Arch Dis Child*, **88**, 748-752.

Reilly JJ (2005) Descriptive epidemiology and health consequences of childhood obesity. *Best Practice and Research Clinical Endocrinology and Metabolism*, **19** (3), 327-341.

Reilly JJ, Armstrong J, Dorosty AR, Emmett PM, Ness A, Rogers I, Steer C, Sherriff A. (2005) Early life risk factors for obesity in childhood: cohort study. *BMJ*, **330**, 1357-9.

Reilly JJ (2006a) Obesity in childhood and adolescence: evidence based clinical and public health perspectives. *Postgrad. Med J.*, **82**, 429-437.

Reilly JJ (2006b) Diagnostic accuracy of the BMI for age in paediatrics. *International Journal of Obesity*, **30**, 595-597.

Reilly JJ (2007) Childhood obesity: an overview. *Children and Society*, **21**, 390-396.

- Reilly JJ, Penpraze V, Hislop J, Davies G, Grant S, Paton JY (2008) Objective measurement of physical activity and sedentary behaviour: review with new data. *Archives of Disease in Childhood*, **93**, 614-619.
- Reinehr T, Andler W. (2004) Changes in the atherogenic risk factor profile according to degree of weight loss. *Arch. Dis. Child.*, **89**, 419-422.
- Rhee K (2008) Childhood overweight and the relationship between parent behaviours, parenting style, and family functioning. *ANNALS, AAPSS*, **615**, 12-37.
- Rhee KE, Lumeng JC, Appugliese DP, Kaciroti N, & Bradley RH (2006) Parenting styles and overweight status in first grade. *Pediatrics*, **117**, 2047-2054.
- Riddoch CJ, Mattocks C, Deere K, Saunders J, Kirkby J, Tilling K, Leary SD, Blair SN, Ness AR (2007) Objective measurement of levels and patterns of physical activity. *Arch Dis Child*, **92**, 963-969.
- Ritchie J, Spencer L (1993) Qualitative data analysis for applied policy research. In Bryman A, Burgess R (Eds.) *Analysing qualitative data*. 1993. London: Routledge, pp173-194.
- Roberts K, Cavill N, Rutter H (2009) Standard Evaluation Framework for weight management interventions. National Obesity Observatory. [www.noo.org.uk/uploads/doc/vid\\_3534\\_NOOSEFreportJuly09.pdf](http://www.noo.org.uk/uploads/doc/vid_3534_NOOSEFreportJuly09.pdf) (accessed 9/12/2009)
- Robinson TN. (1999) Reducing children's television viewing to prevent obesity. A randomized controlled trial. *JAMA*, **282**, 1561-1567.
- Robinson TN, Killen JD, Kraemer HC, Wilson DM, Matheson DM, Haskell WL et al (2003) Dance and reducing television viewing to prevent weight gain in African-American girls: The Stanford GEMS pilot study. *Ethnicity and Disease*, **13**, S65-S77.
- Robson C (1993) *Real World Research. A Resource for Social Scientists and Practitioner-Researchers*. Oxford: Blackwell.
- Rosenstock IM (1974). Historical Origins of the Health Belief Model. *Health Education Monographs*, **2** (4), 328-335.
- Rudolf M, Christie D, McElhone S, Sahota P, Dixey R, Walker J, Wellings C. (2006) WATCH IT: a community based programme for obese children and adolescents. *Arch Dis Child*, **91**, 736-739.
- Sabin MA, Shield JPH. (2006) Clinical significance vs. statistical significance in childhood obesity weight management programmes. *Archives of Disease in Childhood*, eLetter. <http://adc.bmj.com/cgi/eletters/91/9/736> (accessed 9/12/2009)

- Sacher PM, Chadwick P, Wells JCK, Williams JE, Cole TJ, Lawson MS (2005) Assessing the acceptability and feasibility of the MEND programme in a small group of obese 7-11 year old children. *J Hum Nutr Dietet*, **18**, 3-5.
- Sacher P, Chadwick P, Kolotourou M, Cole T, Lawson M, Singhal A. (2007) The MEND RCT: Effectiveness on health outcomes in obese children. *International Journal of Obesity*, May 2007. (Abstract from the European Congress on Obesity, 23<sup>rd</sup> April 2007)
- Sacher PM, Chadwick P, Kolotourou M, Cole T, Lawson M, Singhal A. (2009) The MEND study: sustained improvements on health outcomes in obese children at one year. (Poster on MEND website)  
[http://www.mendprogramme.org/sites/default/files/MEND/RCT\\_Data\\_071021.pdf](http://www.mendprogramme.org/sites/default/files/MEND/RCT_Data_071021.pdf)  
 (accessed 9/12/2009)
- Saelens BE (2008) Visceral fat is worth measuring and measuring well. *Arch Pediatr Adolesc Med*, **162** (5), 491-492.
- Sale JEM, Lohfeld LH, Brazil K (2002) Revisiting the quantitative-qualitative debate. Implications for mixed-methods research. In: V.L. Plano and JW Creswell (Eds), *The Mixed Methods Reader* (pp363-374), 2008, London: Sage Publications.
- Sandelowski M (2003) Tables or tableaux? The challenges of writing and reading mixed methods studies. In: V.L. Plano and JW Creswell (Eds), *The Mixed Methods Reader* (pp363-374), 2008, London: Sage Publications.
- Sanders MR, Markie-Dadds C, Turner KMT (2003) Theoretical, Scientific and Clinical Foundations of the Triple P-Positive Parenting Program: A Population Approach to the Promotion of Parenting Competence. Parenting Research and Practice Monograph No. 1  
<http://www.gov.mb.ca/triplep/pdf/monograph1.pdf> (accessed 9/12/2009)
- Sargent JD, Blanchflower DG. (1994) Obesity and stature in adolescence and earnings in young adulthood. Analysis of a British birth cohort. *Arch Pediatr Adolesc Med*, **148**(7), 681-7.
- Satter E. (2004) Children, the feeding relationship and weight. *Maryland Medicine*, **5**(3), 26-28.
- Schwimmer JB, Burwinkle TM, Varni JW. (2003) Health-related quality of life of severely obese children and adolescents. *JAMA*, **289** (14), 1813-1819.
- Schmitz KH, Lytle LA, Phillips GA, Murray DM, Birnbaum AS, Kubik MY. (2002) Psychosocial correlates of physical activity and sedentary leisure habits in young adolescents: The teens eating for energy and nutrition at school study. *Preventive Medicine*, **34**, 266-278.
- Schonfeld-Warden N, Warden CH (1997) Pediatric obesity: an overview of etiology and treatment. *Pediatr Clin North Am*, **44**, 339-36.



- Scottish Intercollegiate Guidelines Network. (2003) Management of obesity in children and young people. A national clinical guideline. [www.sign.ac.uk/pdf/sign69.pdf](http://www.sign.ac.uk/pdf/sign69.pdf) (accessed 9/12/2009)
- Serdula MK, Ivery D, Coates RJ, Freedman DS, Williamson DF, Byers T. (1993) Do obese children become obese adults? A review of the literature. *Prev Med*, **22**, 167–177.
- Shaw NJ, Crabtree NJ, Kibirige MS, Fordham JN (2007) Ethnic and gender differences in body fat in British schoolchildren as measured by DXA. *Arch Dis Child*, **92**, 872-875.
- Shear CL, Freedman DS, Burke GL, Harsha DW, Webber LS, Berenson GS. (1988) Secular trends of obesity in early life: The Bogalusa Heart Study. *American Journal of Public Health*, **78** (1), 75-77.
- Shevlin M, Adamson G, Collins K (2003) The self-perception profile for children (SPPC): a multiple-indicator multiple-wave analysis using LISREL. *Personality and Individual Differences*, **35**, 1993-2005.
- Shrewsbury V, Wardle J (2008) Socioeconomic status and adiposity in childhood: A systematic review of cross-sectional studies 1990-2005. *Obesity*, **16**, 275-284.
- Singh AS, Mulder C, Twisk JWR, van Mechelen W, Chinapaw MJM (2008) Tracking of childhood overweight into adulthood: a systematic review of the literature. *Obesity Reviews*, **9** (5), 474-488.
- Singer JD (1998) Using SAS PROC MIXED to fit multilevel models, hierarchical models, and individual growth models. *Journal of Educational and Behavioural Statistics*, **23** (4), 323-355.
- Slimming World (2010) Terms and Conditions for Slimming World. [www.slimmingworld.com/join/join\\_online.asp](http://www.slimmingworld.com/join/join_online.asp) (accessed 24/4/2010)
- Smith SM, Gately P, Rudolf M (2008) Can we recognise obesity clinically? *Arch Dis Child*, **93**, 1065-1066.
- Snyder EE, Walts B, Perusse L, Chagnon YC, Weisnagel SJ, Rankinen T, Bouchard C. (2004) The human obesity gene map: the 2003 update. *Obes Res*, **12**(3), 369-439.
- Sobal J, Stunkard AJ. (1989) Socioeconomic status and obesity; a review of the literature. *Psychol. Bul.*, **105**, 260-275.
- Social Issues Research Centre (2005) Obesity and the facts. An analysis of data from the Health Survey for England 2003. Oxford: Social Issues Research Centre.

- Speiser PW, Rudolf MCJ, Anhalt H, Camacho-Hubner C, Chiarelli F, Eliakim A et al (2005) Consensus statement : childhood obesity. *Journal of Clinical Endocrinology and Metabolism*, **90** (3), 1871-1887.
- Spurrier NJ, Magarey A, Wong C (2006) Recognition and management of childhood overweight and obesity by clinicians. *Journal of Pediatrics and Child Health*, **42**, 411-418.
- Stamatakis E, Primatesta P, Chinn S, Rona R, Falaschetti E. (2005) Overweight and obesity trends from 1974 to 2003 in English children: what is the role of socioeconomic factors? *Arch Dis Child*, **90**, 999-1004.
- Stephenson J, Imrie J (1998) Why do we need randomised controlled trials to assess behavioural interventions? *BMJ*, **316**, 611-613.
- Stevens W (2004) Chapter 4: Economic evaluation of health promotion interventions, p41-56. In: Thorogood M and Coombes Y. (Eds.) *Evaluating health promotion. Practice and Methods* (2<sup>nd</sup> Ed). 2004. Oxford: Oxford University Press.
- Stewart J, Thomas S. (2004) Health Promotion in Context. *Environmental Health Journal*, pp 382-384.
- Stewart-Brown S, Patterson J, Mockford C, Barlow J, Klimes I, Pyper C (2004) Impact of a general practice based group parenting programme: quantitative and qualitative results from a controlled trial at 12 months. *Arch Dis Child*, **89**, 519-525.
- Stewart-Brown S (2005) Parenting and Public Health. Briefing Statement. Faculty of Public Health, London.
- Stewart-Brown S (2008) Randomised controlled trial (RCT) and economic evaluation of the Family Links Nurturing Programme. ISRCTN Register : 13919732 [www.controlled-trials.com/ISRCTN13919732/stewart-brown](http://www.controlled-trials.com/ISRCTN13919732/stewart-brown) (accessed 9/12/2009)
- Stewart L, Chapple J, Hughes AR, Poustie V, Reilly JJ (2008) Parents' journey through treatment for their child's obesity: a qualitative study. *Arch Dis Child*, **93**, 335-399.
- Stewart L, Houghton J, Hughes AR, Pearson D, Reilly JJ (2005) Dietetic management of pediatric overweight: development and description of a practical and evidence-based behavioral approach. *Journal of the American Dietetic Association*, **105**, 1810-1815.
- Strauss RS (2000) Childhood obesity and self-esteem. *Pediatrics*, **105**(1), e15.
- Stringer H (2007) An evaluation of the Family Links Nurturing Programme delivered on behalf of Parenting Education and Nurturing Support (PENS). Health on the Streets Team, Bradford and Airedale (teaching) Primary Care Trust.

- Styne DM (1999) Time for action, not complacency. (Editorial) *American Family Physician*, **59**(4), 761-762.
- Sullivan LM, Dukes KA, Losina E. (1999) Tutorials in biostatistics. An introduction to hierarchical linear modelling. *Statistics in Medicine*, **18**, 855-888.
- Summerbell CD, Ashton V, Campbell KJ, Edmunds L, Kelly S, Waters E. (2003) Interventions for treating obesity in children (Cochrane Review). In: The Cochrane Library, Issue 4, 2003. Chichester, UK: John Wiley & Sons, Ltd.
- Summerbell CD, Waters E, Edmunds L, Kelly SAM, Brown T, Campbell KJ (2005) Interventions for preventing obesity in children. Cochrane Database of Systematic Reviews 2005, Issue 3. Art. No.: CD001871. DOI: 10.1002/146551858.CD001871.pub2.
- Sure Start (2008) Childrens Centre Practice Guidance. Section 6: Parenting and Family Support (p33). [www.surestart.gov.uk/publications/?Document=1500](http://www.surestart.gov.uk/publications/?Document=1500) (accessed 7.7.2008)
- Swartz AM, Strath SJ, Bassett DR, O'Brien W, King GA, Ainsworth BE (2000) Estimation of energy expenditure using CSA accelerometers at hip and wrist sites. *Medicine and Science in Sports and Exercise*, **32** (9), S450-S456.
- Sweeting HN. (2007) Measurements and definitions of obesity in childhood and adolescence: a field guide for the uninitiated. *Nutrition Journal*, **6**, 32.
- Tannahill A (1985) What is health promotion? *Health Education Journal*, **44** (4), 167-168.
- Tashakkori A, Teddlie C (1998) Mixed methodology. Combining Qualitative and Quantitative Approaches. London: Sage.
- Tax Free Gold (undated) Exchange rates from dollars to pounds 2001. [www.taxfreegold.co.uk/2001forexrates.html](http://www.taxfreegold.co.uk/2001forexrates.html) (accessed 9/12/2009)
- Taylor RW, Jones IE, Williams SM, Goulding A. (2000) Evaluation of waist circumference, waist-to-hip ratio, and the conicity index as screening tools for high trunk fat mass, as measured by dual-energy X-ray absorptiometry, in children aged 3-19 y. *Am. J. Clin. Nutr.*, **72** (2), 490-495.
- Taylor-Gooby P, Dale J (1981) Cited in Beattie A (1991) Knowledge and control in health promotion: a test case for social policy and social theory. In J Gabe, M Calnan and M Bury (eds) (1994). *The sociology of the health services*, London. Routledge.
- Teddlie C, Yu F (2007) Mixed methods sampling: a typology with examples. *Journal of Mixed Methods Research*, **1** (1), 77-100

- Thompson S, Wordsworth S. (2001) An annotated cost questionnaire for completion by patients. (On behalf of the UK Working Party on Patient Costs). Health Economics Research Unit (HERU) Discussion Paper No. 03/01. University of Aberdeen.
- Thorogood M and Coombes Y. (2004) (Eds.) Evaluating health promotion. Practice and Methods (2<sup>nd</sup> Ed). 2004. Oxford: Oxford University Press.
- Tones K. (1990) Why theorise? Ideology in health education. *Health Education Journal*, **49** (1), 2-6.
- Toschke AM, Ruckinger S, Reinehr T, von Kries R. (2007) Growth around puberty as predictor of adult obesity. *European Journal of Clinical Nutrition*, advance online publication 22 August 2007, doi: 10.1038/sj.ejcn.1602888
- Toschke AM, Kurth BM, von Kries R. (2008) The choice of cutoffs for obesity and the effect of those values on risk factor estimation. *Am. J. Clin. Nutr.*, **87**, 292-294.
- Trehearne James WP, LOSTEIN T. (2009) BMI screening and surveillance: an international perspective. *Pediatrics*, **124**, S42-S49.
- Troiano RP (2005) A timely meeting: objective measurement of physical activity. *Medicine & Science in Sports and Exercise*, **37**(11), S487-S489.
- Trost SG, McIver KL, Pate RR (2005) Conducting accelerometer-based activity assessments in field-based research. *Med. Sci. Sports Exerc.*, **37**(11) Suppl., S531-S543.
- Trost SG, Way R, Okely AD (2006) Predictive validity of three ActiGraph energy expenditure equations for children. *Med. Sci. Sports Exerc.*, **38**, 380-387.
- Tuckman BW (1965) Development sequence in small groups. *Psychological Bulletin*, **63** (6), 384-399.
- Tyrrell VJ, Richards G, Hofman P, Gillies GF, Robinson E, Cutfield WS. (2001) Foot-to-foot bioelectrical impedance analysis: a valuable tool for the measurement of body composition in children. *International Journal of Obesity*, **25**, 273-278.
- UK National Screening Committee (2006) UK National Screening Committee's policy positions. July 2006.  
<http://www.screening.nhs.uk/obesity#fileid8800> (accessed 9/12/2009) and  
<http://www.library.nhs.uk/screening/ViewResource.aspx?resID=60330> (accessed 9/12/2009)
- UK National Screening Committee (2009) Screening Glossary.  
<http://www.screening.nhs.uk/glossary-s#fileid8390> (accessed 9/12/2009)

Unauthored (1999) A primer on before-after studies: Evaluating a report of a "successful" intervention. *Effective Clinical Practice*, **2**(5), 241-243.  
[www.acponline.org/clinical\\_information/journals\\_publications/ecp/sepoct99/primer.pdf](http://www.acponline.org/clinical_information/journals_publications/ecp/sepoct99/primer.pdf) (accessed 9/12/2009)

UNICEF Innocenti Research Centre (2007), An overview of child well-being in rich countries. [http://www.unicef-irc.org/publications/pdf/rc7\\_eng.pdf](http://www.unicef-irc.org/publications/pdf/rc7_eng.pdf) (accessed 9/12/09)

Universities of Leeds and Glamorgan and the London School of Hygiene and Tropical Medicine (1998). The Health of the Nation – a policy assessed. [www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4121577](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4121577) (accessed 9/12/2009)

Upton P, Eiser C, Cheung I, Hutchings HA, Jenney M, Maddocks A, Russell IT, Williams JG (2005) Measurement properties of the UK-English version of the Pediatric Quality of Life Inventory 4.0 (PedsQL) generic core scales. *Health and Quality of Life Outcomes*; **3**: 22.

