Feasibility evaluation and long-term follow up of a family-based behaviour change intervention for overweight children (GOALS)

Paula Mary Watson

A thesis submitted in partial fulfilment of the requirements of Liverpool John Moores University for the degree of Doctor of Philosophy

April 2012

The following figures and appendices have been omitted on request of the university –

Fig 2.1 (p.9)

Fig 2.2 (p.11)

Fig 2.3 (p.12)

Fig 7.1 (p.200)

Fig 7.3 (p.205)

Appendices 1-4

Abstract

Childhood obesity is the most serious public health challenge of the 21st century. Whilst evidence supports a family-based lifestyle approach to childhood obesity treatment, research is needed to understand *how* interventions work and how practitioners can effectively support families to sustain behavioural changes in the long-term. This thesis evaluated the feasibility of a family-based behaviour change intervention for overweight children (GOALS) and explored the psychosocial process of long-term behavioural change in families with overweight children.

Study 1 measured the impact of GOALS on the body composition, lifestyle behaviours and self-perceptions of children and parents who completed the intervention. A complete case analysis (n=70) showed a significant 6-month reduction in child BMI SDS (-0.07, $p<0.001$) that was maintained at 12-month follow up. There was a significant year-on-year increase in the proportion of children reducing BMI SDS (42.9% year 1, 62.5% year 2, 80% year 3, $p<0.05$) and a strong positive relationship between parent and child BMI change ($r = .479$, $p<0.001$). Parents reported positive changes to their own and their children's physical activity and diet. BMI SDS reduction during the intervention was associated with improved global self-esteem and perceived physical appearance at 12 months.

Study 2 explored the experiences of families six weeks into the 18-session intervention through focus groups with parents and children. Motivators to attend GOALS included the non-judgemental approach, being in the same boat as others and child enjoyment. The whole family approach was perceived positively and families used BCTs both as a core component of GOALS and to facilitate their behaviour change at home. As well as the challenges of living with childhood overweight, families described a lack of support from extended family members and a perceived need for on-going professional support.

Study 3 followed up 15 families 3-5 years after they attended GOALS. Child and parent BMI was collected and parents took part in a semi-structured interview to explore their perceptions of "success" and their experiences of changing physical activity and eating behaviours. Mean child BMI SDS change from baseline was -0.47 for the 14 families who had completed GOALS. The majority of families perceived positive long-term outcomes, but these were not always aligned with actual child weight change. The most "successful" families placed a priority on changing child weight-related behaviours and parents took responsibility for these changes. While weight-control was a conscious process for these families, it was not necessarily made a *"big issue"* and parents used practices of an authoritative nature to facilitate change. Physical activity had become a way of life for the children, and mothers had reached a stage of feeling in control of their own weight.

This is the first UK childhood obesity treatment study to follow children up beyond 12 months, and the first known study worldwide to employ qualitative methods to explore parental perceptions of long-term success. Findings provided a unique insight into the process of long-term behavioural change for overweight children and raised questions about the way "success" is defined following participation in childhood obesity treatment. Recommendations are made to enhance the delivery of family-based childhood obesity treatment and policy-makers are urged to adopt a multilevel approach to tackling childhood obesity, with child weight management care pathways that recognise the heterogeneity of familial needs. Further research is required to substantiate the impact of GOALS, and to prospectively explore the process of behavioural change in overweight children and the familial factors that serve as moderators in this process.

Acknowledgements

I would like to thank the following people, without whom this PhD would not have been possible.

Professor Tim Cable, my director of studies and manager over the past 7 years, you have been a continued source of support, inspiration and the voice of reason when I have needed it most.

My supervisory team Dr Zoe Knowles and Dr Rebecca Murphy for your belief and guidance, over the past year in particular and Dr Martin Eubank for your support during the early stages of the PhD.

Professor Lindsey Dugdill, for the belief and passion you have shown for this project since the outset, and your continued advice and guidance. You always make time, even amidst the numerous other plates you juggle.

The many passionate and dedicated individuals who have developed and continue to deliver the GOALS intervention, without you this research would not be possible. I wish to acknowledge in particular Leanne Staniford, Marvan Awang, Rochelle Ellis, Katie Pickering, Jackie Hargreaves, Chris Egan and Karen Gaynor who facilitated focus groups for this research. Also Louise Coyne, for your help in transcribing the interview data.

My mum, dad, and closest family and friends for your continued belief and encouragement. In particular Ange, for your support and belief over the years; Anna, for your friendship, motivation and patience with my saying "no" to everything over the last six months (!); and most of all my good friend and fellow PhD student (now doctor!) Mareesa – you have supported me through the ups and downs and it has been a privilege to share this journey with you.

Finally, but by no means least, I would like to thank the families who have taken part in this research and who have shared their personal experiences to help improve the lives of other children.

This research was supported by Liverpool City Council through the Neighbourhood Renewal Fund [2006-2008] and the Area Based Grant [2008-2009] as part of Liverpool's *Taste For Health* Strategy (Liverpool PCT and Liverpool City Council). I wish to thank Liz Lamb, Dr Ruwan De Soysa, Dr Jamuna Acharya and Annette James for contributing to the strategic development of GOALS, and the many schools who have supported the project. Also Nicola Eccles, Shirley Judd, Lisa Newson, Hazel Cheung and Phil Casey for their contribution to the early development of the GOALS intervention.

Table of contents

Appendices

List of tables

List of figures

List of abbreviations

On the first occasion a term is mentioned in the main text it will be provided in full (with its abbreviation in parenthesis). Thereafter the abbreviation will be used.

BCT = Behaviour change technique

BMI = Body Mass Index

BMI SDS = Body Mass Index standard deviation score

FSA = Food Standards Agency

GOALS = Getting Our Active Lifestyles Started

IMD = Indices of Multiple Deprivation

LJMU = Liverpool John Moores University

MEND = Mind, Exercise, Nutrition, Do it!

MRC = Medical Research Council

NICE = National Institute for Clinical Excellence

NHS = National Health Service

PA[1] = physical activity

PE = physical education

PCT = Primary Care Trust

RCT = Randomised controlled trial

SES = Socio-economic status

SIGN = Scottish Intercollegiate Guidelines Network

SPPC = Self-Perception Profile for Children

TTM = Transtheoretical Model of Health Behaviour Change

WHO = World Health Organisation

%ile = percentile

[1] "Physical activity" is used in the main text, "PA" in tables and figures

Terminology

This thesis is based on the evaluation of a **family-based** behaviour change intervention for **children and adolescents** who are **overweight or obese** (Getting Our Active Lifestyles Started (GOALS)). To maintain brevity the following terminology is used.

Term	Usage within thesis	Detail
Parent/s	Any adult responsible for caring for a child	GOALS states that the "minimal family unit is one child plus one parent/adult guardian". Whilst the majority of adults attending GOALS are mothers or fathers, it must be acknowledged that "parent/s" may also include guardians, carers, older siblings, grandparents, aunts/uncles, extended family or household members.
A person who is overweight	Someone who is medically classified as overweight or obese	"Overweight" and "obese" are medical terms used to describe conditions of excess weight and are defined by BMI cut-off points (see section 2.4.1.1). However, these cut-offs vary between studies and the terms are used inconsistently in the academic literature. Thus the following protocol is adhered to: **Overweight and obese as adjectives** Where research relates to children who are either overweight or obese (as in the GOALS population), the term "overweight" is used. Where research is specific to children who are obese the term "obese" is used. **Overweight and obesity as nouns** When referring to the development of excess weight in childhood, the term "childhood obesity" is used (this is the standard in the literature). However, where the authors of a report have specifically used the term "childhood overweight" this is replicated.
Child/ren	Anyone under the age of 18 years	It is standard in the literature to refer to children aged 0-11 years as "children", and 12-18 years as "adolescents". The terms "young people" and "youth" may be used when children and adolescents are involved collectively. In research focussed on family relationships the terms "child" and "children" refer to offspring and encompass a broader age range. **When describing the study population for this thesis** This thesis involves both children and adolescents and the longitudinal nature of the study means some children from studies 1 & 2 became adolescents in study 3. For consistency, the terms "child" and "children" are used throughout, with age-specific observations as appropriate. **When describing the research of others** "Children", "adolescents", "youth" and "young people" are used according to the original research reports.
Childhood obesity treatment	Any intervention targeted at children under 18 years who are overweight or obese	Treatment might include lifestyle, pharmaceutical or surgical approaches. The focus of this thesis is on lifestyle approaches that focus on changing physical activity and dietary behaviours to address the child's excess weight. In the literature the terms "childhood obesity management" or "child weight management" might also be used.

Publications

The following publications have resulted from this research.

Watson PM, Dugdill L, Pickering K, Bostock S, Hargreaves J, Staniford L & Cable NT. A whole family approach to childhood obesity management (GOALS): relationship between adult and child BMI change. *Annals of Human Biology* 2011;38:445-452.

Watson PM, Dugdill L, Murphy R, Knowles Z & Cable N T. Moving forward in childhood obesity treatment: a call for translational research. *Health Education Journal.* Published online 3 April 2012. DOI: 10.1177/0017896912438313

Copies of both articles are provided in appendices 1 & 2.

Chapter 1

Introduction

1.1 Background

The prevalence of childhood obesity has risen at alarming rates over the past three decades (World Health Organisation (WHO), 2011). As obesity tracks into adulthood (Singh et al., 2008) and is a major risk factor for non-communicable diseases (e.g. heart disease, stroke, cancer, diabetes (Prospective Studies Collaboration, 2009)), this rise in childhood obesity presents a serious challenge for public health. Growing evidence supports a family-based multidisciplinary approach to childhood obesity treatment (Oude Luttikhuis et al., 2009), but further research is needed to help policy-makers and practitioners translate this evidence to implement interventions in practice. Such research should be *ecologically valid*, include *long-term follow up* and explore the *psychosocial mechanisms of changing physical activity and dietary behaviours* for children who are overweight.

This thesis is based on an evaluation of the Getting Our Active Lifestyles Started intervention (GOALS (Dugdill et al., 2009a; Stratton & Watson, 2009)[1]) that took place between 2006 and 2009 with a follow up in 2011-2012. GOALS is a family-based behaviour change intervention for overweight children, managed under Liverpool's *Taste for Health* Strategy by Liverpool John Moores University (LJMU) in partnership with Liverpool Primary Care Trust (PCT), Liverpool City Council, Alder Hey Children's NHS Foundation Trust and the University of Salford. GOALS aims to support families in making gradual sustainable changes to their physical activity and eating behaviours, with a view to reducing the child's level of overweight for their age and sex and improving the family's future health prospects.

Liverpool is a city in the North-West of England with large areas of socioeconomic deprivation (Office for National Statistics, 2007). When the GOALS project was founded in 2003, almost one third of 9-10 year olds in Liverpool were overweight or obese (Stratton et al., 2007) and there was growing local concern for their provision. School health teams were receiving referrals for overweight children for whom there was no service available and community paediatricians were expressing concern about the volume of families seeking *medical* support for their child's obesity, which

[1] Copies of the these two published book sections are provided in appendices 3 and 4

in the majority of cases required a *lifestyle* solution. At the time, the evidence base for treating childhood obesity was scarce (Summerbell et al., 2003) and no evidence-based community intervention model existed in the UK. Therefore the project followed Medical Research Council guidelines (MRC, 2000; 2008) to develop an intervention in accordance with the needs of local service-users and drawing on evidence as it emerged (e.g. Scottish Intercollegiate Guidelines Network (SIGN), 2003), National Institute for Health and Clinical Excellence (NICE), 2006) . This process involved planning (pre-2005), development (2005-2006) and piloting (June-Dec 2006) phases before the intervention was implemented across Liverpool from September 2006. This thesis evaluates the feasibility of GOALS in this city-wide implementation phase, drawing on the perspectives of participants who attended between September 2006 and March 2009.

1.2 Introduction to studies

The focus of the thesis is on exploring "what works" in family-based childhood obesity treatment. It aims to generate hypotheses and produce recommendations for policy-makers, practitioners and researchers. As the thesis progresses, it evolves from "breadth" to "depth" to augment understanding of the long-term behavioural change process for families with overweight children.

- **Study 1** (*does GOALS work?*) measures the 6- and 12-month impact of GOALS on the body composition, lifestyle behaviours and self-perceptions of children and parents who complete the intervention, and explores the relationships between these variables.
- **Study 2** (*how does GOALS work?*) qualitatively explores the experiences of families whilst they are taking part in GOALS. Topics include perceived changes to families' physical activity and eating behaviours, factors facilitating these changes and challenges they are facing.
- **Study 3** (*who does GOALS work for in the long-term and how?*) follows up families 3-5 years after they attend GOALS to explore actual and perceived outcomes, parental psychosocial factors associated with positive outcomes and the processes involved in sustaining long-term behavioural change.

1.3 My role in GOALS and conception of the PhD

Since January 2005 I have been employed by LJMU as *Project Manager and Principal Researcher* for GOALS. Over this time I have collaborated with National Health Service (NHS) and local authority partners to lead the development, delivery and evaluation of the intervention, allowing the on-going generation of research evidence that is directed by – but also feeds directly into – public health policy.

During the data collection phase for studies 1 and 2 (September 2006-March 2009), I was closely involved in the delivery of the intervention, both in the operational management of a staff team (approx 11-15 staff at any one time) and occasionally in the delivery of behavioural change sessions. The research protocol was developed in collaboration with the GOALS management group[2] and whilst I was the principal researcher throughout, the GOALS delivery personnel also played a role in the research process. My role as researcher-practitioner meant I was already known to the participants in this study. Throughout the thesis I consider the implications of this relationship and in the final chapter I provide justification for why ultimately, I regard it as a strength of this translational research project.

The PhD was conceived to conduct a comprehensive analysis of the data that was collected during 2006-2009 and add meaning to this with a long-term follow up of the same participants 3-5 years after they attended GOALS. This provided a unique opportunity to study the psychosocial mechanisms of behaviour change at two different time points: a) whilst participants were in the early stages of the intervention and b) several years after they had attended the intervention.

1.4 Structure of the thesis

Chapter 2 begins with a review of the literature, focussing on the familial and behavioural change factors of lifestyle-based approaches to childhood obesity treatment. It concludes with a section discussing my philosophical stance and methodological approach, before outlining the aims and objectives of the thesis. *Chapter 3* outlines the GOALS intervention framework and provides details of the delivery processes between September 2006 and March 2009. *Chapters 4, 5 and 6* report the research studies in turn; each chapter includes an introduction, methods,

[2] During 2006-2009 the GOALS management group included Paula Watson (LJMU), Professor Tim Cable (LJMU), Professor Lindsey Dugdill (University of Salford), Dr Ruwan de Soysa (Alder Hey), Dr Jamuna Acharya (Alder Hey), Liz Lamb (Liverpool City Council), Shirley Judd (Liverpool PCT) and Julie Curren/Annette James (Liverpool PCT).

results/findings and a discussion relating to the findings of the study. *Chapter 7* then considers the implications of the findings for child health behaviour change theory, before making recommendations for policy, practice and research to advance the field of childhood obesity treatment. *Chapters 4, 5, 6 and 7* are preceded with a study map outlining the aims, research questions and key findings from each study as they evolve.

1.5 Ethical approval

Ethical approval for this PhD was received as follows:

	Research Ethics Committee	Reference number
Studies 1 and 2	Liverpool NHS Paediatric Research Ethics Committee	05/Q1502/28
	Liverpool John Moores University Research Ethics Committee	02436
Study 3	NHS North-West 3 Research Ethics Committee – Liverpool East	11/NW/0014
	Liverpool John Moores University Research Ethics Committee	11/SPS/046

Chapter 2
Review of the literature

Childhood obesity is a complex multidisciplinary issue and the associated literature is vast. Researchers globally are studying the antecedents, consequences, and management of childhood obesity and related behaviours. Philosophical roots of this research lie not only in the social, physical and medical sciences but also in the arts and humanities. To include everything is beyond the scope of this thesis, therefore this chapter focusses on the familial and behavioural change factors of lifestyle-based approaches to childhood obesity treatment.

The chapter starts by setting the scene with childhood obesity epidemiology and current policy, before outlining key theoretical concepts, empirical studies related to family-based childhood obesity treatment, and finishing with methodology, aims and objectives of the thesis. *Section 2.1* provides an overview of the prevalence and consequences of childhood obesity, discusses policy related to childhood obesity treatment in the UK and describes the development of the GOALS intervention. *Section 2.2* outlines key theories as a basis for reviewing the empirical evidence for influences on child weight, with a particular focus on influences at the family level. *Section 2.3* discusses theories of health behaviour change in the context of physical activity and dietary behaviours. *Section 2.4* reviews family-based childhood obesity treatment interventions, considering which children respond best to interventions, how interventions are received by families, and how "successful" outcomes are currently determined. Finally, *section 2.5* discusses the philosophical stance and methodological approach, before outlining the aims and objectives of the thesis.

2.1 Childhood obesity

In the last three decades, the prevalence of obesity in children has risen at an alarming rate and in 2010 nearly 43 million children under five were overweight worldwide (WHO, 2011). Since the National Child Measurement Programme was established in 2006 in England obesity prevalence in 10-11 year old children has shown a statistically significant increase of 0.35% per year, with 20.6% of boys and 17.4% of girls found to be obese during the 2010-2011 school year (National Obesity Observatory, 2012). Although Health Survey for England data suggests the overall increase in obesity prevalence has stabilised during recent years, the socioeconomic gap has widened and the highest increases have occurred in the

most deprived areas (Stamatakis et al., 2010). Obesity prevalence is also higher in children from certain black and ethnic minority groups (The NHS Information Centre, 2011) and in children who have obese parents (Lake et al., 1997).

Obesity is a risk factor for non-communicable diseases (e.g. heart disease, stroke, cancer, diabetes (Prospective Studies Collaboration, 2009)) which are the leading cause of mortality in the world (Global Health Observatory). It was estimated that the total annual cost of obesity and overweight for England in 2002 was nearly £7 billion, predicted to rise to £45.5 billion per annum by 2050 (Foresight, 2007). Since it is consistently reported that children who are obese are more likely to become obese adults (Singh et al., 2008), the increase in childhood obesity presents a serious challenge for public health.

As well as the distal threats of obesity-related morbidity and mortality, there are many immediate physical, psychological and social consequences for children who are obese. Children who are obese are more likely to experience continence problems (Fishman et al., 2004), respiratory disease (Fiorino & Brooks, 2009) and reduced mobility (Shultz et al., 2009). They may display clinical morbidities such as fatty liver (Reinehr et al., 2009), impaired glucose tolerance, raised blood pressure, raised triglycerides and reduced HDL cholesterol (features associated with the adult "metabolic syndrome" (Sabin et al., 2006)). Children are often bullied at school (Curtis, 2008) and their obesity continues to be the target of daily stigma from peers (Latner & Stunkard, 2003), media (Latner et al., 2007), educators and parents themselves (Puhl & Latner, 2007). Consequently, many obese children suffer low self-esteem and a poor quality of life (Griffiths et al., 2010).

2.1.1 Childhood obesity treatment in the UK

At the outset of this study, relatively little was known about treating childhood obesity (Summerbell et al., 2003). In light of the evidence that existed at the time, SIGN (2003) recommended interventions adopted a multi-disciplinary approach (physical activity, diet and behaviour change) and work towards sustained behavioural change involving the family. The available evidence came mostly from the same research team in the US (e.g. Epstein et al., 1982; Epstein et al., 1994a; Goldfield et al., 2001), and showed it was more effective in the long-term to include parents in childhood obesity treatment than to treat children alone (Epstein et al., 1994). The earliest UK-based childhood obesity treatment intervention to be evaluated was a residential weight-loss camp (with very little involvement from parents), and whilst there was some support for the effectiveness of the approach in

helping children *lose weight* (Gately et al., 1997; Gately & Cooke, 2003), changes to physical activity and dietary behaviours were difficult to sustain when children returned to their home environments (Holt et al., 2005).

During the years that followed, evidence for the treatment of childhood obesity emerged at an ever-increasing pace (e.g. Oude Luttikhuis et al., 2009) and served to substantiate the messages that appeared in the original SIGN guidelines (later superseded by an updated version (SIGN, 2010)) for a multidisciplinary family-based behaviour change approach. The first available NICE guidance for managing obesity (NICE, 2006) also pointed towards a behavioural change approach to childhood obesity treatment and in 2008 the British government published a national obesity strategy (*Healthy Weight, Healthy Lives*, Cross-Government Obesity Unit, 2008) and a Public Service Agreement focussed on reducing the proportion of overweight and obese children to 2000 levels by 2020 (HM Treasury, 2008).

During the last decade, many childhood obesity treatment interventions were commissioned by NHS PCT and local authorities across England, and the previous government provided guidance to support the commissioning and training process (Cross-Government Obesity Unit, 2009; CSIP-NW/Cross-Government Obesity Unit, 2008). In 2008, approximately 51 schemes were operating to promote healthy weight amongst overweight and obese children in England, involving PCTs, local authorities, schools, and voluntary or community organisations (Aicken et al., 2008). Some of these were small local schemes, others (e.g. MEND, Sacher et al., 2010) were running at hundreds of sites in the country. Yet few robust evaluations have been carried out, and the number of schemes with publications in the public domain is only recently beginning to approach double-figures (e.g. Coppins et al., 2011; Croker et al., 2012; Hughes et al., 2008; Murdoch et al., 2011; Pittson & Wallace, 2011; Robertson et al., 2008; Rudolf et al., 2006; Sacher et al., 2010; Tyers, 2005).

2.1.2 Childhood obesity in Liverpool

Liverpool is a city in the North-West of England with a population of approximately 458,000 residents (Liverpool City Portal, 2012). In the 2004, 2007, and 2010 Indices of Multiple Deprivation (IMD) Liverpool was ranked the most deprived local authority area in the country (Liverpool City Council, 2011), containing 22 of the 100 most deprived Lower Super Output Areas in England.

Between 1997 and 2003 there was a steady increase in the mean Body Mass Index (BMI) of 9-10 year old children in Liverpool, with an independent decline in cardiovascular fitness (Stratton et al., 2007). In 2006 over one third of 10-11 year

old children in Liverpool were overweight or obese (The Information Centre for Health and Social Care, 2007). Despite indications that the rising levels of obesity have begun to plateau (Boddy et al., 2010) childhood obesity rates in Liverpool remain higher than the national average, with 25.8% of 4-5 year olds and 37.5% of 10-11 year olds overweight or obese (The NHS Information Centre, 2011).

Liverpool's commitment to action on childhood obesity was reflected in the *Healthy Weight, Healthy Liverpool* strategy for 2008-2011 (Liverpool PCT and Liverpool City Council, 2008), which emphasised the importance of a multi-level approach in tackling childhood obesity levels locally. Focussing on both prevention and treatment, the obesity strategy linked closely into Liverpool *First for Health*, which is a joint strategy between Liverpool City Council and Liverpool PCT aimed at improving the health and wellbeing of Liverpool residents. Within the First for Health strategy are three sub-strategies, *Taste for Health*, *Active City* and *Smoke Free Liverpool.*

2.1.2.1 Development of GOALS

Since 2003, LJMU has received a series of yearly funding contracts from NHS and local authority public health resources to develop, deliver and evaluate a family-based childhood obesity treatment service targeting socioeconomically deprived communities (GOALS). The GOALS project sits under Liverpool's Taste for Health strategy to provide a childhood obesity treatment service within a multi-level programme of citywide initiatives contributing to the childhood obesity prevention agenda (eg. *Sports*Linx (Boddy et al., 2010), Sport and Physical Activity Alliances, Healthy Schools, School Sports Partnerships, Extended Schools).

GOALS was founded by key academic, health and local authority partners in the North-West (LJMU, Liverpool PCT, Liverpool City Council, Alder Hey Children's NHS Foundation Trust, University of Salford) in response to growing local concern regarding provision for children who were overweight or obese. There was an urgent need for a childhood obesity treatment service in Liverpool (Stratton et al., 2007) but little published evidence of "what worked" in the UK or internationally. Therefore, following the recommendations of the Medical Research Council (MRC, 2000, 2008) for the development and evaluation of complex interventions, the project adopted a phased approach to develop an intervention in accordance with the needs of local service-users (figure 2.1). Phase 1 began with an assessment of local public health need and current research evidence. Phase 2 was a formative

Fig 2.1 Phased development of the GOALS intervention, informed by the MRC framework for developing and evaluating complex interventions (MRC, 2000, 2008)

action research study involving local service-users and practitioners in intervention development (Dugdill et al., 2009a). In phase 3 the newly designed intervention was piloted with a small group of families, leading to phase 4 which is the feasibility phase on which this thesis is based (outlined in full in chapter 3). Throughout the development process a cycle of reflective practice involving service-users, practitioners and stakeholders ensured the intervention was aligned with public health needs and emerging research evidence (Dugdill 2009). This yielded a reciprocal cycle where both "evidence to policy" and "policy to evidence" were key (Hunter, 2009).

2.2 Influences on child weight

When intervening to treat children who are overweight, it is first important to understand the factors that influence the development of overweight in childhood. The section that follows will outline the theories of child behaviour on which GOALS is based, supported by examples of empirical evidence to demonstrate the key influences on child weight and related behaviours.

2.2.1 The child's ecological "niche"

Childhood obesity results from an energy imbalance whereby the child is consuming too much energy through food and drink and burning off insufficient energy through physical activity (Anderson & Butcher, 2006). There are multiple levels of influence determining a child's lifestyle behaviours (i.e. physical activity, sedentary behaviour and diet) and *Ecological Systems Theory* (Bronfenbrenner, 1986) provides a useful model within which to understand these. The theory proposes that a child's individual characteristics cannot be explained without considering their whole "ecological niche", that is the immediate context they are embedded in (e.g. family) and the larger contexts which surround that (e.g. school, community, society). Davison and Birch (2001) drew on this theory to propose an ecological model of predictors of child overweight (figure 2.2).

Fig 2.2 Ecological model of predictors of child overweight. * = *Child risk factors (shown in upper case lettering) refer to child behaviours associated with the development of overweight. Characteristics of the child (shown in italic lettering) interact with child risk factors and contextual factors to influence the development of overweight (i.e. moderator variables).* (Davison & Birch, 2001, p.161) Whilst it is important to acknowledge the wider influences of the child's ecological niche, it is the familial levels of influence (within the red circle) that form the focus of this thesis.

It can be seen from figure 2.2 that the main obesity-inducing behaviours in childhood are an unhealthy diet, lack of physical activity and sedentary behaviour (Davison & Birch, 2001). However, the relative contribution of these behaviours continues to be a matter of debate. In a recent systematic review examining the prospective association between pre-school lifestyle behaviours and anthropometric measures in later childhood (Te Velde et al., 2012) a lack of physical activity was found to be the most strongly related factor to the development of overweight. There was a moderate association between TV viewing and overweight, but heterogeneity in the dietary measures made it difficult to draw conclusions about the link between diet and overweight. One of the challenges of elucidating the relative influences of lifestyle behaviours is that unhealthy dietary practices often co-exist with sedentary behaviours in children (Pearson & Biddle, 2011), and it can be a challenge to separate their effects on the development of obesity. Furthermore, the majority of sedentary behaviour research in children focuses on TV viewing

(Tremblay et al., 2011) which constitutes only a low-to-moderate proportion of young people's total sedentary time (Biddle et al., 2009).

Despite these methodological challenges, it is widely established that physical activity (Hills et al., 2011), sedentary behaviour (The Sedentary Behaviour and Obesity Expert Working Group, 2010) and diet (Johnson et al., 2008) all play a role in the development of obesity in children. In the outside circle of figure 2.2 are the broader environmental influences on these factors such as food commercialism, technology, urban and socioeconomic development which over the past three decades have led to an "obesogenic" culture in which sedentary pastimes are more attractive, there are less opportunities for unstructured physical activity and energy-dense foods have become widely accessible (Maziak et al., 2007). Whilst children's behaviour must be considered in the context of this universally obesogenic environment, it remains that some children are more behaviourally susceptible to obesity than others (Carnell & Wardle, 2007) and it is the interaction between the middle circle (family characteristics) and the inner circle (child lifestyle behaviours) that this thesis is focussed on.

2.2.2 Familial influences on childhood obesity-inducing behaviours

Fig 2.3 A socialisation model of child behaviour (Taylor et al., 1994, based on Bandura's Social Cognitive Theory, 1986)

In a review of the familial determinants of physical activity in childhood, Taylor and colleagues (1994) proposed a *Socialisation Model of Child Behaviour* that draws on Bandura's *Social Cognitive Theory* (Bandura, 1986) and emphasises the interactions between children, parents and their environment in determining child

behaviour (see figure 2.3). The model proposes that a child's physical activity behaviour might be influenced by their cognitions (e.g. whether they believe they are good at sport), their behaviour (e.g. whether they have been successful in the past at a particular activity), their parents' cognitions (e.g. whether parents believe it is important for their child to be physically active), their parents' behaviour (e.g. whether parents are active themselves and are willing to support their child's physical activities) and their home environment (e.g. whether they have a garden or safe place to play). Whilst the model was developed to understand child physical activity behaviour, it can equally be applied to eating behaviour. Familial cognitive, behavioural and environmental factors have all been shown to have an influence on child dietary intake (Pearson et al., 2008).

There is extensive evidence for familial influences on child physical activity and eating behaviours. In a review of reviews of correlates of physical activity in youth, Biddle and colleagues (2011) found evidence for correlates related to child cognitions (e.g. perceived competence, physical self-perceptions), child behaviour (e.g. diet, previous physical activity) and the home environment (e.g. time spent outdoors). Parent support was found to be an important factor, but it was not possible to elucidate the differential effects of material, social, or emotional support (reflecting environment, parent behaviour and parent cognitions respectively). The evidence for parental role-modelling of physical activity was mixed, but several studies found small-to-moderate associations, with the strongest relationships observed for fathers' physical activity. Similarly, a systematic review of family correlates of child and adolescent fruit and vegetable intake (Pearson et al., 2008) found evidence for correlates related to the home environment (e.g. availability of fruit and vegetables), parent cognitions (e.g. encouragement) and parent behaviour (e.g. modelling and parental intake). Child behaviours and cognitions were not measured.

Whilst these reviews provide solid evidence for the association between the components of Taylor et al.'s model and child weight-related behaviours, the studies reviewed were cross-sectional in nature and thus causation cannot be assigned. However longitudinal evidence does suggest family involvement (e.g. family meals, being physically active with child) is predictive of positive changes in 10-11 year old children's physical activity and eating behaviours over an 18-month period (Ray & Roos, 2012). A key component of Taylor et al.'s socialisation model is the *interaction* between child factors, parent factors and the environment. Yet the majority of studies have treated variables in isolation, and if the design of behaviour

change interventions is to be improved, research is needed to explore the way in which variables interact (Biddle et al., 2011).

2.2.2.1 Parenting styles and practices

The way in which children and parents interact is influenced by the dominant *parenting style* in the home. Parenting style is *"the general pattern of parenting that provides the emotional background in which parent behaviours are expressed and interpreted by the child"*. While parenting practices and behaviours describe *"what parents do"*, parenting style refers to *"how parents do it"* (Rhee, 2008, p.23). Baumrind (1966) outlined three parenting styles termed *permissive* (high warmth, low regulation), *authoritarian* (low warmth, high regulation) and *authoritative* (high warmth, high regulation). Permissive parenting was characterised by attempts to behave in a *"nonpunitive, acceptant and affirmative manner toward the child's impulses, desires and actions"* (p.889), providing the child with the warmth and love they need but allowing them the freedom to do as they choose without regulation. Authoritarian parenting demanded high obedience from children to set standards and was characterised by *"punitive, forceful measures to curb self-will at points where the child's actions or beliefs conflict with what she thinks is right conduct"* (p.890). In contrast to the extremes of permissive and authoritarian practices authoritative parenting was considered a balanced alternative, characterised by a firm but fair approach in which *"she enforces her own perspective as an adult, but recognises the child's individual interests and special ways"* (p.891). A fourth *uninvolved* parenting style was later proposed by Maccoby and Martin (1983), characterised by an absence of either warmth or regulation.

An authoritative parenting style has been linked with a lower risk of developing overweight in children (Rhee et al., 2006) and recent systematic reviews have shown that children raised in authoritative homes are more likely to eat healthily, be physically active and have a lower BMI (Sleddens et al., 2011) and promoting authoritative parenting is an effective strategy for the prevention and management of childhood obesity (Gerards et al., 2011). Sleddens et al. (2011) proposed both moderating and mediating pathways for the observed relationship between parenting style and child weight-related behaviours. The *moderating pathway* suggests parenting style interacts with parenting practices to influence the effect on child weight-related behaviours. For example, van der Horst et al. (2007) showed the association between restrictive parenting practices and sugar-sweetened drink consumption was stronger when adolescents perceived their parents to be moderately strict and highly involved (a combination typical of authoritative

parenting). The *mediating pathway* suggests parenting style influences child weight-related behaviours through more specific parenting practices. For example, authoritative parents are more likely to model positive behaviours, monitor and perceive responsibility for their child's food intake whereas authoritarian parents are more likely to restrict food and pressure children to eat (Hubbs-Tait et al., 2008). Furthermore, research has drawn attention to the fact parents may exhibit elements of more than one parenting style (Johnson et al., 2012). It is recommended research takes into account this multidimensionality, viewing parenting styles not as bipolar categories but as continuous dimensions (Sleddens et al., 2011).

2.2.2.2 Parental locus of control

Another potential moderating variable when considering control relationships within the home is the extent to which parents assign the child's excess weight to their own actions (*internal locus of control*) or to external forces outside of their control (*external locus of control*). In an interview study with 53 families embarking on treatment for their child's obesity, Grønbæk (2008) found 91% of families stated they had played a part in the development of their children's obesity, whereas 9% attributed the obesity to external factors such as genetics, illness or unknown reasons. Further research is required to understand how parental control attributions interact with parenting style and child weight-related behaviours.