Van Coevering P, Harnack L, Schmitz K, Fulton JE, Galuska DA, Gao S. (2005) Feasibility of using accelerometers to measure physical activity in young adolescents. *Medicine and Science in Sports and Exercise*. **37** (5), 867-871.

van de Mortel TF (2008) Faking it: social desirability response bias in self-report research', *Australian Journal of Advanced Nursing*, **25** (4), 40-48.

van Sluijs EMF, McMinn, A.M., Griffin, S.J. (2007) Effectiveness of interventions to promote physical activity in children and adolescents: systematic review of controlled trials *BMJ*, **335**, 703-707.

Varni JW (1998) PedsQL Pediatric quality of life inventory. Version 4. [www.pedsq1.org/pedsq113.html](http://www.pedsq1.org/pedsq113.html) (accessed 9/12/2009)

Varni JW, Seid M, Kurtin PS (2001) PedsQL 4.0 : reliability and validity of the Pediatric Quality of Life Inventory version 4.0 generic core scales in healthy and patient populations. *Med Care*, **39** (8), 800-812.

Victora CG, Habicht J-P, Bryce J (2004) Evidence-based public health : moving beyond randomized trials. *American Journal of Public Health*, **94**, 400-405.

Viner RM, Cole TJ. (2005) Adult socioeconomic, educational, social, and psychological outcomes of childhood obesity: a national birth cohort study. *BMJ*, **330**, 1354-7.

Viner RM, Cole TJ (2006) Who changes body mass between adolescence and adulthood? Factors predicting change in BMI between 16 year and 30 years in the 1970 British Birth Cohort. *International Journal of Obesity*, **30**, 1368-1374.

Wabitsch M, Braun U, Heinze E, Muche R, Mayer H, Teller W, Fusch C. (1996) Body composition in 5-18-y-old obese children and adolescents before and after weight reduction as assessed by deuterium dilution and bioelectrical impedance analysis. *Am J Clin Nutr*, **64**, 1-6.

Wardle J, Cooke L (2005) The impact of obesity on psychological well-being. *Best Practice and Research Clinical Endocrinology and Metabolism*, **19** (3), 421-440.

Wardle J, Henning Brodersen N, Cole TJ, Jarvis MJ, Boniface DR (2006) Development of adiposity in adolescence: five year longitudinal study of an ethnically and socioeconomically diverse sample of young people in Britain. *BMJ*, doi:10.1136/bmj.38807.594792.AE (published 5 May 2006)

Wardle J (2007) Eating behaviour and obesity. *Obesity Reviews*, **8 (Suppl.1)**, 73-75.

Wardle J, Carnell S, Haworth CMA, Plomin R (2008) Evidence for a strong genetic influence on childhood adiposity despite the force of the obesogenic environment. *Am J Clin Nutr*, **87**, 398-404.

Weight Watchers International (2003) Press release. Weight Watchers announces new position on enrolment of children and adolescents. [www.weightwatchers.com/about/prs/wwi\\_template.aspx?GCMSID=1003161](http://www.weightwatchers.com/about/prs/wwi_template.aspx?GCMSID=1003161) (accessed 25/4/2010)

Weight Watchers UK (2010) Monthly Pass Subscription Agreement. (Section 12) [www.weightwatchers.co.uk/legal/monthlypasssubagreement.aspx](http://www.weightwatchers.co.uk/legal/monthlypasssubagreement.aspx) (accessed 25/4/2010)

Wells JCK, Fewtrell MS (2006) Measuring body composition. *Arch Dis Child*, **91**, 612-617.

Wells JCK, Fewtrell MS (2008) Is body composition important for paediatricians? *Arch Dis Child*, **93**, 168-172.

Weston AT, Petosa R, Pate RR (1997) Validation of an instrument for measurement of physical activity in youth. *Medicine & Science in Sport & Exercise*, **29** (1), 138-143.

Westwood M, Fayter D, Hartley S, Rithalia A, Butler G, Glasziou P, Bland M, Nixon J, Stirk L, Rudolf M. (2007) Childhood obesity: should primary school children be routinely screened? A systematic review and discussion of the evidence. *Arch. Dis. Child.*, **92**, 416-422.

Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH (1997) Predicting obesity in young adulthood from childhood and parental obesity. *N Engl J Med*, **337**, 869-873.

Widhalm K, Schonegger K, Huemer C, Auterith A. (2001) Does the BMI reflect body fat in obese children and adolescents? A study using the TOBEC method. *Int. J. Obes. Relat. Metab. Disord.*, **25**(2), 279-285.

Williams J, Wake M, Hesketh K, Maher E, Waters E (2005) Health-related quality of life of overweight and obese children. *JAMA*, **293**, 70-76.

Wolcott HF (2001) Writing up qualitative research. 2<sup>nd</sup> Edition. California: Sage Publications.

World Bank (2009) Glossary. [www.worldbank.org/hsr/class/module1/glossary.htm](http://www.worldbank.org/hsr/class/module1/glossary.htm) (accessed 9/12/09)

World Health Organisation (1986) Ottawa Charter: principles for health promotion. Copenhagen: WHO regional office for Europe.

World Health Organisation (1998) WHO (Five) Well-Being Index. Psychiatric Research Unit, WHO Collaborating Centre for Mental Health. [http://www.cure4you.dk/354/WHO-5\\_English.pdf](http://www.cure4you.dk/354/WHO-5_English.pdf) (accessed 9/12/2009)

World Health Organisation (2004) Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet*, **363**, 157-163.

World Health Organisation (2006) BMI Classification. Global database on body mass index. [www.who.int/bmi/index.jsp?introPage=intro\\_3.html](http://www.who.int/bmi/index.jsp?introPage=intro_3.html) (accessed 9/12/2009)

World Health Organisation (2009) Childhood overweight and obesity. [www.who.int/dietphysicalactivity/childhood/en](http://www.who.int/dietphysicalactivity/childhood/en) (accessed 9/12/2009)

Wright CM, Parker L, Lamont D, Craft AW. (2001) Implications of childhood obesity for adult health: findings from thousand families cohort study. *BMJ*, **323**, 1280-1284.

## Appendix I

### Further Details of UK Studies on Tracking of Childhood Obesity to Adulthood

**Hardy et al (2000)** reported findings from the 1946 British birth cohort and showed that overweight at age 14 years tracked through to adult obesity in only 6% of participants at age 20, but became a stronger predictor with increasing age (35% at age 43) (Table 2.6). However, to define overweight at age 14 the authors used body weight as a % of standard weight for a specific height, age and sex, and then classified those who were 20% above the standard weight as being 'overweight'. This definition is different from all other studies and may account for the lower persistence of obesity. Multi-level modelling showed that manual social class in childhood was associated with an increased persistence of obesity.

**Wright et al (2001)** reported results from the 1947 birth cohort of 1000 families from Newcastle (Table 2.6). There were only a small number of children who were obese. BMI in childhood at both age 9 and age 13 showed significant correlations with adult BMI (9 yrs:  $r=0.24$ ,  $p<0.001$ ; 13 yrs:  $r=0.39$ ,  $p<0.001$ ). Of those children who were above the 90<sup>th</sup> centile for BMI at age 9, 42% had a BMI above 30 kg/m<sup>2</sup> (i.e. obese) at age 50 years, whereas only 8% of children in the lowest quartile for BMI (<25<sup>th</sup> centile) were obese at age 50. Similarly, of the children who were above the 90<sup>th</sup> centile at age 13 years, 45% were obese at age 50, in contrast to only 5% of the children in the lowest quartile for BMI.



**Power et al (1997)**, in an analysis of the data from the 1958 British birth cohort found that there was an increased likelihood of being obese (BMI > kg/m<sup>2</sup>) at age 33 years if the child was obese at later stages of childhood (56% tracking at age 16) (Table 2.6). Furthermore, the more obese the child (i.e. higher percentile for BMI) the greater the tracking to adult obesity (not in table). Power et al (1997) illustrated this by defining childhood obesity by the 91<sup>st</sup>, 95<sup>th</sup> and 98<sup>th</sup> percentiles for females at age 16yrs which led to a tracking to adult obesity at age 33 years of 46%, 56% and 72%, respectively. Other analyses of the 1958 British birth cohort have also shown that gain in BMI / weight from age 7 to 11 was a risk factor for later obesity (Toschke et al 2007). Furthermore, parental obesity has been shown to be a risk factor, with obese children of two obese parents showing the strongest tracking of obesity to adulthood (Lake 1997).

**Viner and Cole (2005, 2006)** reported findings from the 1970 British birth cohort and showed that of children who were obese at age 10 and 16 years (defined by 95<sup>th</sup> centile for BMI) just over half (52% and 61%) were also obese at age 30 (BMI>28.5 kg/m<sup>2</sup>) (Table 2.6). Obesity at age 10 carried a fourfold increased risk of obesity in adulthood in both men (OR 4.8, 95% CI 3.3 to 6.8, p<0.0001) and women (OR 4.7, 95% CI 3.2 to 6.9, p<0.0001).

## Appendix II

### Further Details of Studies Examining Impact of Childhood Obesity on Social and Economic Outcomes in Adulthood

**Sargent and Blanchflower (1994)** used the National Child Development Study, a 1958 UK birth cohort, to examine the association between obesity at age 16 and earnings at age 23 in 12,537 respondents. Both males and females who were obese at age 16 had significantly less years of schooling than those who were not obese. Females who were obese at 16 also performed less well in mathematic and reading tests at ages 7,11 and 16. Moreover, women in the top 10% for BMI at age 16 were earning 7% less (95% CI -4 to -11%) at age 23. This was true for both obese 16 year-old females whose obesity persisted to age 23, and for those who were *not* obese by age 23. These relationships were independent of parental social class and scores on mathematic/reading tests. There was no relationship between obesity and earnings in males.

**Viner and Cole (2005)** examined data from 8,490 participants from the 1970 British birth cohort at age 10 and age 30. In this cohort, obesity in childhood which persisted into adulthood led to a doubling of the risk in women of both never having been employed (OR = 1.9, 95% CI 1.1. to 3.3) and relationship outcomes defined as having no current partner (OR = 2.0, 95% CI 1.3 to 3.3), compared with those who were not obese in childhood or adulthood. However, the age they left school, number of qualifications, type of job, and likelihood of never having been married were not significantly different for women whose obesity had persisted since childhood. No adverse effects were seen at all in men. In contrast to the previous study, obesity in childhood **only**, had no

adverse socio-economic, educational, social and psychological outcomes at age 30 in either gender.

**Laitinen et al (2002)**, from the 1966 Northern Finland birth cohort, examined BMI data from 9754 adolescents at age 14 and at age 31, examining the primary outcome of long-term unemployment. Obesity and overweight at age 14 did not predict long-term unemployment in either males or females at age 31, compared with normal weight. However, in multivariate regression controlling for social class as a confounder, obesity at age 14 was associated with being single or divorced at age 31 in females (OR: 1.62, 95% CI 1.20 to 2.21) but not in males (OR: 1.19, 95% CI 0.85 to 1.67). Furthermore, obesity at age 14 was associated with low educational attainment at age 31. In a previous paper it was shown that in this cohort childhood obesity persisted to adulthood in about half (Laitinen et al 2001). A useful sub-group analysis would have been to compare those whose obesity persisted into adulthood and those whose obesity stopped in adolescence, but this was not done.

### Appendix III – Research Grant, Service Support and Treatment Costs

#### Details of Research Grant (£70,385) from Department of Health's Public Health Initiative for novice researchers

Item	Cost
Tender for developing the programme, training manuals and parent and child handbooks	£25,000
Printing costs for parent and child workbooks and facilitator hand books	£500
3-4 day training & supervision of facilitators	£9,000
Clerical support (2 days a week for the 2 years)	£15,895
Half day training session for clinicians recruiting to study	£2,000
Health Economics Consultant	£5,000
Equipment i.e. scales, stadiometer, pedometers, heart rate monitors, mini-disc recorder, rights to questionnaire, BMI charts	£2090
Qualitative research skills methods course	£650
Transcribing of interviews	£2,000
Costs of meetings for the research advisory group (venue, hospitality, travel)	£1,000
Travel to conferences for dissemination of results	£1,000
Office consumables necessary for the project	£5,000
'Thank you' for families completing questionnaires e.g. Fruit and vegetable box, leisure centre voucher, Boots voucher	£900
Travel expenses and payment for parents who provide consumer advice	£350
<b>Total</b>	<b>£70,385</b>

#### Estimate of Service Support and Treatment Costs

Type of 'Ad-hoc' Funding & Funder	Summary of activities	Estimated Cost
<b>Service support costs</b>  from R&D Department at the Department of Health	Obtaining advice from NHS staff for the development of the programme	<b>£3,709</b>
	Recruitment of families by NHS staff	
	Obtaining opinions of NHS facilitators	
<b>Treatment Costs</b> from Coventry Teaching PCT	Training of facilitators	<b>£12,836</b>
	Facilitators time to run intervention	
	Additional costs to run the programme i.e. hire of venue, consumables	

**Appendix IV**  
**Letters confirming Ethical Approval from Coventry Research Ethics Committee (NHS) (REC reference 05/Q2802/15)**

**(a) Letter from Coventry REC – 17/3/05**

SL14 Favourable opinion following consideration of further information  
Version 2, October 2004



**Coventry Research Ethics Committee**  
Trust Admin Centre 1  
Walsgrave Hospital  
Clifford Bridge Road  
Coventry  
CV2 2DX  
pauline.pittaway@uhcw.nhs.uk

17 March 2005

Prof Sarah Stewart-Brown  
Professor of Public Health  
Division of Health in the Community  
Warwick Medical School, LWMS  
Gibbet Hill Campus, The University of Warwick  
Coventry  
CV4 7AL

Dear Prof Stewart-Brown

**Full title of study:** *A new family based intervention ('Families for Health') for the management of overweight and obese children: programme development and pilot study to inform future cost-effectiveness trial.*

**REC reference number:** 05/Q2802/15

**Protocol number:**

Thank you for your letter of 14 March 2005, responding to the Committee's request for further information on the above research and submitting revised documentation. Your very clear documentation was much appreciated.

The further information has been considered on behalf of the Committee by the Chairman.

**Confirmation of ethical opinion**

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised. Please do not forget to type the current version number and date of the Participant Information Sheet into paragraph 1 on the Consent Form.

**Conditions of approval**

The favourable opinion is given provided that you comply with the conditions set out in the attached document. You are advised to study the conditions carefully. Should any R&D department of any Primary Care Trust require you to implement any changes subsequent to this approval you must submit a Request for Protocol Amendment form to this Research Ethics Committee for approval.