2.3 Health behaviour change

The theories in section 2.2 provide a framework for understanding children's dietary and physical activity *behaviours*, but they do not specifically address child *behaviour change*. Whilst there are many conceptual models that provide a basis for understanding physical activity and dietary behaviour change in adults (e.g. Ajzen, 1991; O'Connell et al., 1985), the predictive value of individual models is limited and it is not clear how they apply to health behaviour change in children (Baranowski et al., 2003). There is insufficient evidence to suggest one model of behaviour change is more effective than another, and NICE recommended interventions should *"employ a range of behaviour change methods and approaches, according to the best available evidence"* (NICE, 2007, recommendation 2.5). In light of these challenges, this thesis draws on components from a number of theoretical models to explore the process of behavioural change in children who are overweight. Section 2.3.1 outlines the *Transtheoretical Model of Health Behaviour Change* (Prochaska & Velicer, 1997) as a means of understanding motivation and readiness to change; section 2.3.2 discusses the role of habit in changing individual behaviours; then

section 2.3.3 outlines research focussed on establishing the effective behavioural components of interventions.

2.3.1 Transtheoretical Model of Health Behaviour Change (TTM, Prochaska & Velicer, 1997)

The TTM proposes that for a given health behaviour, an individual could be in any of five stages of change depending on their current behaviour and motivational readiness: a) *precontemplation* (the individual has no intention of taking any action in the foreseeable future); b) *contemplation* (the individual is intending to change within the next six months); c) *preparation* (the individual has made some concrete action to show their intention to change in the immediate future); d) *action* (the individual has made overt lifestyle changes in the past six months); or e) *maintenance* (the individual is working on maintaining their changes and preventing relapse). A sixth stage of *termination* was also proposed in which the individual has *"zero temptation and 100% self-efficacy"*, however Prochaska and Velicer (1997) themselves recognised *"termination may not be a practical reality for a majority of people"* (p.39). Movement between stages is facilitated by *processes of change* (cognitive and behavioural strategies), *decisional balance* (the individual's perceived pros and cons of changing) and *self-efficacy* (the individual's confidence they can continue to perform the behaviour) and is hampered by *temptation* (urges to engage in an unhealthy habit). Importantly, the model acknowledges that change often involves *relapse* to earlier stages.

The TTM was developed initially as a model to understand smoking cessation (Prochaska & DiClemente, 1983) and questions remain about the application of some of the model's components (e.g. six-month timescales) to more complex behaviours such as physical activity or diet (Baranowski et al., 2003). Furthermore, the model is based on research with adults and it is not known at what developmental stage the TTM becomes relevant for children, nor how child stage of change interacts with parental stage of change. Nevertheless, if viewed as a flexible framework, the TTM provides a useful model for considering the stages individuals go through when changing their behaviours, and the different intervention strategies required.

2.3.2 The role of habit

A habit is a behaviour that is repeated in stable contexts (Wood et al., 2002). Habitual behaviour is thought to develop through the repetition of a behaviour in a

given setting, either through intentional goal-directed action or through unintentional reactions to a given situation. As the habit develops, less cognitive resources are required to perform the action and it becomes an automatic recurring behaviour triggered by an environmental cue in a stable context. Once formed a habit is very resistant to change and can override individual intentions (Oullette & Wood, 1998). However, one way through which a habit can be broken is if the environmental context in which the habit is performed changes, in which case intention becomes a better predictor of behaviour (Wood et al., 2005).

The theory of habit has several implications for interventions aiming to change physical activity and dietary behaviours. Firstly, the disruption of negative habits (e.g. refraining from raiding the "treat" cupboard in the evening) will require the use of different behavioural change strategies from the acquisition of positive habits (e.g. starting to eat fruit on a daily basis). Secondly, behaviours that are habitual will be more resistant to change than behaviours that are non-habitual (Webb & Sheeran, 2006); if a negative habit is not addressed directly it may continue to the detriment of other behaviours. Finally, even when positive habits are formed relapse prevention strategies will be required for circumstances in which they are likely to be disrupted (e.g. whilst on and returning from holiday).

Lally and colleagues (2010) provided an insight into the use of a habit-formation model in weight control by showing the time it took to adopt a new healthy physical activity or dietary habit (to a plateau of perceived automaticity) varied between 18 and 254 days. The same research group (Lally et al., 2008) showed it was possible to achieve a clinically significant weight loss by giving motivated overweight adults a simple advice leaflet with ten tips for forming positive physical activity and dietary habits (e.g. *"pack a healthy snack"*, *"walk 10000 steps a day"*). It was found weight loss occurred gradually over the 8-month measurement period and was positively correlated with the perceived level of automaticity with which participants performed the behaviours at 12 weeks, both factors supporting the role of habit formation in the weight loss process. The authors recommended *"interventions aiming to create habits may need to provide continued support to help individuals perform a behaviour for long enough for it to be subsequently enacted with a high level of automaticity"* (Lally et al., 2010, p.1007).

Whilst the work of Lally et al. provides some insight into the habit formation process of physical activity and dietary behaviours for motivated adults, little is known about the role of habit formation in childhood obesity treatment. Nor does Lally et al.'s

research address the process of disrupting negative habits which, in theory, should be more easily achieved (by removing the cue that prompts the action) than acquiring positive habits (which require ongoing practice). Research is required to test this hypothesis in practice, as breaking down deeply engrained unhealthy habits may require also addressing emotive and cognitive factors.

2.3.3 Behavioural components of interventions

It has been noted that behaviour change interventions are not well described in either the general health literature (Michie et al., 2009a) or in childhood obesity treatment research (Golley et al., 2011; Pittson & Wallace, 2011), making it difficult to replicate interventions or to identify which techniques are important for intervention effectiveness. Abraham and Michie (2008) called for the use of a common vocabulary to report the behaviour change techniques (BCTs) used in interventions and published a taxonomy of 26 BCTs mapped onto a variety of behaviour change theoretical frameworks. This was recently refined to include standardised definitions of 40 BCTs specifically focussed on helping people change their physical activity and eating behaviours (Michie et al., 2011). These taxonomies have been used in meta-analyses (e.g. Michie et al., 2009b) and systematic reviews (e.g. Williams & French, 2011) to facilitate identification of the most effective BCTs in physical activity and dietary interventions in adults.

In the field of childhood obesity treatment, Golley and colleagues (Golley et al., 2011) used the 2008 taxonomy (Abraham & Michie, 2008) to evaluate the BCTs associated with effectiveness in 17 interventions involving parents to improve children's weight-related nutrition intake and activity patterns. BCTs used in effective interventions included *prompt specific goal setting*, *prompt self-monitoring of behaviour*, *environmental restructuring* and *prompt barrier identification*. Effective interventions were also more likely to use techniques spanning the processes of behavioural change, defined by Golley et al. as *a) identify and motivate readiness to change*, *b) facilitate motivation to change*, *c) provide relevant information and advice/behaviour change strategies*, *d) build self-efficacy (and independence)* and *e) prevent and manage relapse*. These results were supported by a study commissioned by NHS Scotland, in which the authors reviewed the literature on health behaviour change models and approaches to childhood obesity treatment plus conducted interviews with current providers of UK-based childhood obesity treatment interventions (Sahota et al., 2010). They found effective childhood obesity treatment interventions used a "package" of techniques including *self-monitoring*, *stimulus control*, *goal-setting*, *rewards for reaching goals* and *problem*

solving. Interview data suggested it was important deliverers were trained to use a range of BCTs, allowing appropriate techniques to be tailored to individual needs. The authors of both reviews highlighted a need for further research evaluating the specific behavioural components of interventions and urged researchers to draw on available taxonomies to improve reporting standards.

2.4 Family-based childhood obesity treatment interventions

As described in section 2.1.1 above, the field of childhood obesity treatment has developed rapidly over the past decade. This section will first outline definitions and measurement of childhood obesity, before reviewing current evidence for family-based childhood obesity treatment interventions, predictors of success and participant perspectives of treatment.

2.4.1 Measurement of childhood obesity

2.4.1.1 Defining childhood overweight and obesity

Whilst there is an established worldwide definition for adult obesity (WHO, 2011), the definition of childhood obesity is less clear-cut. To determine whether a child is a healthy weight, their BMI is compared to a growth reference for a population matched for age and sex. However, the situation is complicated by the use of different reference populations in different studies, meaning the same child could be defined as overweight in one study but healthy weight in another (Boddy et al., 2007). Furthermore, different percentiles are used to define obesity cut-offs in different countries and in England the population monitoring definition of overweight and obesity ($\geq 85^{th}$% ile and $\geq 95^{th}$ %ile) differs from the definition of overweight and obesity used for clinical diagnosis ($\geq 91^{st}$ %ile and $\geq 98^{th}$ %ile). In an attempt to overcome these issues, Cole and colleagues (Cole et al., 2000) established a standard definition of childhood overweight and obesity for international use that corresponded to the adult definitions of BMI $\geq$ 25 for overweight and BMI $\geq$ 30 for obesity. Whilst these cut-offs were made widely available, they have not been adopted in the mainstream and studies continue to vary in reference populations and cut-off points used. Childhood obesity prevention and treatment in England is guided by current NICE (2006) guidance, which states *"BMI measurement in children and young people should be related to the UK 1990 BMI charts (Cole, Freeman, & Preece, 1995) to give age- and gender-specific information."* (recommendation 1.2.2.12). As this thesis is focussed on treatment for the

individual child, the 91st %ile and 98th %ile are used to define overweight and obesity respectively.

2.4.1.2 Measuring change in children's weight status

Because BMI varies with age, BMI needs to be converted to an age- and sex-specific standard to determine how a child's weight status changes over time (Cole et al., 1995). These standards include BMI percentile (BMI %ile), percent BMI (%BMI[3]), and BMI Standard Deviation Score (BMI SDS[4]) (Cole et al., 2005). *BMI %ile* shows what proportion of children in the reference population have a BMI lower than theirs; *BMI SDS* shows how many standard deviations their BMI is above or below the mean[5] BMI for their age and sex; *%BMI* is calculated as 100 x (child's actual BMI / median BMI for child's age and sex). Thus a child whose BMI is equivalent to the median for the population would sit on the 50th%ile, have a BMI SDS of 0 and a %BMI of 100 or 0 (style of reporting of %BMI varies between studies). Again there is variation in the methods used between childhood obesity treatment studies; historically %BMI was the most widely used, but BMI SDS is now the most commonly reported outcome measure internationally (Oude Luttikhuis et al., 2009). BMI %ile is used mostly for the definition of population characteristics, and has limited use for measuring change in childhood obesity treatment interventions.

2.4.1.3 Other measures of child body composition

Although BMI correlates closely with measures of adiposity (Steinberger et al., 2005), it is important to acknowledge BMI provides no information about the relative contribution of fat and fat-free mass to a child's body weight (Wells et al., 2002). The most accurate measures of child body composition are obtained through dual-energy X-ray absorptiometry (e.g. Taylor et al., 2002), but this is an expensive laboratory technique that is rarely feasible for the evaluation of community-based childhood obesity treatment interventions. Measures that can be carried out in the field include skinfold measurements and bio-electrical impedance analysis, but both have been shown to be poor indicators of body fat change in obese children (Lazzer et al., 2008; Watts et al., 2006) and the associated risks (e.g. discomfort, equipment required) may outweigh the benefits of their use. A proxy measure of abdominal fat can however be obtained through measuring abdominal girth, which has been shown to be more predictive of cardiovascular risk factors in children than BMI

---

[3]This is also referred to as *adjusted BMI* or *%overweight/relative weight* if weight is used instead of BMI

[4]This is also referred to as *BMI z-score*.

[5]The LMS method (Cole & Green, 1992) is used to transform the BMI distribution of the reference population to normality, thus the mean and the median are the same.

(Savva et al., 2000). This is a simple measure that can be converted to abdominal-to-height ratio to account for changes in child height over time (McCarthy & Ashwell, 2006). In research involving obese children, however, the waist can be challenging to locate and consideration must be given to ensuring the most appropriate measurement protocol is used (Rudolf et al., 2007).

2.4.2 Overview of family-based childhood obesity treatment: differing levels of parental involvement

In the recent Cochrane review of randomised controlled trials (RCTs) of interventions for treating obesity in children (Oude Luttikhuis et al., 2009), 54 lifestyle interventions were reviewed, 40 of which targeted either the family or the child with a parent. The majority of studies contained a behavioural component, defined as *"therapy aimed at changing thinking patterns and actions, especially in relation to dietary intake and eating, physical activity and sedentary behaviours, and the family's food and physical environment"* (p.10). A small, clinically relevant effect size on BMI SDS (-0.06 for children, -0.14 for adolescents) was observed following participation in family-based behavioural lifestyle interventions, leading the authors to conclude important features of childhood obesity treatment intervention are a combined dietary, physical activity and behavioural component and parental involvement. However, there was much heterogeneity in study designs, quality and outcome measures and the generalisability of results was limited by the fact the majority of studies were conducted in motivated, middle class, Caucasian populations (mostly from the US). The authors identified a need for further research into the familial characteristics associated with success, the psychosocial factors of behaviour change in overweight children, and the most effective strategies for long-term maintenance of healthy weight.

Another limitation of the Cochrane review was that it did not distinguish between different types of parental involvement. For although many "family-based" interventions claim to promote lifestyle change for the family (e.g. Robertson et al., 2008), parental involvement varies. Intervention approaches include:

- involving parents to support the child's behaviour change, either generally (e.g. Rudolf, et al., 2006; Sacher et al., 2010; Stewart et al., 2005) or through changing the family environment (e.g. Croker et al., 2012; Murdoch et al., 2011; Pittson & Wallace, 2011);
- involving parents as the exclusive agent of change (e.g. Golan et al., 1998; Golley et al., 2007); and

- supporting both parent and child together to change their physical activity and eating behaviours (e.g. Berry et al., 2007; Goldfield et al., 2001).

It is not known which approach is the most effective (Oude Luttikhuis et al., 2009), but the majority of UK-based interventions involve parents with the aim of supporting their child's behaviour change. The most comprehensively evaluated UK community-based childhood obesity treatment programmes are MEND (Sacher et al., 2008; Sacher et al., 2005; Sacher et al., 2010), SCOTT (Hughes et al., 2008; Stewart et al., 2008a, 2008b; Stewart et al., 2005) and WATCH IT (Dixey et al., 2006; Murtagh et al., 2006; Rudolf et al., 2006). All three interventions include physical activity, dietary and behaviour change components but the delivery format and structure of the interventions vary. The MEND intervention (Mind, Nutrition, Exercise, Do it) is delivered in a group setting over three months (two sessions a week) and includes behaviour change and nutrition workshops plus a weekly exercise session for children only. A recent RCT showed a significant intervention effect at six months for child BMI SDS (-0.24), waist circumference z-score, cardiovascular fitness, physical activity, sedentary behaviours and global self-esteem (Sacher et al., 2010). At 12 months however, there was still a significant reduction in BMI SDS from baseline but the children had regained some of the weight they had lost. In contrast, the SCOTT intervention (Stewart et al., 2005) involves eight individual family appointments over 26 weeks delivered by experienced paediatric dietitians trained in behavioural change counselling. There are no organised physical activity sessions but families are provided with advice to facilitate increases in physical activity and decreases in sedentary behaviour. This novel treatment was compared in an RCT with standard dietetic treatment (3-4 outpatient visits and no behavioural change element) and, whilst no between group difference was observed in BMI SDS change, the intervention group became more physically active and reduced their sedentary behaviour (Hughes et al., 2008). WATCH IT (Rudolf et al., 2006) combines individual family appointments with group physical activity sessions for the children and group workshops for the parents, delivered by lay trainers supervised by a professional team. Families attend initially for three months then are able to renew three-monthly for up to a year. A feasibility evaluation showed a significant within-subjects decrease in BMI SDS (-0.07) at six months and the intervention was received positively by parents and children, who reported improved child self-confidence and friendships (Rudolf et al., 2006).

2.4.2.1 Interventions with long-term follow up

None of the UK interventions described above have reported follow up beyond 12 months. Whilst this may be due in part to the relative infancy of childhood obesity treatment in the UK, the need to build longer-term follow up into study designs has been highlighted (Jones et al., 2011; Oude Luttikhuis et al., 2009; Sahota et al., 2010). A range of international studies have demonstrated favourable child weight outcomes after follow up periods of 4-5 years (Braet & Van Winckel, 2000; Reinehr et al., 2007; Vignolo et al., 2008), 7-8 years (Golan & Crow, 2004; Moens et al., 2010) and 10 years (Epstein et al., 1994). However, it is important to recognise long-term child weight change is often modest and the benefits are not universal. It is estimated that approximately 50% of treated obese children benefit in the long-term (Moens et al., 2010), whilst for many other children their obesity tracks into adulthood (Togashi et al., 2002). Further research is required to explore the mechanisms associated with long-term weight loss maintenance in children.

2.4.2.2 Effects of childhood obesity interventions on child psychosocial wellbeing

It is important to consider the effect of childhood obesity treatment interventions on children's psychosocial wellbeing. Early evidence in this area was equivocal (Walker et al., 2003) and some authors have expressed concern that an increased focus on weight, diet and physical activity might heighten weight-related concerns and unhealthy approaches to weight-loss (O'Dea, 2004). One of the first studies to investigate the effect of childhood obesity treatment on psychosocial wellbeing found a significant decrease in children's self-esteem after participation in a 12-week "weight-loss programme" (Cameron, 1999). However, childhood obesity treatment was in its infancy at the time. The "weight-loss programme" described was far removed from the family-based lifestyle change approach recommended by current guidelines (e.g. NICE 2006) and it is questionable whether Cameron's study would pass a research ethics review in the current day. For example, Cameron noted *"54 children agreed (or were made to by their parents) to participate in a weight-loss programme"* (p.78). There were *"weekly weigh-ins"*, *"lectures on meal preparation"* and *"individualised exercise prescriptions"* (p.79-80). Furthermore, there was no parental involvement. More recent reviews have found overall positive effects of childhood obesity treatment on self-esteem (Oude Luttikhuis et al., 2009; Walker Lowry et al., 2007), although many studies still omit to measure child psychosocial outcomes and the importance of measuring potential adverse effects of interventions has again been highlighted (Oude Luttikhuis et al., 2009).

2.4.3 Predictors of treatment outcome

Given the heterogeneity in the way children respond to obesity treatment, many studies have investigated demographic, behavioural and psychosocial factors associated with treatment outcomes in an attempt to better tailor interventions to individual needs. The first bank of studies focuses on predictors of attrition, the second on predictors of child weight outcomes.

2.4.3.1 Predictors of attrition

Attrition from childhood obesity treatment interventions is high, with rates of 0% to 42% reported in the Cochrane review (Oude Luttikhuis et al., 2009) and 27% to 73% in a review of clinical childhood obesity treatment interventions (Skelton & Beech, 2010). In Skelton and Beech's review, they concluded it is often those most in need (e.g. children with higher BMIs, co-morbidities, and behavioural issues) or from vulnerable groups (e.g. black and minority ethnic groups, single parent households) who drop out of interventions. Reasons for attrition include interventions not meeting families' needs or other commitments interfering. Elsewhere, parental factors reported to be associated with attrition include a high parental BMI (Jelalian et al., 2008) and a low parental motivation at baseline (Braet et al., 2010).

2.4.3.2 Predictors of child weight outcomes

Research exploring biological and demographic predictors of treatment outcome (e.g. age, SES, gender, parental BMI) is equivocal. For example, some studies have reported age to be a significant predictor of treatment outcome (e.g. Sabin et al., 2007) whereas others have found age to have no impact (e.g. Reinehr et al., 2007). This may be explained in part by the heterogeneity between studies as the relationship between BMI and BMI SDS differs with age and adiposity (Cole et al., 1995), thus caution must be taken when comparing BMI SDS outcomes from populations not matched on these factors.

Behavioural and psychosocial factors found to be positively related to treatment outcome include child weight loss during the early stages of treatment (Jelalian et al., 2008; Reinehr et al., 2007); parental weight loss during the intervention (Hunter et al., 2008; Wrotniak et al., 2004); a positive change in parenting style (Golan et al., 2006; Stein et al., 2005) and programme adherence (Steele, Steele, & Hunter, 2009; Stein, et al., 2005; Togashi, et al., 2002). Negative associations have been found for maternal psychopathology (Favaro & Santonastaso, 1995; Moens et al., 2010; Pott et al., 2009) and child impulsivity (Nederkoorn et al., 2006), with the most impulsive children losing the least weight. Whilst these studies provide some insight

into the possible factors associated with child treatment success, the heterogeneity of study designs, populations and interventions make it difficult to draw conclusions and further research is required to understand the factors associated with positive long-term outcomes in childhood obesity treatment.

2.4.4 Qualitative studies in childhood obesity treatment

The recent Cochrane review (Oude Luttikhuis et al., 2009) highlighted the need for qualitative research in childhood obesity treatment, urging stakeholder organisations to recognise that qualitative research will *"provide a powerful evidence-base on the views of participants...highlighting why interventions may be more or less successful"* (p.18). Yet few evaluations of childhood obesity treatment interventions have employed qualitative methodologies. The handful of studies that have been conducted (e.g. Dixey et al., 2006; Murtagh et al., 2006; Staniford et al., 2011; Stewart et al., 2008a, 2008b) have shown family-based childhood obesity treatment is generally received positively by both parents and children, with important elements being the non-judgmental social support and the opportunity for children to mix with others "in the same boat". Challenges include extended family members undermining attempts to change physical activity and eating behaviours, and a lack of self-efficacy for continuing changes when the regular support from the intervention ceases. Further qualitative research is needed to elucidate the mechanisms through which behaviour change interventions work for overweight children and families through exploring the familial and intervention factors that help families change and the challenges they face in changing.

2.4.5 Issues to consider when defining "success"

Whilst BMI SDS is the most commonly reported outcome from childhood obesity treatment studies, much debate surrounds what constitutes a clinically important change in BMI SDS. Some studies suggest a minimum change of -0.50 is required for positive health outcomes (e.g. Reinehr & Andler, 2004), others show any reduction in BMI SDS has a beneficial effect (Pollestad Kolsgaard et al., 2011). Furthermore, the heterogeneity of study designs, populations and intervention approaches makes comparisons between studies a challenge; the same change in absolute BMI will produce a different change in BMI SDS depending on the child's age and degree of overweight. Similarly, it might be appropriate for an overweight adolescent to aim towards weight *loss*, whereas a pre-pubertal child should focus on weight *maintenance* whilst their height continues to increase (NICE, 2006). In light of these challenges, the recent Cochrane review (Oude Luttikhuis et al., 2009) recommended alternative outcome measures need to be considered, such as

habitual physical activity, healthy eating and psychosocial measures. This perspective is supported by qualitative evidence that shows parental perceptions of intervention outcomes differ from practitioner perceptions (Staniford et al., 2011) and further research should seek to elucidate the factors that determine long-term success from the participants' viewpoint.

2.5 Methodology, aims and objectives

2.5.1 Translational research

Whilst the evidence base for family-based multidisciplinary approaches to childhood obesity treatment is growing (Oude Luttikhuis et al., 2009), hypothesis-driven RCTs have limited ecological validity for intervention implementation in practice (Epstein & Wrotniak, 2010). Childhood obesity is an urgent public health concern, and research must help policy-makers and practitioners understand the most effective delivery mechanisms for family-based childhood obesity treatment. In recognition of this concern, Haslam and colleagues (Haslam et al., 2006) called for *"some form of continuous improvement methodology"* (p.640) that allows obesity research and policy to go hand in hand, drawing on alternative methods of evaluation that maintain the rigour of hypothesis-driven research yet have the external validity to inform public health policy and practice (Dugdill et al., 2005). Translational research is defined as *"applied research that strives to translate the available knowledge and render it operational in clinical and public health practice"* (Narayan et al., 2000, p.1794). In the complex public health environment, the translational framework must be cyclical, with a reciprocal feedback loop between evidence and practice (see figure 2.1) that involves service users and allows the ongoing refinement of interventions (Ogilvie et al., 2009).

In an endeavour to develop an intervention that was acceptable to service-users, feasible for implementation in a community setting and effectively addressed public health needs, the MRC phased approach (MRC, 2000, 2008) was followed to develop GOALS (as advocated by NICE (2007) and outlined in section 2.1.2.1). Focussing on the *feasibility phase* of this process (see figure 2.1), this thesis employs a mixed methods approach (as advocated for research with families (Andrew & Halcomb, 2006)) to evaluate the feasibility of GOALS and explore psychosocial factors of behavioural change in overweight children. A range of quantitative and qualitative methods are used both *concurrently* and *sequentially*, allowing the research questions, design and methods of study 3 to be informed by

the findings from studies 1 and 2. The implementation sequence and prioritisation of quantitative and qualitative methods is shown in figure 2.4.

Data collection	Prioritisation
Sep 2006 – March 2009	QUANT (study 1) + QUAL (study 2)
	↓
Nov 2011 – Jan 2012	QUAL + quant (study 3)

Fig 2.4 Mixed method design matrix, showing sequence of studies and prioritisation of methods within each study. QUANT/quant = quantitative; QUAL/qual = qualitative; + = concurrent data collection; → = sequential data collection; both methods in upper case = equal priority; one method in upper case, one in lower case = upper case method prioritised. Adapted from Andrew & Halcomb (2006).

There are many reasons for combining quantitative and qualitative data in health research (O'Cathain et al., 2007) which in the context of this thesis include:

- using quantitative methods to investigate outcomes and qualitative methods to explore processes contributing to outcomes (e.g. how the intervention works, who it works for etc.);
- using quantitative methods to investigate relationships between variables, and qualitative methods to explore the mechanisms underlying these relationships; and
- triangulating objective outcomes with participant perspectives to inform intervention development and understand how childhood obesity treatment is operationalised in a real world setting.

2.5.2 Legitimising qualitative research

One tension of conducting mixed methods research concerns the *"criteria to judge what is 'rigorous', which does differ between quantitative and qualitative and across disciplines"* (Jones & Sumner, 2009, p.38). Driven by the post-positivist agenda surrounding academic publication, many qualitative researchers seek to legitimise their research with "trustworthiness criteria" such as *credibility*, *dependability*, *transferability* and *confirmability* (that parallel the quantitative standards of validity, reliability, generalisability and objectivity respectively (Sparkes, 1998)). However, reporting standards and techniques used to demonstrate trustworthiness vary considerably across studies (Biddle et al., 2001). In the few qualitative studies that have been conducted in childhood obesity treatment the issue of trustworthiness is given little attention. Reports range from no mention of trustworthiness at all (Grønbæk, 2008; Murtagh et al., 2006), to unlabelled descriptions corresponding to

triangulation/peer consultation and *member checking* (Dixey et al., 2006), to named techniques such as *peer consultation, member checking* and *audit trails* (Staniford et al., 2011; Stewart et al., 2008a, 2008b). No studies make reference to which of the trustworthiness criteria their techniques are demonstrating.

To date, qualitative research in childhood obesity treatment has been dominated by a post-positivist approach; author-evacuated, passive language and descriptions of interview and analysis procedures are used to demonstrate attempts to reduce researcher bias. Whilst the "parallel perspective" of trustworthiness criteria might be appropriate for such research, its appropriateness for qualitative research grounded in alternative paradigms has been questioned (Biddle et al., 2001). Instead the case has been put forward for more *"open-ended, fluid, list-like and flexible criteria"* (Sparkes, 1998, p.379) that are seen as characterising traits that change over time and can be applied on a flexible basis. Drawing on the work of Guba and Lincoln (1989), Manning (1997) and Blumenfeld-Jones (1995), Sparkes outlined concepts such as *authenticity* (characterised by fair, trusting researcher-participant relationships that lead to enhanced awareness and encourage action), *fidelity* (the extent to which findings represent participant experiences as it means to them) and *believability* (the extent to which the reader is convinced of the fidelity of participant experiences). These alternative criteria are less about proving the research process has been carried out "correctly" than about guiding the researcher in the way they approach studies, for example through shared learning, trustful relationships or social action.

2.5.3 Philosophical approach of the thesis

By virtue of its translational mixed methodology, this thesis follows a pragmatic approach (as outlined by Andrew & Halcomb, 2006). Public health needs drive the research questions, which in turn drive the methods, writing and ways of knowing within each study. Thus whilst the whole thesis is underpinned by my personal philosophy as a researcher (outlined in the paragraphs that follow), the data collection methods and writing techniques vary according to the aims of each study.

The thesis combines *post-positivist* foundations (in that it is theory-based), with *interpretive* methods (focus groups and semi-structured interviews) and an underlying *constructivist* philosophy (in its aim to create knowledge and make recommendations for social improvement). Whilst the qualitative methods used are interpretive, I regard the notion that *"the interpreter remains unaffected by and external to the interpretive process"* (Schwandt, 2000, p.194) as somewhat

unrealistic. Rather my personal philosophy draws from the constructivist view that *"human beings do not find or discover knowledge so much as we construct or make it"* (Schwandt, 2000, p.197). As such, the understanding drawn from the findings is influenced by my own role as researcher-practitioner and by the participants' background, experiences and assumptions. And in turn both the participant and myself risk being changed by the knowledge we create.

> *"Understanding is risky. If I let myself really understand another person I might be changed by that understanding."* (Rogers, 1961, in Kirschenbaum & Henderson, p.20)

As the thesis progresses it moves from "breadth to depth" and the writing tone and legitimisation criteria evolve with it. In study 1, the focus is on breadth (understanding what changes take place in the population as a whole) with an empirical pre-post design used to measure quantitative outcomes, supplemented by qualitative questions that are quantified for interpretation. The method of writing is scientific in nature and steps are taken to minimise researcher bias to enhance the validity and reliability of the results. Study 2 then uses qualitative focus groups to add meaning to the findings of study 1 (understanding what is helping people change), but the focus remains broad and the study is nomothetic in nature. Legitimisation criteria are aligned to the parallel perspective and focus on credibility, dependability and transferability. On occasions, the first-person plural is used to indicate the presence of the research team involved in the data collection and triangulation processes. Study 3 takes an idiographic approach and focusses on deeper explorations of a few individuals' experiences (understanding the processes people go through in changing). There is at times a first-person singular presence that acknowledges the bi-directional influences between the researcher and the research process. The study is legitimised by the extent to which the processes undertaken have created a deeper understanding of the psychosocial process of behavioural change.

2.5.4 Aims and objectives of the thesis

The above review has highlighted a need for family-based childhood obesity treatment research that is *ecologically valid*, includes *long-term follow up* and explores the *psychosocial mechanisms of changing physical activity and dietary behaviours.* In an attempt to address these gaps, this thesis will evaluate the feasibility of a family-based behaviour change intervention for overweight children (GOALS) and qualitatively explore the psychosocial process of long-term behavioural change in families with overweight children. GOALS is the first UK

intervention to focus on changing both parent and child behaviours together. The study aims to increase understanding of how practitioners can intervene from the "outside" to support families to make sustainable changes to their eating and physical activity behaviours "inside" the family environment, in doing so generating hypotheses that can be tested through future prospective studies. Objectives of the study are:

a) To provide a comprehensive overview of the GOALS intervention framework and describe delivery processes during the feasibility phase (2006-2009).
b) To measure the potential impact of GOALS on the body composition, lifestyle behaviours and self-perceptions of children and parents who complete the intervention, and explore the relationships between these variables.
c) To qualitatively explore the experiences of families whilst they are taking part in GOALS, discussing perceived changes to their physical activity and eating behaviours, factors facilitating these changes and challenges they are facing.
d) To follow up families 3-5 years after they attend GOALS to explore actual and perceived outcomes, parental psychosocial factors associated with positive outcomes and the processes involved in sustaining long-term behavioural change.
e) To draw on the findings from a) to d) to:
    i. Discuss what constitutes a "successful" outcome in childhood obesity treatment;
    ii. Propose a theoretical model for health behaviour change in overweight children;
    iii. Outline implications for improving policy and practice in childhood obesity treatment;
    iv. Make recommendations and formulate hypotheses for further research.

Chapter 3

GOALS: the feasibility phase

3.1 Background and aim

In their guidance for developing and evaluating complex interventions, the MRC highlighted the importance of developing new interventions to the point they can be expected to have a worthwhile effect before experimental trial (MRC, 2008). The *feasibility phase* allows time to refine the intervention, carry out preliminary evaluation, identify appropriate research outcomes, and overcome pragmatic challenges of delivery and implementation. If this *"vital preparatory work"* (p.10) is overlooked lack of impact may reflect implementation failure rather than intervention ineffectiveness, risking dismissal of a potentially efficacious intervention in a manner analogous to the type II error in statistical analysis.

Although the evidence-base is growing to suggest a multidisciplinary family-based lifestyle approach to childhood obesity treatment is effective (Oude Luttikhuis et al., 2009), it can be a challenge for policy-makers and practitioners to translate this knowledge to implement interventions in practice (Epstein & Wrotniak, 2010). Family-based childhood obesity treatment involves a complex interplay of factors and questions must be asked about where the intervention is best delivered, the most appropriate session format and how practitioners can effectively engage the whole family. These questions cannot be answered simply, and may require the piloting of several approaches before a solution is found.

As outlined in section 2.1.2.1, the GOALS intervention framework was developed prior to the start of this study through a year-long action research project involving families, practitioners and stakeholders (Dugdill et al., 2009a). The intervention was then piloted with a small group of families to develop a protocol for its delivery across Liverpool. This thesis is based on the phase that followed, which aimed to explore the intervention's feasibility as it was delivered on a larger scale across Liverpool from September 2006.