**Approved documents**

The final list of documents reviewed and approved by the Committee is as follows:

An advisory committee to West Midlands South Strategic Health Authority

<b>Document Type:</b>	<b>Version:</b>	<b>Dated:</b>	<b>Date Received:</b>
Application	Version 2	14/03/2005	17/03/2005
Investigator CV	Prof. S Stewart-Brown	01/09/2003	25/01/2005
Investigator CV	Wendy Robertson		25/01/2005
Protocol	Version 2	04/03/2005	17/03/2005
Covering Letter		24/01/2005	25/01/2005
Summary/Synopsis	Version 1	25/01/2005	25/01/2005
Letter from Sponsor	J Baldwin, Registrar	21/01/2005	25/01/2005
Peer Review	Public Health Initiative, 2 versions		25/01/2005
Compensation Arrangements	email from J McErlane + copies of Insurance Certificates	01/01/2005	25/01/2005
Interview Schedules/Topic Guides	Consultation with Parents re. Development of Programme	25/01/2005	25/01/2005
Interview Schedules/Topic Guides	Topic Guide for Children's Focus Groups	25/01/2005	25/01/2005
Interview Schedules/Topic Guides	Topic Guide 1to1 Interviews with Parents at end of Programme	25/01/2005	25/01/2005
Copy of Questionnaire	Children's Picture Questionnaire, version 1	25/01/2005	25/01/2005
Copy of Questionnaire	Vs 4 Child Report (age 8-12)		25/01/2005
Copy of Questionnaire	Family Eating & Activity Habits Revised		25/01/2005
Copy of Questionnaire	PedsQL vs 4 Parent Report for Children age 8-12		25/01/2005
Copy of Questionnaire	vs1 End of Programme Evaluation	25/01/2005	25/01/2005
Sample Diary/Patient Card	Physical Activity Diary		17/03/2005
Copies of Advertisements	Does yr 7-11 yr old have difficulty with their weight?		25/01/2005
Letters of Invitation to Participants	Version 1, from the GP	23/01/2005	25/01/2005
Participant Information Sheet	Version 2 Children	04/03/2005	17/03/2005
Participant Information Sheet	Version 2 Parents	04/03/2005	17/03/2005
Participant Consent Form	Version 1	25/01/2005	25/01/2005
Response to Request for Further Information	Letter Prof. S Stewart-Brown	14/03/2005	17/03/2005
Other	Funding Contract between Secretary of	29/10/2004	25/01/2005

	State for Health & Warwick University		
Other	Copy application National Co-ordinating Centre	18/03/2004	25/01/2005
Other	Version 1 RETURN SLIP agree details passed to W Robertson for more information	23/01/2005	25/01/2005
Other	Version 1 RETURN SLIP following consultation request more info.	23/01/2005	25/01/2005
Other	Short Depression Happiness Scale		25/01/2005

Regarding the last paragraph of your letter dated 14 March 2005 referring to the Children's Physical Activity Diary; when you are ready to use this document will you please supply a copy, together with a completed 'Request for Amendment Form' which you will find available on the COREC website i.e. [www.corec.org.uk](http://www.corec.org.uk). This Committee is unable to grant approval for any document that it has not viewed. Your documents will be reviewed by an Executive Sub-Committee who will make a decision within 35 days of receipt.

#### Management approval

The study should not commence at any NHS site until the local Principal Investigator has obtained final management approval from the R&D Department for the relevant NHS care organisation.

#### Notification of other bodies

The Committee Administrator will notify the research sponsor that the study has a favourable ethical opinion.

#### Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

05/Q2802/15

Please quote this number on all correspondence

With the Committee's best wishes for the success of this project,

Yours sincerely,

  
Mrs C C Wright  
Chairman

SL14 Favourable opinion following consideration of further information  
Version 2, October 2004

Enclosures

Standard approval conditions  
Site approval form (SF1)

Copy to

Division of Health in the Community  
Warwick Medical School  
University of Warwick  
Coventry CV4 7AL  
Attention of Prof. Jeremy Dale



## Coventry Research Ethics Committee

LIST OF SITES WITH A FAVOURABLE ETHICAL OPINION

*For all studies requiring site-specific assessment, this form is issued by the main REC to the Chief Investigator and sponsor with the favourable opinion letter and following subsequent notifications from site assessors. For issue 2 onwards, all sites with a favourable opinion are listed, adding the new sites approved.*

<b>REC reference number:</b>	05/Q2802/15	<b>Issue number:</b>	1	<b>Date of issue:</b>	17 March 2005
<b>Chief Investigator:</b>	Prof Sarah Stewart-Brown				
<b>Full title of study:</b>	A new family based intervention ('Families for Health') for the management of overweight and obese children: programme development and pilot study to inform future cost-effectiveness trial.				
<p><i>This study was given a favourable ethical opinion by Coventry Research Ethics Committee on 17 March 2005. The favourable opinion is extended to each of the sites listed below. The research may commence at each NHS site when management approval from the relevant NHS care organisation has been confirmed.</i></p>					

Principal Investigator	Post	Research site	Site assessor	Date of favourable opinion for this site	Notes <sup>(1)</sup>
Prof. Sarah Stewart-Brown		Recruitment of participants will be from: (a) Coventry Primary Care Trust, via General Practices and Coventry PCT:- Approx 10 General Practices and the clinics of the Community Paediatricians, School Nurses, University Hospitals Coventry & Warks (UHCW) NHS Trust:- Via the clinics of Paediatricians & Dietitians Coventry City Leisure Centre, Fairfax St, Coventry	Coventry Research Ethics Committee	17/03/2005	
<p>Approved by the Chair on behalf of the REC:</p> <p><i>[Signature]</i> ..... (Signature of Chair/Administrator*)</p> <p>(*delete as applicable)</p> <p><i>[Signature]</i> ..... (Name)</p>					

<sup>(1)</sup> The notes column may be used by the main REC to record the early closure or withdrawal of a site (where notified by the Chief Investigator or sponsor), the suspension or termination of the favourable opinion for an individual site, or any other relevant development. The date should be recorded.

(b) Letter from Coventry REC – 12/9/05 (Substantial Amendment 1)

SL32 Favourable opinion of amendment  
Version 2, October 2004



**Coventry Local Research Ethics Committee**

Walsgrave Hospital Site  
Clifford Bridge Road  
Coventry  
CV2 2DX

12 September 2005

Tel: 024 7653 5219  
Fax: 024 7653 5168  
Email: [pauline.pittaway@uhcw.nhs.uk](mailto:pauline.pittaway@uhcw.nhs.uk)

Professor Sarah Stewart-Brown  
Professor of Public Health  
Warwick Medical School  
University of Warwick  
Coventry  
CV4 7AL

Dear Professor Stewart-Brown

**05/Q2802/15 – Please quote in all communications**

**Family Intervention for the Management of Overweight/Obese Children. (Prof. Sarah Stewart-Brown, Professor of Public Health, Warwick Medical School, University of Warwick)**

**Amendment number: 1**  
**Amendment date: 22 August 2005**

Thank you for your letter dated 22 August 2005 advising this Committee that you were not seeking ethical approval to use 3 questionnaires for children and 1 questionnaire for adults. I must inform you that the use of additional questionnaires falls under the category of a substantial amendment, SOPS version 3, section 5.33 (see attached copy pages).

This amendment was reviewed by the Sub-Committee today.

**Ethical opinion**

The members of the Committee present gave a favourable ethical opinion of the amendment on the basis described in your letter and supporting documentation.

**Approved documents**

The documents reviewed and approved at the meeting were:

- Your letter dated 22 August 2005.

For Children

- "What I am Like" Version 1 22 August 2005.  
(presumably some instructions will be given for the completion of this tool?)
- "How good is your Health today?" Version 1 22 August 2005.
- Activity Diary Version 1 22 August 2005.

For Adults

- "What did it cost you?"

Version 1 22 August 2005

**Membership of the Committee**

The members of the Ethics Committee who reviewed this amendment were:

Mrs C C Wright	Chairman	University Lecturer	Female
Revd M Bratton	Alternative Vice-Chair	Anglican Chaplain & Barrister at Law	Male

**Research Governance Approval**

All investigators and research collaborators in the NHS should notify the R&D Department of the relevant NHS care organisation of this amendment and check whether it affects research governance approval of the research.

**Statement of compliance**

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

05/Q2802/15

Please quote this number on all correspondence

Yours sincerely,



**Pauline Pittaway**  
**Committee Co-ordinator**

Copies: :R&D Dept. Coventry PCT  
Sponsor: Jeremy Dale, Division of Health in Community, University of Warwick

(c) Letter from Coventry REC – 9/5/07 (Substantial Amendment 2)



**National Research Ethics Service**

**Coventry Research Ethics Committee**

2nd floor West Wing  
University Hospital  
Clifford Bridge Road  
Coventry  
CV2 2DX

09 May 2007

Tel: 024 7696 7529  
Fax: 024 7696 5033

Prof Sarah Stewart-Brown  
Professor of Public Health  
Warwick Medical School, LWMS  
Gibbet Hill Campus, The University of Warwick  
Coventry  
CV4 7AL

Dear Prof Stewart-Brown

**Study title:** A new family based intervention ('Families for Health') for the management of overweight and obese children: programme development and pilot study to inform future cost-effectiveness trial.  
**REC reference:** 05/Q2802/15  
**Amendment number:** Amendment No 2  
**Amendment date:** 10 April 2007

The above amendment was reviewed by the Sub-Committee of the REC on 09 May 2007.

**Ethical opinion**

The members of the Sub-Committee gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation. Please remember to produce the Participant Information Sheet and Consent Form on University letterheads.

**Approved documents**

The documents reviewed and approved at the meeting were:

Document	Version	Date
Participant Information Sheet: Parents	Version 3	27 March 2007
Participant Consent Form	Version 2	10 April 2007
Notice of Substantial Amendment (non-CTIMPs)	Amendment No 2	10 April 2007
Covering Letter	Prof. Stewart-Brown	10 April 2007

This Research Ethics Committee is an advisory committee to West Midlands Strategic Health Authority  
*The National Research Ethics Service (NRES) represents the NRES Directorate within the National Patient Safety Agency and Research Ethics Committees in England*

### **Membership of the Committee**

The members of the Sub-Committee who reviewed the amendment were:

Mr S Keay	Consultant in Reproductive Medicine	Chairman
Mr M Sakr	Consultant in Emergency Medicine	Expert Member

### **R&D approval**

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

### **Statement of compliance**

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

05/Q2802/15:

Please quote this number on all correspondence

Yours sincerely

  
**Ms Pauline Pittaway**  
**Committee Co-ordinator**

E-mail: pauline.pittaway@uhcw.nhs.uk

Enclosures List of names and professions of members who reviewed the amendment.

Copy to: Professor Jeremy Dale, Division of Health in the Community,  
University of Warwick, Coventry CV4 7AL

R&D office for Coventry PCT

**Appendix V**  
**Letter Confirming Research & Development Approval from Coventry PCT**

**Confidential**

**Coventry NHS**  
**Primary Care Trust**

Our Ref: R&D/Coventry tPCT/05/Q2802/15 (Version 2)

Date: 6<sup>th</sup> April 2005.

**Research & Development Dept**  
**The Caludon Centre**  
Clifford Bridge Road  
Walsgrave  
Coventry  
CV2 2TE

☎ 02476 602020 Ext: 7430  
Fax: 02476 538920

**CHIEF INVESTIGATOR**

Professor of Public Health  
Division of Health in the Community  
University of Warwick  
Warwick Medical School  
(Old Maths & Statistics Building)  
Gibbet Hill  
COVENTRY CV4 7AL

For the attention of Professor Sarah Stewart-Brown

Associate Research Fellow/Specialist Trainee in Public Health

Division of Health in the Community  
University of Warwick  
Warwick Medical School  
(Old Maths & Statistics Building)  
Gibbet Hill  
COVENTRY CV4 7AL

✓ For the attention of Wendy Robertson

**RESEARCH ADMINISTRATOR**

Room MSB04  
Division of Health in the Community  
Warwick Medical School  
(Old Maths & Statistics Building)  
Gibbet Hill  
COVENTRY CV4 7AL

For the attention of Mrs Krysia Saul

Dear Professor Stewart-Brown and Ms Robertson,

**RESEARCH & DEVELOPMENT**

**REC REC Ref: 05/Q2802/15 Please quote at all times.**

**RESEARCH STUDY:**

**A new family based intervention ('Families for Health') for the management of overweight and obese children: programme development and pilot study to inform future cost-effectiveness trial.**

**CHIEF INVESTIGATOR:**

Prof. Sarah Stewart-Brown  
Professor of Public Health  
Division of Health in the Community  
University of Warwick  
COVENTRY CV4 7AL

Thank you for the above research study, the R&D Dept of Coventry Teaching PCT considered the locality issues relating to the above application and has no objection to the research being conducted within this locality.

- The above study has been granted approval by Coventry Teaching PCT and is registered with the R&D Dept of Coventry Teaching PCT. In due course, the study will be submitted to the Dept of Health's National Research Register.

Page 1

## **Appendix VI**

### **Members of the Research Advisory Group**

- Professor Sarah Stewart-Brown, Professor of Public Health, Warwick Medical School (Chair of Advisory Group)
- Professor Jane Barlow, Professor of Public Health in the Early Years, Warwick Medical School, University of Warwick
- Dr Jackie Blissett, Department of Psychology, University of Birmingham
- Chris Burrows, Community Dietitian, University Hospitals Coventry & Warks (UHCW) NHS Trust
- Mary Crowley, Chief Executive, Parent Education & Support Forum, London (for support with the tendering process only)
- Dr Laurel Edmunds, Research Fellow
- Dr Krystina Matyka, Senior Lecturer in Paediatrics, University of Warwick
- Dr Anita Morgan, Consultant Community Paediatrician, Coventry PCT
- Shirley Raven, Clinical Leader – School Nursing, Coventry PCT
- Wendy Robertson, Warwick Medical School
- Professor Mary Rudolf, Consultant Community Paediatrician and Professor of Child Health, University of Leeds
- Dr Maybelle Wallis, Consultant Community Paediatrician and Director of Child Health Services, Coventry PCT (now Consultant Paediatrician, Sandwell General Hospital)
- Rob Wallis, Partnership Director, Coventry, Solihull and Warwickshire Sport, University of Warwick (partnership between Local Authorities, local education & sport's bodies)
- Elizabeth Wilcock, Senior Lecturer in Lifestyle Management, Department of Nursing, Midwifery and Health Care, Coventry University



Articles in the local Coventry Newspapers for Recruitment

It way to raise funds

Church, will be running a "posh hats" stall, which promises to offer some top-quality headgear for the most ostentatious occasion.

Mrs Boston said: "We've got so many, I don't know what we'll get rid of them

all but it's a case of no good offer refused."

Her stall will be one of many at tomorrow's fete at Manor Farm from 2pm.

It is raising funds for the restoration of the parish church, which needs about £100,000.



...al car from Les Ratcliffe. **Picture: LISA CAREY**  
 ...r  
 ...adition  
 ...ys for  
 ...s been  
 ...s Lord  
 ...h the  
 ...e.  
 ...lant  
 ...Lord

**Mayor of Coventry.**

The Lord Mayor, who drives a Peugeot, said: "I enjoy sitting in the Jaguar. Most importantly, I am keen to maintain a good relationship with the company even though the production line is being transferred to Castle Bromwich. It is sad that Coventry has lost the production here."

# Fun way to help children shed weight

By STAFF REPORTER

news@coventry-telegraph.co.uk

**CHILDREN with a weighty problem could get help to shed the pounds at a pilot health scheme running at Warwick University.**

The university, in Gibbet Hill Road, Coventry, has received funding to help 30 city families with overweight children aged seven to 11.

The programme, funded by the Department of Health, will involve parents and children and put an emphasis on making changes in a fun way.

Experts in nutrition, exercise and parenting will work with the families over 12 weeks this autumn to improve youngsters' lifestyles.

Prof Sarah Stewart-Brown from Warwick Medical School, who is leading the research, said: "We know from research in other countries that support which involves all the family can help children with their weight.

"We want such programmes to be

available to families in the UK. The programme we have developed is based on research which shows that parents' help is crucial and that it is easier to make changes to your lifestyle if you are having fun."

The first 30 families to contact the university and who fit the overall profile will get a place on the programme.

The families will take part in a two-and-a-half hour session each week for 12 weeks from September to December, on Wednesdays after school or on Saturday mornings. The venue is Coventry Sports and Leisure Centre in Fairfax Street, city centre.

Prof Stewart-Brown added: "Children who are obese have higher risks of getting joint problems, asthma and diabetes and in being bullied or teased.

"They are also more at risk of a number of health problems in adulthood, including heart disease."

Families interested in the programme should contact Wendy Robertson at Warwick Medical School on 024 7657 4660 or e-mail w.robertson@warwick.ac.uk

6 August 11, 2005

THE BRIDGE HYPNOTHERAPY CLINIC

**QUIT SMOKING NOW!  
LOSE WEIGHT  
NOW!**

**FREEDOM FOREVER**

**USING CLINICAL  
HYPNOTHERAPY**

**CALL TODAY ON 024 7641 8849**

52 Earlsdon Street, Coventry CV5 6EL.  
FOR OTHER ISSUES PLEASE CALL  
FOR FURTHER INFORMATION.

ON THE WEB? GO TO: [www.icCoventry.co.uk](http://www.icCoventry.co.uk)

Coventry Citizen

## Uni to pilot weight loss programme for kids

THE University of Warwick has just received funding to provide a free pilot programme for 30 families in Coventry with children aged 7-11 year old who face problems with their weight.

The free pilot programme, funded by the Department of Health, will be run and evaluated by Warwick Medical School in the Autumn. The first 30 families to contact the University who fit the overall profile will get a place in a family centred 12 week support programme entitled "Families for Health" that will involve both parents and children and be good fun. And

draw on specially trained facilitators who know about nutrition, physical activity, parenting and working with children.

The programme is for families of children aged 7 to 11 years who have difficulty with their weight. It is for both the child and at least one of their parents.

If families have more than one child between 7 and 11 they can all attend, whether or not they have weight problems. The families will take part in one 2 and a half hour sessions each week for 12 weeks from September to December 2005, on Wednesdays after school or on Saturday

mornings in Coventry Sports and Leisure Centre, Fairfax Street, Coventry. Parents and children will meet in separate groups both of which will cover ideas for supporting family relationships and well-being, and healthy food and activity.

Professor Sarah Stewart-Brown from Warwick Medical School at the University of Warwick who is leading the research has said: "We know from research in other countries that support which involves all the family can help children with their weight, and we want such programmes to be available

to families in the UK. The programme we have developed is based on research which shows that parents help is crucial, and that it is easier to make changes to your lifestyle if you are having fun. These first 30 families will help us road test the programme."

She added: "Children who are obese have higher risks of getting joint problems, asthma and diabetes, and in being bullied or teased. They are also more at risk of a number of health problems in adulthood including heart disease."



**Appendix VIII - PARTICIPANT INFORMATION SHEET for Children**  
(Version 2, 4/3/05)



**What is the 'Families for Health' programme?**

It is an exciting new programme for children aged between 7 to 11 years who have difficulty with their weight.



**Do I have to take part?**

*No. It is up to you and your Mum, Dad or carer to decide if you would like to*

**What will we do if we decide to take part?**

You will come to the 'Families for Health' group sessions each week for 12 weeks. You will be in a group with other children, and will also meet up with your Mum, Dad or carer some of the time. The sessions will be fun, and will include games and chances to be active while you learn about healthy eating and other ways to feel good. You will also be able to talk about your life generally and how you feel about it. You can choose what activities you want to join in with. You will be given an Activity Book with ideas for things to try out between sessions, and where you can add your own ideas too



**Who can I talk to if I have some questions?**

Your Mum / Dad or  
Wendy Robertson  
Telephone 024 7657 4660,  
Email [W.Robertson@warwick.ac.uk](mailto:W.Robertson@warwick.ac.uk)



## Appendix IX

### Participant Information Sheet for Parents



#### **'Families for Health' Research Project**

Version 2 (Parents) - Dated 4/3/05

**You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you would like to. Please ask us if there is anything that is not clear or if you would like more information. Our contact details are at the end of this information sheet. Take time to decide whether or not you wish to take part.**

#### **1. What is the purpose of the study?**

Obesity is becoming more common in children in the UK. Being overweight as a child can lead to low self-esteem, health problems and being overweight as an adult. In adulthood, being overweight increases the risk of heart disease, diabetes and other illnesses. We want to find ways to help children who are overweight. Research from around the world show that programmes which closely involve parents are the most likely to be helpful.

Parents have the potential to play a key role in managing the weight of their children by changing the environment in which they live (e.g. what is eaten at home) and by providing more opportunities for exercise. Our skills as parents may be key to this change. With this focus, the 'Families for Health' programme has been developed by researchers from the University of Warwick in conjunction with Family Links (who are experts at developing programmes for parents and children). This study will assess the 'Families for Health' programme to see whether it is effective in helping children who have difficulty with their weight and whether it is also helpful to their families.

The 'Families for Health' programme will involve you the parent/carer and your child attending a weekly session for 12 weeks. We will also need to see you and your child 6 months later.

## **2. What is the 'Families for Health' programme ?**

The programme consists of group sessions lasting 2½ hours involving 10-12 parents and their child(ren) every week for 12 weeks. Parents and children will attend separate groups, with a shared activity during the course of the sessions. The group sessions will be run by people who are specially trained, all of whom will have been 'police checked' for their suitability to work with children.

The group sessions for the parents will focus on understanding the physical and emotional causes of obesity, and on parenting skills and issues. The sessions will focus on helping parents develop solutions to problems, including issues around healthy eating and keeping the family active.

The group sessions for the children will include fun activities on healthy eating, opportunities to engage in physical activities and support with their emotional needs (including, where appropriate problems at school and with friends).

Family Links programmes have a well earned reputation among both parents and children for being both helpful and enjoyable. We can arrange for you to talk to another parent/child who have been to a course before you, if you would like.

## **3. Why have you been chosen to take part in this study?**

We are aiming to recruit 30 families in total to the study.

You and your child have been invited to participate because your family doctor, school nurse, paediatrician, dietitian or other health worker has identified that your child is between ages 7 to 11 years and is overweight for his/her age and height. The assessment of 'overweight' has been made using standard charts.

Alternatively, you may have responded to an advertisement about the research because you and your child are interested in taking part.

## **4. Do I have to take part?**

No. It is up to you and your child to decide whether or not to take part. If you decided to take part you would be given this information sheet to keep and would be asked to sign a consent form. If you decided to take part, you would still be free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, would not affect the standard of care you receive.

## 5. **What would happen if we agreed to take part in the study?**

The 'Families for Health' programme would involve you the parent/carer and your child attending the 2½ hour session each week for 12 weeks at Coventry Sports and Leisure Centre, Fairfax Street, Coventry, CV1 5RY.

The programme will be running from January to March 2006, on Mondays after school from 5pm to 7:30pm.

In order to see if the 'Families for Health' programme works, we need to obtain some measurements and information from you and your child at the following three time points.:-

- (1) At the start of the 12 week Programme
- (2) At the end of the 12 week Programme
- (3) 6 months after the end of the Programme

This is a 'before and after' study, in that we make measurements at the start, at the end of the programme and then again 6 months later, to see if the measurements have changed. The measurements that we wish to make are:-

### ***Measurements with your Child***

- Height, weight, waist size and physical fitness.
- Questionnaires about diet, leisure activities and quality of life.
  
- During the last session of the programme, your child would be interviewed in a group of 3-4 children to find out what they gained from the programme and what they liked / did not like. With your consent this interview would be tape-recorded.

### ***Measurements with Parents/Carers***

- Questionnaires about family eating habits, relationship with your child, quality of life of your child and your own sense of well being.
  
- After the 12 week programme, each parent would be asked to complete a questionnaire about their experiences of the programme. Ten parents would also be interviewed at home to obtain their experiences of the programme and its impact on them. With their consent this interview would be tape-recorded.

**6. What would we have to do?**

You and your child would have to try to attend all of the sessions of the 'Families for Health' programme. During the group sessions you would be given a handbook. There would be suggestions for activities for you and your child to try between the sessions, which would be in the handbook.

**7. What are the possible disadvantages and risks of taking part?**

A possible disadvantage is the amount of time this study would take for you and your child. In particular, attendance at the group session is a weekly commitment for 12 weeks.

**8. What are the possible benefits of taking part?**

The 'Families for Health' programme has been designed to help you and your child with weight management, with parenting skills and with your relationship with your child. However, this cannot be guaranteed. It would also provide you with the opportunity to meet other families with similar issues.

The information we get from this study will help us to help other families with children who are overweight in the future.

**9. What happens when the research study stops?**

After the end of the 12 week 'Families for Health' programme, both children and parents will keep their copies of the programme handbook to refer to if they so wish. The programme will also focus on healthy eating and activity that can be maintained once the 12 week programme has stopped. For example, the programme will include tasters of the exercise sessions that would be available in Coventry Leisure Centre.



#### 10. **What if something goes wrong?**

The 'Families for Health' programme does not replace your child's existing health care.

*If you wish to complain or have any concerns about how you have been approached or treated during the course of this study, Coventry Teaching PCT's Independent Complaints Advocacy is open to you. The contact details are:-*

*By telephone:- 02476 602020, Extension 6008*

*By post:- Complaints Department (For the attention of Karen Railton)  
Coventry Teaching Primary Care Trust  
Christchurch House  
Greyfriars Lane  
Coventry  
CV1 2GQ*

#### 11. **Will my taking part in this study be kept confidential?**

All information which is collected about you and your child during the course of the research would be kept strictly confidential. Any information about you and your child will have your name and address removed so that you cannot be recognised from it.

With your agreement, we would notify your child's General Practitioner and if appropriate your child's Paediatrician of their participation in the study.

The only reason that confidentiality would need to be broken is if there is cause for concern that your child is at risk in some way. If this is the case you will be informed before any action is taken.

#### 12. **What will happen to the results of the research study?**

The results will be used to decide whether the 'Families for Health' programme can help families who have a child who is overweight. The results of the study will be written up in reports for the Department of Health, Coventry Primary Care Trust and health care journals. General Practices will be sent the results.

We will send you a summary of the results in the post by December 2006.

The identity of those taking part will not be identified in any report or publication.

**13. Who is organising and funding the research?**

The research is being organised by Professor Sarah Stewart-Brown and Wendy Robertson from the Medical School at the University of Warwick.

The Department of Health is funding the research. The researchers do not receive any additional payment for including you in the study.

**14. Who has reviewed the study?**

The study has been reviewed by Coventry Local Research Ethics Committee. An Advisory Group has also been set up to oversee the research, which includes a dietitian, paediatricians, psychologist, researchers, experts in parenting programmes and exercise.

**15. What next ?**

This 'Parent Information Sheet' is for you to keep. If you require further copies please contact a member of the research team (details below).

If you decide that you and your child will take part in this study you will be asked to sign a Consent Form. A copy of the signed Consent Form will be given to you to keep and the researcher will keep a copy.

**16. Contact for Further Information**

If you have any questions about the study, please contact a member of the research team. These are:-

Wendy Robertson on 024 7657 4660, or email:

W.Robertson@warwick.ac.uk

Or Professor Sarah Stewart-Brown on 024 7657 4510

Thank you for taking time to read this & for thinking about taking part.



## Appendix X CONSENT FORM (for parents)

**Title of Project: Family Intervention for the Management of Overweight Children (Families for Health)**

Name of Researcher: Wendy Robertson, Warwick Medical School, University of Warwick Tel: 024 76574660

You and your child(ren) are being invited to take part in a research study. If you complete and sign this form you are indicating that you are willing to take part in this study. Before doing so please make sure that you have read and understood the information provided about the study. If you have any questions about the study please telephone Wendy Robertson on 024 7657 4660 or Sarah Stewart-Brown on 024 7657 4510.

If you do decide to take part in the study, please complete the form by writing your initials in boxes 1 to 7. Then at the bottom of the form, add your name, signature and today's date.

**Please initial box**

1. I confirm that I have read and understand the information sheet dated 4/3/05 (version 2) for the above study and have had the opportunity to ask questions.

2. I understand that our participation in the 'Families for Health' research project is voluntary and that we are free to withdraw at any time, without giving any reason, without our medical care or legal rights being affected.

3. I understand that I (the parent) will be asked to complete four questionnaires at three time points, and I may be one of 10 parents who will be interviewed after the 12 week programme. I consent to this interview being tape recorded.

4. I understand that my child(ren) will be asked to complete some questionnaires, have height, weight and activity levels measured, and will be interviewed in groups of 3 to 4 during the last session of the 12 week programme. I consent to this interview being tape recorded.

5. I understand that the information I give will remain confidential and that I will be given anonymity in any publications or reports which arise from the research.

6. I agree to my child's GP being notified of his/her participation in the study.

7. I agree to take part in the above study.

\_\_\_\_\_  
Name of Patient

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name of Person taking consent  
(if different from researcher)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Researcher

\_\_\_\_\_  
Date









\_\_\_\_\_  
Signature

Copies:- 1 for patient; 1 for researcher; 1 to be kept with hospital or general practice notes

## Appendix XI

**Activity Diary to use alongside the accelerometer (completed here for Child 16B when trampolining, 3-4pm)**

**Day: Thursday      Activity monitor put on: 7.30am      Activity monitor taken off: 10.00pm**

Time of day	 Lying Down	 Sitting	 Standing	 Walking	 Dancing	 Swimming	 Riding my bike	 Running	What was your child doing? Please write down what your child was doing, for example watching TV, going to the park, playing football.
6 to 7am									
7 to 8am	✓		✓						Asleep, getting dressed
8 to 9am		✓	✓						Eating breakfast, doing hair
9 to 10am		✓							in car, in class
10 to 11am		✓		✓					in class, break
11 to 12 noon		✓							In class
12 noon to 1pm		✓							In class
1 to 2pm		✓	✓						Eating dinner, class, firebell
2 to 3pm		✓							Class, walking to PE block
3 to 4pm			✓						<b>Trampolining</b>
4 to 5pm		✓							In car, working
5 to 6pm		✓							Working
6 to 7pm		✓							Working
7 to 8pm		✓	✓						Getting dressed, St Johns
8 to 9pm		✓	✓						St Johns
9 to 10pm		✓							Watching TV
10 to 11pm									

**Appendix XII**  
**End-of-programme questionnaire for Parents**



## Parent's end of Programme feedback

We would like to know what you think about the Families for Health Programme and about the parents' group. Your views will help us to improve the Programme.

- |  | Awful    | Bad      | OK       | Good     | Great    |
|--|----------|----------|----------|----------|----------|
|  | ☹        |          | ☺        |          | 😊        |
| <b>1</b> <b>How do you feel about the Programme?</b><br><i>(Please circle a number)</i>  | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> |
| <b>2</b> <b>How did you find the atmosphere in the group?</b><br><i>(Please comment on whether or not you felt at ease, were able to join in, if your opinions were respected, whether you felt safe in the group, etc.)</i> |          |          |          |          |          |
| <b>3</b> <b>How well were the group sessions run?</b><br><i>(Please say if the topics were clearly explained or not, if the sessions felt rushed/too slow/about right, whether or not you liked the leaders, etc.)</i>       |          |          |          |          |          |
| <b>4</b> <b>What did you find especially enjoyable or useful about the Programme?</b>  |          |          |          |          |          |
| <b>5</b> <b>What did you <u>not</u> enjoy or find useful about the Programme?</b>  |          |          |          |          |          |

**6 What do you think about:**





**(a) the length of each session (2½ hours) and how these were structured?**

**(b) the length of the course (12 weeks)?**

**(c) the Coventry Sports & Leisure Centre as a venue?**

**7 How helpful have these parenting skills topics been, and are you using the ideas confidently?**

*(Please circle a number in both columns)*

	How helpful?						Using confidently?				
	Not 				Very 		Not 				Very 
Nurturing ourselves/our children...healthily	1	2	3	4	5		1	2	3	4	5
Giving praise	1	2	3	4	5		1	2	3	4	5
Boundaries, family rules	1	2	3	4	5		1	2	3	4	5
Family rewards	1	2	3	4	5		1	2	3	4	5
Finding our personal power	1	2	3	4	5		1	2	3	4	5
Choices & consequences	1	2	3	4	5		1	2	3	4	5
Building self-esteem	1	2	3	4	5		1	2	3	4	5
Honouring children's feelings	1	2	3	4	5		1	2	3	4	5
Listening to children	1	2	3	4	5		1	2	3	4	5
Solutions to stress	1	2	3	4	5		1	2	3	4	5
Using 'I' statements	1	2	3	4	5		1	2	3	4	5
Solution-spotting	1	2	3	4	5		1	2	3	4	5