Objectives of the feasibility phase were:

- To refine the intervention over time to enhance its effectiveness, "deliverability" and acceptability to families with overweight children living in

Liverpool, exploring which delivery components worked well and how challenges could be addressed.
- To measure the potential impact of the intervention on child body composition, lifestyle behaviours and self-esteem (study 1).
- To explore the acceptability of the intervention to families taking part, facilitators to engagement, and changes made to family physical activity and eating behaviours during the early stages of the intervention (study 2).

This chapter outlines the GOALS intervention framework and provides details of the delivery processes between September 2006 and March 2009. To ensure the clear reporting of intervention components, the chapter draws on the framework of Davidson and colleagues (Davidson et al., 2003) which outlined a minimum of eight intervention components that should be described in research reports (*content*, *provider*, *format*, *setting*, *recipient*, *intensity*, *duration* and *fidelity)*.

3.2 GOALS intervention framework

3.2.1 Aim

The aim of GOALS is to support families in making gradual sustainable changes to their physical activity and eating behaviours, with a view to reducing the child's level of overweight for their age and sex and improving the family's future health prospects.

3.2.2 Objectives

- To support families to establish healthy habits into their daily lives
- To support families to eat a healthy balanced diet in line with the Food Standards Agency (FSA) *eatwell plate* (Food Standards Agency)
- To support families to increase their physical activity levels and reduce their sedentary behaviour in line with current UK guidelines (Department of Health, Physical Activity, Health Improvement and Prevention, 2004; since superseded by Department of Health, Physical Activity, Health Improvement and Protection, 2011)
- To support families to achieve a positive psychosocial wellbeing

3.2.3 Theoretical basis

GOALS operates at the *child* and *family* levels of Davison and Birch's (2001) ecological model of predictors of childhood overweight. Whilst the wider community and societal influences on child physical activity and eating behaviours cannot be

ignored, it is acknowledged this 'outer circle' represents factors that are largely uncontrollable by the individual (e.g. school lunch programmes, neighbourhood safety, access to leisure facilities). In contrast, GOALS draws on Taylor et al.'s (1994) socialisation model of child behaviour to focus on the *changeable* factors associated with families' immediate cognitions, behaviour and environment, whilst acknowledging changes must be realistic within the societal context in which they live. Full descriptions of Davison and Birch's and Taylor et al.'s models are provided in sections 2.2.1 and 2.2.2.

The target for intervention may differ between families, and the use of a social cognitive model enables GOALS to be tailored to different needs. Generic topics are covered through group sessions (e.g. portion sizes, addressing barriers) but the weekly goal setting process allows families to focus on specific issues relevant for them. Moreover, the same surface topic (e.g. child over-consumption) may be tackled through different components of the socialisation model (see figure 2.3), depending which psychosocial factors are influencing the problem. For example, there are many reasons why a 10-year old child might consume excess food:

- if the issue is parental fear in saying "no", it may be appropriate to set cognitive-behavioural goals to help the parent change their thought patterns and re-establish boundaries;
- if the issue is a family culture of unhealthy snacking in the evening, an appropriate goal might focus on changing the home environment by removing high fat and high sugar foods from the cupboards and replacing them with a fruit bowl in the living room; or
- if the child is "comfort eating" in response to bullying, staff might focus on enhancing the child's self-esteem and discussing behavioural strategies with the family to address the bullying.

A second theoretical concept underpinning the GOALS intervention is the theory of habit (see section 2.3.2). When families start the GOALS intervention, they may have already developed negative eating or physical activity habits. The aim may either be to disrupt these negative habits, to develop new positive habits, or a combination of both. Specific goal setting is used to encourage the repetition of new, positive health behaviours (e.g. eating breakfast) until the point they require little or no conscious processing to perform. A stable context is crucial to habit formation (Wood et al., 2002), therefore families are encouraged to practice behaviours that do not rely on attending GOALS each week. For if habits are formed that are dependent on GOALS these habits would likely disappear when the

GOALS intervention ends. It is also important to be aware new behaviours might not reach the point of automaticity before families leave GOALS (as explained in section 2.3.2). Therefore BCTs are focussed on equipping families with the self-efficacy to continue practising the behaviours and the coping skills to prevent relapse if circumstances change.

Another consideration in the behaviour change process is how GOALS maps onto the transtheoretical model of health behaviour change (Prochaska & Velicer, 1997, see section 2.3.1). The nature of the intervention requires an initial action from the parent, whether it be making a phone call to register for GOALS, or turning up to the initial assessment. Such actions indicate that one family member at least is in the *preparation* or *action* stage of change with regards their child's obesity. Yet the situation becomes more complex when other family members are considered. Depending on the age of the child, their stage of change might also be important, plus the stages of change of second or non-attending parents, older siblings, and the way these interact together. Furthermore, several behaviours are addressed simultaneously at GOALS, and one individual might be at a different stage of change for different behaviours. For example, a parent might be in the preparation stage with regards to increasing physical activity, but might not even be contemplating cutting down on the number of takeaways they eat. It must be recognised that different approaches may be required for different families (or even for different individuals within families) and it is important that BCTs are matched appropriately to the individual's stage of change. In doing so, GOALS draws on BCTs that cover all five behaviour change processes outlined by Golley and colleagues (2011): a) *identify and motivate readiness to change*, b) *facilitate motivation to change*, c) *provide relevant information and advice/behaviour change strategies*, d) *build self-efficacy (and independence)* and e) *prevent and manage relapse.*

3.2.4 Core concepts

3.2.4.1 Ethos

Although GOALS targets children who are overweight, the focus of GOALS is on helping the whole family become more physically active and make healthy changes to their diet. The importance of role-modelling is reinforced through encouraging parents and healthy weight siblings to take part in everything the overweight child does. For example, all attending family members are weighed and measured, they all set their own personal goals and they all join in the physical activity sessions.

Staff are trained to adopt a non-judgemental approach and to create an environment that is friendly, personalised and above all fun.

3.2.4.2 Framework

The multidisciplinary intervention is based around three core components: *Fun Foods* (healthy eating), *Target Time* (behaviour change and wellbeing) and *Move It* (physical activity). Table 3.1 provides an overview, aim and objectives of each component.

3.3 GOALS delivery during the feasibility phase (2006-2009)

The local strategic context in which GOALS was delivered is outlined in section 2.1.2.1 in chapter 2.

3.3.1 Participants and recruitment *(recipient)*

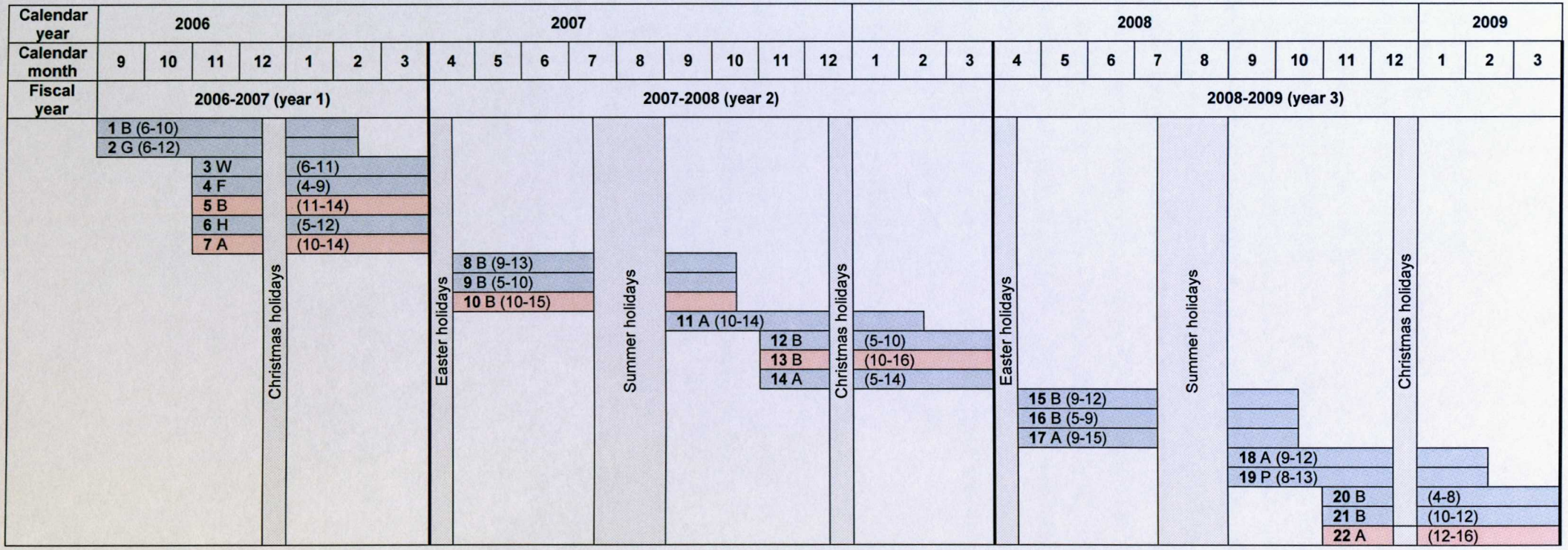
Families with children aged 4-16 years who were overweight or obese (BMI $\geq$ 91st %ile according to the UK 1990 BMI reference charts (Cole et al., 1995)) were eligible for the intervention. Minimal family unit was one child plus one parent/adult guardian. In a small number of cases families with no overweight children were allowed to take part on the basis the intervention was deemed beneficial for their child's health. Recruitment was via the Liverpool *Sports*Linx project (Boddy et al., 2010; Boddy et al., 2007; Stratton et al., 2007), referral from health professionals and self-referral in response to promotional activities (e.g. Press articles, posters, leaflets etc.). In the *Sports*Linx project year 5 and year 7 children were weighed and measured in school, after which the parents of those found to be obese received a letter inviting them to take part in GOALS. No children were excluded from participating in GOALS on the basis of medical grounds or learning disabilities.

3.3.2 Timing of interventions

During the period of study (September 2006 to March 2009) twenty-two interventions were delivered, with cohorts grouped by the age of the overweight child. Interventions ran simultaneously at various locations across the city, with start dates staggered across the year (see figure 3.1). As sessions took place during term-time only, autumn interventions were shorter than interventions that overlapped the summer break (approximately five vs seven months).

Table 3.1 Core components of GOALS

	Aim	Overview	Objectives
Fun Foods	***To equip families with the knowledge and skills to incorporate a healthy balanced diet into their lifestyle***	Informed by the *eatwell plate* (www.eatwell.gov.uk), Fun Foods provides clear, simple messages about healthy eating through a range of classroom-based and practical sessions. Topics include portion sizes, reading food labels and healthy snacking. Families are provided with practical opportunities to develop their cooking skills, and try out new recipes and foods.	To encourage families to: - eat a healthy balanced diet - reduce portion sizes - consume fewer processed foods - cook more meals from fresh - increase fruit and vegetable intake - replace snacks high in fat and sugar with healthier alternatives - reduce the amount of salt and sugar added to food and drink - reduce the frequency of takeaways - increase water consumption - eat regular meals, focussing on breakfast in particular - read food labels and become more aware of what they are eating
Target Time	***To facilitate the process of change through the use of behaviour change techniques and through promoting and enhancing psychosocial wellbeing in families***	This section focuses on behaviour change and wellbeing, supporting families to make their lifestyle changes easier. Topics include hunger and craving, self-esteem, bullying, and parental role-modelling. Each week families are supported to set small, realistic goals to work on at home.	To apply behaviour change techniques to: - support the disruption of negative habits - support the development of positive habits To promote a healthy body image and self-esteem To encourage families to spend quality time together To equip families with behaviour change strategies to continue their healthy lifestyles post-GOALS
Move It	***To provide a positive physical activity experience for people of all ages and abilities, equipping families with the skills and confidence to increase physical activity levels in their daily lives in line with UK physical activity guidelines***	This is a practical physical activity session that provides opportunities to play active games and try new sports. The sessions aim to improve self-efficacy for physical activity through engaging the whole family, with a focus on enjoyment and personal achievement (*task orientation*) rather than competition (*ego orientation*). Through weekly goal setting, families are supported to increase their habitual physical activity outside of the structured GOALS sessions.	To provide fun and varied physical activities accessible for the whole family To enhance perceived competence for physical activity To encourage families to increase their physical activity through: - active transport (e.g. walking to school) - lifestyle activity (e.g. taking stairs instead of lift) - active play (at home, out or with friends) - structured exercise (e.g. Zumba) - sport participation To encourage families to reduce their sedentary behaviours through: - less sitting - substituting sedentary pastimes with active alternatives - reduced screen time



Key

B = Broadgreen High ; A = Alsop High; G = Gwladys Street Primary; W = Windsor Primary; F = Fazakerley Primary; H = Holy Trinity Primary; P = Parklands High

Figures in parentheses show the age range of children who regularly attended (including those who were not eligible for the research)

Mean age of child research cohort at baseline <12 years
Mean age of child research cohort at baseline ≥12 years

Fig 3.1 Timeline of GOALS interventions that ran between September 2006 and March 2009

3.3.3 Intervention content

Figure 3.2 provides an overview of the topics covered and most frequently used BCTs during GOALS mapped onto Taylor et al.'s (1994) socialisation model of child behaviour. As outlined in section 3.2, the two-hour weekly session covered diet (Fun Foods), physical activity (Move It) and behaviour change (Target Time). Fun Foods provided practical cooking and classroom sessions to equip families with the skills and knowledge to eat a healthy balanced diet based on the Food Standards Agency *eatwell plate* (Food Standards Agency). Move It included a weekly fun-based physical activity session for parents and children together with an emphasis on enhancing self-efficacy for physical activity through modelling, goal achievement and positive reinforcement (Stratton & Watson, 2009). Target Time introduced families to guided goal setting and BCTs to support them through their change process at home (targeting behavioural, cognitive and environmental factors). Parents and children each received a GOALS handbook that included information and activities to support the weekly sessions.

3.3.4 Behaviour change techniques

A total of 29 BCTs were employed during the GOALS feasibility period, spanning the five behavioural change processes identified by Golley et al. (2011). Twenty BCTs (table 3.2) were used consistently by all GOALS staff. Some were delivered overtly through timetabled group or individual sessions (e.g. *prompt specific goal-setting, prompt barrier identification*), others were delivered implicitly as part of the intervention (e.g. *provide opportunities for social comparison*) and others were used reactively according to individual family needs (e.g. *prompt generalisation of a target behaviour*). A further group of nine BCTs (table 3.3) were only used by some staff, as they were more relevant to some roles than others (e.g. *prompt self-talk* was used frequently by Target Time mentors, but rarely by Move It coaches). Tables 3.2 and 3.3 provide examples of how the BCTs were used during the intervention, mapped onto Golley et al.'s (2011) processes of change.

Weekly goal setting was a core part of the intervention, and was externally reinforced through a 'points' scheme through which children could earn tangible rewards (e.g. water bottle, pump bag, T-shirt). All attending family members set goals and were asked to record their weekly progress in a personal log book (*"Goalgetter"*). Although it was important each individual was in control of their own goal setting process, some families needed more support than others to set

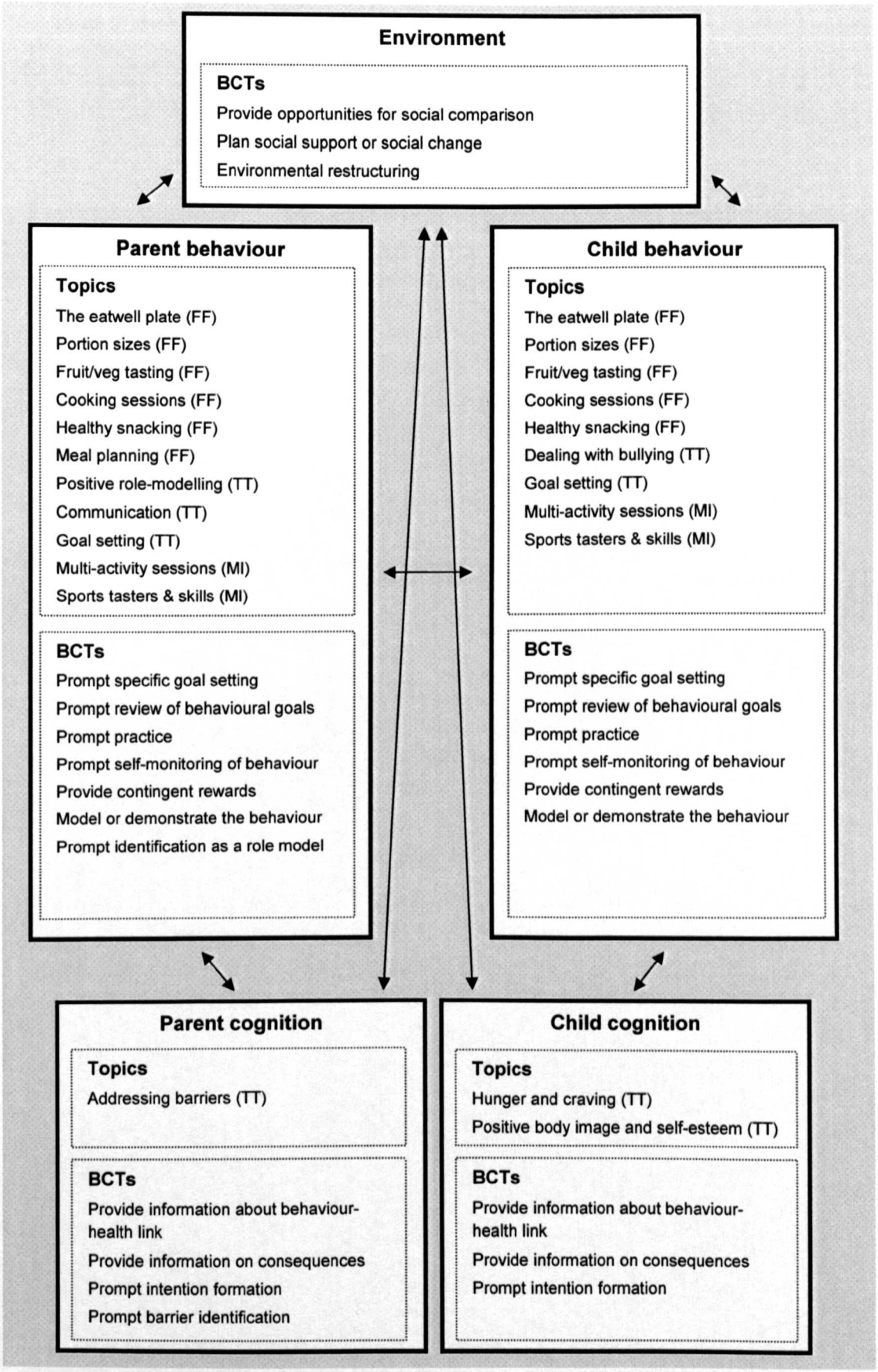


Fig 3.2 Example session topics and most frequently used BCTs in the GOALS intervention, mapped onto Taylor et al's (1994) socialisation model of child behaviour. FF = Fun Foods; TT = Target Time; MI = Move It. Session topics and BCTs are categorised according to whether they mainly target behaviours, cognitions or the environment. Some areas target both child and parent behaviour / cognitions. "Environment" in this context refers to both social and physical factors.

Table 3.2 Most consistently used BCTs in the GOALS intervention. Italic figures in parentheses refer to the technique's corresponding number on Abraham and Michie's 2008 taxonomy. *Provide general encouragement (#6 in Abraham and Michie's taxonomy)* was not included as a separate technique as the coding manual advised of its unreliability in coding interventions. General encouragement was, however, an implicit component of the GOALS intervention.

	BCT	Golley et al. behavioural change process	Examples of application	Frequency of usage[b]
1	Provide information about behaviour-health link *(1)*	Identify and motivate readiness to change	Written information about benefits of physical activity/healthy eating and dangers of being overweight in handbooks; Giving verbal information about physical activity/diet and health during group and one to one sessions.	A
2	Provide information on consequences *(2)*	Identify and motivate readiness to change	Going through the BMI and growth charts, showing parents the extent of their child's obesity and explaining the risks their child faces unless something changes; Decisional balance during Target Time session; Talking about positive outcomes of change during mentor/goal setting sessions (e.g. "eating breakfast will give you more energy in the morning").	A
3	Prompt anticipated regret[a]	Identify and motivate readiness to change[c]	Managing expectations during group and one to one sessions – e.g. 18 weeks sounds a long time now but it will pass quickly so it is important to make the most of this opportunity, it is only going to become more difficult to address the obesity as children get older etc.	C
4	Prompt intention formation *(4)*	Facilitate motivation to change	Setting long and medium term goals with families.	A
5	Prompt specific goal setting *(10)*	Facilitate motivation to change	Guided goal setting is used to set weekly targets with each family.	A
6	Prompt self-monitoring of behaviour *(12)*	Facilitate motivation to change	Food and physical activity diaries at the start of GOALS; Weekly log, asking families to write down their progress towards their goals and checking this is done.	B
7	Provide contingent rewards *(14)*	Provide relevant info & advice/behaviour change strategies	Allocating points when a goal is achieved, withholding them when it isn't (points add up to earn tangible rewards).	A
8	Time management *(26)*	Provide relevant info & advice/behaviour change strategies	May be included in weekly goal setting for families who need it; Meal planning session.	C
9	Environmental restructuring[a]	Provide relevant info & advice/behaviour change strategies	During one to one sessions, discuss ways of restructuring the home environment to support change – e.g. Put clothes out ready for morning, have bowl of fruit on table, remove tempting foods from house etc.	B
10	Set graded tasks *(7)*	Build self-efficacy (and independence)	Working step by step towards medium-term goals, making sure new goals are progressive rather than unlinked.	C
11	Model or demonstrate the behaviour *(9)*	Build self-efficacy (and independence)	Visual and practical Fun Foods sessions, such as portion sizes and cooking; Demonstrating technique and showing how to play games during Move It; Staff as role-models.e.g. Showing a willingness to try new foods, join in Move It.	A
12	Provide feedback on performance *(13)*	Build self-efficacy (and independence)	Lifestyle feedback (based on questionnaires & food/physical activity diaries) provided after week 3; Providing specific negative or positive verbal feedback when reviewing weekly goals; Providing feedback during Move It or Fun Foods sessions to correct technique, or confirm that an action is being performed correctly.	B

13	Prompt practice *(17)*	Build self-efficacy (and independence)	Weekly goal setting is aimed at habit formation. Each goal is continued (alongside others) to prompt practice until it comes more easily.	A
14	Provide opportunities for social comparison *(19)*	Build self-efficacy (and independence)	Weekly group sessions provide opportunity to mix with others "in the same boat"; Move It sessions – comparison of own sporting/PA ability with that of others. May change perceptions and improve self-efficacy; Also provides opportunity for parents to compare their own children to other overweight children (visually and behaviourally).	A
15	Plan social support or social change *(20)*	Build self-efficacy (and independence)	A whole family approach embedded throughout GOALS (i.e. Parents and siblings encouraged to change their own behaviour as well as the child); Weekly goals aimed at involving non-attending family members (particularly if their actions are acting as a barrier to progress); Encouraging group to attend local activities together and help each other out (e.g. Provision of lifts).	A
16	Prompt identification as a role-model *(21)*	Build self-efficacy (and independence)	Throughout GOALS, parents encouraged to look at their own physical activity, diet and weight-related behaviours; Target Time session on positive role-modelling and supporting information in handbook; Parent discussion groups to allow sharing of ideas (i.e. "what worked for them").	B
17	Prompting generalisation of a target behaviour[a]	Build self-efficacy (and independence)[c]	Mastering new cooking skills at GOALS, then setting a goal to try cooking the same meal at home; Signposting families to local physical activity sessions, and attending with them to increase their confidence in that setting.	C
18	Prompt barrier identification *(5)*	Prevent and manage relapse	Target Time session on addressing barriers to healthy lifestyles; Problem solving when setting goals with families, eg. If someone is struggling asking "what is stopping you doing this and how can it be overcome?"	A
19	Prompt review of behavioural goals *(11)*	Prevent and manage relapse	Following up families to review their goals on a weekly basis; Six-weekly mentor sessions to review overall progress.	A
20	Relapse prevention *(23)*	Prevent and manage relapse	Discussions during mentor chats, addressing barriers and identifying coping strategies throughout programme.	C

[a] BCT was not included in Abraham and Michie's 2008 taxonomy but was undergoing validation at the time of study and has since been added to the extended taxonomy (CALO-RE , Michie et al., 2011)

[b] To explore the most frequently used BCTs during the feasibility phase, nine GOALS staff members independently rated 37 BCTs as either *"never used"*, *"used occasionally"*, or *"used frequently as a core part of the way they deliver GOALS"*. A = "used frequently" by at least 8/9 staff members; B = "used frequently" by 6/9 or 7/9 staff members; C = mostly "used occasionally".

[c] BCT was not listed in Golley et al's (2011) paper therefore was categorised into the appropriate behavioural change process by the author.

Table 3.3 BCTs used more frequently by some GOALS staff than others. Italic figures in parentheses refer to the technique's corresponding number on Abraham and Michie's 2008 taxonomy.

	BCT	Examples of application	Staff who use most frequently
21	Provide instruction *(8)*	Teaching people how to read food labels or plan meals. Providing written advice and tips in handbooks. Teaching skills related to physical activity.	Fun Foods and Move It staff
22	Agree behavioural contract (16)	Asking families to sign a "promise sheet" during their final mentor session, outlining behaviours they would continue.	Staff mentoring families
23	Use follow up prompts *(18)*	Post-intervention family follow ups. Newsletters and invites to events or to take part in GOALS activities. Ad hoc phone calls to families.	Staff with office time
24	Prompt self-talk *(22)*	Encouraging families to replace negative thoughts with more helpful thoughts.(e.g. "I may not feel like exercising now, but I know it'll make me feel better"). Used particularly during Target Time session about addressing barriers.	Target Time staff
25	Motivational interviewing *(25)*	Core skills of motivational interviewing used throughout (eg. empathy, rolling with resistance), particularly during one to one sessions.	Elements used by all staff, but Target Time staff formally trained
26	Fear arousal[a]	Visual demonstration of amount of fat and sugar in popular foods. Work with individual groups/families as needed. (e.g. explanation of clogging arteries with poster, measuring out the amount of sugar parent has in coffee during a day).	Fun Foods staff
27	Provide information about personal susceptibility to negative consequences[a]	Going through the BMI and growth charts, showing parents the extent of their child's obesity and explaining the risks their child faces unless something changes. Referring to a families' health background to emphasise personal risk (eg. If diabetes is in family).	Staff involved in weighing and measuring families
28	Prompting focus on past success[a]	Increasing confidence by asking families to think of a time they have successfully carried out a behaviour or made a change. Used particularly during Target Time sessions towards start of programme.	Target Time staff
29	Provide normative information about others' behaviour[a]	Giving messages during group and one to one sessions to help families understand they are not alone ("most children in the UK do not get enough physical activity") and support the health messages given ("we have seen most success with families who really put in the effort at home").	Staff across all roles

[a] BCT was not included in Abraham and Michie's 2008 taxonomy but was undergoing validation at the time of study and has since been added to the extended taxonomy (CALO-RE, Michie et al., 2011)

appropriate goals. Therefore a principle of *'guided goals'* was followed, whereby staff helped participants design goals and form ideas but most importantly the individual then chose what their specific target would be (this could either be focussed on individual change or whole family change).

As the habit-formation process can take anything from 18 to 254 days (Lally et al., 2010), it was important cognitive resources were not over-used by the temptation to "change everything at once." Instead, families were encouraged to focus on making one or two small behavioural changes at a time (e.g. eating breakfast, increasing walking). Once those new behaviours became more practised another small change might be introduced (e.g. drinking more water), but only if the individual had the capacity to continue practising the first behaviour/s simultaneously. It was important family expectations were managed to understand the gradual process through which long-term changes would be achieved. As one parent from the development phase of GOALS (Dugdill et al., 2009a) reflected:

> *"You do need to have targets, and you do need to recognize realistic goals. Rome wasn't built in a day. Small changes work and they are commendable. If in the whole year you only change three things this is still better than nothing, and if the changes stay with you for the future then you have cracked it!"* (p.77)

3.3.5 Refinements during the feasibility phase

Although the intervention operated within the same core framework (outlined in 3.2) for the duration of the feasibility phase, there was some variation in delivery components as the intervention was refined over time. Table 3.4 outlines the delivery processes in operation for each of the 22 intervention cohorts, which are explained in the following sections.

3.3.5.1 Setting

Interventions either took place in primary schools (n=4) or secondary schools (n=17). Due to the multidisciplinary nature of the intervention, each site required space for physical activity, facilities for cooking and classrooms for general activities. It was difficult to gain access to cooking facilities in primary schools, and they were rarely open during evening hours and thus incurred costs for site management. By contrast, secondary schools provided ideal space for group cooking sessions in food technology rooms and were often open during the evening for adult education classes (thus allowing free access). Therefore, the four primary school sites were

Table 3.4 Variation in delivery processes for the 22 GOALS interventions that ran between September 2006 and March 2009

	Dates	Venue	Sessions	Creche	Taxi	Medical	Mentor	Fun Foods	Target Time	Move It	Counsellor	Measure	Follow up	Graduate support
1	9/06-2/07	S	19	C	-	P/SHP	Sep	Diet / CFW	HB mentor	PA coach	-	Pre-Post	12m	PA /15m
2	9/06-2/07	P	19	C	-	P/SHP	Sep	Diet / CFW	HB mentor	PA coach	-	Pre-Post	12m	PA /15m
3	11/06-3/07	P	18	-	-	P/SHP	Sep	Diet / CFW	HB mentor	PA coach	-	Pre-Post	12m	PA /15m
4	11/06-3/07	P	17	-	-	P/SHP	Sep	Diet / CFW	HB mentor	PA coach	-	Pre-Post	12m	PA /15m
5	11/06-3/07	S	17	C	T	P/SHP	Sep	Diet / CFW	HBS	PA coach	Workshop	Pre-Post	12m	PA /15m
6	11/06-3/07	P	19	C	-	P/SHP	Sep	Diet / CFW	HB mentor	PA coach	-	Pre-Post	12m	PA /15m
7	11/06-3/07	S	18	-	-	P/SHP	Sep	Diet / CFW	HB mentor	PAS	Workshop	Pre-Post	12m	PA /15m
8	4/07-10/07	S	18	C	T	SHP/P	Sep	Diet1 / FW & Nut / FW	HB mentor	PA coach	Drop-ins	P/6/12/P	9m,12m	PA 9m
9	4/07-10/07	S	18	C	-	SHP/P	Sep	Diet1 / FW & Nut / FW	HBS	PA coach	Drop-ins	P/6/12/P	9m,12m	PA 9m
10	4/07-10/07	S	18	-	-	SHP/P	Sep	Diet1 / FW & Nut / FW	HBS	PA coach	Drop-ins	P/6/12/P	9m,12m	PA 9m
11	9/07-2/08	S	18	C	-	SHP/P	In prog	Nut / FW	HB mentor	PAS	Drop-ins	P/6/12/P	9m,12m	PA 5m
12	11/07-3/08	S	18	-	T	SHP/P	In prog	Nut / FW	HB mentor	PA coach	Drop-ins	P/6/12/P	9m,12m	PA 4m
13	11/07-3/08	S	18	C	T	SHP/P	In prog	Nut / FW	HBS	PA coach	Drop-ins	P/6/12/P	9m,12m	PA 4m
14	11/07-3/08	S	18	-	-	SHP/P	In prog	Nut / FW	HBS	PA coach	Drop-ins	P/6/12/P	9m,12m	PA 4m
15	4/08-10/08	S	18	Cm	-	SHP/P	In prog	Nut / FW	PAS/HBS	PA coach	Drop-ins	P/6/12/P	9m,12m	-
16	4/08-10/08	S	18	-	-	SHP/P	In prog	Nut / FW	HB mentor	PA coach	Drop-ins	P/6/12/P	9m,12m	-
17	4/08-10/08	S	18	-	-	SHP/P	In prog	Nut / FW	PM	PA coach	Drop-ins	P/6/12/P	9m,12m	-
18	9/08-2/09	S	18	-	T	SHP/P	In prog	Nut	HB mentor	PA coach	Drop-ins	P/6/12/P	9m,12m	-
19	9/08-2/09	S	18	-	T	Form	In prog	Nut mentor	HBS	PAS	Drop-ins	P/6/12/P	9m,12m	-
20	11/08-3/09	S	18[a]	IS x1	T	Form	In prog	Nut mentor	HB mentor	PA coach	Appts	P/6/12/P	9m,12m	-
21	11/08-3/09	S	18	-	T	Form	In prog	Nut mentor	HBS	PA coach	Appts	P/6/12/P	9m,12m	-
22	11/08-3/09	S	18+MI[bc]	IS x6	T	Form	In prog	Nut mentor	FLC	PA coach/PAS	Appts	P/6/12/P	9m,12m	-

[a] parent awareness session preceded lifestyle assessments but only one parent attended; [b] parent awareness session preceded lifestyle assessments; [c] Extra weekly exercise session provided for adolescents only at Everton Active Families Centre **Key to abbreviations:** **Venue:** S = secondary school; P = primary school. **Creche:** C = free crèche on site; Cm = child minder arranged but family opted out at last minute; IS x1=cohort included one 3-4 year old sibling during module 1; IS x6=cohort included six siblings aged 2-8. **Taxi:** T = taxis provided for families without transport. **Medical:** P/SHP = medical assessments before GOALS by paediatricians, and by school health practitioners on a few occasions; SHP/P = medical assessments before GOALS by school health practitioners, referrals to paediatricians if required; Form = medical details collected through a paper form, with advice for the family to see their GP prior to starting GOALS. **Mentor:** Sep = 6th, 12th and 18th sessions set aside for individual family mentor chats; In prog = brief mentor chats every few weeks during intervention. **Delivery – Fun Foods:** CFW = Community food workers (PCT employed); Diet = Community dietician (PCT employed); Diet1 = Sessional dietician (LJMU employed); FW = Food workers (LJMU employed); Nut = Nutritionist (LJMU employed); Nut mentor = Nutrition mentor (LJMU employed). **Delivery – Target Time:** HBS = Health behaviour specialist (LJMU employed); HB mentor = Health behaviour mentor (LJMU employed); PM = Project manager (LJMU employed). **Delivery – Move It:** PAS = Physical activity specialist (LJMU employed); PA coach = Physical activity coach (LJMU employed). **Family Lifestyles Counsellor:** Workshop = one-off group workshop for children/adolescents; Drop-ins = counsellor available during weekly session for parents/children to drop-in for individual chats; Appts = parents/children could book appointments to meet with the counsellor. **Measure:** Pre-Post = measured at baseline and post-intervention only; P/6/12/P = measured at baseline, session 6, session 12 and post-intervention. **Follow-up:** 9m = 9 months post-baseline; 12m = 12 months post-baseline. **Graduate support:** PA/15m = weekly family physical activity sessions were available for 15 months, starting several months after cohort completed; PA 9m / PA 5m / PA 4m = physical activity sessions were available for 9 / 5 / 4 months, immediately from completion.

used during the first year only, after which the intervention was based solely at secondary school venues.