**8 How helpful have these healthy lifestyle activity topics been, and are you using the ideas confidently?**

*(Please circle a number in both columns)*

	<i>How helpful?</i>					<i>Using confidently?</i>					
	<i>Not</i>					<i>Very</i>		<i>Not</i>			<i>Very</i>
	☹					☺		☹			☺
Exploring our motivation to change/sharing changes	1	2	3	4	5	1	2	3	4	5	
Balancing act 1: energy in and energy out	1	2	3	4	5	1	2	3	4	5	
Using our power to help children be more active	1	2	3	4	5	1	2	3	4	5	
Using our power to have a more active lifestyle ourselves	1	2	3	4	5	1	2	3	4	5	
Active alternatives (to TV, etc.)	1	2	3	4	5	1	2	3	4	5	




**9 How helpful have these healthy lifestyle food topics been, and are you using the ideas confidently?**

*(Please circle a number in both columns)*

	<i>How helpful?</i>					<i>Using confidently?</i>					
	<i>Not</i>					<i>Very</i>		<i>Not</i>			<i>Very</i>
	☹					☺		☹			☺
Exploring our motivation to change/sharing changes	1	2	3	4	5	1	2	3	4	5	
Balancing act 2: Food groups "plate"	1	2	3	4	5	1	2	3	4	5	
Shopping: Surviving at the supermarket	1	2	3	4	5	1	2	3	4	5	
When, how and why we eat: Healthy eating habits	1	2	3	4	5	1	2	3	4	5	
Lunchboxes and snacks	1	2	3	4	5	1	2	3	4	5	
How much we eat: Portions and portion sizes	1	2	3	4	5	1	2	3	4	5	
Who's in charge of what children eat	1	2	3	4	5	1	2	3	4	5	
Food labels	1	2	3	4	5	1	2	3	4	5	
Healthy lifestyle vs dieting	1	2	3	4	5	1	2	3	4	5	
Balancing act 3: Special occasions	1	2	3	4	5	1	2	3	4	5	

**10 Do you think your child has enjoyed the Programme ?**




*(Please circle one number for each child)*

	No 	Not sure	A bit 	Definitely	A lot 
CHILD 1	1	2	3	4	5
CHILD 2	1	2	3	4	5
CHILD 3	1	2	3	4	5

**Please say what you think they liked/did not like about it.**

**11 Have you noticed any changes in your child as a result of the Programme?**

*(Please circle one number for each child)*




	No 	Not sure	A bit 	Definitely	A lot 
CHILD 1	1	2	3	4	5
CHILD 2	1	2	3	4	5
CHILD 3	1	2	3	4	5

**Please say what has changed.**

**12 Do you think the Programme has helped you and your child to tackle**

**his/her weight difficulty?**

*(Please circle one number for each child)*

	No 	Not sure	A bit 	Definitely	A lot 
CHILD 1	1	2	3	4	5
CHILD 2	1	2	3	4	5
CHILD 3	1	2	3	4	5

**Please say how you have tackled it.**






**13 What do you think has happened to your child's weight?**

*(Please tick one box for each child)*




	<i>Lost weight</i>	<i>Weight stayed the same</i>	<i>Put on weight</i>
CHILD 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHILD 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHILD 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**14 Do you think the Programme has helped the rest of the family?**

<i>No</i>	<i>Not sure</i>	<i>A bit</i>	<i>Definitely</i>	<i>A lot</i>
				
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>

**If it has helped, please say in what ways.**

**15 Would you recommend the Programme to other families?**

<i>No</i>	<i>Not sure</i>	<i>A bit</i>	<i>Definitely</i>	<i>A lot</i>
				
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>

**Please say why or why not.**

**16 Please add any other comments and suggestions about the Programme.**

**THANK YOU VERY MUCH**

**Appendix XIII**  
**Costs questionnaire for parents (end of programme)**

## What did it cost you?

We would like to find out about extra time and money you and your family had to spend to take part in the 'Families for Health Programme' at Coventry Sports and Leisure Centre. Your answers are important because they will give those who make decisions about services provided by the National Health Service an idea of how much being involved in such programmes costs families.

The information that you provide will be completely confidential. Your answers will be combined with the answers of other families and reported in such a way that it will not identify you.

**Parent/Carer Code:** \_\_\_\_\_

## Travel costs

1. Over the last 12 weeks how many times did you attend the Families for Health Programme at Coventry Sports and Leisure Centre?

Number of Times:	<input type="text"/>
------------------	----------------------

2. How did you **normally** travel when you came to the Families for Health Programme? Please circle the number that best describes how you normally travelled from your home to Coventry Sports and Leisure Centre. If you normally used more than one form of transport please indicate the way you travelled most often for the **longest** part of your journey. *Please circle one number.*

Walked	1	
Cycled	2	
Bus	3	
Train	4	
Taxi	5	
Private Car	6	
Motorbike	7	
Other (Please specify)	8	<input type="text"/>

3. Please indicate any other forms of transport you **normally** used to travel from your home to the Families for Health Programme? *You may circle more than one answer if appropriate. Please circle 'No other forms of transport' if you used only one form of transport.*

No other forms of transport	0	
Walked	1	
Cycled	2	
Bus	3	
Train	4	
Taxi	5	
Private Car	6	
Motorbike	7	
Other (Please specify)	8	<input type="text"/>

4. (a) If you **normally** travelled by public transport (e.g. bus, train) for part or the entire journey, what was the cost of the one-way fare for you and your child(ren)?

Cost of one-way fare:	£		pence	
-----------------------	---	--	-------	--

- (b) If you **normally** travelled by taxi for part or the entire journey, what was the cost of the one-way fare?

Cost of one-way fare:	£		pence	
-----------------------	---	--	-------	--

- (c) If you **normally** travelled by private car or motorbike for part or the entire journey:-

How many miles did you travel one-way?

Number of miles one-way:			miles.
--------------------------	--	--	--------

Did you have to pay parking fees or tolls ?      YES / NO

If YES, how much did this amount to each week?

Cost of parking fees / tolls each week:	£		pence	
---	---	--	-------	--

5. When you visited the Families for Health Programme how long did it normally take to travel there from your home? Please write the number of hours and minutes below:-

Travel time:	hours		minutes	
--------------	-------	--	---------	--

## Parent's Time

6. What would you normally have been doing as your main activity if you had not gone to the Families for Health Programme?

Housework	1	
Childcare	2	
Caring for a relative or friend	3	
Voluntary work	4	
Leisure activities	5	
Attending College / University	6	
On sick leave	7	
Seeking work	8	
Paid work	9	
Other (Please specify)	10	

If you normally took time off from paid work please continue with Question 7. Otherwise please go to Question 8.

7. (a) If you took time off from paid work (or business activity if self employed) to go to the Families for Health Programme, approximately how much time did you **normally** take off?

Time off work (or business activity if self employed):	hours		minutes	
--	-------	--	---------	--

(b) Did you **normally** lose earnings as a result?      YES / NO

## Childcare and Other Dependent Costs

The next section of the questionnaire asks about any assistance that you needed to look after your other children or dependents when you were at the Families for Health Programme.

8. When you were at the Families for Health Programme, did you normally get someone to look after your other children or dependents (if you have any)?

Yes ( <i>please continue with Question 9</i> )	1
No ( <i>Please go to Question 10</i> )	2
Not applicable ( <i>no other children or dependants -please go to Question 10</i> )	3

9. If yes (a) How many hours did they normally spend looking after your children or other dependents for each session?

Time spent looking after your children / dependents:	hours		minutes	
--	-------	--	---------	--

- (b) Did you normally pay that person to look after your children or other dependents?

Yes ( <i>please continue with Question 9</i> )	1
No ( <i>Please go to Question 10</i> )	2

- (c) How much did you normally pay that person to look after your children or other dependents for each session?

Amount paid for each session:	£		pence	
-------------------------------	---	--	-------	--

**Equipment Purchased.**

The next section of the questionnaire asks about any equipment you have purchased especially for you and your child to attend the Families for Health Programme.

10. In the last 12 weeks have you bought any clothes and or equipment which you have bought because of your attendance at the Families for Health programme?

(a) Clothes for your child	Yes	No
(b) Trainers / Shoes for your child	Yes	No
(c) Specific food you wouldn't have otherwise bought	Yes	No
(d) Other ( <i>please specify</i> ):		

11. Over the last 12 weeks how much have you paid out of pocket for the items listed in question 10. (Please specify the amount below, or an estimate will do if you don't remember the exact amount).

Amount spent on clothes for your child:	£		pence	
Amount spent on trainers / shoes for your child:	£		pence	
Amount spent on food you wouldn't have otherwise bought	£		pence	
Amount spent on other items:	£		pence	

**Miscellaneous Costs.**

12. Have you incurred any other costs because of attending the Families for Health programme?

Yes ( <i>please continue with Question 12</i> )	1
No	2

- (a) If yes what were they for, and how much did you spend?

	£		pence	
	£		pence	
	£		pence	

**Thank you for taking the time to complete this questionnaire.**

## **Appendix XIV**

### **Interview schedule for parents**

#### **Topic Guide for One-to-one Interviews with Parents at end-of-programme**

After the 12 week intervention, interviews will be carried out at home with 10 parents, with partner where possible. The sample will include a mixture of parents who completed the programme and those who did not. The interviews will be tape recorded, if consent is given from the parent.

The topics to be covered with the stem question are below. Parents to have their end of programme evaluation questionnaire available to them.

#### ***Recruitment***

STEM1 - How did you feel when you (*choose one*)  
- were approached to take part in the study  
OR - saw/heard the advert about the study?

#### ***Families for Health Programme***

STEM2 - What were you expecting from the Families for Health programme?  
- How did it differ in practice?

STEM3 - In your questionnaire in the last session, you have told us some things about how you felt about the group sessions. Is there anything you have thought of since, or which was too complicated to write, that you would like to tell me about how the group sessions went:-

- Probe - Atmosphere*
- *Venue*
- *Timing*
- *Facilitators*
- *Other parents*
- *Programme as a whole*

STEM4 - How did you find the balance of topics ? By topics I mean healthy eating, physical activity and how you are getting on as a family, and the way you are handling your own and your children's behaviour and feelings.

In your questionnaire you have already rated the helpfulness of the specific topics covered in the group sessions, and whether they are being used in your family.

STEM5 - Please can you expand on one or two topics that have been particularly useful for you, giving an example of how they have been used in your family.

STEM6 - Please can you expand on one or two topics that you have not found useful, and try to explain why they were not helpful to you please.



STEM7 - Which ideas are you still using now?

STEM8 - What did you think of the structure of the programme?  
*i.e. The format of the sessions, separate groups for parents and children*  
How useful was it to have the children doing similar things in their group?  
How did you find meeting up with the children at half-time?

STEM9 - I wonder if there are any specific things that have changed as a result of the programme. Can you describe any please?

*Probe*

- *Meal times*
- *Shopping*
- *Exercise*
- *Limiting inactivity*
- *Family functioning / Relationships with child / Sibling relationship*

STEM10 - How could the programme be improved ?

STEM11 - Has your child had any other support for their weight issue? What was this? How does the FFH programme compare?

### ***Evaluation***

STEM12 - What did you think of the research aspects of the programme, such as the measurements of height/weight/waist, questionnaires and interviews, and activity monitor, at the start and end of the programme?

### ***Future Plans***

STEM13 - What are your plans now with regard to the topics covered and ideas you talked about in the group now that the programme has ended.

*– prompt, if necessary, but capture relationships too, as well as healthy lifestyle.*

I wonder if there is there anything else that you would like to say ?

Thank you!

## **Topic Guide for interview of Parents from Families who had Dropped-out**

Thank you for volunteering for the Families for Health programme. It is fine that your family have stopped coming – you always had a choice to opt out, which we fully respect.

What I would like to ask you today are the reasons why you stopped coming to the programme. The reasons may be about the programme itself or may be entirely different. This will be very valuable to the research, so we know whether the programme is helpful or not.

### **STEM 14 - What were the reasons for your family not continuing with the programme please?**

***Probe if necessary:- (though rarely used in this way)***

Was it you or XXXXX (name of child) or perhaps a bit of both, who did not wish to come to the programme?

What was it about the parent's programme that you didn't find XXXXXXXX (insert whatever was said by parent e.g. enjoyable, comfortable, safe etc) ?

What was it about the children's programme that your child didn't find XXXXXXXX (insert whatever was said by parent e.g. enjoyable, comfortable, safe etc) ?

Was it anything to do with the timing of the programme after school ? or the venue for the programme?

What did you think about the leader of the parents' group? (i.e. Did you feel respected, supported, feel you could say what you wanted to say... )

What did your child think about the leaders of the children's group ? (i.e. Did they feel respected, supported, feel you could say what you wanted to say... )

*Q to child (if there & appropriate for them):*

I noticed you didn't always join in - why was this ?

### **STEM 15 - If there was another opportunity to come to the programme, would you want to try again ? What would need to be different ?**

### **STEM 16 - Would you be willing to do the questionnaires and measurements of height and weight again ? This will be around the end of March.**

## Appendix XV

### Coding Framework for NVivo for the one-to-one interviews with parents

Main NODE	Sub-Node
a Recruitment Emotions	Negative
	Positive
b Motivation to take part	Asthma
	Bullying
	Family functioning
	Others perception of parents
	Weight loss
c Expectations of the programme	Diet
	Exercise
	Healthy Eating
	Healthy Lifestyle
	In reality - different
	In reality - the same
	Weight loss
d Atmosphere	Negative
	Positive
e Venue	Negative
	Positive
f Timing of Session	Negative
	Positive
g Length of Session	About right
	Too long
	Too short
h Children's Facilitators	Negative
	Positive
i Parents' Facilitators	Negative
	Positive
j Other Parents & Group Support	Negative
	Positive
k Size of Group	Negative
	Positive
l Balance of Topics	Good balance
	Negative
m Topics Useful	Activity & exercise (further sub-nodes)
	Food (further sub-nodes)
	Parenting skills (further sub-nodes)
n Topics not so Useful	Activity & exercise (further sub-nodes)
	Food (further sub-nodes)
	Parenting skills (further sub-nodes)

<b>Main NODE</b>	<b>Sub-Node</b>
o Ideas that Still Using	Activity & exercise (further sub-nodes)
	Food (further sub-nodes)
	Parenting skills (further sub-nodes)
p Programme Structure	Activity sessions
	Break time
	Negative
	Positive
	Same topics for parents & children
	Separate groups for parents and children
q Changes Made to Behaviour	Balancing Energy
	Eating environment
	Exercise
	Food choices & Eating Habits
	Inactivity & TV
	Meal times
	School dinners & packed lunch
	Shopping
r Changes in Family Function	Child's confidence
	Discipline of child
	Family atmosphere
	Family time
	Parent & child relationship
	Parent & parent relationships
	Parents confidence
	Praise of child
	Sibling relationships
s Suggested Changes & Improvements	Activity
	Childcare
	Drop out comment
	Follow Up Sessions
	Length & Timing
	More feedback to parents on child
	Reduce drop-outs
	Session Format
t FFH vs Other Support for Weight	Active Kidz
	Dietician
	Doctor
	Nurse - GP
	School or School Nurse

<b>Main NODE</b>	<b>Sub-Node</b>
u Research Aspects	Actigraphs
	Interviews
	Measurements
	Questionnaires
v Future Plans	Activity & exercise (further sub-nodes)
	Follow up support
	Food (further sub-nodes)
	Maintaining new skills
	Meet with other parents
	Parenting skills (further sub-nodes)
w Reason for Dropping Out	
x Attend the Programme Again	
y Willing to do Research Again	

## Appendix XVI

### Tendering process for the Development of the Programme

The development of the programme for the management of childhood obesity was put out to tender. Tendering documents were prepared in accordance with university regulations, entitled '*Invitation to Tender for the Development and Piloting of a Parent and Child Programme for the Management of Childhood Obesity*'. I took the lead in writing the background information, tender timeline, the scope of the tender (Box A.1) and the layout for the proposal form (Box A.2). This provided a specification for the programme.

#### **Box A.1 Scope of the Tender**

##### **(a) Development of the Programme**

- The tender is for the development and piloting of parallel parent and child programmes, to include the development of training manuals and parent and child handbooks if appropriate.
- The programme to be developed is for families which have a child or children aged 7-11 years who is/are overweight or obese. It is anticipated that the programme will consist of group sessions lasting 2 hours involving 10-15 parents and 15 children every week for 12 weeks, incorporating behaviour management, relationships education, diet and physical activity.
- It is imperative that the successful tenderer will work closely with the research Advisory Group and its specialist members in the development of the programme.