3.3.5.2 Intervention structure (format and intensity)

Figure 3.3 shows the intervention contact each family received over a 12-month period. Prior to the start of the main intervention, families attended a "lifestyle assessment" with an intervention delivery staff member. The purpose of these sessions was to build initial rapport with families, complete paperwork such as consent and monitoring forms, and to gather information about the family's current physical activity and dietary habits through an informal interview. Parents and children (over 8 years) were each asked to complete a 7-day physical activity diary and a 3-day food diary to provide supporting information about their baseline lifestyle. Body composition measurements (height, weight and abdominal girth) were collected from all attending family members. Feedback was provided using growth and BMI charts to communicate messages clearly yet sensitively, with discussion focussed around the healthy family lifestyle approach aimed at helping the child grow into their weight.

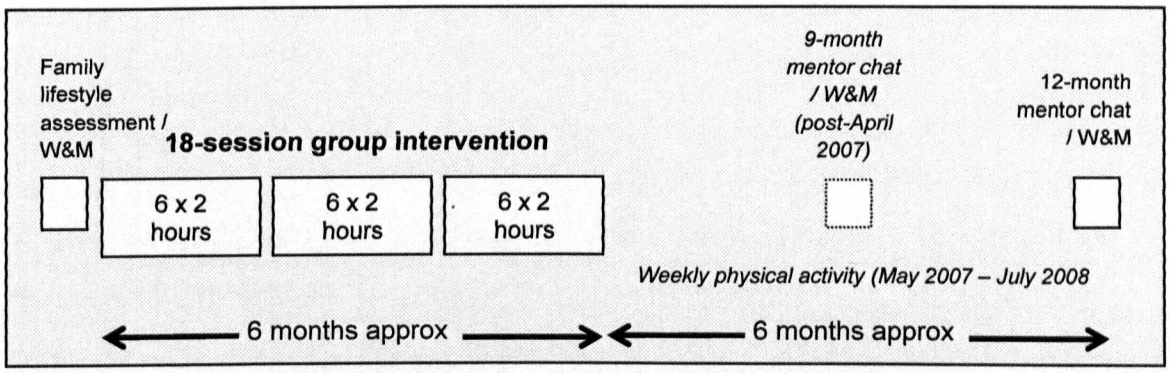


Fig. 3.3 GOALS intervention structure – family journey from start to finish

The intervention itself consisted of 18 x two-hour group sessions broken down into three modules of six sessions each. Prior to April 2007, intervention contact varied between 17, 18 and 19 sessions. To promote whole family involvement, sessions took place once a week at either 5.30-7.30pm or 6.00-8.00pm. The time was set to be late enough to allow adults who worked to take part, yet not so late it interfered with child bedtime. Each family was allocated a personal mentor with whom they set weekly targets and tracked progress through six-weekly "mentor chats". Various ways of structuring mentor chats were explored, such as setting aside specific weeks or taking families aside from the main group.

All cohorts were followed up 12 months after baseline for individual family mentor chats and body composition measurements (an additional 9-month follow up was introduced in April 2007). A family-based weekly physical activity session for "GOALS graduates" was piloted between May 2007 and July 2008, but ceased due to poor attendance and allocation of resources to the main intervention.

3.3.5.3 Childcare

To allow whole families to attend, it was important provision was made for the childcare of younger siblings. Several childcare approaches were explored. From September 2006 to March 2008 a free créche was provided for families at the intervention site (through a mobile créche funded by the project). However the mobile créche proved costly given the small number of children who used it, and children often expressed a wish to join in the main group's activities. The option of arranging local child-minders was explored but the families concerned were reluctant to leave their children with an unknown adult. Therefore the most appropriate solution was to include young children within the main session, with an allocated staff member to take them aside for age-appropriate activities where necessary.

3.3.5.4 Transport

As it was not possible to provide intervention sites in every district of the city, consideration was given to the provision of transport for families who lived further afield. Several options were explored, including reimbursement of public transport expenses for families without a car and arrangement of taxis to and from sessions. It was however a challenge to develop objective criteria for offering these services and there was some concern the arrangement of taxis hindered the lifestyle change process for families. Financial support for transport was ceased after the study period, and staff instead supported families to identify appropriate public transport solutions.

3.3.5.5 Medical assessment

The available guidelines for treating childhood obesity recommended all children with BMI $\geq$ 99.6th %ile be referred to hospital or community paediatric consultants before treatment was considered (SIGN, 2003) and a medical assessment be undertaken of presenting symptoms and underlying causes of overweight and obesity, comorbidities and risk factors, and growth and pubertal status (NICE, 2006). As the majority of children registering for GOALS had a BMI $\geq$ 99.6th %ile and GOALS frontline staff were not medically trained, this raised the question of how

these medical assessments would be carried out and who would have the capacity and expertise required to conduct them. Therefore during the first fiscal year, all children were assessed by a community paediatrician prior to starting GOALS. This was however a time-consuming and costly arrangement, and research suggests these assessments may not be necessary for all obese children (Leigh-Hunt & Rudolf, 2007). The protocol was therefore replaced by an assessment with a school health practitioner and later a self-completion form by the parent with recommendations to visit the family GP before starting the intervention.

3.3.5.6 Provider

The strategic development of GOALS was managed by a multidisciplinary team from LJMU (Director of School of Sport and Exercise Sciences; GOALS Project Manager/Principal Researcher), Liverpool City Council (Principal Health and Physical Activity Officer), Liverpool PCT (Public Health Strategic Lead), Alder Hey Hospital (Consultant Community Paediatrician; Community Paediatrician), and the University of Salford (Professor of Public Health). GOALS was designed, delivered and evaluated by a team at LJMU, operationally led by the project manager/principal researcher (thesis author). The three sections (*Fun Foods, Move It, Target Time*) were developed by LJMU staff with postgraduate qualifications in public health nutrition, exercise physiology and sport and exercise psychology. As well as delivering some interventions themselves, these staff trained and supervised sessional staff (non-clinical) to deliver the intervention.

The delivery mechanism for Fun Foods varied during the feasibility phase. Until March 2007, Fun Foods was led by community dietitians (theory-based sessions) and community food workers (practical sessions) employed by the NHS in Liverpool. From April 2007, the employment of all Fun Foods staff was transferred to LJMU. A public health nutritionist delivered the theory-based sessions and food workers continued to deliver practical elements. In September 2008 all food workers were trained to be "nutrition mentors", responsible for the delivery of both theory-based and practical sessions with ongoing training and supervision from the public health nutritionist.

A qualified counsellor began working with GOALS in February 2007 to provide additional support for children and parents who needed it. Several different ways of working were explored, ranging from informal drop-ins during the weekly session, group sessions about feelings, and fixed appointment times for families either during or outside of the weekly session.

3.3.5.7 Fidelity

During the first year, reflective staff meetings were held weekly to ensure the intervention was delivered as intended and to agree actions for the following week. Staff completed a written evaluation after each session to note what worked well, challenges they had faced and ideas for improvement. During the later stages, meetings continued on a six-weekly basis with regular session visits from the project manager. Regular training ensured the GOALS ethos and core framework was understood and practised by all staff.

3.4 Conclusion

Feasibility work is crucial in the development of complex interventions to allow time to overcome pragmatic challenges of delivery and implementation before the intervention undergoes experimental trial (MRC, 2008). This chapter outlined the GOALS intervention framework and provided details of the delivery processes between September 2006 and March 2009. Following the recommendations of Davidson et al. (2003), details were provided of the intervention *content*, *provider*, *format*, *setting*, *recipient*, *intensity*, *duration* and *fidelity*.

GOALS draws on theories of child behaviour and health behaviour change to support families with overweight children to make sustainable changes to their physical activity and eating behaviours. Whilst GOALS operated within a core framework throughout the feasibility phase, the mechanisms through which it was delivered varied as the intervention was refined over time. Where challenges were experienced in terms of childcare, transport, and medical assessments several options were explored before the most feasible delivery mechanism was established.

The two chapters that follow report the evaluation of GOALS that took place during this feasibility phase.

- *Chapter 4* reports the quantitative outcome evaluation, measuring the impact of the intervention on child body composition, lifestyle behaviours and self-esteem and the effects of the intervention refinements over time (study 1).
- *Chapter 5* reports the qualitative process evaluation, exploring the acceptability of the intervention to families taking part and facilitators and challenges in their behaviour change process (study 2).

Chapter 4

Study 1: Six- and twelve-month outcomes from the feasibility phase of a family-based behaviour change intervention for overweight children (GOALS)

Study and aim	Research questions
Study 1 **Aim** To measure the potential impact of GOALS on the body composition, lifestyle behaviours and self-perceptions of children and parents who complete the intervention, and explore the relationships between these variables	1. Do children and parents who complete GOALS improve their body composition, as measured by BMI and abdomen-to-height ratio? 2. Are there changes in perceived fitness and health, parent-reported physical activity and diet and child self-esteem after completion of GOALS? 3. How does parent BMI change relate to child BMI SDS change? 4. How does child self-esteem change relate to BMI SDS change? 5. Are there improvements in child BMI SDS change as the GOALS intervention develops over time?
Study 2 **Aim** To qualitatively explore the experiences of families whilst they are taking part in GOALS, discussing perceived changes to their physical activity and eating behaviours, factors facilitating these changes and challenges they are facing	1. What changes have occurred at home during the first six weeks of attending GOALS? 2. What is helping families change? 3. What challenges do families face in making changes? 4. What are the lived experiences of families with overweight children that help practitioners and researchers understand the context in which changes take place?
Study 3 **Aim** To follow up families 3-5 years after they attend GOALS to explore actual and perceived outcomes, parental psychosocial factors associated with positive outcomes and the processes involved in sustaining long-term behavioural change	1. Do children who attend GOALS demonstrate an improved body composition 3-5 years after baseline? 2. How do parents perceive participation in GOALS influences their child's life several years on, and how does this relate to child body composition change? 3. What parental psychosocial factors are associated with positive long-term outcomes for children who attend GOALS? 4. What processes are involved in sustaining long-term behaviour change for families who attend GOALS?

4.1 Introduction

Obesity is a known risk factor for cardiovascular disease and diabetes (Prospective Studies Collaboration, 2009) and the increasing prevalence in children presents a serious challenge for public health. A growing body of evidence advocates a multidisciplinary family-based approach to treating childhood obesity (e.g. Oude Luttikhuis et al., 2009), and recent years have seen the emergence of several promising UK community-based interventions (e.g. Coppins et al., 2011; Murdoch et al., 2011; Pittson & Wallace, 2011; Robertson et al., 2008; Rudolf et al., 2006; Sacher et al., 2010).

Most childhood obesity treatment studies have evaluated interventions over a short time period (≤6 months) and provide little information about their longer-term impact (Oude Luttikhuis et al., 2009). Many published studies report data from either small pilot cohorts (e.g. Robertson et al., 2008) or from randomised controlled trials with strict inclusion criteria (e.g. Sacher et al., 2010); making it difficult to draw conclusions regarding external validity for delivery on a large community scale. Furthermore, the UK community-based interventions cited above were all conceived within the last decade and, as noted by the MRC (2008), it can take years for a complex intervention to develop to the point of maximum impact. Therefore it is of interest to investigate stability, and potential improvement, of measurable outcomes as interventions are refined over time.

Childhood obesity is identified as one of the most serious public health challenges of the 21st century (WHO, 2011) and policy-makers cannot afford to wait for lengthy trial outcomes before interventions can be implemented in practice. A key strength of rigorous service evaluation is its capacity to investigate intervention impact as it is delivered in practice. Yet the impact of service evaluation is often limited through its dissemination only through the "grey literature". If we are to bridge the gap between evidence and policy in childhood obesity treatment, it is necessary to adopt translational research methodologies that draw on the strengths of both hypothesis-driven research and high quality service evaluation.

Despite being "family-based", few studies have measured the effectiveness of interventions on parental health outcomes. As described in chapter 3, GOALS is a multidisciplinary childhood obesity treatment intervention aimed at changing the physical activity and dietary behaviours of the whole family. Parental role-modelling of physical activity, eating and weight-related behaviours is a key

component of the intervention, which draws on Taylor et al.'s (1994) socialisation model of child behaviour (see figure 2.3). The importance of parental role-modelling in childhood obesity treatment is supported by studies that have reported parent weight loss to be a predictor of child weight loss, even if the parent is not specifically targeted for weight change (Hunter et al., 2008; Wrotniak et al., 2004). These international studies are mostly based in controlled laboratory or clinical settings and it is unknown if the relationship between parent and child weight change transfers to a UK community setting, where the treatment effect is often smaller (e.g. Rudolf, et al., 2006).

The importance of measuring the potential adverse effects of interventions on child psychosocial wellbeing has been highlighted (Oude Luttikhuis et al., 2009), for early research found a significant decrease in children's self-esteem after participation in a 12-week "weight-loss programme" (Cameron, 1999). Whilst this observation was most likely due to the way the intervention was delivered (see section 2.4.2.2), such observations have prompted authors to make recommendations for enhancing self-esteem through lifestyle change interventions (Walker Lowry et al., 2007). These include building a positive and supportive family environment for change, including sessions to directly address self-esteem and body issues, and focussing on directly changeable goals (e.g. reducing screen time, eating breakfast) rather than weight status change per se. It is notable that the intervention in Cameron's study did not meet any of these recommendations.

It is possible the decrease in self-esteem observed by Cameron (1999) was related to the fact there was no significant change in BMI for the children completing the intervention. Few studies have explored the relationship between BMI change and self-esteem change following participation in childhood obesity treatment interventions. The available evidence is equivocal, with some studies (e.g. Walker et al., 2003) reporting an inverse relationship between child BMI change and self-esteem change (i.e. the children with the largest decreases in BMI had the largest increases in self-esteem) and other studies (e.g. Murdoch et al., 2011) failing to find a significant correlation. Where a significant association was observed, the directionality of the relationship was unclear. BMI reduction has a likely positive influence on self-esteem, but it is also plausible a child with higher self-esteem might be more motivated to make lifestyle changes, suggesting the relationship is bi-directional (Walker Lowry et al., 2007). Research exploring self-esteem and BMI change at several time-points may help elucidate this relationship further.

As outlined in chapters 1 to 3, GOALS was developed following a phased methodology that included planning, development, piloting and feasibility (see figure 2.1). Objectives of the *feasibility phase* were to explore delivery mechanisms, refine the intervention and measure its potential impact on child and parent body composition, lifestyle behaviours and self-perceptions. This study reports 6- and 12-month outcome data from the feasibility phase of GOALS, uniquely collected as the intervention was delivered in practice.

4.1.1 Study aim

The aim of this study is to measure the potential impact of GOALS on the body composition, lifestyle behaviours and self-perceptions of children and parents who complete the intervention. Secondary objectives are to explore the relationship between child BMI SDS change and parent BMI change, the relationship between child BMI SDS change and self-esteem change and the variation in child outcomes over time.

4.1.2 Research questions

1. Do children and parents who complete GOALS improve their body composition, as measured by BMI and abdomen-to-height ratio?
2. Are there changes in perceived fitness and health, parent-reported physical activity and diet, and child self-esteem after completion of GOALS?
3. How does parent BMI change relate to child BMI SDS change?
4. How does child self-esteem change relate to BMI SDS change?
5. Are there improvements in child BMI SDS change as the GOALS intervention develops over time?

4.2 Methods

4.2.1 Research design

This study reports data from families who attended GOALS between September 2006 and March 2009. During the study period GOALS was funded by public health monies as the only child weight management service in Liverpool. It was crucial that public health needs took priority and this had implications for evaluation design. Thus it was not ethically viable to conduct an RCT as the service was deemed beneficial and access was required for all eligible children (preventing randomisation to an alternative treatment). Furthermore, funding was provided on

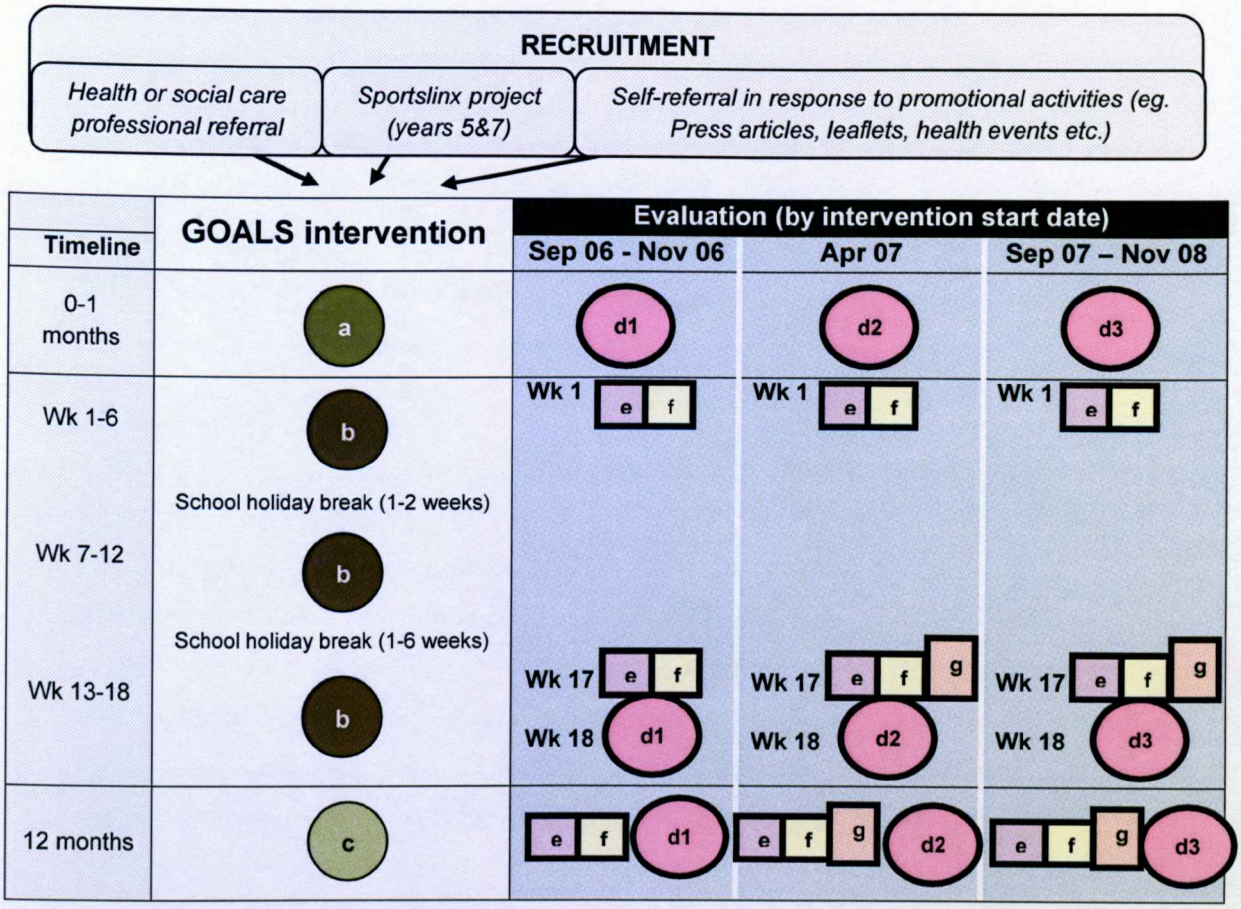
a year-by-year basis which – given the duration and start times of the intervention – meant a waiting list control (such as that employed by Sacher and colleagues in the MEND trial (Sacher et al., 2010) was not possible. Therefore a repeated measures evaluation design was used whereby participant measures were taken at baseline then again after completion of the intervention for comparison.

Outcome measures were selected with the aim of balancing scientific rigour with the practicalities of collecting data from families in a field setting. Consideration was given to the acceptability of measures to families, the feasibility of obtaining reliable data, the timing of data collection, ways of minimising intrusion and preventing families being "over-researched." Where challenges were identified through staff and family feedback, changes were made to the evaluation protocol in an endeavour to improve the validity and reliability of data being collected. Hence there was some variation in the data collected and timing of data collection between cohorts (figure 4.1). This chapter focusses on the data collected at common timepoints across all cohorts (baseline, 6 months, 12 months).

4.2.2 Participants and recruitment

4.2.2.1 Inclusion criteria

All families who participated in GOALS intervention cohorts 1-21 (see figure 3.1) and had an overweight or obese child (BMI $\geq 91^{st}$ %ile according to the UK 1990 BMI reference charts (Cole et al., 1995)) aged 4-16 years were eligible for the research. Where there was more than one eligible overweight child in the family (n=16 families with two overweight children, 1 family with three overweight children) only the child who was referred to GOALS was included in the main analysis. Data for the second overweight child/ren (defined as "siblings") was analysed separately. In a few families there were also non-overweight siblings who attended regularly. Due to the small numbers and young age of these children (5/10 who completed the full intervention were under 8 years, and only one other child had complete pre- and post-intervention data) their data is not included in this study.



Key (circles = activities, squares = objects)

a — Family lifestyle assessment with intervention delivery staff member. Semi-structured interview lasting approximately 45 minutes aimed at building rapport and gathering information about current physical activity and diet. All family members weighed/measured and feedback provided. Discussion of the healthy family lifestyle approach that will help the child grow into their weight. Given PA diary to complete before session 1.

b — **GOALS intensive phase.** 6 x 2-hour sessions once a week. Group-based, with individual family mentor sessions/weighing and measuring at the end of each six week "module". All family members took part in weekly sessions based on 3 sections - **Fun Foods** (healthy eating based on FSA Eatwell Plate), **Move It** (weekly 40-minute physical activity session), **Target Time** (behaviour change and wellbeing). 2-3 activities per week, except middle session of each module which was a full 2-hour cooking session. Sessions delivered by non-clinical staff trained to help families through lifestyle change (physical activity coaches, food mentors & health behaviour mentors).

Weekly goal setting and self-monitoring helped families make small, sustainable changes to their physical activity & diet at home. Encouraged habit formation that is independent of the GOALS context to enhance family autonomy to maintain changes after the intensive phase of GOALS. Integration into community activities was encouraged through local signposting and visits from partner organisations.

c — Individual family follow up session lasting approximately 45 minutes. Review goal progress and take weight/height, provide motivational feedback and come up with solutions to any problems the family are facing.

d1 — Weight, height & *waist* circumference (once only) – **parents/children**

d2 — Weight, height & *waist* circumference (average of three) – **parents/children**

d3 — Weight, height & *umbilical* circumference (average of three) – **parents/children**

e — Perceived health and fitness questions– **parents/children**

f — Self-perception Profile for Children (Harter, 1985) – Social acceptance, athletic competence, physical appearance & global subscales – **children over 8 years**

g — Feedback questionnaire about family physical activity and diet – **parents**

Fig. 4.1 GOALS intervention and outcome evaluation during the study period

Families were included in the complete case analysis if the overweight child had complete baseline and post-intervention BMI data. Intervention cohort 22 was not included in the research study as it included an additional weekly physical activity session for the children attending (see table 3.4), hence the dose received was more intense than the other 21 cohorts.

4.2.2.2 Exclusion criteria

Children with obesity caused or exacerbated through medical conditions or syndromes, severe learning disabilities, or without baseline data were excluded from the research (although they were still able to take part in the *intervention*). Completing children were excluded from the complete case analysis if they suffered a medical event during the intervention that was likely to have impacted on the child's weight. Completing parents were excluded from the complete case analysis if they were simultaneously undergoing an extreme weight-loss plan or suffered medical circumstances during the intervention that were likely to have impacted on their weight. If a child was excluded from the research or the complete case analysis, their parent was also excluded. Where parents were excluded however, the child was still included.

4.2.2.3 Recruitment to the research

During the initial lifestyle assessment, families were asked to consent to their data being used for research purposes, and were given the opportunity to opt out if they wished to do so. Written informed consent was sought from adult participants, and written assent from children over 8 years and deemed capable of understanding.

4.2.3 Protocol

Figure 4.1 outlines the GOALS intervention structure and outcome evaluation, using Perera and colleagues' (2007) graphical method for depicting complex interventions. The figure shows data collected at each time point and outlines variations as the evaluation protocol developed over time. A full description of the intervention components is provided in sections 3.2 and 3.3.

Outcome data was collected at baseline, post-intervention (approximately 6 months post-baseline), and 12-month follow up (data collection varied from 12-16 months post-baseline). Pre- and post-intervention body composition data was collected during individual family meetings and questionnaire data was collected in the first and last group sessions. All follow up data was collected during individual family meetings.

4.2.3.1 BMI SDS (child) / BMI (parent)

The current study uses BMI SDS as the primary measure of child weight status change, as it is the most widely reported measure in childhood obesity treatment studies (Oude Luttikhuis et al., 2009) and thus allows for international comparison. Weight was recorded to the nearest 0.1kg using a Tanita WB/100MA floor scale. Height was recorded to the nearest 0.1cm using a portable Leicester Height Measure. For cohorts 1-7, height was measured once only. For cohorts 8-21, the average of three measures was calculated. If the difference between the first two measures was <1% the *mean* was calculated and no further measures were taken. If the difference between the first two measures was ≥ 1% a third measure was taken and the *median* of the three was recorded. BMI was calculated using the equation weight (kg)/height $(m)^2$. To account for change in children's ages from baseline, BMI was converted to Standard Deviation Scores based on the 1990 UK Growth Reference curves (Cole et al., 1995)[6].

4.2.3.2 Abdomen-to-height ratio (child and parent)

Abdominal girth was measured at the waist for the first 10 cohorts (once only for cohorts 1-7, average of three as described in section 4.2.3.1 for cohorts 8-10). The waist was defined as the mid-point between the lowest rib and the iliac crest. For cohorts 11-21, the measurement point was changed to the umbilicus (average of three) to provide a stable marker and reduce the room for measurement error (as researchers were finding it a challenge to reliably locate the waist on obese participants). Each participant's abdominal girth measure was divided by their height measure (cm) to give an abdomen-to-height ratio (waist-to-height and umbilicus-to-height respectively).

4.2.3.3 Self-Perception Profile for Children (SPPC (Harter, 1985), children aged over 8 years only*)*

The SPPC is a 36-item validated questionnaire consisting of six subscales measuring global self-esteem plus five specific domains of self-esteem in children. Each item follows a "structured alternative" response format (see figure 4.2), whereby two types of children are described and the child is asked to tick the box that best describes them. They must first select which children they are most like, then whether this is only *"Sort of"* true or *"Really"* true for them.

---

[6] A free computer package to calculate child BMI SDS is available to download from http://www.healthforallchildren.co.uk/pro.epl?DO=PRODUCT&WAY=INFO&ID=185

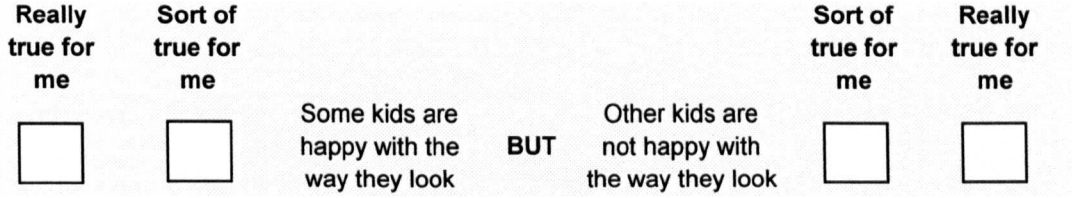


Fig. 4.2 Example item on the SPPC. A response is only valid if a child ticks one (of the possible four) boxes only.

This question format implies half the children in the world view themselves one way and the other half view themselves another way, suggesting either response is legitimate and reducing the temptation for socially desirable responses. Scores for each item range from 1 (most negative self-perception) to 4 (most positive self-perception). A mean subscale score of 2.5 indicates a neutral self-perception in that domain (equal positive and negative responses), <2.5 indicates mostly negative responses and >2.5 indicates mostly positive responses. The SPPC is validated for use in children aged over 8 years and has acceptable internal consistency reliabilities for all six subscales (Cronbach's Alpha range .71 to .86).

To reduce participant burden in the current study, four subscales that have been shown elsewhere to change through healthy lifestyle intervention (Walker Lowry et al., 2007) were used (*Social acceptance; Athletic competence; Physical appearance; Global self-esteem)*, yielding a questionnaire with 24 items in total (6 in each subscale). An item response was valid if the child ticked only one of the four options available to them. If the child ticked more than one box or left all the boxes blank the response was considered invalid and the item was excluded from the mean subscale score. A copy of the questionnaire plus instructions are provided in appendices 5 and 6.

4.2.3.4 Perceived fitness and health (child and parent)

To explore changes in perceptions of health and fitness, participants were asked "*how fit do you think you are?*" and "*how healthy do you think you are?*". Answers were based on a 5-point likert scale ranging from *very unfit/unhealthy* to *very fit/healthy* (plus a 6th option of *don't know*).

4.2.3.5 Parent-reported changes in family physical activity and diet

From April 2007 (cohorts 8 -22), parents completed a written feedback questionnaire at the end of the intervention and at 12-month follow up, containing questions exploring physical activity and dietary changes (table 4.1).

4.2.4 Data analysis

To account for clustering of children within intervention cohorts, data were first entered into MLwiN version 2.24 to explore the variance contributed by between-cohort differences (comparison of a two-level model (time; child) with a three-level model (time; child; cohort), BMI SDS change as the outcome variable). As inclusion of cohort as a random variable did not improve the fit of the model, data were treated as independent and pooled for analysis in SPSS version 17. Outcome data are presented for complete cases only. Paired samples *t*-tests (normally distributed data) and *Wilcoxon signed rank* tests (non-parametric data) were used to assess

Table 4.1 Parent feedback questions asked post-intervention and at 12-month follow up (via written questionnaire)

Theme	Post-intervention	12-month follow up
Parent physical activity	How do your activity levels now compare to your activity levels before you came to GOALS? Please describe anything that is different.	How do your activity levels now compare to your activity levels before you came to GOALS? Please describe anything that is different. How do your activity levels now compare to your activity levels immediately after GOALS finished? If there are differences, what are the reasons for these?
Child physical activity	How do you feel your child's activity levels compare to their activity levels before GOALS?	How do you feel your child's activity levels compare to their activity levels before, and immediately after, GOALS?
Child confidence	Have you noticed any changes in your child's confidence and attitude to physical activity since coming to GOALS (either positive or negative)?	Have you noticed any changes in your child's confidence and attitude to physical activity since finishing GOALS(either positive or negative)?
Family diet	How do your family's eating habits now compare to your eating habits before you came to GOALS? Please describe anything that is different.	How do your family's eating habits now compare to your eating habits before you came to GOALS? Please describe anything that is different. How do your family's eating habits now compare to your eating habits immediately after GOALS finished? If there are differences, what are the reasons for these?
Facilitators/barriers		If you have continued with your healthy lifestyle, what was it about GOALS that prepared you to do this? If you have not managed to keep up as healthy a lifestyle as you'd have liked, what do you feel has prevented you? If there are differences, how could we have helped?

within-subjects change from pre- to post-intervention, and from pre-intervention to 12-month follow-up. Independent *t*-tests were used to compare results by gender and by direction of parent BMI change. One-way ANOVA (parametric continuous data), *Kruskal-Wallis* (non-parametric continuous data) and *Chi-Squared* tests of independence (categorical data) were used to assess between-group differences according to year of attendance. *Pearson* correlations were performed to measure relationships between child BMI SDS change and adult BMI change plus child BMI SDS change and child self-esteem change.

Responses to the post-intervention and follow up feedback questionnaires were analysed within the pre-determined themes in table 4.1. Participant responses were first read as a whole and coded as "improved", "unchanged" or "got worse" (stage 1). The component clauses of responses were then analysed deductively to identify the most common change themes and map these against the GOALS intervention objectives (see table 3.1) with a further inductive analysis to draw out any themes not covered by the objectives (stage 2). To enhance the credibility of findings, stage 1 analysis was carried out independently by two researchers, who then resolved any points of disagreement through discussion. Stage 2 analysis was carried out by the principal researcher, and the coding for each question checked for accuracy by the second researcher. Points of disagreement were again resolved through discussion. A breakdown of the stage 2 coding is provided in appendix 7.

4.3 Results

4.3.1 Baseline characteristics

Of the 21 intervention cohorts, 17 had a mean child age < 12 years, 4 had a mean child age ≥ 12 years (figure 3.1). One hundred and sixty-three families participated in the intervention, of whom 143 met the inclusion criteria for the research. Thirteen of these did not consent to their data being used for research purposes, two were ineligible as they had no overweight children in the family and five were excluded on the basis of the child meeting one of the exclusion criteria (lack of baseline data (n=2); Prader-Willi Syndrome (n=1); Hypothyroidism (n=1); Down's Syndrome (n=1)).

Table 4.2 Referral and postcode data for families taking part in GOALS

		n	% of sample
Families		**143**	
Referral	Liverpool Sportslinx project	44	30.8
	Promotional activities (eg. newspaper articles, whole school letters)	36	25.2
	Primary care referral	24	16.8
	Secondary care referral	25	17.5
	Word of mouth	6	4.2
	Miscellaneous or unknown	8	5.6
Postcode ranking on Indices of Deprivation 2007	Living within 10% most deprived neighbourhoods in England	92	64.3
	Living within 11-50% most deprived neighbourhoods in England	34	23.8
	Living within least 50% deprived neighbourhoods in England	17	11.9

Table 4.2 shows referral and postcode data for the 143 families included in the research sample. Sixty-four percent of families lived within the most 10% deprived neighbourhoods in England according to the 2007 Indices of Multiple Deprivation (Office for National Statistics, 2007). The most common referral route was via the *Sports*Linx project (Stratton et al., 2007), whereby parents of year 5 and year 7 children found to be overweight during school fitness testing days were sent a postal invite to join. Other referral routes included non-targeted promotional activities (e.g. articles in the Liverpool Echo or Daily Post) and referral from primary care (e.g. GP, school nurse) or secondary care health practitioners (e.g. paediatricians). Just under 10% of the sample were recruited through word of mouth or miscellaneous/unknown routes.

The baseline characteristics of the research sample are shown in table 4.3. Referred children were 80 girls and 63 boys, with a mean age of 10.4 $\pm$ 2.16 years and a mean BMI SDS of 3.00 $\pm$ 0.57. In 3/17 cases, there was a "sibling" who was more overweight than the referred child.

4.3.2 Attendance and completion

Of the 143 families who took part, 74 completed the intervention (51.7%; 74 children, 81 adults). Completion was defined as at least 50% attendance and still attending at the end of the intervention. Mean attendance for these families was 83.3%. It was not always possible to attain reasons for drop-out, but these included difficulty with transport, clashes with other commitments (e.g. Sports clubs), or adverse life events (e.g. relationship breakdown, family illness).

Table 4.3 Baseline characteristics of participants

		n	% of sample
Referred children		**143**	
Sex	Boys	63	44.1
	Girls	80	55.9
Mean age	10.4 years (sd 2.2, range 4.65 – 16.07)		
Mean BMI	28.7(sd 4.8, range 20.11 – 47.69)		
Mean BMI SDS	3.00 (sd 0.57, range 1.53 – 4.73)		
BMI percentile for age and sex (British 1990 Growth Reference, Cole et al.,1995)	>99.6th	108	75.5
	>98th	29	20.3
	>91st	6	4.2
Ethnicity		**Data available for 79 (/143) children only**	
	White-British	67	
	White – other background	2	
	Mixed race	3	
	Black-British	3	
	Asian	1	
	Other	3	
Overweight siblings		**17**	
Sex	Boys	12	70.6
	Girls	5	29.4
Mean age	10.4 years (sd 3.7, range 4.87 – 15.61)		
Mean BMI	25.6 (sd 7.6, range 18.6 – 46.2)		
Mean BMI SDS	2.45 (sd 0.83, range 1.43 – 3.99)		
BMI percentile for age and sex (British 1990 Growth Reference, Cole et al.,1995)	>99.6th	7	41.2
	>98th	4	23.5
	>91st	6	35.3
Ethnicity		**Data available for 11 (/17) children only**	
	White-British	10	
	Mixed race	1	
Parents		**168**	
Sex	Male	35	20.8
	Female	133	79.2
Mean age (GOALS start month)	**Age data available for 125 (/168) parents only**		
	40.5 years (sd 7.5, range 19.18 – 60.10)		
Relationship to child	Mother	120	71.4
	Father	34	20.4
	Grandmother	7	4.2
	Adult sibling	3	1.8
	Aunt	1	0.6
	Other	2	1.2
	BMI data available for 152 (/168) parents only		
Mean BMI	31.7 (sd 7.3, range 18.84 – 58.72)		
Weight status (World Health Organisation)	Healthy weight	23	
	Overweight	51	
	Obese	78	
	Of which class I (BMI 30-34.99)	*37*	
	Of which class II (BMI 35-39.99)	*22*	
	Of which class III (BMI ≥40)	*19*	

4.3.3 Child outcomes – complete case analysis

Children were eligible for the complete case analysis if:

- they had complete pre- and post-intervention BMI data; and
- they had complete pre- and post-intervention data for the outcome measure being analysed (if a non-BMI outcome).

Of the 74 children who completed the intervention, three were excluded (two had no post-BMI data, the third lost weight during the intervention due to a medically-prescribed diet), leaving 71 children for analysis (38 girls). One further (male) child's data was removed, as his BMI SDS change from pre- to post-intervention (-0.71) was over three standard deviations greater than the sample mean. The complete case analysis therefore included 70 children. The body composition and self-esteem data for these children is shown in table 4.4.

4.3.3.1 BMI SDS

There was a significant decrease in mean BMI SDS from pre- to post-intervention (-0.07±0.16, $p<0.001$), with 44/70 children (62.9%) decreasing BMI SDS by at least 0.01. In the 40 children who attended follow up, BMI SDS change was slightly greater (-0.09±0.18, $p<0.01$) and was maintained 12 months from baseline (-0.09±0.26, $p<0.05$). Girls had a significantly lower BMI SDS at baseline than boys (2.88±0.62 vs 3.19±0.55, $p<0.05$), but there was no significant difference in their mean BMI SDS change from pre- to post- intervention (-0.07±0.16 vs -0.08±0.15, $p=0.917$) or in the proportion of girls who reduced BMI SDS from pre- to post-intervention compared with boys (63.2% vs 62.5%, $p=0.955$).

4.3.3.1.1 Overweight siblings. Of the 17 overweight siblings who started GOALS, 8 completed the intervention but 1 was excluded as his referred sibling did not have complete pre- and post-intervention BMI SDS data. For the 7 completing children median BMI SDS at baseline was 1.76 (range 1.43 to 3.44) and median change from pre- to post-intervention was -0.06 (range -0.27 to 0.33), with 4/7 children reducing BMI SDS by at least -0.01 from pre- to post-intervention. Follow up data was available for 3/7 children only; pre-intervention to 12-month follow up BMI SDS change for these children was -0.14, 0.06 and 0.59.

Table 4.4 Baseline, post-intervention and 12-month follow up data pooled across cohorts (one outlier removed). Means and standard deviations are reported for children with both pre- and post-intervention data. Outcomes for the subsample who attended 12-month follow up are reported separately.

Measure		n	Baseline	Post	Follow up	Baseline to post change	p	Baseline to follow up change	p
BMI SDS	Complete	70	3.02 (0.60)	2.95 (0.62)	n/a	**-0.07*** (0.16)**	**<0.001**	n/a	n/a
	Complete with follow up	40	2.88 (0.60)	2.79 (0.60)	2.79 (0.66)	**-0.09** (0.18)**	**0.004**	**-0.09* (0.26)**	**0.041**
Waist-to-height ratio (to April 07)	Complete	20	0.58 (0.06)	0.57 (0.06)	n/a	**-0.02* (0.03)**	**0.022**	n/a	n/a
	Complete with follow up	16	0.58 (0.06)	0.57 (0.06)	0.56 (0.06)	-0.01 (0.03)	0.164	**-0.01* (0.02)**	**0.035**
Umbilicus-to-height ratio (from Sep 07)	Complete	39	0.64 (0.06)	0.64 (0.06)	n/a	**-0.01* (0.02)**	**0.013**	n/a	n/a
	Complete with follow up	18	0.63 (0.05)	0.61 (0.05)	0.62 (0.06)	**-0.01* (0.02)**	**0.019**	-0.01 (0.03)	0.348
PSPP Social Acceptance	Complete	45	2.99 (0.74)	3.26 (0.57)	n/a	**0.26* (0.78)**	**0.028**	n/a	n/a
	Complete with follow up	22	2.97 (0.70)	3.23 (0.57)	2.99 (0.69)	0.26 (0.75)	0.112	0.02 (0.62)	0.905
PSPP Athletic Competence	Complete	45	2.35 (0.66)	2.46 (0.76)	n/a	0.11 (0.65)	0.244	n/a	n/a
	Complete with follow up	21	2.49 (0.55)	2.65 (0.59)	2.55 (0.66)	0.16 (0.70)	0.315	0.06 (0.63)	0.661
PSPP Physical Appearance	Complete	45	2.04 (0.81)	2.20 (0.77)	n/a	0.16 (0.74)	0.165	n/a	n/a
	Complete with follow up	21	2.05 (0.64)	2.33 (0.70)	2.35 (0.73)	0.28 (0.74)	0.102	0.31 (0.78)	0.087
PSPP Global Self-Esteem	Complete	45	2.72 (0.80)	2.85 (0.69)	n/a	0.13 (0.74)	0.253	n/a	n/a
	Complete with follow up	21	2.70 (0.72)	2.89 (0.71)	2.87 (0.69)	0.18 (0.76)#	0.218	0.17 (0.98)#	0.727

*p value of within-subject effect (paired samples *t*-test) <0.05; **p value of within-subject effect (paired samples *t*-test) <0.01; ***p value of within-subject effect (paired samples t-test) <0.001; #Data not normally distributed, *Wilcoxon signed rank* test used.

4.3.3.2 Abdomen-to-height ratio

Due to the difficulty of taking abdominal measures from some children (e.g. clothing, struggling to relax), abdomen-to-height ratios were available for 59 children only (20 measured at the waist, 39 at the umbilicus). Ratios reduced significantly from pre- to post-intervention in both the waist measurement group (-0.02±0.03, $p<0.05$) and the umbilicus measurement group (-0.01±0.02, $p<0.05$).

4.3.3.3 Self-Perception Profile for Children

A child's data was considered complete if they provided a valid response to at least 4 of 6 items on each subscale (a valid response was one where a child ticked only one of the possible four boxes for an item, see section 4.2.3.3). After excluding children under 8 (n=6), those absent when questionnaires were completed (n=9) and those who provided too few valid responses (n=10), there were 45 children with complete pre- and post-intervention data. There were small improvements in global self-esteem and the three specific domains from pre- to post-intervention, though the only change to reach significance was in the social acceptance domain (0.26±0.78, $p<0.05$). There were no significant differences between boys (n=18) and girls (n=27) in their baseline global self-esteem or specific domain scores. Girls did appear to have a greater improvement in global self-esteem from pre-to post intervention though this did not reach significance (0.26±0.56 vs -0.08±0.94, $p=0.180$).

When looking more closely at the data, there was some 'regression to the mean from pre- to post- intervention. In all domains, there was a significant inverse correlation between baseline scores and change scores (social acceptance $r= -.716$, $p<0.001$; athletic competence $r= -.332$, $p<0.05$; physical appearance $r= -.508$, $p<0.001$; global self-esteem $r= -.608$, $p<0.001$). That is, the greatest increases were seen in those with the poorest self-perceptions at the start, and the greatest decreases in those with the highest self-perceptions at the start.

4.3.3.4 Correlations between BMI SDS change and self-esteem change

There were no significant correlations between baseline BMI SDS and either baseline self-esteem or self-esteem change from pre- to post-intervention in any domain. However, the correlation between baseline BMI SDS and pre- to post-intervention perceived social acceptance change did approach significance ($r= .288$, $p=0.055$); suggesting the most obese children experienced the greatest increase in perceived social acceptance.

Table 4.5 *Pearson* correlations between BMI SDS change and self-esteem change (SA = social acceptance; AC = athletic competence; PA = physical appearance; Global = global self-esteem)

	Pre- to post-intervention				Pre-intervention to 12-month follow up[a]			
	SA	**AC**	**PA**	**Global**	**SA**	**AC**	**PA**	**Global**
Pre- to post-intervention BMI SDS	n = 45 r = .015 p= 0.920	n = 45 r = -.250 p= 0.098	n = 45 r = -.064 p= 0.678	n = 45 r = -.108 p= 0.478	n = 25 r = -.380 p=0.061	n = 24 r = -.390 p=0.060	**n = 24** **r = -.423** **p=0.040***	**n = 24** **r = -.433** **p=0.034***
Pre-intervention to 12-month follow up BMI SDS	n = 27 r = -.141 p= 0.483	n = 27 r = -.167 p= 0.405	n = 27 r = -.057 p= 0.776	n = 27 r = .100 p= 0.618	n = 25 r = -.200 p= 0.339	n = 24 r = -.245 p= 0.249	n = 24 r = -.213 p= 0.318	n = 24 r = -.157 p= 0.464

*correlation is significant at the 0.05 level; [a]includes 3 cases where self-esteem scores were available pre-intervention and at 12-month follow up, but not post-intervention

Pre-to post intervention BMI SDS change did not correlate with pre-to post-intervention self-esteem change in any domain (table 4.5). However, the highlighted cells show there were significant correlations between *pre- to post-intervention* change in BMI SDS and *pre-intervention to 12-month follow up* change in global self-esteem ($r = -.433$, $p<0.05$) and perceived physical appearance ($r = -.423$, $p<0.05$). The correlations between pre- to post-intervention BMI SDS change and pre-intervention to 12-month follow up change in the other two domains also approached significance (social acceptance, $r = -.380$, $p=0.061$; athletic competence, $r = -.390$, $p=0.060$). There were no significant correlations between pre-intervention to 12-month follow up BMI SDS change and self-esteem change.

4.3.3.5 Perceived fitness and health

Figures 4.3 and 4.4 show how fit (figure 4.3) and healthy (figure 4.4) children perceived themselves to be pre- and post-intervention. Complete data was available for 54 children. The number of children who considered themselves fit or very fit more than trebled from pre- to post-intervention (n=4 pre-intervention, 15 post-intervention), and the number of children who considered themselves healthy or very healthy doubled (n=12 pre-intervention, 24 post-intervention). The number of children who perceived themselves unfit or unhealthy or did not know whether they were fit or healthy decreased from pre- to post-intervention. There were few changes between post-intervention and 12-month follow up (n=28).

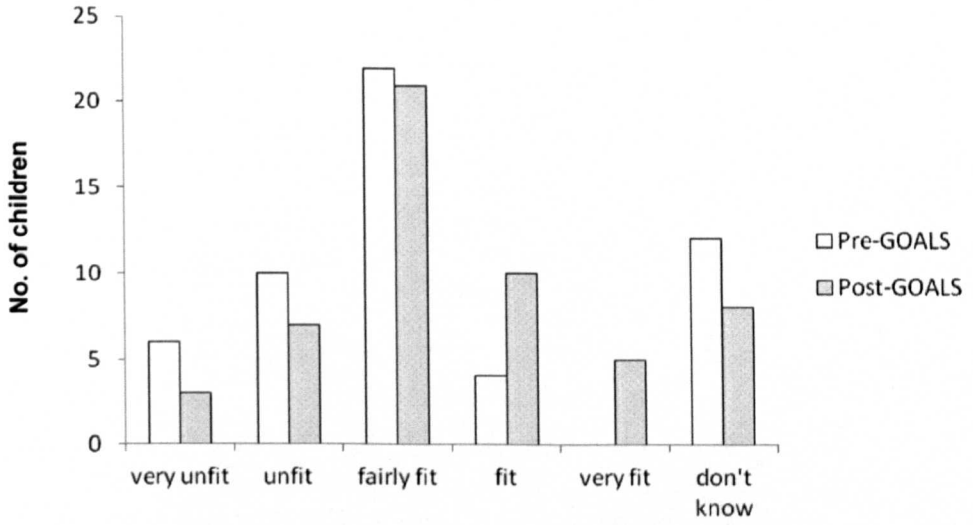


Fig. 4.3 Child perceived fitness pre- and post-intervention

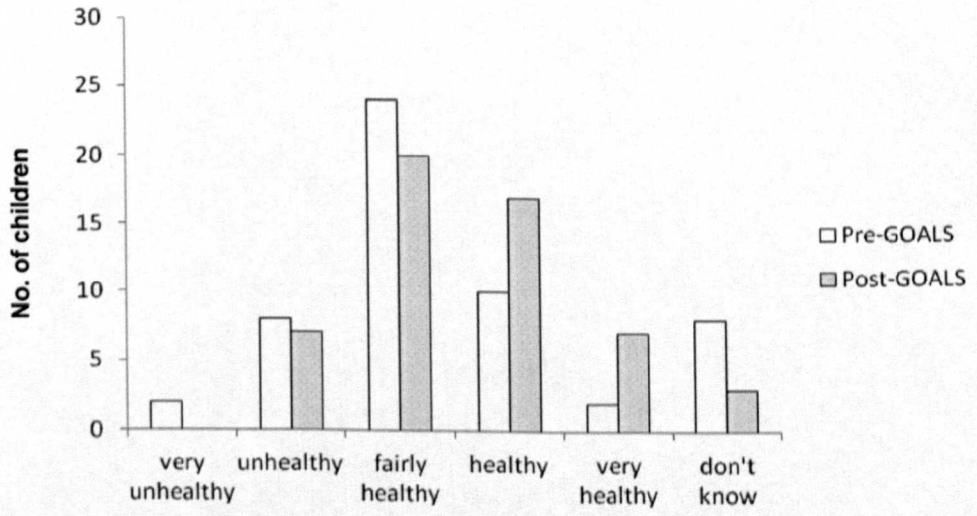


Fig. 4.4 Child perceived health pre- and post-intervention

4.3.4 Parent outcomes – complete case analysis

Parents were eligible for the complete case analysis if:

- the referred child in their family was included in the complete case analysis; and
- they had complete pre- and post-intervention data for the outcome measure being analysed.

Within the 70 families eligible for the complete case analysis, there were 58 parents with complete pre- and post-intervention BMI data. One father was excluded as he

was following an extreme weight-loss plan at the same time as attending GOALS, leaving 57 parents for analysis. Table 4.6 shows the body composition data for parents with complete pre- and post-intervention measures. Each parent came from a different family, other than one mother and one father who were from the same family. To control for potential effects of this non-independence, analyses were performed with and without these two participants. Since both analyses revealed the same results, both parents were included (other than the child-parent BMI correlational analyses, where the mean of the two parent's BMI change was used).

4.3.4.1 BMI

Parent BMI did not change significantly, either from pre- to post-intervention, or from pre-intervention to 12-month follow up. Of the 57 parents with complete data, 51 were overweight or obese (24 overweight, 12 obese I, 10 obese II, 5 obese III). Median BMI change from pre- to post-intervention for this overweight/obese group was comparable to the whole cohort (0.07, IQR -0.68 to 0.66, $p = 0.888$).

4.3.4.2 Abdomen-to-height ratio

There was little change in parent abdomen-to-height ratio, either from pre- to post-intervention or from pre-intervention to 12- month follow up. The only significant change was from pre- to post-intervention in the parents whose measurement was taken at the umbilicus and attended 12-month follow up (-0.01, IQR -0.04 to 0.00, $p<0.05$; n=12).

4.3.4.3 Perceived fitness and health

Complete pre- and post-intervention data was available for 48 parents. Forty-four parents were from separate families, there was one mother/father pair, and one mother/sister pair. Since their ratings did not appear any more similar than any non-family pairs, all four participants were included in the descriptive analysis. The pattern of change observed was the same as for the children (for child data see figures 4.3 and 4.4). The number of parents who perceived themselves as unfit/very unfit (28 pre-intervention, 19 post-intervention) and unhealthy/very unhealthy (15 pre-intervention, 7 post-intervention) reduced from pre- to post-intervention. The number of parents who perceived themselves as fit/very fit (2 pre-intervention, 5 post-intervention) or healthy/very healthy (10 pre- intervention, 12 post-intervention) increased slightly from pre- to post-intervention. As with the children, there were few changes in perceived fitness or health between post-intervention and 12-month follow up (n=24).

Table 4.6 Parent baseline, post-intervention and 12-month follow up data pooled across cohorts. BMI data was not normally distributed, therefore medians and inter-quartile ranges are reported for participants with both pre- and post-intervention data. *Wilcoxon signed ranks* tests were used to assess within-subjects changes. Outcomes for the subsample who attended 12-month follow up are reported separately.

Measure		n	Baseline	Post	Follow up	Baseline to post change	p	Baseline to follow up change	p
BMI	Complete	57	29.42 (27.10 to 35.19)	29.89 (27.12 to 35.24)	n/a	0.07 (-0.68 to 0.69)	0.757	n/a	n/a
	Complete with follow up	33	29.26 (27.10 to 35.60)	29.34 (26.80 to 35.08)	30.91 (26.73 to 34.63)	0.07 (-0.89 to 0.73)	0.908	0.19 (-0.81 to 1.20)	0.292
Waist-to-height ratio (to April 07)	Complete	18	0.56 (0.49 to 0.64)	0.54 (0.51 to 0.64)	n/a	-0.01 (-0.04 to 0.01)	0.103	n/a	n/a
	Complete with follow up	14	0.56 (0.47 to 0.66)	0.54 (0.49 to 0.68)	0.54 (0.47 to 0.67)	0.00 (-0.04 to 0.01)	0.445	0.00 (-0.04 to 0.01)	0.355
Umbilicus-to-height ratio (from Sep 07)	Complete	31	0.63 (0.57 to 0.68)	0.62 (0.57 to 0.68)	n/a	0.00 (-0.02 to 0.01)	0.225	n/a	n/a
	Complete with follow up	12	0.60 (0.57 to 0.68)	0.58 (0.56 to 0.67)	0.61 (0.56 to 0.67)	**-0.01* (-0.04 to 0.00)**	**0.024**	-0.01 (-0.02 to 0.01)	0.717

***p value of within-subject effect <0.05**

4.3.5 Relationship between child and parent BMI change

Figures 4.5 and 4.6 present scatter-plots of the correlations between parent BMI change and child BMI SDS change, from pre- to post-intervention and pre-intervention to 12-month follow up respectively. There was a significant positive correlation between parent BMI change and child BMI SDS change pre- to post-intervention (n=56; r=.479; p<0.001) and from pre-intervention to 12-month follow up (n=31; r=.509; p<0.01), with approximately 26% of the variance in child BMI SDS change pre-intervention to 12-month follow up explained by parent BMI change over the same period (and vice-versa).

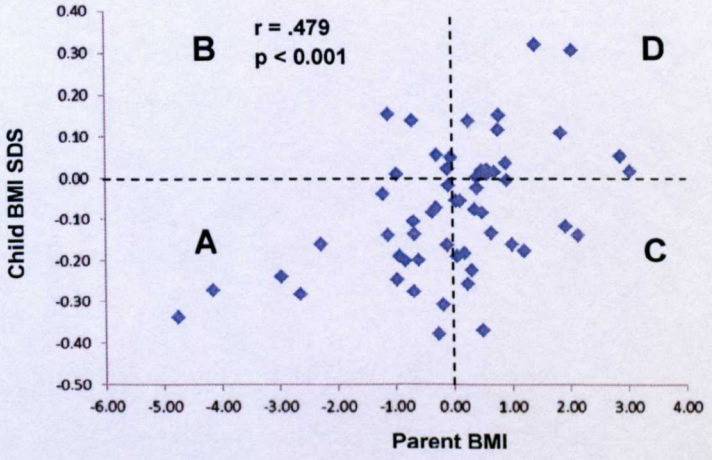


Fig 4.5 Correlation analysis of child BMI SDS change and parent BMI change: pre- to post-intervention (n=56). A = parent BMI and child BMI SDS both decreased (n=20); B = parent BMI decreased, child BMI SDS maintained or increased (n=6); C = parent BMI maintained or increased, child BMI SDS decreased (n=15); D = parent BMI and child BMI SDS both maintained or increased (n=15).

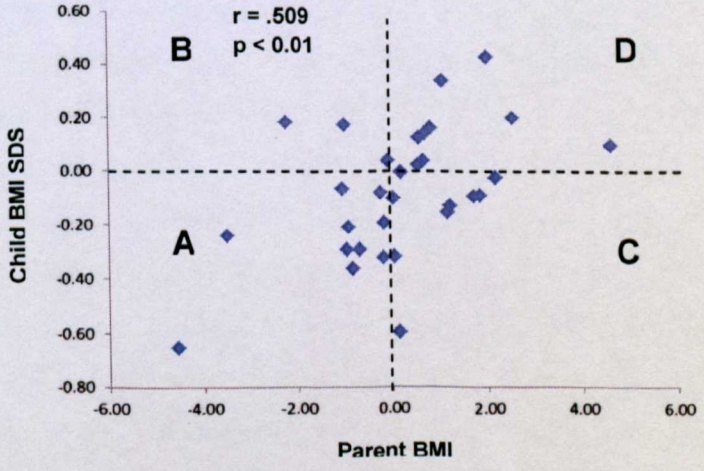


Fig 4.6 Correlation analysis of child BMI SDS change and parent BMI change: pre-intervention to 12-month follow up (n=31). A = parent BMI and child BMI SDS both decreased (n=10); B = parent BMI decreased, child BMI SDS maintained or increased (n=3); C = parent BMI maintained or increased, child BMI SDS decreased (n=9); D = parent BMI and child BMI SDS both maintained or increased (n=9).

Chi-Square analysis confirmed there was a significant association between the direction of parent BMI change and direction of child BMI SDS change ($p<0.05$), with 20/26 (77%) children whose attending parent reduced BMI showing a reduction of at least 0.01 BMI SDS pre- to post-intervention, compared with 15/30 (50%) of the children whose attending parent did not reduce BMI. The same pattern was observed for pre-intervention to 12-month follow up (10/13 (77%) vs 9/18 (50%)) but the effect lost significance ($p=0.129$), possibly due to reduced numbers. The strength of these associations is reflected in the scarceness of cases in quadrant B in figures 4.5 and 4.6.

4.3.5.1 Overweight siblings

For the 7 completing families with overweight siblings, the correlation between parent pre- to post-intervention BMI change and referred child BMI SDS change ($r = .59$) was higher than the correlation between parent BMI change and sibling BMI SDS change ($r = .37$) or between referred child and sibling BMI SDS change ($r = .45$). Participant numbers were too small to explore the significance of these differences.

4.3.6 Child BMI SDS change by year of attendance

Table 4.7 shows median child BMI SDS change according to year of attendance. Although there were decreases in BMI SDS from pre- to post-intervention and from pre-intervention to 12-month follow-up in all groups, the only significant decrease was from pre- to post-intervention for children who attended during year 3. There was however no significant difference between year groups for either pre- to post-intervention or pre-intervention to 12-month follow up BMI SDS change. This is possibly due to small numbers and high variability in child responses during years 1 and 2, and the fact that the only three children (from the cohort of 70) with a BMI SDS increase >0.20 all attended during year 2. There was however a significant year-on-year improvement in the proportion of children who reduced BMI SDS by at least -0.01 from pre- to post-intervention (table 4.8). Numbers were too small to test for significant differences from pre-intervention to 12-month follow-up, though the most recent year group again had the highest proportion of children who reduced BMI SDS (table 4.9). There were no significant differences in baseline age, baseline BMI SDS or gender between children who attended each year.

Table 4.7 Child BMI SDS change for children who attended during Year 1 (Sep 2006 - March 2007), Year 2 (April 2007 – March 2008) and Year 3 (April 2008 – March 2009).
Not all change data was normally distributed. Medians and inter-quartile ranges are reported for participants with both pre- and post-intervention data. Outcomes for the subsample who attended 12-month follow up are reported separately.

		n	Baseline	Post	Follow up	Baseline to post change	Baseline to follow up change
Year 1	Complete	21	3.24 (2.86 to 3.44)	3.13 (2.67 to 3.48)	n/a	0.00 (-0.19 to 0.05)	n/a
	Complete with follow up	14	3.03 (2.44 to 3.29)	3.07 (2.47 to 3.24)	2.97 (2.60 to 3.39)	-0.06 (-0.20 to 0.06)	-0.10 (-0.24 to 0.14)
Year 2	Complete	24	2.97 (2.47 to 3.18)	2.92 (2.44 to 3.21)	n/a	-0.08 (-0.14 to 0.05)	n/a
	Complete with follow up	14	2.73 (2.09 to 3.09)	2.63 (2.29 to 3.05)	2.51 (2.35 to 2.99)	-0.05 (-0.17 to 0.11)	-0.19 (-0.32 to 0.21)
Year 3	Complete	25	2.93 (2.84 to 3.40)	2.82 (2.63 to 3.32)	n/a	**-0.11*** (-0.20 to -0.05)**	n/a
	Complete with follow up	12	2.91 (2.63 to 3.36)	2.74 (2.43 to 3.30)	2.87 (2.67 to 3.33)	**-0.18** (-0.26 to -0.07)**	-0.11 (-0.19 to 0.02)

** p value of within-subject effect (Wilcoxon signed ranks test) <0.01

***p value of within-subject effect (Wilcoxon signed ranks test) <0.001

Between-groups effect for pre- to post-intervention BMI SDS change (Kruskal-Wallis test) X^2 (2) = 3.321, p=0.19
Between-groups effect for pre- intervention to follow-up BMI SDS change (Kruskal-Wallis test) X^2 (2) = 0.085, p=0.959

Table 4.8 Proportion of children reducing BMI SDS by at least -0.01 from pre- to post-intervention according to year of attendance (Year 1 = Sep 2006 - March 2007; Year 2 = Apr 2007 - March 2008; Year 3 = Apr 2008 - March 2009). Absolute figures and %age of annual cohort are reported.

	Year 1	Year 2	Year 3	Total
Reduced BMI SDS by at least -0.01	9 **42.9%**	15 **62.5%**	20 **80%**	44 62.9%
Maintained or increased BMI SDS	12 57.1%	9 37.5%	5 20%	26 37.1%
Total	21	24	25	70

X^2 (2) = 6.75, p < 0.05

Table 4.9 Proportion of children reducing BMI SDS by at least -0.01 from pre-intervention to 12-month follow-up according to year of attendance (Year 1 = Sep 2006 - March 2007; Year 2 = Apr 2007 - March 2008; Year 3 = Apr 2008 - March 2009). Absolute figures and %age of annual cohort are reported.

	Year 1	Year 2	Year 3	Total
Reduced BMI SDS by at least -0.01	9 **64.3%**	8 **57.1%**	9 **75%**	26 65%
Maintained or increased BMI SDS	5 35.7%	6 42.9%	3 25%	14 35%
Total	14	14	12	40

Chi-square invalid as 50% cells with expected count <5

4.3.7 Multivariate analysis (parent BMI change and year of attendance)

As significant associations were found between direction of child BMI SDS change and both parent BMI change and year of attendance it was of interest to explore the relationship between these two potential predictor variables. As with the children, there was a year-on-year increase in the proportion of parents who reduced BMI from pre- to post-intervention (year 1 37.5%; year 2 45.5%; year 3 55.5%), and parents attending in year 3 reduced BMI by the greatest amount (-0.55±1.96 vs increases of 0.42±1.20 in year 1 and 0.10±0.96 in year 2), though neither trend was significant (p=0.306 and p=0.570 respectively). With such a strong correlation between parent BMI change and child BMI SDS change however (see figures 4.5 and 4.6), it was possible the year-on-year improvement in child BMI SDS change was confounded, or mediated by, the higher proportion of parents reducing BMI in years 2 and 3. Unfortunately data from the current study did not allow these effects to be tested for two reasons.

- There was insufficient data to separate mediating from confounding effects. On the one hand, the intervention improvements over time could have led to an increased likelihood of parents reducing BMI, which in turn could have increased the likelihood of children reducing BMI SDS (a *mediating* effect). On the other hand there could have been a natural selection of more motivated parents in the most recent cohorts, increasing the likelihood of children reducing BMI SDS (a *confounding* effect).
- Only 56 children had an attending parent with complete pre- to post-intervention BMI data, and for this subsample the year-on-year increase in the proportion of children reducing BMI SDS pre-to post-intervention was no longer significant (p=0.122). Thus logistic regression could not be used to determine whether the year-on-year increase lost significance when parental BMI change direction was added into the model.

4.3.8 Parent- reported physical activity and dietary changes

4.3.8.1 Post-intervention questionnaire data

Post-intervention questionnaire data was available for 44 parents, including two same-family pairs (one mother/older sister; one mother/father). Data for these four participants were included as independent responses for the analysis of question 1 (relating to the parent's own physical activity changes). For questions 2-4 the data for both parents was either excluded (where there was disagreement) or combined to constitute one response (where there was agreement). Inter-rater agreement for stage 1 coding ranged from 0.80 (question 1) to 0.91 (question 3). A full breakdown of the stage 2 coding is provided in appendix 7.

Question 1 (parent physical activity levels). *"How do your activity levels now compare to your activity levels before you came to GOALS? Please describe anything that is different."*

Responses to this question were provided by 41 parents, 34 of whom felt their activity levels had improved. Six parents felt there was little or no change in their activity levels (one of whom noted they had always been an active person, another noted they had started walking and exercising more but had not kept it up and needed to start again). One response was not coded as it provided insufficient information about physical activity changes (*"Doing Move It has made me realise just how unfit I really am"*).

Table 4.10 maps the response components from parents who felt their activity levels had improved (n=34) onto the GOALS intervention objectives (described in table 3.1) related to physical activity participation. The most commonly described types of physical activity were structured exercise (12 responses) and walking (11 responses), whereas no parents described taking up any other form of active transport or participating in sports. Although it was not directly addressed by the question, eight participants commented on changes in physical activity-related feelings. Six of the eight mentioned having more energy, two of whom attributed the improvement to their simultaneous dietary change. Psychological benefits included enjoyment, willingness to take part and an increased perceived competence for physical activity.