##### **(b) Piloting of the Programme**

- The programme which has been developed will be run twice in the Summer or Autumn of 2005 with 20-30 families within Coventry.
- The successful tenderer will need to maintain close involvement in the programme pilot to ensure optimum delivery of the programme. This could be through direct delivery and/or training and supervision of other facilitators. The tender will need to state how the tenderer would intend to do this, and the associated costs.

## **Box A.2 Content of the Tender's Proposal Form**

### **(1) RELEVANT EXPERIENCE**

What is your experience of...  
developing family based interventions / parenting programmes?  
developing programmes for children?  
running family based interventions / parenting programmes?  
running programmes for children age 7-11 years?

### **(2) How Would You Develop the Programme?**

Please indicate how you would intend to develop the programme for parents & children (including any theoretical approaches which would underpin the programme).

Please describe in more detail the proposed contents and methods of facilitating learning for the programme for: (a) Parents; (b) Children.

### **(3) How Would You Intend to Support the Piloting of the Parent and Child Programme?**

Please indicate your - proposed involvement with the pilot programmes.  
- proposals for training & supervision of group facilitators.

### **(4) Timetable for the Development of the Programme**

### **(5) Costing**

Fourteen organisations were identified and invited to tender. Eleven of these organisations were identified by the Parenting Education and Support Forum (now renamed Parenting UK, [www.parentinguk.org](http://www.parentinguk.org)), which is a national organisation for people who work with parents. Three organisations were identified by the Research Advisory Group.

Four organisations submitted tenders which were circulated to the Research Advisory Group for short-listing. A pro-forma to assess the tenders was used in the short-listing process, including the following criteria: price, previous experience, quality of the proposed programme, technical ability, completion (all documents supplied) and 'winners' (above expectations). Five members of the Research Advisory Group contributed their opinions, and there was consensus to shortlist two proposals. The lead applicants from these two proposals gave a presentation to the Research Advisory Group on 11<sup>th</sup> November 2004. The tender was awarded to Candida Hunt, then Associate Director of Family Links. The development of the programme commenced in December 2004.

**Appendix XVII**  
**Further Information on Changes to the Delivery of the Intervention**  
**(supplement to Section 6.5)**

**(a) Minor Changes to Content between Group 1 and Group 2**

For Group-2, the 'task force feedback' and 'marketplace' were rolled together in the parents' group because parents were not bringing anything to the 'marketplace' (e.g. recipes, ideas for family activities etc).

- *Marketplace, it's a waste of time as parents don't bring things to it. Definitely combine with feedback next time* (Week-8, Facilitator, Parents' Group-1).

For Group-2, the children had a page inserted in their Activity Book to record daily steps from a pedometer. These were minimal changes, however, which would be expected when a programme is delivered for the first time.

**(b) Feedback from Facilitators on Changes to the Programme – Group 1**

(1) When swimming for the children was cancelled unexpectedly by the Leisure Centre in Week-9, this seemed to have minimal impact:

- *With a disappointing start with young people not able to swim they settled very quickly.* (Week-9, Facilitator, Children's Group-1)

However, there was probably a delayed impact, with facilitators associating the cancelled swimming session with low attendance the following week:

- *Just a shame about the low numbers this week – possibly due to disappointment of children re last weeks cancelled swim?"* (Week-10, Facilitator, Parents' Group-1)

Although there were no comments on the parents' weekly feedback about the swimming, one parent mentioned it in their end-of-programme questionnaire:

- *A good central location but the Centre let the programme down when they messed up the swimming session.* (Parent-6, End-of-programme Questionnaire)

This family did not attend in Week-10, indicating that this could have had an impact on the attendance of that family.

(2) The facilitators noted other minor deviations to the content, mainly due to difficulties with timing. These are worth noting because it is related to 'dose-received' (i.e. if a section wasn't delivered then it could not be expected that participants would mention it in their feedback):



- *..the section on Praise and Criticism was not covered in as much depth as required by the Facilitators handbook. (Week-2, Facilitator, Parents Group-1).*
- *Spent too long on feedback (and started late) – so missed empathy role play and listening skills – I need to fit role play in somewhere else if possible. (Week-7, Facilitator, Parents Group-1).*
- *We needed to include the relaxing technique and calming down as this was missed out. Need to be aware of completing all the activities. (Week-8, Facilitator, Children’s Group-1)*

### **(c) Feedback from Facilitators on Changes to the Programme – Group 2**

(1) Due to small numbers of families attending in Weeks 3 & 6, the programme developer redesigned these sessions to include some content delivered jointly to children and parents. Facilitators’ comments were positive, raising the possibility that future programmes could include joint sessions:-

- *Balance of Good Health useful; combined with children for fruit & vegetable rainbow and family rules – all seemed ok. Need to consider how to have more joint sessions to hold programme together. (Week-3, Facilitator, Parents Group-2)*
- *Portion sizes were good and probably would be good to include in children’s programme anyway (it was by chance, due to small number of families that we did it together). (Week-6, Facilitator, Children’s Group-2)*

(2) Due to the closure of the leisure centre, the programme developer combined the content from Weeks 10 & 11, which she described as “successful”.

(3) Other specific omissions were noted by the facilitators in their weekly feedback, due to shortage of time:

- *Didn’t explore SATS [surviving at the supermarket]; short of time and mostly not a problem for them. (Week-4, Facilitator, Parents’ Group-2)*
- *Over-ran because of nature of subjects, didn’t have time for relaxing which was important. (Week-8, Facilitator, Children’s Group-2)*

## **Appendix XVIII**

### **Further Information on Dose Received (supplement to Section 6.6)**

**(1) Parenting Topics** - Quotations from parents are given to illustrate engagement with selected parenting topics. The topic of 'giving praise' in week 2 was rated as helpful by 100% of parents in the end-of-programme evaluation, with 75% of parents stating that they were using this confidently (Table 6.8). Nine parents (39%) had specifically mentioned the session on praise and discipline as being helpful in their weekly evaluation (Table 6.7), commenting that they didn't praise their child sufficiently:

- *Praise and criticism-it made me stop and think.* (Parent, Group-2, Week-2)
- *Thinking about praising more. Being more positive and less of the negative.* (Parent, Group-2, Week-2)
- *Thinking about praise in a clear way. It is obvious but you need to do it.* (Parent, Group-2, Week-2)

The topic of 'finding our personal power' was cited as helpful by 73% of parents in the end-of-programme feedback, with 60% using this confidently (Table 6.8). Seven parents (39%) had specifically cited the session as useful or enjoyable in their weekly feedback (Table 6.7), with their comments indicating they hadn't considered this before or they had previously considered themselves powerless:

- *Looking at how 'Power' in moderation can be positive* (Parent, Group-1, Week-4)
- *General ideas of how to gain more power and change little aspects of your life* (Parent, Group-2, Week-4)
- *Talking about how to use personal power even when you don't think you have any power* (Parent, Group-2, Week-4)
- *Understanding we have more power than we realise when we think about it* (Parent, Group-2, Week-4)

The topic of 'family rewards' was rated by 75% of parents as helpful in the end-of programme questionnaire, although only half said that they were using them confidently (Table 6.8). Interestingly family rules and rewards was only mentioned as being useful or enjoyable by two parents in the weekly evaluation in session 3. However, families were given a reward chart and stickers in order to develop a family reward system for their 'homework'. At the start of session 4 there was a discussion about how they had managed with the reward system,

and this topic was then cited as useful by three parents in their weekly feedback:

- *Other ideas about reward systems i.e. using Jenga instead of stickers, 3D reward system. (Parent, Group-2, Week-4)*

This indicates that parents became more engaged with the topic once they were given the chance to apply it, and also highlights the benefit of revisiting topics. One family had clearly engaged with reward systems, and expressed their benefit:

- *Reward systems have led to increased family-time. Less of a demand for food, less hassle and arguments over food. Reward systems encourage the behaviour you want and now expect. (Parent-19, End-of-Programme Questionnaire)*

In session 8, the 'joint' topics on stress and relaxation received some positive comments in the weekly evaluation (Table 6.7). This was reinforced in the end-of-programme evaluation with 87% of parents rating the topic on 'solutions to stress' as helpful, with 75% of parents using them confidently (Table 6.8). Parents' comments about what they found useful indicate that they engaged well with the topic, both offering and receiving ideas:

- *Listening to how other people deal with stressful situations (Parent, Group-2, Week-8)*
- *Talking about tackling stress, getting everybody else's views on how I could deal with situations better than I do. (Parent, Group-2, Week-8)*
- *Talking about stress and learning to listen not just snap. (Parent, Group-2, Week-8)*
- *I enjoyed the breathing exercises and think they'll come in useful, also the tension release(stamping feet).(Parent,Group-1,Week-8)*

Choices and consequences was cited as being useful by only 3 parents in their weekly feedback (Table 6.7), although in the end-of-programme questionnaire 80% of parents said they had found it helpful and 60% were using it confidently (Table 6.8).

- *Choices and consequences – identifying best ways to communicate the choices. (Parent, Group-1, Week-5)*
- *Choices and consequences for me has turned out be a great tool, very clever use of words! Accepts if he makes a wrong choice they may be a consequence to deal with. (Parent-19, Group-2, End-of-programme questionnaire)*

**(2) Physical Activity Topics** - There were only two main topics in the parents' programme that focused specifically on increasing physical activity: Energy Balance in Week-2 and 'Active alternatives to the screen' in Week-7. However, physical activity was also used as an example when exploring some of the parenting topics, in particular around personal power. There were a few comments in the weekly evaluation about these physical activity topics, with four parents (17%) finding the 'energy balance' topic useful and three parents (27%) finding the 'active alternatives to the screen' topic useful (Table 6.7):

- *The scales really simplify that you can overindulge if you exercise to counteract* (Parent, Group-2, Week-2)
- *About balance between food & play.* (Parent, Group-1, Week-2)
- *The different ideas to do instead of TV.* (Parent, Group-1, Week-7)
- *Ways to avoid screen watching.* (Parent, Group-2, Week-7)

However, some parents also indicated that they felt there should be more emphasis on physical activity within the programme (see Chapter 9).

**(3) Food Topics** - A remarkable 92% of parents had made written comments about the usefulness of the session on food labels in their weekly evaluation (Table 6.7). This is consistent with the end-of-programme feedback, in which 81% of parents said they found the topic on food labels helpful *and* were using the knowledge confidently (Table 6.10). Comments indicated that parents had increased their knowledge:

- *Identifying what's written on food labels and learning what they mean.* (Parent, Group-1, Week-9)
- *Actually having the labels explained in more detail and how much fats and sugars are present in our foods without realising it.* (Parent, Group-1, Week-9)
- *Learning about labels was really eye opening. It has made me realise low fat doesn't always mean healthy so I will definitely be looking out for the contents of my foods from now on.* (Parent, Group-1, Week-9)
- *To look at labels and see how much is in the items and how they were different to other of the same sort of food.* (Parent, Group-1, Week-9)

The session on portion sizes was commented on positively in both the weekly evaluation with 64% of parents specifically citing this topic as useful (Table 6.7), and in the end-of-programme evaluation where 79% of parents said they found the topic helpful and were using the knowledge confidently (Table 6.10). Comments indicated that this was new knowledge and was very relevant to their family:

- *The portion sizes was very good. We are eating way too much of everything and need to cut down.* (Parent, Group-2, Week-6)
- *Plate sizes, what to have and how much food.* (Parent, Group-1, Week-6)

The topic on 'What our bodies need to eat' which incorporated the 'Balance of Good Health' plate did receive some positive comments in the weekly evaluation of session 3 (Table 6.7):

- *Balancing food and snacks and swapping ideas again.* (Parent, Group-1, Week-3)
- *I thought the rainbow of fruit and veg was excellent. They all looked appetising and made you want to buy fresh fruit and veg. I will enjoy tasting unusual things over the week.* (Parent, Group-2, Week-3 )

The session on 'surviving at the supermarket' was commented on as being helpful by 86% of parents and being used confidently by 77% in the end-of-programme evaluation (Table 6.10). On the weekly feedback this topic had been commented on as being useful or enjoyable by several parents from Group-1, although one parent did not find the topic useful because it was not applicable to their family:

- *Shopping tips and how to make it fun.* (Parent, Group-1, Week-4)
- *Making ways to enjoy shopping* (Parent, Group-1, Week-4)
- *My husband always does shopping when children are at school.* (Parent, Group-1, Week-4) (not useful)

For Group-2 'Surviving at the Supermarket' had not been delivered in the depth required by the handbook and not surprisingly, was not mentioned by any parents.

## Pilot of "Families for Health": community-based family intervention for obesity

W Robertson,<sup>1</sup> T Friede,<sup>1</sup> J Blissett,<sup>2</sup> M C J Rudolf,<sup>3</sup> M Wallis,<sup>4</sup> S Stewart-Brown<sup>1</sup>

<sup>1</sup>Health Sciences Research Institute, Warwick Medical School, University of Warwick, Coventry, UK; <sup>2</sup>School of Psychology, University of Birmingham, Birmingham, UK; <sup>3</sup>Leeds Primary Care Trust and University of Leeds, Leeds, UK; <sup>4</sup>Children's Unit, Sandwell General Hospital, West Bromwich, UK

Correspondence to: Wendy Robertson, Health Sciences Research Institute, Warwick Medical School, University of Warwick, Coventry CV4 7AL, UK; W.Robertson@warwick.ac.uk

Accepted 23 April 2008  
Published Online First 7 May 2008

**ABSTRACT**

**Objective:** To develop and evaluate "Families for Health", a new community based family intervention for childhood obesity.

**Design:** Programme development, pilot study and evaluation using intention-to-treat analysis.

**Setting:** Coventry, England.

**Participants:** 27 overweight or obese children aged 7–13 years (18 girls, 9 boys) and their parents, from 21 families.

**Intervention:** Families for Health is a 12-week programme with parallel groups for parents and children, addressing parenting, lifestyle change and social and emotional development.

**Main outcome measures:** Change in baseline BMI z score at the end of the programme (3 months) and 9-month follow-up. Attendance, drop-out, parents' perception of the programme, child's quality of life and self-esteem, parental mental health, parent-child relationships and lifestyle changes were also measured.

**Results:** Attendance rate was 62%, with 18 of the 27 (67%) children completing the programme. For the 22 children with follow-up data (including four who dropped out), BMI z score was reduced by  $-0.18$  (95% CI  $-0.30$  to  $-0.05$ ) at 3 months and  $-0.21$  ( $-0.35$  to  $-0.07$ ) at 9 months. Statistically significant improvements were observed in children's quality of life and lifestyle (reduced sedentary behaviour, increased steps and reduced exposure to unhealthy foods), child-parent relationships and parents' mental health. Fruit and vegetable consumption, participation in moderate/vigorous exercise and children's self-esteem did not change significantly. Topics on parenting skills, activity and food were rated as helpful and used with confidence by most parents.

**Conclusions:** Families for Health is a promising new childhood obesity intervention. Definitive evaluation of its clinical effectiveness by randomised controlled trial is now required.

The prevalence of obesity in UK children continues to rise and its prevention and management is now a public health priority.<sup>1,2</sup> Childhood obesity increases the risk of type 2 diabetes, cardiovascular disease, cancer, and psychosocial problems such as low self-esteem and stigma.<sup>3</sup> It predicts adult obesity in 40% to 70% of children, with concomitant risks to adult health.<sup>4</sup>

A current challenge is how best to manage children who are already obese or overweight. Systematic reviews have reported an inadequate evidence base with no studies from the UK<sup>5</sup> and have highlighted the importance of family involvement.<sup>6</sup> The UK National Institute for Health and Clinical Excellence concluded that programmes incorporating behavioural treatment alongside

**What is already known on this topic**

- ▶ The most promising interventions outside the UK for the management of obesity in children under age 12 are when parents are given the main responsibility for change.

**What this study adds**

- ▶ The Families for Health programme is a promising new childhood obesity intervention which shows benefits in measures of overweight and other health outcomes.

physical activity and diet were effective, particularly if parents were given the responsibility for behaviour change.<sup>7</sup>

Primary research contributing to this field includes a report from Epstein's group from New York who showed that family based behavioural treatment (FBBT) targeted at the parent and child together was more effective as regards long term weight management than targeting the child alone.<sup>8</sup> Golan from Israel compared parents with children as the exclusive agents of change, finding a greater reduction in overweight for the parent group.<sup>9</sup> A further randomised controlled trial (RCT) by Israel *et al* demonstrated that a behavioural programme was more effective when run with a parent training course,<sup>10</sup> indicating that parenting skills help to sustain improvement.