Table 4.10 Parent-reported changes in their own physical activity levels after completing GOALS (n=34), mapped against the GOALS intervention objectives. The frequency count refers to the number of participants who provided a comment related to that objective.

Objective	Example response component	Frequency
Structured exercise	*Very different, I never did any exercise after work. As now at least three times a week at least, if not more.*	12
Walking (active transport or lifestyle activity)[a]*	*I am lot more active I always walk instead of getting a taxi*	11
Physical activity feelings[a]	*Feel more energetic, and enjoy the exercise*	8
Physical activity levels (general)	*My activity level has gone up*	6
Physical activity levels (tentative)[a]**	*Improved slightly*	4
Other lifestyle activity	*Use stairs rather than lift*	1
Active play	*Play more physical games*	1
Sport participation	-	0
Other active transport	-	0

[a] theme emerged through inductive analysis; *As it was not always possible to tell from participants' responses whether they were referring to walking as active transport or walking as a lifestyle activity (or both), a separate category labelled "walking" was added; ** The "tentative" category included responses where participants said little and used words such as "slightly", or implied activity levels were improving but still were not where they would like them to be.

Question 2 (child physical activity levels). *"How do you feel your child's activity levels compare to their activity levels before GOALS?"*

After combining responses for the each of the same-family pairs (who were both in agreement), there were 42 eligible responses. Forty-one of these felt their child's physical activity levels had improved since coming to GOALS, one parent felt there had been no change. Table 4.11 maps the response components from parents who felt their child's activity levels had improved (n=41) onto the GOALS intervention objectives related to physical activity participation.

Compared with the data related to parents' own physical activity levels (question 1), parents described a broader range of physical activity changes in their children. The most frequent responses referred to general improvement in physical activity levels, but there were also specific examples of positive improvements related to all five of the physical activity objectives outlined in table 3.1 (sport participation, active transport, structured exercise, lifestyle activity and active play). Many parents (n=8) commented on a child's increased willingness to get involved in physical activities and ability to try harder and others (n=7) provided tentative answers suggesting there had been some improvement but there were challenges along the way.

Table 4.11 Parent-reported changes in their child's physical activity levels after completing GOALS (n=41), mapped against the GOALS intervention objectives. The frequency count refers to the number of participants who provided a comment related to that objective.

Objective	Example response component	Frequency
Physical activity levels (general)	*A lot more activity*	10
Tries harder / gets involved	*My son tries much harder now without giving up too soon when tired of struggling*	8
Physical activity levels (tentative)[a] ***	*Has increased to some degree, but have found it difficult to fit in around school/homework*	7
Sport participation	*His activity is great, he now goes to football and rides his bike frequently. He also plays badminton and goes swimming.*	6
Active transport*	*Walk home from school most nights*	6
Structured exercise	*More active, swimming has improved, little more running*	5
Lifestyle activity**	*[My sister] is involved with more activities after school with her friends*	4
Active play	*[My daughter] does more physical activities and plays more physical games*	3
Awareness[a]	*He is now more aware of importance of exercise*	3

[a] theme emerged through inductive analysis; *All references to walking coded under "active transport" (unless specifically stated it was for leisure purposes); **All references to bike riding coded under "lifestyle activity" (unless specifically stated it was for transport purposes); *** The "tentative" category included responses where participants said little and used words such as "slightly", or implied activity levels were improving but still were not where they would like them to be.

Question 3 (child confidence). *"Have you noticed any changes in your child's confidence and attitude to physical activity since coming to GOALS (either positive or negative)?"*

Forty-three parents answered this question but one same-family pair was excluded as their responses were coded differently. The other same-family pair were in agreement and were thus combined as one response. Of the remaining 40 responses, 36 had noticed positive changes in their child's confidence and attitude to physical activity since coming to GOALS. One parent felt there had been no change. The other three responses were not coded as they included both a positive and a negative element (*"My child is positive when he is at GOALS, but still not so in school and around people he doesn't really know"; "Sometimes positive, sometimes negative due to age and understanding of issues"; and "[my daughter's] confidence although has stayed the same, she is more aware of what she needs to do to help keep fit"*).

Table 4.12 shows the themes that emerged through the analysis of responses from parents who felt their child's confidence had improved (n=36). The majority of parents (n=20) suggested there had been a general positive change in the child's confidence but did not elaborate on their response. There were also a large number of comments (n=13) related to the child's increased willingness to get involved in physical activities. Only one parent commented how their child's body image had improved, but this cannot be taken as an indication of a lack of improvement in other cases since the question did not directly address body image.

Table 4.12 Parent-reported changes in their child's confidence or attitude to physical activity after completing GOALS (n=36), mapped against the GOALS intervention objectives. The frequency count refers to the number of participants who provided a comment related to that objective.

Objective	Example response component	Frequency
Increased confidence	*He appears to be more positive and has more self-confidence*	20
Willingness to get involved	*He has become more involved and will try most things*	13
Tentative response	*Slightly more confident*	3
Body image	*He doesn't seem to worry so much now about his weight and looks more confident*	1

Question 4 (family diet). *"How do your family's eating habits now compare to your eating habits before you came to GOALS? Please describe anything that is different."*

After removing one of the same-family pairs (whose responses were coded differently) there were 40 eligible responses to this question, 38 of whom felt their family's eating habits had improved through attending GOALS. One parent felt there had not been much change as they had always eaten healthily, the other response was not coded as it was not clear whether the parent felt there had been an improvement (*"I have been conscious of eating healthily for some time, but found it difficult to control what he ate outside"*). The response components from the 38 parents who felt there had been positive changes are mapped onto the GOALS intervention diet-related objectives in table 4.13.

Table 4.13 Parent-reported changes in their family's diet after completing GOALS (n=38), mapped against the GOALS intervention objectives. The frequency count refers to the number of participants who provided a comment related to that objective.

Objective	Example response component	Frequency
Healthy balanced diet	*Completely different a lot more healthier choices at the same cost as before*	11
Increase fruit & vegetable intake	*As a family we eat more healthy and we eat a lot more vegetables*	11
Cook more meals from fresh	*Yes I cook more fresh foods e.g. Make my own curries, pasta sauces etc.*	7
Food labels and awareness	*We look at food more about fat content, sugar, calories*	7
Increase water consumption	*Drink more water*	4
Replace snacks	*A big improvement - snack more healthily, carrots, pitta, homemade*	4
Reduce portion sizes	*We have also reduced our food portion*	3
Regular meals, especially breakfast	*Breakfast club, eat all time never did before*	3
Trying new foods[a]	*Kids more adventurous with trying new foods*	3
Fewer processed foods	*We are eating less processed foods*	2
Reduce takeaways	*Much better stopped fast foods*	1
Reduce added salt and sugar	-	0

[a] theme emerged through inductive analysis

Parents provided examples of changes related to 10/11 of the dietary-related objectives. The most commonly reported changes focussed on a healthy balanced diet in general (n=11) and an increase in fruit and vegetable intake (n=11). Many examples of healthy choices were provided, such as switching to healthier varieties of foods (e.g. skimmed milk, wholemeal bread), introducing new foods (e.g. fish) or removing high fat foods (e.g. "*sausage rolls or pies are now a definite 'no no'* "). A new theme emerged related to children increasing their willingness to try new foods. No parents commented that they had reduced the amount of salt or sugar added to food.

4.3.8.2 12-month follow up questionnaire data

Follow up questionnaire data was available for 19 parents, including two same-family pairs (both mother/father). For these pairs, the same inclusion/exclusion protocol was followed as described in 4.3.8.1. For the four outcome themes (parent

physical activity levels, child physical activity levels, child confidence and family diet) responses were first coded as follows:

Changed-maintained: *made healthy changes during GOALS and kept this up*
Changed-relapsed: *made healthy changes during GOALS but since relapsed*
Delayed changed: *little or no change during GOALS but since improved*
No change: *little or no change during or after GOALS*

Since there were only a small number of responses, it was not appropriate to calculate frequencies as an indicator of the most salient factors. Instead a descriptive overview relating to the GOALS objectives is provided in table 4.14. Almost all parents reported that their children had made and kept up healthy changes in their physical activity levels and their confidence (16/17 and 15/15 respectively). Maintenance levels were slightly lower for parent physical activity (13/19) and family dietary changes (11/17); although there were a further three parents who reported keeping up some, but not all, of their dietary changes. There were examples provided linked to all of the physical activity objectives and 8/11 of the dietary objectives.

In response to the question about facilitators (*If you have continued with your healthy lifestyle, what was it about GOALS that prepared you to do this?*), parents commented on:

- the importance of small attainable changes (*"the idea that small changes that can be maintained more easily can make a difference to your weight and shape"*);
- making exercise fun (*"showing you how to enjoy yourself with your family during exercise"*);
- education ("*GOALS helped me in choosing healthy options and checking labels on food*"); and
- coping skills for maintaining change (*"the GOALS methods kick in when I start to feel unhealthy"*).

Parents also mentioned the enthusiasm and encouragement from staff, and specific sessions that had helped them such as the portion sizes and practical cooking sessions.

As most of the families had kept up some changes, very little information was provided on barriers. Those who had relapsed said they had done so because of poor health, lack of time/planning and other commitments. One parent who had

Table 4.14 Parent-reported changes in physical activity, child confidence and diet at 12-month follow up

Pre-determined theme	Eligible responses	Coding	GOALS objectives & examples*
Parent physical activity levels	19	Changed-maintained 13	**General physical activity levels:** *try to do more activities now* **Active transport:** *park car in Kensington and walk into town* **Active play**: *play more active games with kids* **Structured exercise:** *A lot more of activities now, gym at least 3 hours per week* **Lifestyle activity:** *More conscious of doing more activities. We do activity as a family at least once a week.* **Perceived competence for physical activity:** *I feel more motivated now. The GOALS team made me realise how easy activity can be placed into everyday life.* **Tentative (n=2)**: *varies according to work and weather*
		Changed-relapsed 2	*Become lazy after GOALS* [though still more active than before attended GOALS] *My activities are less because the children do more and I have to take them*
		Delayed change 2	*Moved house, closer to the park so out more* *I am doing more activity since doing the GOALS programme. When doing the Move It sessions I realised just how unfit I was.*
		No change 2	*Unfortunately I don't get much spare time to exercise still! But the kids are more active and I'm starting tap classes and running soon!* *No difference* [already active]
Child physical activity levels	17	Changed-maintained 16	**General physical activity levels:** *Before we were couch potatoes. When we finished GOALS we had lots more energy.* **Structured exercise:** *Now increased activity. Cycles daily, swims, ju jitsu etc.* **Lifestyle activity**: *Willing to go for walks unlike prior to GOALS* **Sport**: *[My daughter] has always been an active child but since leaving GOALS she plays for a football team twice a week, only missed 1 session!* **Tentative (n=2):** *There has been some increase*
		Delayed change 1	*My child's activity levels have gone up since moving into high school, more activities and sport to do.*

Pre-determined theme	Eligible responses	Coding	GOALS objectives & examples*
Child confidence	15	Changed-maintained 15	**General confidence:** *[My son] is more confident in himself and I feel the change he has made will be forever* **Willingness to take part in physical activity:** *He is more likely to give things a try now, whereas before he would just say he couldn't do it*
Family diet	17	Changed-maintained 11	**Healthy balanced diet:** *We are all now health aware and we eat a healthy balanced diet, with the odd treat now and again* **Increase fruit & vegetable intake:** *We have a lot more fruit and vegetables* **Food labels and awareness:** *We now think before we eat "rubbish" and our diet has improved vastly without too many big changes and it's become a way of life* **Cook more meals from fresh:** *I cook homemade soups and we have homemade chips* **Replace snacks:** *Try to have healthy snacks rather than a sugary fix!* **Reduce portion sizes:** *Smaller portion sizes* **Regular meals:** *[My daughter] and I always have our evening meal together at the dining room table and chat about the day, which is a nice thing which is associated with food in a good way - cos [my daughter] thought food was an enemy!* **Reduce takeaways:** *We eat less fatty foods and try to restrict takeaways*
		Changed-maintained some** 3	*We have changed a lot of eating habits, but sometimes will fall back a bit and have to start again* *I do try to be aware of saturated fats and sugars but have not been as vigilant as I could* *Can go off the rails slightly now and again*
		Changed-relapsed 1	*Convenience, just had a baby*
		No change 2	*Didn't really have a diet problem, only activity problem!* *Not much difference. Maybe more emphasis on 5-a-day.*

*For *changed-maintained* responses are mapped onto GOALS objectives and example quotes provided. For *changed-relapsed*, *delayed change* and *no change*, quotes giving reasons for each participant are provided; ** An additional code of *changed-maintained some* was added for family diet, as three parents commented how they have kept up some changes, but lapsed in other areas. Quotes giving reasons for each participant are provided.

struggled to keep up his physical activity levels noted the GOALS group session finishing had been a big challenge. When asked how GOALS could have helped more, only two parents responded:

- *"There is nothing that could be done to help, it's down to me"*
- *"No GOALS has benefited my whole family and I am glad I attended".*

4.4 Discussion

4.4.1 Overview of findings

The aim of this study was to measure the potential impact of GOALS on the body composition, lifestyle behaviours and self-perceptions of children and parents who completed the intervention. Secondary objectives were to explore the relationship between child BMI SDS change and parent BMI change, the relationship between child BMI SDS change and self-esteem change and the variation in child outcomes over time. Results showed a statistically significant BMI SDS reduction in children completing GOALS that was maintained at 12-month follow up. This was supported by an improved abdominal-to-height ratio and improved self-perceptions of health and fitness. While there were no changes in parent body composition from pre- to post-intervention or from pre-intervention to 12-month follow up, there was a strong positive correlation between parent BMI change and child BMI SDS change. Parents reported changes to physical activity and diet that demonstrated GOALS was meeting 100% of the specific physical activity objectives and 91% of the specific dietary objectives outlined in table 3.1.

The importance of measuring psychosocial outcomes following childhood obesity treatment has been highlighted (Walker Lowry et al., 2007), both to explore the mechanisms for improving self-esteem in children who are overweight and to ensure interventions do not have an adverse effect. Following completion of GOALS, there was a small improvement in perceived social acceptance but there was no change in child self-esteem in the other domains, nor was there a relationship between pre- to post-intervention BMI SDS change and self-esteem outcomes at post-intervention. There was, however, a positive correlation between pre- to post-intervention BMI SDS change and pre-intervention to *12-month* self-esteem change in the global and physical appearance domains. This finding suggests the children who lost the most weight whilst at GOALS were most likely to have an improved self-esteem at 12 months.

The study adopted a feasibility methodology recommended in the MRC guidance (2000, 2008) for developing and evaluating complex interventions. This approach allowed the GOALS intervention to be evaluated whilst in practice, allowing time to overcome pragmatic delivery challenges and refine intervention components according to emerging evidence. The potential effect of this intervention refinement was seen in the year-on-year increase in the proportion of children who reduced BMI SDS from pre- to post-intervention. Whilst the possibility this result was confounded or mediated by parent BMI change cannot be ruled out, this progressive improvement highlights the benefits of translational approaches to research when developing complex health behaviour change interventions.

The discussion that follows will consider the study findings in the context of:

- interpreting the practical significance of child BMI SDS change;
- maintenance of health behaviour change in overweight children;
- familial factors in childhood obesity treatment; and
- the effects of childhood obesity treatment on psychosocial wellbeing.

4.4.2 Interpreting child BMI SDS change

The within-subjects BMI SDS change (-0.07) in the current study was consistent with other feasibility studies of UK community-based interventions (e.g. Murdoch et al., 2011; Rudolf et al., 2006), yet smaller than that reported in published RCTs (e.g. Coppins et al., 2011; Sacher et al., 2010). Whilst some authors (Reinehr & Andler, 2004; Sabin & Shield, 2006) have cautioned against over-interpretation of small (albeit *statistically* significant) changes in child BMI SDS, there is evidence to suggest even very small reductions in BMI SDS are associated with positive improvements to cardiovascular risk factors in obese children and adolescents. For example, Pollestad Kollesgaard and colleagues (2011) showed a BMI SDS change between 0.00 and -0.10 over one year was associated with significantly lower insulin, total cholesterol, LDL and total/HDL cholesterol ratio in overweight and obese children (aged 7-17 years). Similarly, Reinehr and colleagues (2006) observed improvements in cardiovascular disease risk factors in obese children who reduced BMI SDS during a 1-year lifestyle change intervention. Both the reduction in BMI SDS and the improvement in cardiovascular risk factors were maintained 1 year after the intervention finished. These results support the consensus statement prepared by Speiser and colleagues (2005) who concluded *"obese children (and their physicians) should be encouraged by any reduction in BMI z-score* [SDS]" (p.1880).

Given the aim of feasibility studies (i.e. to overcome delivery practicalities and refine interventions prior to experimental trial), it is perhaps not surprising the observed intervention effects were smaller than in RCTs. Indeed this notion is supported by the improvement in GOALS outcomes during the study period. The proportion of children that reduced BMI SDS increased with each year of delivery, with 80% who completed GOALS during the most recent year (2008-2009) reducing BMI SDS by at least -0.01. It is possible these improvements were related to the increased staff experience and intervention refinements that were made over time (see section 3.3.5). Throughout the study period, questions arose about where the intervention was best delivered, the most appropriate format for sessions and how practitioners could effectively engage the whole family. Several approaches were explored before a solution was found. For example, several childcare options were piloted to evaluate their feasibility (practical and cost) before it was concluded inclusion of younger siblings within the main group was the most appropriate approach. Thus the intervention operated within the same *framework* for the whole study period, but intervention components were refined in response to ongoing feedback from staff and families. These results highlight the importance of taking the time to develop complex interventions to a point they can realistically be expected to have a worthwhile effect (MRC, 2008); an experimental trial carried out too early risks writing off a potentially efficacious intervention.

4.4.3 Maintaining health behaviour change

The importance of long-term follow up in childhood obesity research has been noted (Jones et al., 2011) and systematic reviews have called for studies with follow up at least 12 months from baseline (e.g. Oude Luttikhuis et al., 2009). A key challenge for childhood obesity treatment is the transition from the safe and supportive group environment to long-term behaviour change at home (Staniford et al., 2011). GOALS aims to address this challenge through using BCTs that cover the five behavioural change processes (Golley et al., 2011) from *identifying and motivating readiness to change* through to *preventing and managing relapse* (see section 3.3.4), with a particular emphasis on BCTs that *build self-efficacy and independence*. At post-intervention, parents reported physical activity and dietary changes that suggested both cognitive (e.g. "*he is more determined to do activity*") and behavioural changes (e.g. "*we have stopped eating as many crisps and biscuits*") had occurred. While a promising indicator of the short-term impact of GOALS, this data told us little about the longevity of these changes, and whether any of these

behaviours had become habitual (a behaviour that is repeated in stable contexts (Wood et al., 2002)).

The parent-report data at 12-month follow up suggested all parents who completed the questionnaires had maintained some physical activity and/or dietary changes. Parents provided examples of physical activity and dietary behaviours that had become a way of life for them (e.g. *"We now think before we eat "rubbish" and our diet has improved vastly without too many big changes and it's become a way of life."*), described the acquisition of coping skills to prevent relapse (e.g. *"I can feel when I'm getting lazy and I up my walking"*) and reported the formation of healthy routines (e.g. *"we always do an activity as a family once a week"*). These factors are all important elements of habit formation. Perceived facilitators to attending GOALS included attainable goals, enjoyment, and education. Where relapse had occurred, parents mostly attributed this internally to factors such as lack of planning, poor vigilance and laziness. For example, one parent who had not kept up as many changes as she had hoped stated *"there is nothing that could be done to help, it's down to me."*

It is acknowledged the follow up questionnaire data represents a compliant sample, and may be biased towards those who kept up changes. Nevertheless, this is promising data that provides a unique insight into health behaviour change maintenance during the post-intervention period where structured support is minimal. Chapter 6 provides a more in-depth exploration of the mechanisms underpinning sustained behavioural change (3-5 years on) in families who completed GOALS.

4.4.4 Familial factors of childhood obesity treatment

4.4.4.1 Association between parent and child BMI change

The role of the family in childhood obesity has long been acknowledged (e.g. Bruch & Touraine, 1940) and data from the early 1980s showed the benefits of a family-focussed approach to childhood obesity treatment (Epstein et al., 1981). Yet still little is known about the most appropriate ways of involving the family in treatment (Oude Luttikhuis et al., 2009). GOALS places a strong emphasis on parental role-modelling, with parents encouraged to join in all aspects of the intervention including setting their own goals, being weighed and measured and participating fully in the physical activity sessions. This is the first UK study to report the impact of family-based childhood obesity treatment on parent health outcomes. In support of previous US studies (Epstein et al., 1994; Hunter et al., 2008; Wrotniak et al., 2004), there was a strong positive correlation between parent BMI change and child BMI

SDS change after completion of GOALS that further strengthened during the six months after intervention. These findings support research from Israel et al. (1990) that suggested the parental weight loss role is more important during periods when therapeutic contact is minimal (i.e. after the intervention had finished).

There was also an association between the direction of parent BMI change and the direction of child BMI SDS change (regardless of the size of change). In 77% of cases where the parent reduced BMI from pre- to post-intervention the child also reduced BMI SDS, suggesting a parent BMI reduction (however small) may reflect a high effort to change the family's lifestyle. The reverse was not true for an increase in parent BMI (possibly indicative of little change to lifestyle, rather than a negative change), since 50% of children decreased BMI SDS despite their attending parent increasing their BMI. Yet in 71% of cases where the child increased BMI SDS from pre- to post-intervention the parent also increased BMI, suggesting the child BMI SDS increase occurred in the context of the family's lifestyle rather than in isolation. Taylor et al's (1994) reciprocal socialisation model of child behaviour (figure 2.3) stipulates there are two-way influences operating between the child and the parent, and these findings warrant further research to explore the moderating effect of this relationship on weight loss. While family status suggests a positive parental influence will override any negativity from the child, in dyads characterised by a permissive parenting style (Baumrind, 1966) one might expect the child to have a stronger influence. For example, if the child demands high-fat, high-sugar foods when at the supermarket or refuses to take part in physical activity they may have a negative influence on the parent's motivation to change.

The possibility that the shared parent-child intervention response is mediated by genetic influences cannot be ruled out. For example, a recent study from Epstein et al. (2010) showed where there was concordance of the Taq1 A1 allele of the dopamine D2 receptor between parents and children there was more similarity between child and parent weight loss. Data from the overweight siblings in the present study, however, point towards an environmental explanation (in line with Taylor et al's (1994) model). The correlation was stronger between parent BMI change and BMI SDS change of the referred child than it was of the overweight sibling. In two cases in particular, the second sibling gained a substantial amount of weight in comparison to the referred child and attending parent. There appeared to be a certain pattern of parent-child interaction in these families. Although the "whole family" approach was behaviourally manifest through attendance at the intervention, this failed to transfer to the home environment. Both children in the family were

overweight, but parents were primarily concerned with helping the most overweight child and did not consider the weight of the other child (both younger) to be an issue. It is possible this lack of shared support mechanism may have contributed to the different intervention response of the second child.

4.4.4.2 Parent BMI change

Although GOALS placed a strong emphasis on whole family lifestyle change, it did not address parent weight loss specifically. This may account for the lack of significant changes in parent BMI. For the 26 parents who did reduce BMI, median change was modest (-0.68) and only 6 parents exceeded the clinically significant marker of 5% weight loss (NICE, 2006). Furthermore BMI change pre- to post-intervention bore little relation to BMI change during the follow up period, with those who decreased BMI pre- to post-intervention most likely to gain during the follow up phase, and vice-versa. The aim of GOALS was for families to make small, gradual changes to physical activity and eating behaviours that were sustainable beyond the intervention period. Therefore a steady, gradual impact on weight might be expected (rather than a large initial weight loss followed by a period of maintenance). It is possible that those who lost weight early on had done so through more radical behavioural changes that were not sustainable post-intervention. Further research is required to explore the relationship between patterns of behavioural change and parent weight loss and the potential impact of placing a stronger focus on parent weight loss at GOALS.

4.4.5 Psychosocial implications of childhood obesity treatment

Although research examining the association between global self-esteem and childhood overweight has produced mixed results, evidence suggests children who are overweight have lower social, athletic and physical self-esteem (Walker Lowry et al., 2007). At baseline the children in our sample reported low perceived athletic competence and physical appearance, but their social acceptance scores were positive and comparable with a UK sample of mixed-weight children (Sahota et al., 2001). Interestingly, it was only in this social domain – where children already had a positive self-worth - that significant improvements were found from pre- to post-intervention. This was likely a short-term effect of the socially supportive environment of GOALS, for when the group intervention ended these improvements were lost. It was in the physical appearance domain that improvements were maintained and approached significance at 12-month follow up. In children who are overweight, it is possible physical self-perceptions represent a deeply engrained self-schemata that requires gradual change over a longer timescale.

Research to date exploring the relationship between child weight-related change and self-esteem change has been equivocal, and Walker-Lowry et al. (2007) raised the question as to the directionality in this relationship. In the present study BMI SDS change from pre- to post-intervention was not linked to self-esteem change over the same period, but was positively associated with self-esteem change from pre-intervention to *12-month follow up.* The fact this relationship was only found in one direction (i.e. there was no correlation between pre- to post-intervention self-esteem change and pre-intervention to 12-month follow up BMI SDS change) suggests it was the changing weight status that influenced self-esteem rather than the increased self-esteem that enhanced weight loss attempts. Essentially, these results suggest positive improvements to weight status in the short-term may increase children's confidence over the longer-term.

Self-esteem did decrease in some children, but often in those who already had a high self-esteem (and still did after the decrease). The fact the greatest increases were seen in those with the poorest self-esteem was promising, suggesting the intervention had a positive psychosocial impact for those "most in need". However it is important not to over-interpret mean changes (positive or negative) in self-perception profile data, since a change of 0.17 indicates a change as small as selecting "sort of" instead of "really" on one of the six subscale items. Essentially, physical self-perceptions remained low and it is important obesity treatment interventions help adults understand how they can promote a healthy body image in children. For example, Marx and Neumark-Sztainer (2005) suggested parents should focus on healthy behaviours rather than weight and encourage children to adopt an identity that goes beyond physical appearance.

4.4.6 Limitations

Evaluation of a publicly-funded childhood obesity service presented a number of research challenges. A control group was neither feasible nor appropriate as the GOALS service was required for all eligible children. Without a control group it is not possible to attribute the positive changes to participation in GOALS, as it is not known if change would have occurred in these children without intervention. For example, some studies have found obese children in waiting-list control groups have also reduced their BMI SDS (e.g. Croker et al., 2012) whilst others have shown BMI SDS to stay constant in obese children who do not receive intervention (e.g. Reinehr et al., 2006). The fact it has been reported that obese children attending a hospital outpatient clinic increased their BMI SDS by 0.2 over six months (Rudolf, et al., 2006) does however support the possibility that GOALS

facilitated a reduction in child BMI SDS. Nevertheless, further research is required to substantiate the impact of GOALS.

The challenge of measuring physical activity and dietary behaviours has been acknowledged (National Obesity Observatory, 2009) and at the time of study no appropriately-validated questionnaires were available. Therefore a simple qualitative feedback questionnaire was used with the aim of eliciting responses relevant to the GOALS key objectives of improving family physical activity levels and dietary behaviours. It was anticipated the open-question format would reduce the tendency towards socially-desirable answers and, through drawing on recall rather than recognition memory, would elicit responses with higher validity. There were however some 'tentative' responses from parents, characterised by brief answers with the use of adjectives such as "slightly". It is possible such responses reflected a social desire to please, rather than a true improvement in health behaviour. These responses were therefore coded in a separate category. A further drawback to the questionnaire was a lack of questions focussed on sedentary behaviour or psychosocial changes.

The current study showed positive reductions in BMI SDS were maintained at 12-month follow up. Albeit a promising indicator, it must be noted only 40/70 children attended follow up. The pre- to post-intervention BMI SDS change for these children was slightly greater (-0.09) than the BMI SDS change for the cohort as a whole (-0.07), thus it is possible the sample was biased towards the most compliant families. Furthermore, although the mean change from pre-intervention to 12-month follow up was comparable to the mean change from pre- to post-intervention, there was far greater individual variability at 12-month follow up and further research is required to explore the mechanisms underlying sustained behavioural change.

Although high, the 48% attrition rate in this study was comparable to that observed in other childhood obesity treatment interventions (Skelton & Beech, 2010). However, the conclusions are limited to this population and it remains unknown whether GOALS had any impact for the families who attended the intervention for a shorter period of time, or did not attend follow up. To evaluate the effectiveness of the GOALS intervention for public health, further research is required employing an appropriate comparator group and an intention-to-treat analysis.

4.4.7 Conclusion

This study evaluated six- and twelve-month outcomes from GOALS as the intervention was implemented in practice. Results showed a positive improvement

in child body composition, family lifestyle behaviours and perceived health and fitness. Although there was little change to child self-esteem during the intervention, results did suggest BMI SDS reduction in the short-term has positive benefits for perceived physical appearance and global self-esteem in the long-term. There was a strong relationship between child and parent BMI change, as previously observed in the clinical setting (Hunter et al., 2008; Wrotniak et al., 2004). Further research is required to explore the mechanisms underpinning the parent-child weight loss relationship, considering the influence of family characteristics such as parenting style and sibling weight.

A major issue in childhood obesity treatment concerns the utility of evidence from controlled efficacy trials for informing intervention implementation in the community. There is little value in an efficacious intervention if it is neither feasible nor sustainable in the real-world. This study suggested GOALS was feasible to be delivered in a UK community setting and initial outcomes were positive, the year-on-year improvement in child BMI SDS change demonstrating the importance of allowing complex interventions the time to develop. The chapter that follows will build on these findings by exploring the process information that is crucial if policy-makers are to translate this evidence into practice (study 2). In doing so it will ask:

- whether the GOALS intervention is acceptable to families;
- which elements of the intervention are perceived as facilitative to behaviour change; and
- what challenges families face in making behavioural changes.

Chapter 5

Study 2: A qualitative exploration of children and parents' experiences of a family-based behaviour change intervention for overweight children (GOALS)

Study and aim	Research questions	Key findings
Study 1 **Aim** To measure the potential impact of GOALS on the body composition, lifestyle behaviours and self-perceptions of children and parents who complete the intervention, and explore the relationships between these variables	1. Do children and parents who complete GOALS improve their body composition, as measured by BMI and abdomen-to-height ratio? 2. Are there changes in perceived fitness and health, parent-reported physical activity and diet and child self-esteem after completion of GOALS? 3. How does parent BMI change relate to child BMI SDS change? 4. How does child self-esteem change relate to BMI SDS change? 5. Are there improvements in child BMI SDS change as the GOALS intervention develops over time?	• There was a statistically significant reduction in child BMI SDS (-0.07) that was maintained at 12-month follow up • Parent-reported changes to physical activity and diet showed GOALS was meeting 100% of physical activity objectives and 91% of dietary objectives • There was only minimal change in child self-esteem, but the greatest increases were seen in the children with the poorest self-esteem at baseline • BMI SDS change *from pre-to post-intervention* was correlated with self-esteem change *from pre-intervention to 12-month follow up* in the global and physical appearance domains • There was a strong positive correlation between parent BMI change and child BMI SDS change • There was a significant year-on-year increase in the proportion of children who reduced BMI SDS from pre- to post-intervention
Study 2 **Aim** To qualitatively explore the experiences of families whilst they are taking part in GOALS, discussing perceived changes to their physical activity and eating behaviours, factors facilitating these changes and challenges they are facing	1. What changes have occurred at home during the first six weeks of attending GOALS? 2. What is helping families change? 3. What challenges do families face in making changes? 4. What are the lived experiences of families with overweight children that help practitioners and researchers understand the context in which changes take place?	
Study 3 **Aim** To follow up families 3-5 years after they attend GOALS to explore actual and perceived outcomes, parental psychosocial factors associated with positive outcomes and the processes involved in sustaining long-term behavioural change	1. Do children who attend GOALS demonstrate an improved body composition 3-5 years after baseline? 2. How do parents perceive participation in GOALS influences their child's life several years on, and how does this relate to child body composition change? 3. What parental psychosocial factors are associated with positive long-term outcomes for children who attend GOALS? 4. What processes are involved in sustaining long-term behaviour change for families who attend GOALS?	

5.1 Introduction

The outcome evaluation of the GOALS feasibility phase (chapter 4) showed completion of GOALS was associated with a positive improvement in child body composition and improved eating and physical activity behaviours in the family. This data, however, told us little about how families made these changes, and what factors were important in this process. Qualitative methods are required to elucidate a better understanding of the change process, and the way in which the GOALS intervention facilitates change.

A growing body of international health promotion literature (e.g. Dugdill et al., 2009b; Popay & Williams, 1994; Rootman et al., 2001) advocates service-user involvement and multi-method evaluation in the development of complex community-based interventions. Qualitative methods allow us to draw on participant experiences to explore what it is about an intervention that is working (i.e. which components are important to replicate) and how an intervention can be improved in practice (i.e. which components need refining). Such "bottom-up" approaches remain rare in the childhood obesity arena, but may be key in the translation of research to practice (Blamey & Mutrie, 2004).

Focus groups have been used effectively to explore children's views related to obesity in several areas, such as perceptions of fatness, thinness and associated social pressures (Dixey et al., 2001), experiences of young people with obesity in secondary school (Curtis, 2008), and levers and barriers to weight loss (Murtagh et al., 2006). The flexible, interactive nature of focus groups supports the move away from researching "on" children to researching "with" them (Hill et al., 1996), recognising that children can make a unique and valuable contribution to our understanding of their experiences and are not simply underdeveloped-adults (Darbyshire et al., 2005).

Although there is increasing evidence to suggest family-based childhood obesity interventions are effective (Oude Luttikhuis et al., 2009), few researchers have directly explored what it is about these interventions that helps families change. Several UK-based qualitative studies provide some insight however. Stewart and colleagues (Stewart et al., 2008a, 2008b) interviewed 17 parents of overweight children who had received either standard dietetic treatment or a novel treatment delivered in a motivational interviewing style. The novel treatment, which was received more positively by parents, used BCTs previously suggested for managing

behaviour change in children (goal setting, contracting, rewards, self-monitoring, environmental/stimulus control, problem solving and preventing relapse), many of which have been found to be associated with intervention effectiveness elsewhere (Golley et al., 2011). Factors perceived as facilitative included goal setting with rewards, self-monitoring (particularly at the start of the intervention) and motivation for the child from a positive external influence. Further studies exploring parent and child experiences of participating in family-based childhood obesity treatment interventions found social support from similar others to be a key factor in helping children feel accepted, make friends and essentially "be normal" (Dixey et al., 2006; Murtagh et al., 2006; Staniford et al., 2011).

Whilst these studies demonstrated some positive elements of family-based intervention for children who are overweight, parents raised several challenges when trying to change physical activity and dietary behaviours in the family. Parents in all studies spoke about a lack of support from extended family members (e.g. grandparents), and all had concerns about continuing their changes once professional support ceased. Children who are overweight are subjected daily to social stigma (Latner & Stunkard, 2003), bullying (Griffiths et al., 2006) and judgment from others (Budd et al., 2011). Such experiences can lead to a poor body image (Kostanski & Gullone, 2007), low self-esteem (Griffiths et al., 2010) and ongoing concern in parents (Jackson et al., 2005). Any attempt to understand health behaviour change in this population must take place in the context of these lived experiences and explore how these external influences interact with family factors and the behaviour change intervention itself.

This chapter presents findings from a qualitative study involving focus groups with children and parents six weeks into the 18-session GOALS intervention. Building on the qualitative work in this field to date, this study provides a unique insight into the experiences of children and parents during the early stages of their behavioural change process. In considering facilitators and challenges related to both the family and to the GOALS intervention itself, the study explores the relative influences on child health behaviour change and considers these in the context of the lived experiences of being or having a child who is overweight.

5.1.1 Study aim

The aim of this study is to qualitatively explore the experiences of families whilst they are taking part in GOALS (six weeks into the 18-session intervention),

discussing perceived changes to their physical activity and eating behaviours, factors facilitating these changes and challenges they are facing.

5.1.2 Research questions

1. What changes have occurred at home during the first six weeks of attending GOALS?
2. What is helping families change?
3. What challenges do families face in making changes?
4. What are the lived experiences of families with overweight children that help practitioners and researchers understand the context in which changes take place?

5.2 Methods

5.2.1 Research design

A qualitative focus group design was used for the current study. Focus groups provide a useful means of exploring whether there are shared or diverse views on a particular topic (Patton, 2002), and have been used with both parents (e.g. Dixey et al., 2006; Goodell et al., 2008) and children who are overweight (e.g. Curtis, 2008; Murtagh et al., 2006) to explore issues related to their obesity and participation in treatment interventions.

The research design and methodology were informed by pilot work during the formative and pilot GOALS phases (see figure 2.1) and with participants attending GOALS between September 2006 and April 2007. Both family interview and focus group approaches were piloted, using different interactive techniques to engage children (e.g. visual prompts, write and draw, role-playing). The family interviews had several drawbacks, such as children getting bored, and parents withholding information in the child's presence. The focus groups on the other hand, when run separately for children and parents, proved a useful technique for exploring group views about experiences of GOALS and health behaviour change. Furthermore, for busy families who had already committed to attending an 18-week intervention, we found focus groups to be the most effective means of reaching all participating families during the study time period.

5.2.2 Participants and recruitment

All families who took part in GOALS between November 2007 and March 2009 (intervention cohorts 12 – 22) were eligible for inclusion. During the initial lifestyle assessment, families were provided with an information sheet and were able to ask any questions about the research process. Written informed consent was sought from adult participants, and written assent from children over 8 years and deemed capable of understanding. As focus groups took place during intervention time, only those families who attended during week six were included. Families were able to opt out if they decided on the day they did not wish to take part, or if they had previously indicated so on their consent form. Inclusion for study 2 was independent of study 1, thus opting out of one study had no impact on the other.

It must be noted the research sample for study 2 included some participants who were excluded from study 1 on the basis of medical conditions or lack of quantitative data. The research sample also included parents and children from intervention cohort 22, which was excluded from study 1 as the intervention included a second weekly physical activity session for the children. The intervention did however run within the same GOALS framework and it was not deemed necessary to exclude the cohort from the focus groups on this basis. To reduce potential bias resulting from this difference, researchers remained mindful of the second physical activity session during analysis and used only responses that were relevant to the core GOALS intervention.

5.2.2.1 Sample characteristics

Due to a session being cancelled, focus groups did not take place for cohort 19. There was no child focus group for cohort 20 as the group were very young, and the adult focus group for cohort 13 was excluded as one of the participants since passed away. Therefore nine parent and nine child focus groups took place, with between two and nine participants per group. The sample included 36 families (34 parents, 39 children (19 boys)), of whom 33 went on to complete the intervention. Seventy-one percent of families lived in neighbourhoods ranked in the 10% most deprived in the 2007 Indices of Multiple Deprivation (Office for National Statistics, 2007). Of the 24 families for whom ethnicity was known, 22 were White-British. The make-up of each group is provided in tables 5.1 (parents) and 5.2 (children).

Table 5.1 Parent focus group participation

Group	Intervention Cohort*	Year of attendance	No. of participants	Relationship to child	No. of families from group who went on to complete GOALS	Postcode status (no. of families)	Ethnicity (no. of families)	Facilitator
A	14	2	2	2 mothers	2/2	10% most deprived: 2	White British: 2	JH
B	17	3	4	2 mothers, 2 fathers	4/4	10% most deprived: 3 20% most deprived: 1	White British: 3 Unknown: 1	PW
C	18	3	6	4 mothers, 1 father, 1 aunt	6/6	10% most deprived: 4 30% most deprived: 1 50% least deprived: 1	White British: 3 Unknown: 3	PW, with SB
D	22**	3	4	4 mothers	4/4	10% most deprived: 4	White British: 3 Unknown: 1	CE
E	12	2	6 (inc 1 same family pair)	5 mothers, 1 older sister	5/5	10% most deprived: 4 20% most deprived: 1	White British: 4 Unknown: 1	PW
G	15	3	2	1 mother, 1 father	2/2	10% most deprived: 1 30% most deprived: 1	White British: 2	PW
H	16	3	4	4 mothers	3/4	10% most deprived: 3 40% most deprived: 1	White British: 2 Asian: 1 Unknown: 1	PW
J	20	3	2	1 mother, 1 father	1/2	50% least deprived: 1 40% least deprived: 1	Unknown: 2	PW
K	21	3	4	4 mothers	4/4	10% most deprived: 2 40% most deprived: 1 50% least deprived: 2	White British: 2 Unknown: 2	LS

*See table 3.4 ** Cohort was not included in study 1, as the intensity of the intervention received was higher (children received an extra weekly physical activity session)

Table 5.2 Child focus group participation

Group	Intervention Cohort*	Year of attendance	No. of participants	Boys: Girls	Age range	Postcode status (no. of families)	Ethnicity (no. of families)	Facilitator
A	14	2	2	0:2	9-10 years	10% most deprived: 2	White British: 2	KP
B	17	3	5	3:2	9-13 years	10% most deprived: 4 20% most deprived: 1	White British: 3 Mixed – White and Black African: 1 Unknown: 1	RE
C	18	3	9 (inc. 3 same family pairs)	3:6	9-13 years	10% most deprived: 4 30% most deprived: 1 50% least deprived: 1	White British: 3 Unknown: 3	RE, with LS
D	22**	3	5 (inc. 1 same family pair)	5:0	11-15 years	10% most deprived: 4	White British: 3 Unknown: 1	CS
E	12	2	5	1:4	6-11 years	10% most deprived: 4 20% most deprived: 1	White British: 4 Unknown: 1	KP,RE,KG
F	13	2	2	2:0	11-16 years	10% most deprived: 1 50% least deprived: 1	White British: 1 Unknown: 1	JH
G	15	3	2	2:0	10 years	10% most deprived: 1 30% most deprived: 1	White British: 2	RE
H	16	3	4	2:2	5-9 years	10% most deprived: 3 40% most deprived: 1	White British: 2 Asian: 1 Unknown: 1	RE
K	21	3	3	1:3	10-11 years	10% most deprived: 2 40% most deprived: 1 50% least deprived: 2	White British: 2 Unknown: 2	MA

*See table 3.4 ** Cohort was not included in study 1, as the intensity of the intervention received was higher (children received an extra weekly physical activity session)

5.2.3 Protocol

5.2.3.1 Setting

During our pilot work, attempts to conduct focus groups outside of the sessions had resulted in very low participation, thus it was decided the most appropriate setting in which to conduct the focus groups was at intervention sites during the times allotted for the weekly intervention. The school classrooms provided a familiar and safe environment for families in which they were accustomed to having group discussions. Therefore, with effect from November 2007, the intervention programme was adapted for the focus groups to take place during week six of the intervention. This allowed families several weeks to "settle in", yet was early enough in the intervention to ensure participant views could be meaningfully drawn upon to inform intervention development.

5.2.3.2 Group facilitation

Groups were facilitated by either the principal researcher or by a member of GOALS staff (see tables 5.1 and 5.2). All facilitators were previously known to the participants and were experienced in conducting group discussions with children and/or parents. The principal researcher provided each facilitator with training and a topic guide.

5.2.3.3 Parent focus groups

Parent groups lasted approximately 45 minutes to one hour. At the start of each group the facilitator explained to parents they would be asked some general questions about how they were finding GOALS so far. They were reminded there were no right or wrong answers, it did not matter if different opinions were raised, and it was just as important to raise negative aspects as it was positive; critical feedback was key to improving the intervention. Participants were encouraged to view the experience – rather than a formal interview - as a normal conversation and "forget the tape recorder was there".

The groups were designed to encourage natural interaction with minimal facilitator input, giving participants the opportunity to consider their own views in the context of those around them (Patton, 2002). The semi-structured topic guide (see table 5.3) consisted of three very broad questions plus more specific prompts to guide the conversation if it was going off track. The prompts were intended as a loose guide rather than a rigid question-by-question interview schedule. Hence the topics discussed in each group depended on facilitator skill, the situational context, and

Table 5.3 Parent topic guide mapped onto original research questions and revised research questions (in blue)

Original research questions	Focus group questions	Focus group prompts	Revised research questions	Subcategories
How acceptable is GOALS to parents? What are parents finding positive about GOALS? How do parents feel GOALS could be improved?	Tell me about your experience of GOALS so far	How does GOALS compare to what you expected? What do you hope to get out of GOALS? What are the most positive aspects for you at this stage? What are you finding challenging? Are any aspects of GOALS not working for you? Do you feel anything is missing (from GOALS)? Are there any topics you would like to see covered that aren't there yet?	**What is helping families change?**	GOALS Family Other
			What challenges do families face in making changes?	GOALS Family Other
			What are the lived experiences of families with overweight children that help practitioners and researchers understand the context in which changes take place?	
	How do you feel about the length and the structure of the programme?	How did you find the referral process? How do you feel about our approach (focus on healthy lifestyle, rather than weight)? How do you find the group programme with individual mentor sessions? How do you find the handbook?		
What changes have occurred at home during the first six weeks of attending GOALS?	Talk me through any changes that have occurred at home since coming to GOALS	Changes in your child? Changes in your behaviour? Changes in how you feel? How confident are you that you will keep these changes up? How could we help?	**What changes have occurred at home during the first six weeks of attending GOALS?**	Physical activity Diet Other

participant emotions, cognitions and behaviours (Kidd & Parshall, 2000). To enhance the credibility of participant accounts, the use of the guide prompts was informed by the emerging discourse. Not all guide prompts were used in every group. For example, if information related to a prompt had already been provided, or if the facilitator felt the prompt would take the conversation off track. Similarly, prompts that were not included on the guide were added if it was felt they would lead to a deeper understanding related to the research questions. Facilitators were trained to paraphrase and ask for examples to check their understanding of participant responses.

Table 5.3 shows the original research questions that informed the topic guide. These were exclusively focussed on GOALS and explored the acceptability of the intervention to families, what was working and what could be improved. However, the focus group questions elicited discourse that was far more insightful than a process evaluation of GOALS. Parents discussed their experiences of making changes at home that included factors linked not only to GOALS, but also to family and external influences. They shared common experiences of daily life as a parent of an overweight child that were emotive and illuminating. This led to a reflection of the research questions, for as posed initially they did little justice to the data that was emerging and would do little to advance understanding of health behaviour change in children who are overweight. An alternative set of research questions were developed (see table 5.3) with subcategories for analysis that would allow an exploration focussed on factors of behavioural change in families attending a childhood obesity treatment intervention. Such open awareness of what is not working and why, with the flexibility to mould the research in accordance with emerging phenomena, is essential for good qualitative enquiry (Morse, 2000).

5.2.3.4 Child focus groups

Child groups lasted approximately 30 to 40 minutes. In designing the groups, we drew on our pilot experiences and the recommendations of Porcellato, Dugdill and Springett (2002) who suggested groups should be small, homogenous and interactive with short, simple, open-ended questions. Due to the diversity of child ages, characteristics and group sizes, it was recognised that different approaches were needed for different groups. Thus flexible topic guides were made available to facilitators that included "simple" and "advanced" questions asking what children liked about GOALS, how they thought it could be improved and what changes they had made so far. Table 5.4 maps these questions onto the original and revised

Table 5.4 Child topic guide mapped onto original research questions and revised research questions (in blue)

Original research questions	Simple focus group questions	Advanced focus group questions	Revised research questions	Subcategories
	Imagine I'm new to GOALS and haven't been to any of the sessions. Could you start by telling me a bit more about GOALS...(e.g. What do you do there? Who is it for?) **Optional interactive aids:** Write and draw, Child-to-child TV interviews			
How acceptable is GOALS to children? What are children finding positive about GOALS? How do children feel GOALS could be improved?	What do you think about GOALS? What is the best thing about GOALS? What is the worst thing about GOALS? How does GOALS help you? What would make GOALS better? Have you read your handbook? Which bits do you like most? What would you like to do at GOALS in the future?	**Tell me about your experience of GOALS so far...** How does GOALS compare to what you expected? What do you hope to get out of GOALS? What do you like about GOALS? What are you finding challenging? What do you not like about GOALS? How could we make GOALS better? Are there any topics you would like to see covered that aren't there yet? How do you feel about GOALS finishing? **How do you feel about the length and the structure of the programme...** How did you find the referral process? How do you feel about our approach (focus on healthy lifestyle, rather than weight)? How do you find the group programme with individual mentor sessions? How do you find the handbook?	**What is helping families change?** **What challenges do families face in making changes?** **What are the lived experiences of families with overweight children that help practitioners and researchers understand the context in which changes take place?**	**GOALS** Family Other **GOALS** Family Other
What changes have occurred at home during the first six weeks of attending GOALS?	What have you learned at GOALS? Has anything changed at home since coming to GOALS?	**Talk me through any changes that have occurred at home since coming to GOALS...** Changes in your behaviour? Changes in how you feel? Changes in your parents or family? What are you achieving so far in GOALS? How confident are you that you will keep these changes up? How could we help?	**What changes have occurred at home during the first six weeks of attending GOALS?**	**Physical activity** **Diet** **Other**

research questions, as described in section 5.2.3.3 above.

For older groups or small groups where the children were happy to engage in conversation, the advanced questions were used and the focus group was run in an analogous manner to the parents' groups (though invariably more facilitator input was needed than with the parents). For younger or mixed groups, either the simple questions or a combination of both were used. In addition, two interactive techniques were made available for facilitators to use as they felt appropriate. The first of these was a write and draw task in which children were asked to draw a picture about how they felt about GOALS at that time. This was used only in one or two groups and served mainly as a prompt for the later conversation. The second task was a "television interview" using the digital Dictaphone as a microphone, in which one child was the interviewer and the other was the interviewee (after which they swapped over). Children were given example questions but were told they could also invent their own. Although this task was only used in one or two groups it was useful to encourage peer interaction between younger children, who have a tendency to interact with the facilitator rather than each other (Hill et al., 1996).

It was important to be aware of the power imbalance inevitable with a child focus group being run by an adult (Hill et al., 1996) and with it the potential for socially desirable answers, particularly given the context in that facilitators were also staff members. It was felt the environment that had been created at GOALS (where nobody was judged and children saw staff as "friends") helped to dissipate this power imbalance and further efforts were made to reinforce equality throughout the groups. At the start of each group, children were encouraged to familiarise themselves with the tape recorder, for example by doing a practice recording where they all said their names and something about themselves. They were reminded there were no right or wrong answers, they did not need to put up their hands to speak (though younger children often continued to do so), and we were interested in their ideas to help make GOALS better. Facilitators started with a question based on the "interested idiot" strategy (Darbyshire et al., 2005), in which they pretended they knew nothing about GOALS and asked the children to tell them. Some facilitators asked children if there were any questions they would like to ask them in return, which was an activity the children appeared to enjoy doing.

5.2.4 Analysis

All focus groups were recorded with a digital Dictaphone, transcribed verbatim and anonymised. Where there were several participants in a group, two Dictaphones were placed at different locations in the room to aid transcription of unclear sections. At the start of the focus group, each participant's name and voice was recorded as a reference for the transcribers, none of whom had been present during the focus groups.

5.2.4.1 Formulating the analysis

To reduce the potential bias resulting from the researcher's immersion in the intervention delivery process, a preliminary deductive analysis was undertaken by a researcher who had not been involved in the GOALS intervention, data collection or transcription of the focus groups. Pre-determined categories based on the focus group questions were used to produce "pen profiles" with frequency counts of participant utterances for emerging themes (as used elsewhere by Mackintosh et al., 2011). However the pen profile approach did not allow for the examination of between-participant interactions and, as described in section 5.2.3.3, extensive data emerged that the planned deductive analysis was unable to capture. Therefore the original transcripts were revisited and a thematic analysis, as described below, was undertaken by the principal researcher. Where there was crossover in constructs, the preliminary deductive coding was used as a credibility check of the themes that emerged.

5.2.4.2 Thematic analysis

The thematic analysis involved both deductive and inductive components and drew on the guidelines of Kidd and Parshall (2000) for enhancing analytical rigour in focus groups:

> *The trick is to devise analytical approaches sufficiently flexible to identify any undue influence of the group on any individual participant(s), or vice-versa, before drawing one's conclusions* (p.299).

A phased approach was used, analogous to that reported by Hart and colleagues (2003) in their analysis of parental perspectives of promoting healthy diet and exercise in children. All data was analysed using the electronic qualitative analysis package NVivo version 9.2.

Identifying meaningful discourse units. Kitzinger (1994) highlighted the importance of interaction between participants in focus groups in helping to identify group norms, exploring areas of disagreement, and facilitating the discussion of sensitive

or embarrassing topics. Human learning is a social process influenced by talking with and observing others, and a major advantage of the focus group is the opportunity it provides to examine these social processes in action. To ensure these group processes were taken into account, we used a broad-brushed approach (Kidd & Parshall, 2000) to extract meaning from the transcripts. Coded chunks of discourse included interaction between group members and allowed participant viewpoints to be considered in the context of the surrounding conversation. This was supplemented by a more fine-grained coding of content to identify individual utterances with meaning. Thus a "meaningful discourse unit" could range from a single line uttered by an individual to an exchange between a number of participants in the group, the important factor being it illustrated an issue that was valid in the context of the group.

Stage 1. Meaningful discourse units were coded into pre-determined categories based on the research questions (see figure 5.1). All data relevant to being overweight, physical activity, diet, family life or changing behaviour was coded, leaving very little un-coded text. Where a discourse unit provided an insight relevant to more than one category it was coded twice (e.g. if a parent described a physical activity change but they also described what had helped them make that change). The category "lived experiences of being overweight" included discourse units that provided an insight into the day to day lives of overweight children and their families (which may or may not have also been coded in another category). Discourse units that were not clearly linked to facilitators, challenges or changes were automatically coded in this category.

Stage 2. Each category was read as a whole to look for emerging themes and create a mind-map of relationships between themes. Once this process was complete a preliminary model of the inductive themes was constructed in NVivo, and discourse units from each category were coded. As the analysis progressed themes were renamed, reshaped, and the model moulded to fit the emerging data. Initial coding was continuously revisited throughout the analysis process, and discourse units un-coded, re-coded and double-coded in accordance with the emerging themes.

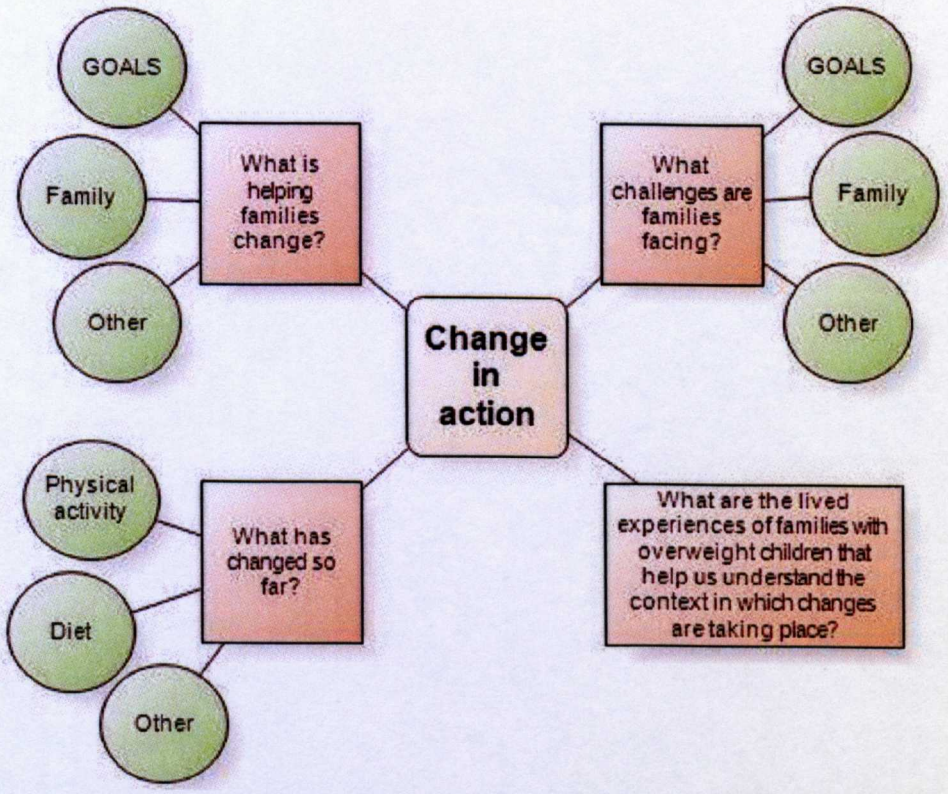


Fig 5.1 Pre-determined categories in which participant responses were analysed

During the analysis process several steps were taken to enhance the trustworthiness of the data, as recommended by Kidd and Parshall (2000).

- NVivo software was used to check for the emergence of similar viewpoints across multiple groups, looking out for themes that might reflect a strongly held view of one or two participants rather than the wider group *(credibility)*.
- In identifying meaningful discourse units, consideration was given to the context in which responses were made. For example, whether comments arose spontaneously or in response to a question from the facilitator, the style of the question that was asked, the conversation that preceded the comment, and the influence of other participants in the group (potentially leading to either convergence or divergence) *(dependability)*.
- The themes related to participant changes were triangulated against the data from the post-intervention questionnaire in study 1 *(credibility / dependability)*.
- Finally, throughout the interpretation and reporting process the data were compared and contrasted with other studies in the field of childhood obesity and health behaviour change *(transferability)*.

5.3 Findings

This section presents primary data to illustrate the emerging themes through the words of the participants themselves (as advocated by Krane et al., 1997) before moving on to interpret these findings in the discussion. Findings are presented for each of the research questions in turn (1.*What has changed so far?* 2. *What is helping families change?* 3. *What challenges are families facing?* 4. *What are the lived experiences of families with overweight children?*). At the start of each section, a summary model illustrates the emerging themes and relationships between themes. This is followed by an explanation in the text with supporting quotes from participants. For research questions 1 and 4 parents and children's responses are discussed together. For research questions 2 and 3 the emerging themes are presented separately for parents and children and the summary diagrams are further broken down into GOALS factors, family factors and other factors. Quotes are identified by the participant's relationship to the referred child, the focus group they took part in (see tables 5.1 and 5.2) and a number to indicate which family within the focus group they belonged to. Where it was not possible to identify who made the comment, a question mark is used in place of the family number.

5.3.1 What has changed so far?

Parents and children reported changes to their dietary and physical activity behaviours that aligned with the majority of the GOALS objectives (figure 5.2, for GOALS objectives see table 3.1).

Dietary changes included increased intake of healthy alternatives (e.g. more water, more fruit and vegetables), reduced options high in fat or sugar (e.g. healthier snacking, fewer fizzy drinks), healthier mealtimes (e.g. regular meals, cooking from fresh, reduced portion sizes, healthier packed lunches) and an increased knowledge and awareness, including a willingness to try new foods. Examples were provided for both parents and children for all changes, other than the healthier snacking and the healthier packed lunches which were reported only for child behaviours.

Both parents and children reported improvements in general physical activity levels and fitness, active transport, lifestyle activity and structured exercise. In addition, children reported taking part in more sport and active play, and parents reported a greater awareness of the need to fit physical activity into their families' lives.

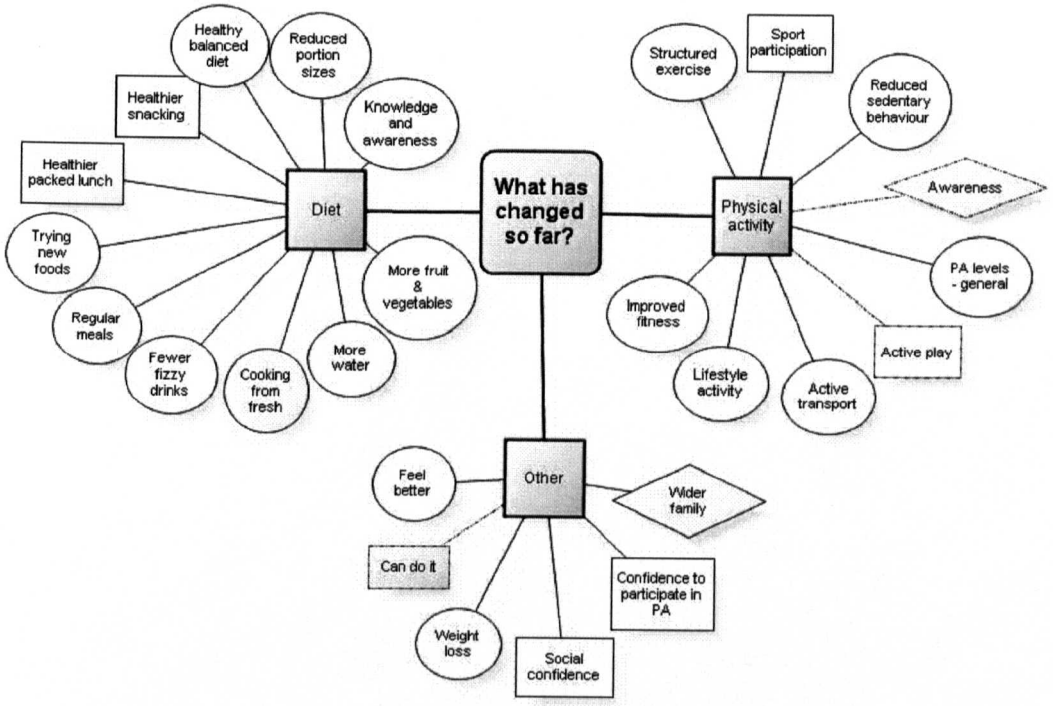


Fig 5.2 Dietary, physical activity and other changes made during the first six weeks of attending GOALS

Key to shapes
circle = change in both children's and parents' behaviours
rectangle = change in children's behaviour only
diamond = change in parents' behaviour only

Key to colours
white = change reported by both children and parents
yellow = change reported by parents only
blue = change reported by children only

dashed outlines = themes that emerged from only 1 or 2 groups

Many groups told how they were spending less time "sitting around", one mother describing her conscious effort to be more active at work.

Mother K4 *I feel as though I've got more energy*

Facilitator *cos' you were saying you'd started climbing the stairs a lot more at work hadn't you*

Mother K4 *if they go out for a smoke I go "right, I'm coming with you but I'm not going for a smoke" then I'll walk downstairs then I'll go back up the stairs so I do that at least three times a day instead of sitting on my arse all day*

Both parents and children reported losing weight and feeling better in themselves, plus the children felt more confident in social situations and were more comfortable taking part in physical activity. A couple of children said they felt better because

they now knew what to do, and had learned that they could do it. A few adults also described how they were taking the messages learned at GOALS home to try and involve their non-attending family members.

> *because I go to an all girls school all the girls are quite skinny...I never used to go out with them because they'd all have nice clothes and all look dead nice in them and now because I've been coming here* [GOALS] *and I've lost a bit of weight I wear nice clothes now and go out with them all* (sibling C5)

> *but it's great to see a smile on the kids' faces and the enthusiasm you know... it's like last week...I was made up I could hear her "great! great!", I have never ever heard* [my daughter] *like that ever shouting for the kids and the enthusiasm for them to pass the ball and you know I went home and I had a big smile on my face that's made my day that* (mother C6)

> *I feel more confident in joining in stuff in school...I never wanted to do sport play football but now I've been playing every afternoon I've been more confident in stepping up my game and asking people if I can play with them* (child K4)

5.3.2 What is helping families change?

For the parents, facilitative factors were distinguished by whether they helped *motivate families to attend GOALS*, or whether they helped families *make changes to their physical activity and dietary behaviours outside of GOALS*. For the children, much of the conversation focussed on what they liked about GOALS and such a distinction was not as apparent. Figures 5.3 and 5.4 show the key themes that emerged across the parents (figure 5.3) and children's (figure 5.4) focus groups for the research question "what is helping families change?".

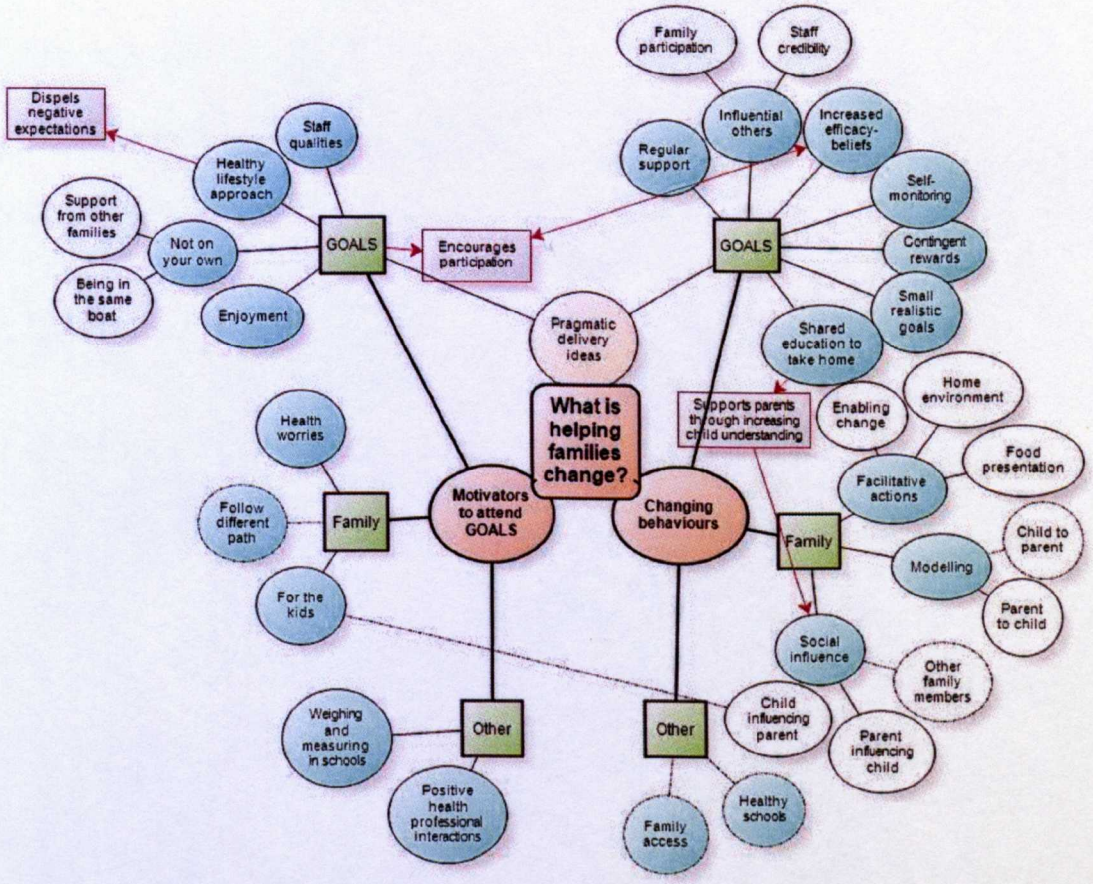


Fig 5.3 Facilitators for lifestyle change – parents' views. Blue circles represent emerging themes in each of the pre-determined categories. White circles represent subthemes of the theme to which they are associated. Dashed outlines indicate themes/subthemes that emerged from only 1 or 2 groups. Boxes outlined in red show psychosocial mechanisms underlying or linking themes. A separate theme of *pragmatic delivery ideas* relates to practical improvement ideas for GOALS, perceived by parents to be facilitative.