These trials, although suggesting that family interventions are effective, were all carried out in clinical settings. There is a lack of evidence on community-based interventions. However, recent UK research on community interventions to manage childhood obesity include pilot studies on the WATCH IT programme from Leeds<sup>11</sup> and MEND (mind, exercise, nutrition, Do it!) from London.<sup>12</sup>

The home environment is important in the aetiology of childhood obesity. Parenting styles and skills have been shown to predict children's BMI, fruit and vegetable intake, healthier eating, physical activity and sedentary behaviours.<sup>13–15</sup> Therefore, it is important for programmes to address parenting skills as well as lifestyle.

The aim of the current project was to develop and pilot a new family based group intervention, "Families for Health". This differs from other programmes being researched in the UK in its

## Original article

emphasis on parenting, relationship skills and emotional and social development, which may enhance long term sustainability. It is delivered in a community setting, with potential for increased access. The model is one of training local facilitators in order to increase local capacity.

## METHODS

**Development of the Families for Health programme**

The programme was developed to a specification by a practitioner experienced in the development and delivery of parenting programmes and in training facilitators, in conjunction with a multi-disciplinary professional and academic advisory group. It is a 12-week programme involving a 2½ h weekly session, comprising parallel programmes for overweight/obese children aged 7–11 and their parents. Parents and children meet mid-session to share an activity and a healthy snack.

The sessions combine proven elements from parenting programmes, school based emotional development programmes and family lifestyle programmes. Parenting aspects draw on the UK based Family Links Nurturing Programme,<sup>16</sup> which has received positive evaluations in qualitative research and “pre-post” evaluation.<sup>17,18</sup> Healthy eating components draw on nutritional recommendations in the *Balance of good health*.<sup>19</sup> Parents are encouraged to control the home eating environment and monitor children’s food intake, known to be effective strategies.<sup>20,21</sup> Restriction of children’s eating was not employed, as this may lead to weight gain.<sup>22</sup> The programme promotes a sustainable healthy approach to family-wide lifestyle change. Further details are given in appendix A.

**Piloting of the Families for Health programme**

The programme was piloted twice in Coventry at a leisure centre, on Saturday mornings (10 am–12:30 pm) from September to December 2005 and on Monday evenings (5 pm–7:30 pm) from January to March 2006. The parents’ and children’s groups were each led by two facilitators. The programme developer was one of the facilitators for the parents’ groups and other facilitators were recruited from local services and included a health visitor, a school nurse, a school lifestyle worker, a nutritionist and a mental health worker. The facilitators undertook a 3-day training course followed by weekly supervision during the programme, provided by the programme developer.

The sample size was pragmatic, selected to include the experience of a range of different families and to estimate effect sizes for sample size calculations in the design of a subsequent RCT, if indicated. We aimed to recruit 20 families.

**Recruitment of families**

Families with children aged 7–11 years who were overweight (BMI  $\geq$ 91st to 98th centile) or obese (BMI  $\geq$ 98th centile) according to UK 1990 BMI reference charts<sup>23</sup> were eligible. They were excluded if they did not speak English or if the child had a medical cause of obesity.

Several recruitment strategies were piloted. A range of health professionals were asked to recruit families, and when this strategy failed, press releases were sent from the University of Warwick’s communications office, resulting in articles in local newspapers and radio interviews. In the second pilot two primary schools distributed flyers.

**Evaluation design**

Process evaluation examined the success of recruitment methods, the type of families recruited, attendance and drop-out. Families who attended at least half of the sessions were considered to have completed the programme. Families who withdrew were asked for their reasons. At the end, parents completed a questionnaire giving their perception of the programme and stated whether they were using their new skills and knowledge confidently (Likert scale, 1–5). “Before and after” evaluation was undertaken to compare quantitative measures at baseline with those at the end of the programme (3 months) and at 9 months’ follow-up.

**Measures of overweight**

The primary outcome measure was change in the children’s BMI z score from baseline. One investigator (WR) measured weight to the nearest 0.1 kg with Tanita scales (TBF-300MA; Tanita, Yiewsley, UK) and height to the nearest 0.1 cm (Leicester height measure; Child Growth Foundation, London, UK). BMI (weight(kg)/height(m)<sup>2</sup>) was converted into z scores using the Child Growth Foundation’s programme based on UK 1990 data.<sup>23</sup> Waist was measured to the nearest 0.1 cm and translated into z scores.<sup>24</sup> Percentage fat was measured by the scales using bio-impedance.

**Psycho-social measurements**

Children’s quality of life was measured using PedsQL 4.0 for ages 8–12.<sup>25</sup> Children completed the 23-item self-report and parents the parent-proxy version. Children’s self-esteem was measured using the 36-item Self-Perception Profile for Children.<sup>26</sup> Parents completed the 15-item Child-Parent Relationship Scale<sup>27</sup> and the Short Depression-Happiness Scale.<sup>28</sup>

**Eating and activity behaviour**

Children completed a 24 h food recall using the Day in the Life Questionnaire to determine portions of fruit and vegetables.<sup>29</sup> Parents completed the Family Eating and Activity Questionnaire, with summary scores calculated for activity/inactivity balance, stimulus exposure (eg, unhealthy snacks at home), eating related to hunger, and eating style.<sup>30</sup>

Children’s physical activity was measured using a 7-day recording with a uniaxial accelerometer with step function (GT1M; ActiGraph, Pensacola, FL). A diary was completed at the same time. Average minutes per day undertaking moderate to vigorous physical activity (MVPA) was calculated using Freedson’s equation,<sup>31</sup> using 4 METS as a cut-off. Average daily steps were also calculated. To be included in the analysis, 4 days of monitoring were needed for a reliable measurement.<sup>32</sup>

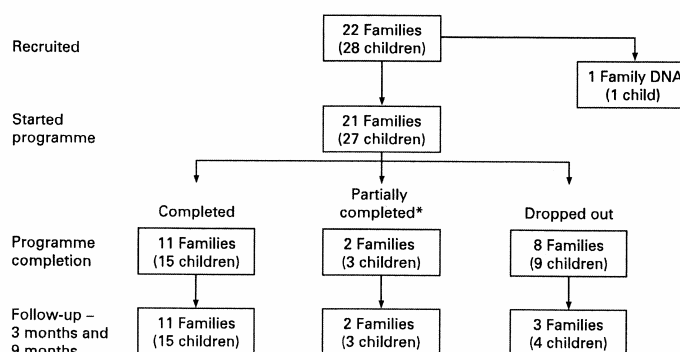
**Ethics approval**

The project was approved by Coventry Research Ethics Committee (NHS) and registered with Coventry Teaching PCT.

**Statistical analysis**

Binary and categorical data were summarised by frequencies and percentages, and descriptive statistics (means, standard deviations) are given for continuous outcomes. Six families enrolled more than one child. To account for the hierarchical nature of the data induced by family clustering, we fitted linear mixed models with random family effects for differences in scores between both (i) baseline and the end of the programme (3 months) and (ii) baseline and 9-month follow-up. Intention-to-treat analyses are presented for both groups combined.

**Figure 1** Flow of families through the pilot groups. \*Attended half the sessions but attended irregularly (ie, one family attended mostly in the first half of the programme and little in the second half, and one family attended at the start and end of the programme but missed many of the middle sessions). DNA, did not attend.



Differences between the two groups (Saturday and Monday) were investigated; results are presented separately where significant differences were identified. We refer to differences as statistically significant when the two-sided *p* value is smaller than 0.05. Analyses were conducted using SAS v 9.

## RESULTS

### Recruitment and baseline characteristics

A total of 21 families (27 children) were recruited and started the programme (fig 1). Of these, five families were recruited by health professionals, 13 families self-referred following publicity in the local media, and three came via recommendations from family/friends. No families were recruited through the school flyer.

**Table 1** Baseline characteristics of families and their children who started the Families for Health programme

Families, n	21
Family type, n (%)	
Two parent family	9 (43%)
Single mother	9 (43%)
Step family	3 (14%)
Socio-economic classification of families, <sup>20</sup> n (%)	
Managerial/professional	5 (24%)
Intermediate	5 (24%)
Routine and manual	9 (43%)
Never worked/unemployed	2 (9%)
Parental BMI, n (%)	
Not overweight/obese	4 (19%)
At least 1 parent overweight	5 (24%)
At least 1 parent obese	12 (57%)
Children, n	27*
Gender, n (%)	
Males	9 (33%)
Females	18 (67%)
Age (years), mean (SD) range	9.3 (1.9) 7–13
Ethnicity, n (%)	
White	22 (82%)
Asian/mixed	5 (18%)
BMI classification, n (%)	
Overweight (91st–98th centile)	3 (11%)
Obese (≥98th centile)	24 (89%)
BMI z score, mean (SD) range	2.76 (0.59) 1.42 to 4.02

\*Six families with two children.

Table 1 shows demographic data and baseline BMI for the participants. Two thirds of the children were girls. The ethnic mix was typical of Coventry (84% white in the 2001 Census). Most children were obese, with three overweight children being siblings of obese index children. Three children were above the target age range of 7–11.

### Attendance

Attendance was 62%. Of the 27 children who started the programme, 15 (56%) completed, three (11%) partially completed (attended half the sessions, but attended irregularly) and nine (33%) withdrew (fig 1). Four families cited practical reasons for dropping out (new baby, new job, domestic issue, demands of work), one disliked the programme, and three gave no reason.

Engagement with the programme was better on Saturday morning, with 75% attendance and only one family withdrawing. The Monday evening programme achieved only 52% attendance and seven families (eight children) withdrew.

### Attrition

We sought follow-up data on all families. Twenty two of the 27 children (from 16 families) contributed data, including four who withdrew (fig 1).

### Perception of the programme

Sixteen parents completed the questionnaire. The percentage of parents rating the various components as helpful (scoring 4 or 5) was high for parenting skills (84%), activity (79%) and food (83%). These new skills and knowledge were being applied confidently by 63%, 57% and 73% of parents, respectively.

### Change in BMI z scores

The primary outcome, change in BMI z score, was reduced from baseline by  $-0.18$  (95% CI  $-0.30$  to  $-0.05$ ,  $p = 0.008$ ) at the end of the 3-month programme. This was maintained at the 9-month follow-up ( $-0.21$ , 95% CI  $-0.35$  to  $-0.07$ ,  $p = 0.007$ ) (table 2). The fully engaged group ( $n = 15$ ) showed a slightly greater reduction in BMI z score at 9 months ( $-0.26$ , 95% CI  $-0.40$  to  $-0.12$ ) than overall. Other measures of overweight (waist z score, % body-fat) were also significantly reduced.



## Original article

**Table 2** Summary of body composition, quality of life and self-esteem scores at baseline (0 months), the end of the programme (3 months) and 9-month follow-up in 22 children with data (intention-to-treat analysis)

	0 months, mean (SD)	3 months, mean (SD)	9 months, mean (SD)	0-3-month change		0-9-month change	
				Mean (95% CI)	p Value	Mean (95% CI)	p Value
<b>Child's body composition</b>							
BMI z score	2.75 (0.63)	2.58 (0.73)	2.55 (0.68)	-0.18 (-0.30 to -0.05)	0.008	-0.21 (-0.35 to -0.07)	0.007
BMI (kg/m <sup>2</sup> )	26.0 (4.4)	25.6 (4.8)	25.9 (4.6)	-0.48 (-1.04 to 0.08)	0.090	-0.11 (-0.80 to 0.58)	0.737
Waist z score	3.33 (0.58)	3.16 (0.67)	3.13 (0.67)	-0.19 (-0.30 to -0.07)	0.003	-0.21 (-0.34 to -0.08)	0.004
Waist (cm)	86.4 (13.1)	84.9 (12.9)	86.3 (12.5)	-1.73 (-3.14 to -0.32)	0.02	-0.23 (-2.3 to 1.8)	0.813
% Body fat	37.7 (5.5)	36.8 (6.1)	34.9 (6.0)	-1.03 (-2.72 to 0.66)	0.212	-2.90 (-4.98 to -0.82)	0.01
Fat free mass (kg)	31.3 (8.3)	31.9 (8.4)	34.7 (8.7)	0.66 (0.11 to 1.21)	0.020	3.46 (2.72 to 4.21)	<0.001
<b>Child's quality of life (PEDS QL) – from parent's perspective (range 0-100)</b>							
All 23 questions	69.1 (11.8)	78.0 (9.2)	75.1 (12.9)	9.0 (4.9 to 13.0)	<0.001	6.7 (-0.9 to 14.4)	0.08
Physical health	70.1 (14.8)	79.8 (12.1)	77.6 (17.1)	10.0 (2.9 to 17.1)	0.009	8.2 (-0.9 to 17.3)	0.075
Emotional/social/school	68.6 (13.3)	77.1 (10.3)	73.8 (12.2)	8.5 (3.8 to 13.2)	0.001	5.8 (-2.1 to 13.6)	0.138
<b>Child's quality of life (PEDS QL) – from child's perspective (range 0-100)</b>							
All 23 questions	64.9 (17.0)	70.2 (17.8)	71.6 (17.2)	5.1 (-2.8 to 13.0)	0.189	7.0 (-1.2 to 15.2)	0.087
Physical health	63.6 (17.8)	73.7 (15.5)	74.1 (17.4)	9.7 (0.0 to 19.3)	0.049	11.1 (0.6 to 21.6)	0.04
Emotional/social/school	65.6 (18.1)	68.3 (21.7)	70.3 (18.9)	2.7 (-6.2 to 11.5)	0.534	4.8 (-3.1 to 12.8)	0.214
<b>Child's self-esteem (Self-Perception Profile for Children) (range 1-4)</b>							
Scholastic	2.66 (0.88)	2.67 (0.60)	2.72 (0.84)	0.01 (-0.26 to 0.27)	0.953	0.06 (-0.22 to 0.34)	0.657
Social	2.54 (0.68)	2.55 (0.68)	2.58 (0.91)	0.01 (-0.24 to 0.26)	0.960	0.03 (-0.31 to 0.38)	0.851
Athletic	2.33 (0.77)	2.38 (0.56)	2.39 (0.62)	0.04 (-0.24 to 0.31)	0.781	0.06 (-0.34 to 0.46)	0.753
Physical appearance	2.24 (0.85)	2.17 (0.85)	2.30 (0.92)	-0.08 (-0.46 to 0.31)	0.689	0.06 (-0.43 to 0.54)	0.810
Behaviour	2.89 (0.89)	2.89 (0.73)	3.06 (0.72)	0.0 (-0.38 to 0.38)	0.987	0.14 (-0.31 to 0.59)	0.512
Global self-worth	2.62 (0.96)	2.68 (0.61)	2.76 (0.89)	0.06 (-0.25 to 0.37)	0.687	0.14 (-0.37 to 0.64)	0.578

**Psycho-social measurements**

From the parents' perspective, each aspect of the child's quality of life improved at 3 months (the end of the programme) but not at 9-month follow-up compared to baseline (table 2). Significant improvements in physical functioning were reported by children at 3 and 9 months, but other aspects of quality of life were unchanged. Children's self-esteem showed no change for the six domains (table 2). The relationship between parents

and children improved significantly at 3 months, although statistical significance was lost by 9 months (table 3). Parents' mental health improved significantly at both time points.

**Lifestyle change**

The Family Eating and Activity questionnaire showed that children were significantly less exposed to unhealthy foods in the home ("stimulus exposure") and had developed an

**Table 3** Summary of lifestyle (dietary and activity) measures, relationship between parents and children, and parents' mental health scores at baseline (0 months), the end of the programme (3 months) and 9-month follow-up in 22 children with data (intention-to-treat analysis)

	0 months, mean (SD)	3 months, mean (SD)	9 months, mean (SD)	0-3-month change		0-9-month change	
				Mean (95% CI)	p Value	Mean (95% CI)	p Value
<b>Child's habitual activity by accelerometer (ActiGraph)*</b>							
MVPA (min/day)	59.3 (34.8)	60.6 (30.7)	62.3 (33.7)	2.7 (-9.1 to 14.6)	0.620	4.0 (-8.8 to 16.8)	0.521
Step count (steps/day)	7361 (2743)	7871 (2171)	8859 (2140)	654 (-630 to 1937)	0.292	1571 (519 to 2623)	0.007
<b>Child's fruit and vegetable consumption (Day in the Life Questionnaire)</b>							
Portions	1.7 (1.3)	1.8 (1.8)	2.4 (1.6)	0.1 (-0.7 to 0.9)	0.777	0.7 (-0.2 to 1.5)	0.119
<b>Child's scores for Family Eating and Activity questionnaire (Golan) (lower is better for all domains.)</b>							
Inactivity/activity	14.1 (13.2)	7.4 (13.6)	8.8 (10.3)	-8.5 (-13.9 to -3.2)	0.004	-6.8 (-12.1 to -1.4)	0.017
Stimulus exposure	9.7 (3.4)	6.8 (2.7)	6.8 (3.1)	-3.1 (-4.6 to -1.6)	0.001	-3.3 (-5.0 to -1.5)	0.001
Eating related to hunger	3.4 (1.4)	3.5 (1.5)	3.0 (1.9)	0.2 (-0.8 to 1.1)	0.672	-0.4 (-1.2 to 0.5)	0.364
Eating style/rites	23.8 (5.4)	18.1 (6.3)	17.8 (5.6)	-6.2 (-9.5 to -3.0)	0.001	-6.2 (-8.9 to -3.6)	0.000
<b>Child-Parent Relationship Scale (higher is better) (range 1-5)</b>							
15 Questions	3.85 (0.71)	4.15 (0.48)	4.08 (0.78)	0.31 (0.06 to 0.55)	0.018	0.22 (-0.07 to 0.52)	0.128
<b>Parents mental health (Short Depression-Happiness Scale) (range 0-3)</b>							
Score (16 parents)	1.81 (0.75)	2.25 (0.64)	2.21 (0.59)	0.44 (0.12 to 0.76)	0.011	0.40 (0.01 to 0.78)	0.045

\*Mean data only on 18 children who had at least 4 days of records at each time point, differences done on n = 20 for 0 to 3 month change and n = 19 for 0 to 9-month change. MVPA, moderate and vigorous physical activity.

improved eating style; both changes were maintained to 9 months. However, fruit and vegetable consumption had not changed significantly at the end of the programme or at 9 months (table 3).

Children became significantly less sedentary at both time points, based on the balance of activity/inactivity reported by parents (table 3).<sup>30</sup> This is consistent with the significant increase in average steps per day of children at the 9-month follow-up (table 3). However, the average minutes per day doing MVPA was unchanged (table 3), although the two groups differed in their response. Group 1 reduced their daily MVPA from 71 to 64 min (mean difference -8, 95% CI -22 to 5.9,  $p=0.22$ ) from September to December, and group 2 showed a significant increase from 40 to 55 min (mean difference 15.5, 95% CI 0.7 to 30.4,  $p=0.042$ ) from January to April.

#### Completers versus drop-outs

There was no differences in baseline BMI or gender between the 18 children who completed the programme and the nine who withdrew, but there appear to be differences depending on how they were recruited. Only two of the 13 families who self-referred after publicity in the local media withdrew, whereas three of the five families referred by health professionals and all three of the families who enrolled following recommendations by friends/family withdrew.

#### DISCUSSION

Families for Health differs from other childhood obesity programmes currently being researched in the UK in its emphasis on parenting and relationship skills. It is based in a community setting and the model is one of training local facilitators in order to increase local capacity and sustainability. This pilot study with 21 families suggests that the programme may reduce overweight and improve other health related outcomes.

The programme attracted participants from diverse family types and socio-economic groups. Unpaid publicity in the local media proved to be the most effective recruitment strategy, and families recruited in this way were more likely to complete the programme (self-referral may indicate commitment to change).<sup>34</sup> The overall drop-out rate of 33% is within the range for other obesity management interventions.<sup>7</sup> Our pilot showed that timing of sessions influenced attendance and completion, with Saturday morning being much better than Monday evening, largely because of the practicalities of attending this 2½ h programme after school. Parents indicated that the programme was helpful, with new skills and knowledge being used confidently.

The achievement of a significant reduction in BMI z score of -0.21 at the 9-month follow-up (6 months after completion of the intervention) is very encouraging. This may underestimate the benefit on obesity as children referred to hospital outpatient clinics may actually increase BMI by 0.2 z score over this timescale.<sup>11</sup> Although benefits are difficult to assess without a control group, our results are similar to those of other UK based interventions aimed at this age group, notably MEND which showed a -0.24 difference in BMI z score between randomised groups at a 6-month follow-up.<sup>35</sup>

Quality of life scores (PedsQL) for the 28 overweight/obese children at baseline of 65.3 (self-report) and 67.7 (parent) are much lower than scores for "healthy" children from Wales (UK) and USA but similar to those for children with chronic diseases and obese children in USA.<sup>36,37</sup> It is therefore encouraging that

the parent-proxy scores in both physical function and psychosocial health increased significantly at the end of the Families for Health programme. The difference lost statistical significance by 9 months, but the clinical significance of these improvements in quality of life should not be underestimated. Children reported improved physical functioning, which may help engagement in physical activity.

Surprisingly, a review of the literature showed that the association between obesity and self-esteem in children is modest in community samples, although it shows a stronger link in clinical samples.<sup>38</sup> Baseline scores for children participating in Families for Health appeared lower than those of Scottish children, at least on the athletic and appearance domains,<sup>39</sup> but the programme has shown no change. The validity of Harter's Self-Perception Profile has been questioned for intervention designs in British children,<sup>40</sup> suggesting that further work may need to use an alternative measure.

Improvements on the Family Eating and Activity Questionnaire<sup>30</sup> could be attributable to social desirability response bias, with answers from parents reflecting perceived expectations. Interviews with parents, however, validated the questionnaire findings, with some families indicating they had bought dinner tables and had stopped having sweets/snacks in the home.

Changes in activity levels, however, were only partially demonstrated. The inactivity/activity balance on the Golan questionnaire did improve significantly, with children becoming less sedentary.<sup>30</sup> Increased step-counts at 9-month follow-up also indicated the success of the programme to encourage 10 000 steps per day. However, minutes of MVPA did not change as a result of Families for Health, although the second group showed a significant increase from baseline in January to the end of the programme in April. This highlights a problem with looking at changes over time. Children are less active in winter,<sup>41</sup> and as we did not have a full 12-month follow-up, habitual activity was measured at different times of year, making interpretation difficult. Although MVPA did not change, the two other measures suggest an increase in habitual activity.

The relationship between parents and children improved significantly at the end of the programme, reflecting the emphasis in Families for Health on parenting and relationship skills. Giving parents the main responsibility for the behaviour change in the family is central to the success of the Families for Health pilot and may enhance long term sustainability. This will be examined in a 2-year follow-up.

#### CONCLUSION

The Families for Health programme is a promising new childhood obesity intervention which has the potential to make a real difference to help families with children who are overweight or obese, impacting on obesity and other health outcomes. This programme warrants further piloting and evaluation in a randomised controlled trial.

**Acknowledgements:** Thanks to Michelle Oldfield for administrative support; the facilitators, Mandy Coombes, Clair Hobbs, Daksha Myrie, Dawn Swan and Stephen Withers; Coventry Sports and Leisure Centre; and to the families who took part. The materials for this programme were developed by Candida Hunt and the University of Warwick. Candida Hunt developed the training programme, trained children and parent group facilitators and facilitated the parents' groups. Professor Jane Barlow, Chris Burrows, Dr Laurel Edmunds, Dr Krystyna Matyka, Dr Anita Morgan and Elizabeth Wilcock sat on the Research Advisory Group which provided advice and support for the development of the programme and the evaluation. Dr Moria Golan provided advice on the development of the programme.

## Original article

**Funding:** The development and piloting of the Families for Health (FFH) programme was funded by a Public Health Initiative award from the Department of Health. Coventry Teaching PCT supported the pilot both practically and financially.

**Competing interests:** None.

**Ethics approval:** The project was approved by Coventry Research Ethics Committee (NHS) and registered with Coventry Teaching PCT.

## REFERENCES

1. **The Information Centre.** Statistics on obesity, physical activity and diet, England 2006. Available from [www.ic.nhs.uk/statistics-and-data-collections/health-and-lifestyles/obesity/statistics-on-obesity-physical-activity-and-diet-england-2006](http://www.ic.nhs.uk/statistics-and-data-collections/health-and-lifestyles/obesity/statistics-on-obesity-physical-activity-and-diet-england-2006) (accessed 3 July 2008).
2. **Department of Health.** Choosing health: making healthier choices easier. Public health white paper, 2004. Available from [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4094550](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4094550) (accessed 3 July 2008).
3. **Ebbeling CB, Pawlak DB, Ludwig DS.** Childhood obesity: public-health crisis, common sense cure. *Lancet* 2002;**360**:473–82.
4. **Reilly JJ, Methven E, McDowell ZC, et al.** Health consequences of obesity. *Arch Dis Child* 2003;**88**:748–52.
5. **Summerbell CD, Ashton V, Campbell KJ, et al.** Interventions for treating obesity in children. *Cochrane Database Syst Rev* 2003;(3):CD001872.
6. **McLean N, Griffin S, Toney K, et al.** Family involvement in weight control, weight maintenance and weight-loss interventions: a systematic review of randomised trials. *Int J Obes Relat Metab Disord* 2003;**27**(9):987–1005.
7. **National Institute for Health and Clinical Excellence.** Obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children. NICE clinical guideline 43. 2006. Available from <http://www.nice.org.uk/CG043> (accessed 3 July 2008).
8. **Epstein LH, Valoski A, Wing RR, et al.** Ten-year outcomes of behavioural family-based treatment for childhood obesity. *Health Psychol* 1994;**13**:373–83.
9. **Golan M, Crow S.** Targeting parents exclusively in the treatment of childhood obesity: long-term results. *Obes Res* 2004;**12**:357–61.
10. **Israel AC, Stomaker L, Andrian CAG.** The effects of training parents in general child management skills on a behavioural weight loss program for children. *Behav Ther* 1985;**16**:169–80.
11. **Rudolf M, Christie D, McElhone S, et al.** WATCH IT: a community based programme for obese children and adolescents. *Arch Dis Child* 2006;**91**:736–9.
12. **Sacher PM, Chadwick P, Wells JCK, et al.** Assessing the acceptability and feasibility of the MEND programme in a small group of obese 7–11 year old children. *J Hum Nutr Diet* 2005;**18**:3–5.
13. **Rhee KE, Lumeng JC, Appugliese DP, et al.** Parenting styles and overweight status in first grade. *Pediatrics* 2006;**117**:2047–54.
14. **Kremers SP, Brug J, de Vries H, et al.** Parenting style and adolescent fruit consumption. *Appetite* 2006;**41**:43–50.
15. **Schmitz KH, Lytle LA, Phillips GA, et al.** Psychosocial correlates of physical activity and sedentary leisure habits in young adolescents: the teens eating for energy and nutrition at school study. *Prev Med* 2002;**34**:266–78.
16. **Hunt C.** *The parenting puzzle: how to get the best out of family life.* Oxford, UK: Family Links, 2003.
17. **Barlow J, Stewart-Brown S.** Understanding parenting programmes: parents' views. *Prim Health Care Res Dev* 2001;**2**:117–30.
18. **Kirkpatrick S.** *Family links pilot evaluation study.* Oxford: Health Services Research Unit, 2005.
19. **Food Standards Agency.** The balance of good health. Information for educators and communicators. 2001. Available from <http://www.food.gov.uk/multimedia/pdfs/bghbooklet.pdf> (accessed 3 July 2008).
20. **Ogden J, Reynolds R, Smith A.** Expanding the concept of parental control: a role for overt and covert control in children's snacking behaviour? *Appetite* 2006;**47**:100–6.
21. **Faith MS, Berkowitz RI, Stallings VA, et al.** Parental feeding attitudes and styles and child body mass index: prospective analysis of a gene-environment interaction. *Pediatrics* 2004;**114**:e429–36.
22. **Clark HR, Goyder E, Bissell P, et al.** How do parents' child-feeding behaviours influence child weight? Implications for childhood obesity policy. *J Public Health* 2007;**29**:132–41.
23. **Cole TJ, Freeman JV, Preece MA.** Body mass index reference curves for the UK, 1990. *Arch Dis Child* 1995;**73**:25–9.
24. **McCarthy HD, Jarrett KV, Crawley HF.** The development of waist circumference percentiles in British children aged 5–16.9 years. *Eur J Clin Nutr* 2001;**55**:902–7.
25. **Varni JW.** The PedsQL Measurement Model for the Pediatric Quality of Life Inventory. 1998. Available from [www.pedsq.org/about\\_pedsq.html](http://www.pedsq.org/about_pedsq.html) (accessed 3 July 2008).
26. **Harter S.** *Manual for the Self-Perception Profile for Children.* Denver, CO: University of Denver, 1985.
27. **Pianta RC.** Child-Parent Relationship Scale. 1992. Available from <http://www.virginia.edu/vprgs/CASTL/files/Child-ParentRelationshipScale.pdf> (accessed 3 July 2008).
28. **Joseph S, Linley PA, Harwood J, et al.** Rapid assessment of well-being: the Short Depression-Happiness Scale (SDHS). *Psychol Psychother* 2004;**77**(4):463–78.
29. **Edmunds LD, Ziebland S.** Development and validation of the Day in the Life Questionnaire (DILQ) as a measure of fruit and vegetable questionnaire for 7–9 year olds. *Health Educ Res* 2002;**17**(2):211–20.
30. **Golan M.** Reliability and validity of the family eating and activity habits questionnaire. *Eur J Clin Nutr* 1998;**52**(10):771–7.
31. **Trost SG, Way R, Okely AD.** Predictive validity of three ActiGraph energy expenditure equations for children. *Med Sci Sports Exerc* 2006;**38**:380–7.
32. **Trost SG, McIver KL, Pate RR.** Conducting accelerometer-based activity assessments in field-based research. *Med Sci Sports Exerc* 2005;**37**(11 Suppl):S531–43.
33. **Office for National Statistics.** The National Statistics socio-economic classification: user manual. 2005. [http://www.statistics.gov.uk/methods\\_quality/ns\\_sec/downloads/NS-SEC\\_User.pdf](http://www.statistics.gov.uk/methods_quality/ns_sec/downloads/NS-SEC_User.pdf) (accessed 3 July 2008).
34. **Prochaska JO, DiClemente CC, Norcross JC.** In search of how people change. *Am Psychol* 1992;**47**:1102–4.
35. **Sacher P, Chadwick P, Kolotourou M, et al.** The MEND RCT: effectiveness on health outcomes in obese children. *Int J Obes* 2007;**31**:S1.
36. **Upton P, Eiser C, Cheung I, et al.** Measurement properties of the UK-English version of the Pediatric Quality of Life Inventory 4.0 (PedsQL) generic core scales. *Health Qual Life Outcomes* 2005;**3**:22.
37. **Schwimmer JB, Burwinkle TM, Varni JW.** Health-related quality of life of severely obese children and adolescents. *JAMA* 2003;**289**(14):1813–19.
38. **Wardle J.** The impact of obesity on psychological well-being. *Best Pract Res Clin Endocrinol Metab* 2005;**19**(3):421–40.
39. **Hoare P, Elton R, Greer A, et al.** The modification and standardization of the Harter self-esteem questionnaire with Scottish school children. *Eur Child Adolesc Psychiatry* 1993;**2**(1):19–33.
40. **Shevlin M, Adamson G, Collins K.** The Self-Perception Profile for Children (SPPC): a multiple-indicator multiple-wave analysis using LISREL. *Personality and Individual Differences* 2003;**35**:1993–2005.
41. **Riddoch CJ, Mattocks C, Deere K, et al.** Objective measurement of levels and patterns of physical activity. *Arch Dis Child* 2007;**92**:963–9.

## APPENDIX A

## Details of the Families for Health programme

## Parents' programme

The approaches used included facilitated discussion, role play, goal setting, skill practice, a solution focused approach rather than a focus on problems, and homework. The topics covered included support with both parenting skills and family lifestyle. Parenting skills topics included giving praise, raising self-esteem, positive discipline, consistently enforced family rules, relationships' education, emotional health and developing autonomy. Family lifestyle topics included controlling the child's eating environment to limit exposure to unhealthy foods, making healthy choices available, food labels, portion sizes, family meal times; cooking advice and the opportunity to try new foods; decreasing sedentary behaviour (eg, limiting TV); and increasing sustainable physical activity.

## Children's programme

There were three components. First, information on healthy eating using the *Balance of good health*,<sup>19</sup> and emphasis on food labels, trying new foods and practical food preparation (served at the mid-session break with parents). Second, circle time enabled discussion of the emotional aspects of the children's lives and of living with obesity, to develop their emotional literacy, raise self-esteem and build confidence. Third, emphasis was given to physical activity aimed at increasing activity levels by participation in games, new physical activities that could be sustained, and the use of pedometers to encourage 10 000 steps per day.