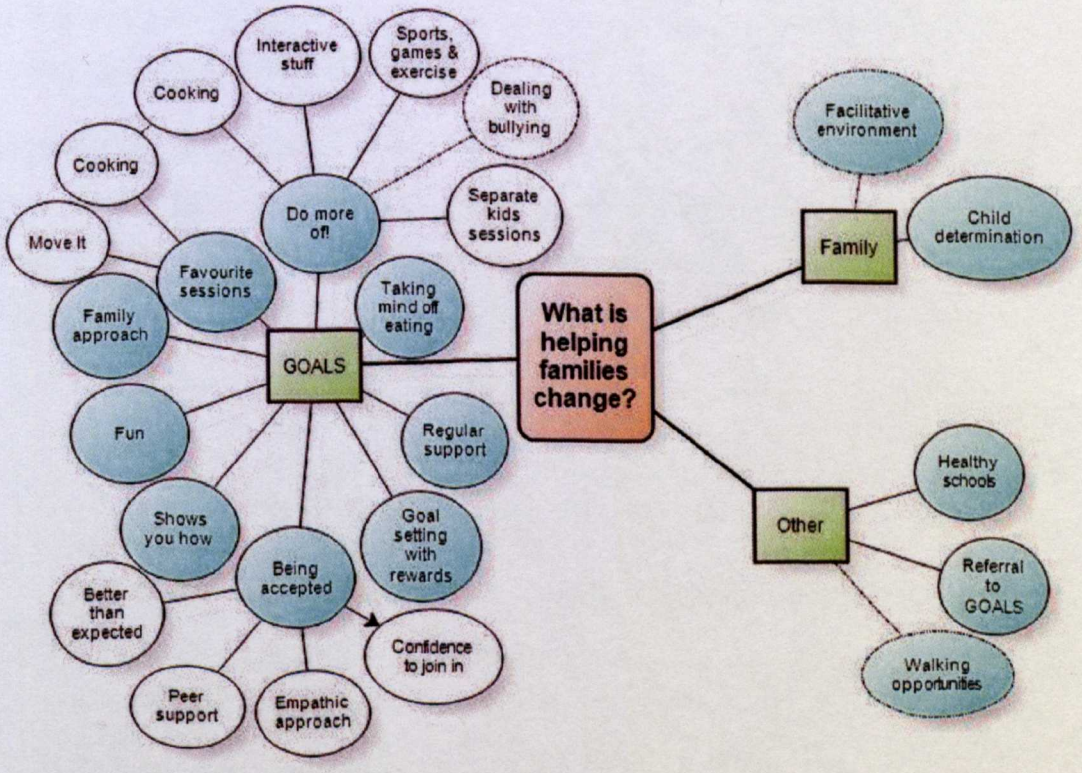
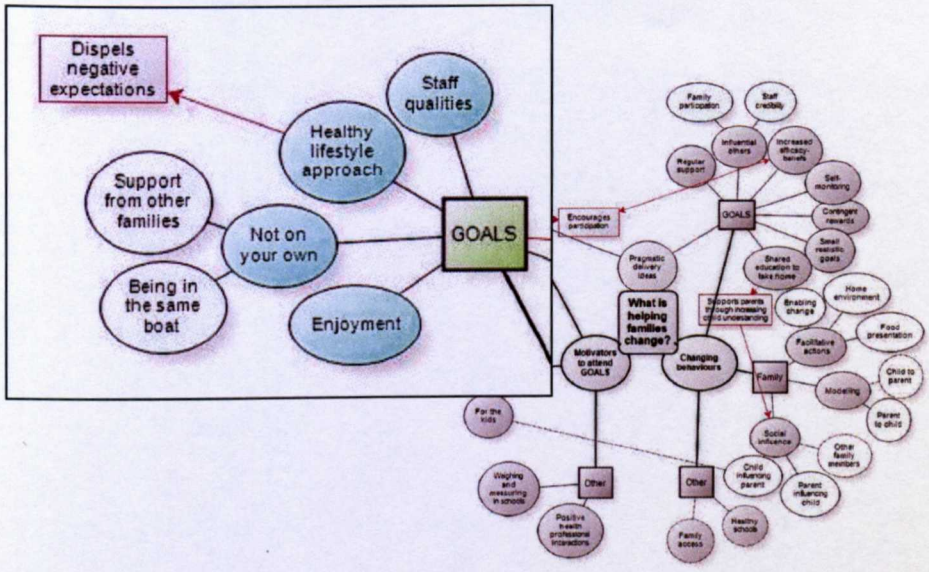


Fig 5.4 Facilitators for lifestyle change – children's views. Blue circles represent emerging themes in each of the pre-determined categories. White circles represent subthemes of the theme to which they are associated. Dashed outlines indicate themes/subthemes that emerged from only 1 or 2 groups.

5.3.2.1 Parents' views

5.3.2.1.1 Motivation to attend GOALS

GOALS factors



Several factors were identified by parents as motivators to attend GOALS. These included the **healthy lifestyle approach** taken and the fact this dispelled their negative expectations; the feeling of **not being on their own** through being part of a group with other families in the same boat; **enjoyment** of sessions and the friendly, positive **qualities of staff.**

Healthy lifestyle approach. Prior to attending GOALS, many parents expected the intervention to be more prescriptive, telling them what to do and what not to do, with a "regimented" feel to it. Attending GOALS dispelled these negative expectations and parents spoke positively of the long-term healthy lifestyle approach taken.

Mother C1 *I was expecting it to emphasise more on the weight and it hasn't, it's shown you it as being healthy rather than it doesn't really matter what you weigh - well it does obviously - but if you're healthy that's more important*

Mother C6 *the fun aspect of it*

Mother C1 *yeah, not to be regimental with your exercise and just play*

it's not all about just losing weight, it's about making changes in your whole life and changes that you can do forever. Because it's not just about being an overweight child, it's about making sure you don't turn into an overweight adult as well…it's not just like going to weightwatchers where you're on a diet, it's the whole package isn't it (mother D2)

The majority of parents felt if GOALS were stricter they would be less likely to attend, some expressing concern about the psychological impact on the children if weight-loss were over-emphasised. In the following exchange, parent K3 suggests she would still attend if GOALS were more prescriptive, whilst parent K1 describes how such an approach would "get her back up" and deter her from attending.

Facilitator	*so how does it sort of compare to what you expected I don't know what your expectations were or what did you…*
Mother K3	*…I thought we were gonna come here and you were gonna say "don't eat this, don't do that, do more exercise"*
Facilitator	*…yeah so you thought it was gonna be more strict and "do this do that"*
Mother K1	(overlapping) *a bit "regimentitive"*
Mother K4	*"we're watching you and what have you ate, why did you do that?"*
Mother K3	*like asking the kids in front of you "have you had any sweets, your mum given you any sweets?" and all that or*
Facilitator	*what do you think about that approach would*
Mother K?	*no I wouldn't like that*
Facilitator	*no*
Mother K3	(overlapping) *I'd probably still come*
Mother K1	(overlapping) *that'd get my back that, I'd probably end up going "you know what, there might be a problem but I'll sort my own family's problem"*

Enjoyment. Parents spoke about how much both they and their children enjoyed attending GOALS, mentioning particularly the practical cooking sessions and the non-competitive, fun approach to exercise.

Father B4	*it's because the games and the things you're doing upstairs aren't competitive, it's fun and they can do it*
Mother B1	*it's daft isn't it, we're like big kids aren't we - I love it just like big kids*
Father B4	*and they can enjoy it*

Not on your own. Parents consistently referred to the group approach as a positive factor that motivated them to attend, giving them a feeling they were not on their own and giving children an opportunity to mix with others "in the same boat." Some parents felt the comfortable environment this created gave children the confidence

to join in with activities they would not take part in elsewhere: "*I couldn't believe it... he won't do sport in school...yet he will here*" (mother D1).

Mother E2 *it's also having children that's the same as her*

Mother E4 *that's it...I think it was the second week when* [my son] *said "the first time I'd ever been with other children who have not said anything nasty about or laughed at me or said anything nasty about my weight" and you know I think he felt safe and good and I thought...everybody's in the same boat as you and you're all here to help each other, you know, so I think that was a positive thing for him and making him feel good about coming*

Parents also talked about how they were able to share ideas and learn from each other, particularly during parent-only discussion sessions such as the focus groups. The following exchange provides an example whereby mother H4 was struggling with her child hiding sweets and the other parents were supporting her by providing ideas for different approaches she could take.

Mother H3 *you've gotta say to her "if you want sweets you ask me for them and I'll decide whether"*

Mother H4 *you're saying no, that's where it is - that's why she's hiding it because I'm saying no*

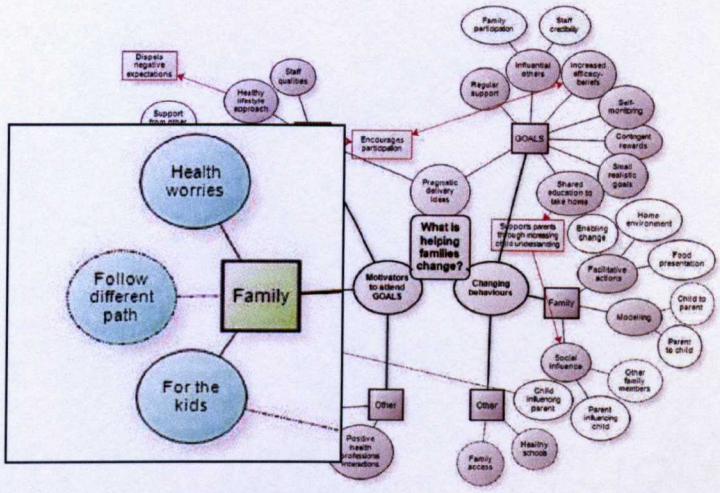
Mother H3 *well maybe if you give her one more treat in the week and say "well we'll compromise please don't hide sweets I'll compromise", because that's what I do with*

Mother H1 *"and if you have that then we go and do an hours exercise, we go and walk it off in the park"*

Staff qualities. Parents felt the qualities of the staff delivering GOALS created an environment that was friendly yet respectful, allowing knowledge to be transferred in an effective manner: *"you gently come across with the information but it sinks in, it sinks in with the kids as well"* (father B4). Parents used words such as "kind", "easy to approach" and "genuine" to describe GOALS staff and referred to their positive nature as a motivating factor.

> *and I've got to say all these young people around us and it's great because they're so bubbly and they're always smiling, you don't get anyone who's grumpy and it does give you that boost I think* (mother G2)

Family factors



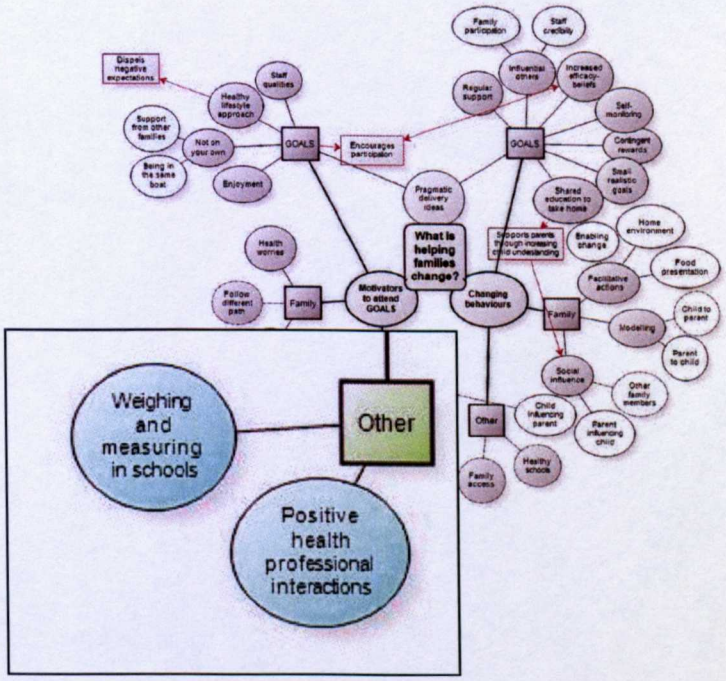
The main family-related reason parents cited for attending GOALS was the fact they were doing it **"for the kids"**, who were enjoying it so much. Other motivators included worries about their child's **health**, and one mother spoke about her wish to **prevent her daughter following the same path** with eating she had experienced as a teenager.

> *after all's said and done we're here for the kids really aren't we - I mean I know we come as a family but we've all come here for our children* (mother B1)

> *it was a holiday abroad where he was struggling in the heat and it was just scary and I thought I'm gonna end up in hospital with him…he couldn't walk anywhere he was too hot he was getting infections between his legs and we had to keep going to the doctors there and it was just a horrible horrible holiday…then you think it's my fault you know and then when we came home again I thought I'm gonna pursue it again so I actually asked for a referral to* [hospital] (mother E4)

> *I've been on the other end of it when I was a teenager… and do you know what it's overtaken my life. I mean it started I had some comments and for all my teens I was bulimic and I wouldn't eat nothing - if I did eat it was laxitives… I'm not having* [my daughter] *going through what I've gone through…so I'm gonna do my best to try and keep her on the straight and narrow…these group things makes them understand I think from an earlier age that they can you know they can still eat but in moderation* (mother A1)

Other factors



Parents mentioned two influences external to GOALS and the family that had motivated them to attend. The first was the **weighing and measuring** process through the Sportslinx project (Boddy, et al., 2010), after which eligible parents received letters inviting them to attend GOALS. Whilst several parents spoke about the negative emotions evoked when they were informed their child was overweight by letter, parents also described how this information prompted them to take action.

Mother E? *I was a bit surprised when they got the letter*

Facilitator *yeah and how did that make you feel*

Mother E? *…it made me feel awful really, it made me feel like I was letting my child down because she is overweight… is it my fault that she's overweight and you know…but on that side you felt bad, but when you told them about it I thought well this is good cos now we've got help*

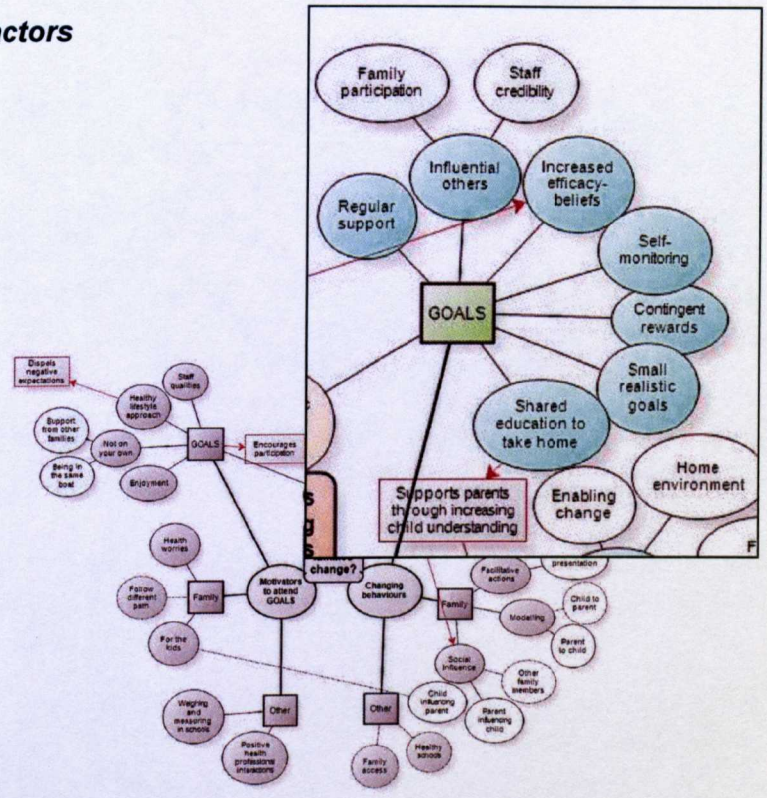
The second external influence came through referral from **health professionals**, where parents gave examples of positive interactions that had motivated them to attend GOALS.

and the consultant there was fantastic… we were there for a good couple of hours at the hospital and he spoke to [my son] *on a one-to-one and he said to me "have you ever heard of GOALS" and he gave us a leaflet…he said to* [my son] *"I'm not concerned about what you weigh at all, I just want to get you healthy inside" so that's what he said and he said that "I know it's not a*

nice term to use but you can be fat and fit"…he was fantastic yeah and [my son] *felt fab when he came out you know he said "I feel better now cos I thought he was gonna say nasty things to me"* (mother E4)

5.3.2.1.2 Facilitators for behaviour change

GOALS factors



There were several elements of GOALS that parents felt helped the behaviour change process. These included the **regular support** provided by weekly sessions; **the use of BCTs** such as self-monitoring, contingent rewards and small realistic goal setting; and factors related to the **delivery approach** which included shared education that was transferable to the home environment, sessions that allowed parents to observe their child's capabilities, and the opportunity for influential others to model and promote healthy lifestyle behaviours.

Regular support. Parents viewed the weekly commitment as a means of giving them structure and described how the regular support motivated children to make changes at home:

> *certainly for us it's been a good motivation tool…if we weren't doing this* [my daughter] *would be at home, so you're putting two hours aside dedicated hours for a minimum of once a week so it's putting that structure back so it's good from that point of view* (father C4)

> *it gives you that positive incentive because you've got somewhere to come, because it's quite easy isn't it to fall back into your old habits - but the fact that we are coming I just think it gives the kids motivation* (mother A1)

BCTs. Some parents described how completing food and physical activity diaries at the start of GOALS made them aware of aspects of their lifestyles they needed to change.

> Mother H4 *that's what I found when I was filling in like a food diary for the two of us and I felt embarrassed bringing it in and giving it in because of what*
>
> Mother H1 *it's in black and white*
>
> Mother H4 *personally I never drank a glass of water, never ever ate breakfast and how can I until you see it in black and white that you don't actually do it yourself*

Parents talked about the gradual, realistic approach to goal setting and how this was helping them make small changes they hoped to keep up in the long-term.

> *so I don't wanna set the goals too high, if we can keep the goals we've got and try and maintain them until we're in a routine...a proper routine and then we can up them* (mother A1)

> *it's the small changes that are realistic and if you can keep that going for the rest of your life...it might sound trivial like having breakfast every day but a change like that is important long term isn't it* (mother D2)

> *if you said "right I'm gonna cut out this, I'm gonna go and exercise, I'm gonna do that"...if you do it for three days you'd fall flat on your face but with this it creeps on each week and before you know it you're doing four different things* (mother H1)

The rewards system, in which children received points for achieving their goals, was also seen as a positive motivator.

> *they are sticking to the goals what they're writing in their book because they're determined they're getting this day out...with the points you get so it is a good thing for them to encourage them to do it* (mother C1)

Delivery approach. The whole family delivery approach was seen as helpful to behaviour change in several ways. Parents felt in the cooking sessions they were developing skills that were transferable to the home environment, and – by increasing their children's understanding - the shared learning experience supported them to influence their children's food intake at home.

> *I mean she didn't snack a lot but she might...like take a chocolate bar or something or a biscuit before her dinner and now...if you try and turn round and say to her "don't have that" she used to like get upset but if you say to her now "don't have that...just think about GOALS", she'll go "ok" and put it back* (mother E5)

GOALS also gave parents the opportunity to observe their children taking part in activities with other children in a way they had not done before. This increased their own awareness and belief in their children's capabilities, which in turn supported positive change at home. One mother whose daughter suffered from Prader-Willi Syndrome described the eye opener she experienced when watching her daughter cook during GOALS.

Mother J1	*I had an eye opener with* [my daughter] *because of* [her] *condition I don't really let* [her] *in the kitchen and I was pleased to see her included with the children and having a little play you know with the food and*
Facilitator	*has it helped you see what* [your daughter's] *capable of in a way, sort of watching her*
Mother J1	*yeah I think I'd put her in a little bubble really...a bit protective you know what I mean*

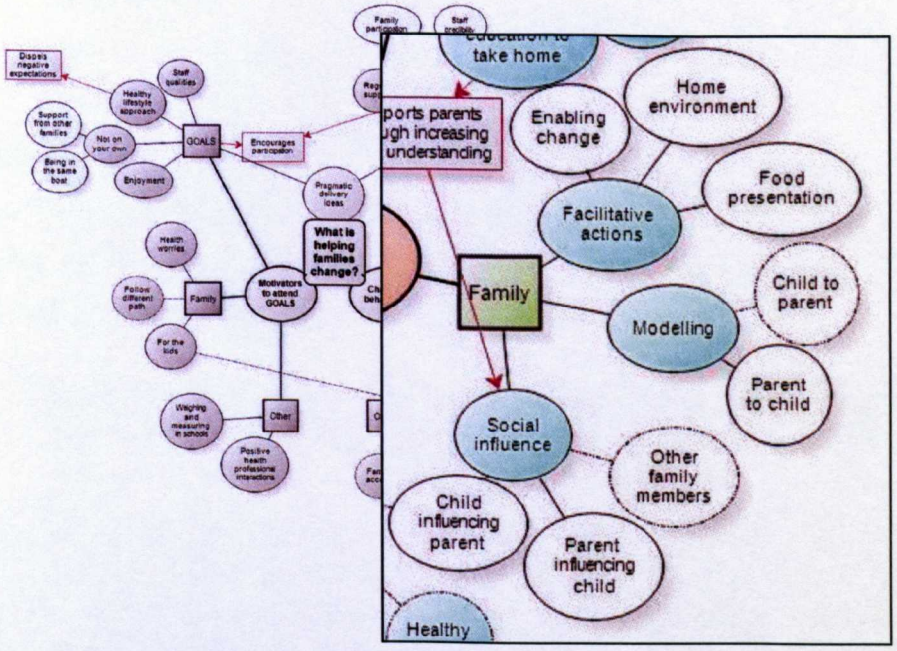
The final GOALS factor parents spoke about was the opportunity the sessions provided for modelling and support from influential others. Several parents viewed their own participation as a motivational factor for the children, and many parents said their children accepted health messages from a credible staff member that would be seen as "picking on them" if delivered by themselves.

> *she loves coming to the sessions, especially to the Move It because you're involved in it as well she likes it* (mother H4)

> *I said well..."we start cutting down all your crisps and all that"...and then she gets a big gob on..."you're going on at me, what are you saying", it's like I can't get through to her because she thinks I'm having a go at her... and where I think she'd listen to one of yous...because you're not as close to her* (mother K3)

> *If* [GOALS staff member] *said especially...because he's like wonderboy* (mother G2)

Family factors



Parents gave many examples of family behaviours and attitudes that were acting as facilitators in their change process. Subthemes were grouped into **facilitative actions**, **modelling behaviours**, and **social influence**.

Facilitative actions were concrete steps taken either to create a more health-friendly environment or to enable change to occur. Examples included stopping bringing biscuits into the house, cutting fruit up so it was easier to eat, and negotiating an earlier finishing time at work to enable the family to attend GOALS.

> *you see I don't buy biscuits anymore - the way he said to me the other week "you're putting them there, you can't put them in front of him and then say no you can't have them - it's not fair" so I've stopped buying them* (mother C1)
>
> *if I do her a fruit salad where you cut it up and everything she'll eat it* (mother A2)
>
> *I've got me hours reduced to half three for three months for this* (mother H1)

Modelling occurred when either the parent or the child demonstrated a positive behaviour that influenced the other to copy them. Only one example was provided where the child acted as the role-model, but several groups spoke about the importance of parents acting as positive role-models to their children.

> *and I think when* [my daughter] *is motivated I stay motivated…because you think well she's being good she's only eating half that bar of chocolate* (mother A1)

> *how can I tell her "this is what you need to do" if she's not seeing me do it* (mother H4)
>
> *I think why she said she'll have fruit this week is because she's been watching me of a night* (mother A2)

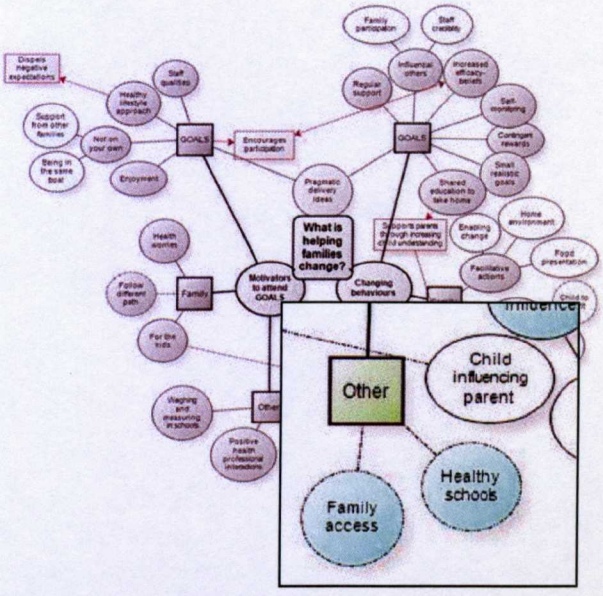
Social influence included encouragement, prompting, and other demonstrations of a positive attitude towards physical activity and healthy eating. Examples were provided of children influencing parents, parents influencing children, and both mutually influencing the other.

> *to be honest* [my son] *reads* [the GOALS handbook] *to you, he'll sit and he'll be "have you seen this?" yeah then he'll say "what about doing this mum" or doing that so it's like all the recipes* (mother K4)
>
> *he wanted sweets and I said "no you can't have nothing out of there"* [the vending machine] *because you'll get tummy ache because you've just been swimming but you can have a drink and I let him pick an orange or a water or whatever and he likes seeing the bottle you know spinning out of the machines* (mother H1)
>
> *I mean he gets on his bike and he's off...and I'm walking behind so he's getting the benefit of the bike and I'm getting the benefit of the walking* (mother G2)

In a small number of groups a positive influence from other family members was reported, such as the following example where the child's older brother helped by sticking up for her so she was no longer scared to play out in the street.

> Mother A2 *I think it helps* [my daughter] *having an older brother*
>
> Mother A1 *do you*
>
> Mother A2 *she's ten and he's nearly twenty two so if anyone in our street says anything, because when we lived with her dad she never played out*

Other factors



Facilitative factors external to GOALS and the family were only discussed in a small number of groups. One parent described a fitness facility whereby different members of the family could take part in different activities simultaneously, and a few parents talked favourably of steps their children's schools had taken to support healthy eating.

> *I know that the packed lunches they're not supposed to have fizzy drinks they can only have water, flavoured water they're supposed to have, fruit…* (mother G2)

5.3.2.1.3 Pragmatic delivery ideas

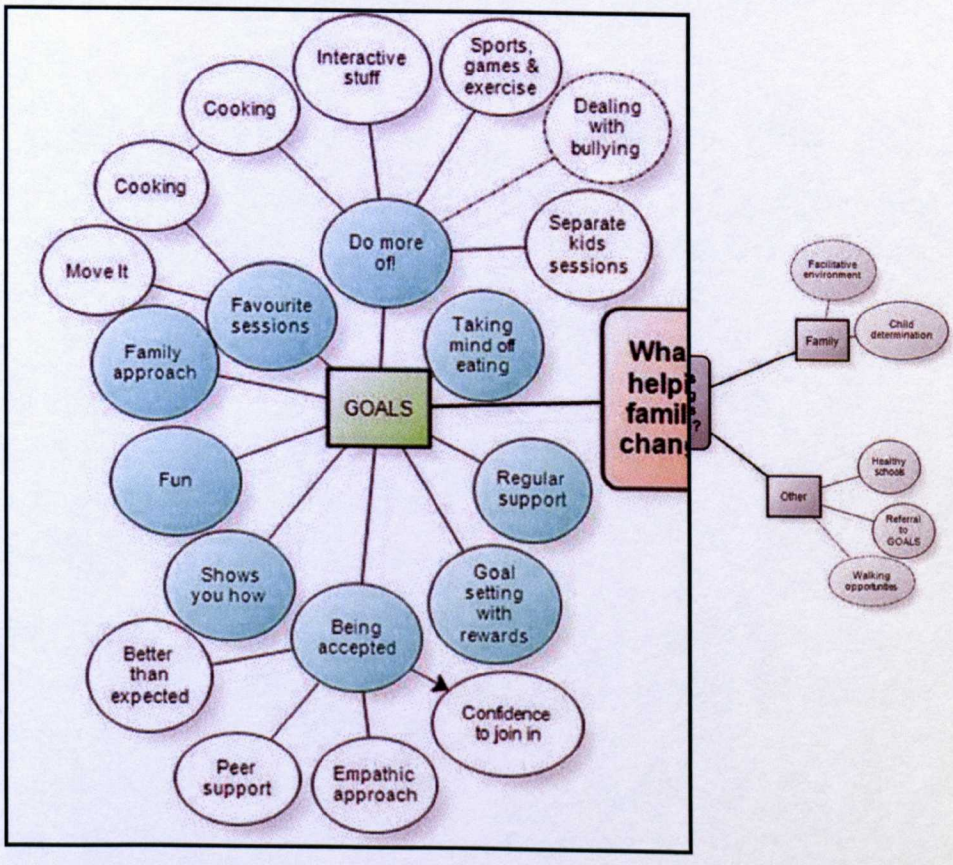
Parents provided a number of ideas to improve the delivery of GOALS, but the topics discussed varied widely between groups. Furthermore, parents within groups often had contrasting opinions as to their preferred approach. For example, when one parent suggested swimming classes, another suggested the girls in the group would not be happy with it, and another felt the boys also might be too self-conscious to join in. Topics raised and supporting quotes are summarised in table 5.5.

Table 5.5 Pragmatic delivery ideas raised during parent focus groups. Includes example quotes and a count of the number of groups in which the topic was raised.

Topic	Number of groups	Example quote
Musical or drama club	1	Mother A2 *I think someone should do a high school musical club or a grease a musical club ...* Mother A1 *or drama that they can do to sort of gain confidence*
Change timing of session so Move It is first	1	*the only thing is if you move the Move It to the beginning of the class because when it comes to the end I'm done in I really am - I go straight from work and I'm like that and I'm thinking if you go to the exercise first you can wind down and then you can relax and talk* (mother B2)
Allow more time for cooking	1	*the ideal I mean would be slow the cooking down a little bit, you know a bit more time* (father B3)
Tell children gradually about length of programme	1	*whereas if you say to her "it's only six weeks" and then at the half term say "oh you've gotta come back and do another six weeks"* (mother B2)
Second session in week	2	*for me it's not enough one day in the week, if it was three times in the week it would be not too much for us* (mother C2)
Swimming / Aqua aerobics	2	*I know we've got the swimming pool here I know this isn't your sole function but you know aqua aerobic type things* (father J2)
Home challenge for during the summer break	1	Father G1 *if the kids were given a sheet, a handout in our last session shall we say...stating that they have to do this...like a work plan* Mother G2 *yeah like a work plan and if* [GOALS staff member] *says any of the above swimming cycling football try and do x amount of minutes each day and if you get the sheet and put it on the fridge and say here you haven't done that today*
Separate parents and children's sessions	2	*I think this parents and children set up is also a good one* (father G1)
Give out the GOALS resource packs sooner	1	*we didn't get it was it for about two or three weeks maybe...I think if we'd have got it right at the very beginning of the day when we came and got weighed I think that would have been a bit more helpful...because we could have gone home and read it and been ready for what we were coming to* (mother H4)
Monitor fitness improvements	1	*you could do with monitoring any improvements in fitness perhaps without them really knowing it* (father J2)
Run session straight after school	1	*I'd sooner have it earlier right after school* (mother K3)

5.3.2.2 Children's views

GOALS factors



Children felt GOALS was fun, with Move It and cooking consistently reported as their favourite sessions and many ideas for things they would like to do more of. They liked the fact GOALS showed them how to manage their weight, and some groups mentioned specific factors such as the goal setting with rewards, involvement of the family, regular support and ways of taking their mind off eating. Every group mentioned the welcoming, friendly environment at GOALS that helped them feel accepted.

Favourite sessions and things children would like to do more of. Children's favourite sessions were Move It and cooking. They gave many examples of Move It games they enjoyed (e.g. bench ball, stuck in the mud) and they described how they liked tasting new foods, learning and making new recipes during cooking sessions. One child described how GOALS helped children lose weight through "fun-ness".

Child G1	*you can lose weight with fun-ness...instead of just doing twenty five laps round the thing you can play sports football tennis*
Child G2	*or even just walking round the park a couple of times with your mates...*
Child G1	*or go on a bike ride*

Similarly, when asked how GOALS could be improved, children said they would like to do more cooking and try a greater variety of sports, games and exercise. The sports mentioned included dodge ball, tag rugby, basketball, football, netball, bench ball, tennis, badminton, rounders, swimming and dance. Children also provided ideas for making GOALS sessions more interactive, such as using maps, posters, quizzes and word-searches. A couple of groups felt it would be useful to do some sessions about dealing with bullying and several groups commented how they would like more separate child and parent sessions, similar to the focus group session itself.

Shows you how. Children felt that GOALS helped them "know what to do" and gave examples of things they had learned at GOALS and implemented at home, such as waiting 20 minutes after their meal before eating anything else, and trying some of the circuit-based exercise they had learned in Move It. Children also liked the fact staff joined in the Move It sessions because it provided them with positive role-models who were not only telling them how, but also showing them how.

Child C5	*yeah because there's loads of helpers around trying to encourage you to do stuff instead of just telling you to not do it*
Child C4	*as well in Move It sessions and I've been to other clubs the helpers don't join in anything in Move It and that so it's good...*
Facilitator	*yeah so do you see that as being*
Child C4	*good*
Facilitator	*a good example*
Child C4	*yeah it's showing a good person to look up to and see what you're meant to do*

Specific positive factors. Children viewed attendance at GOALS as an indirect way of keeping their mind off eating, simply by getting them out of the house.

Child B3	*because to be honest if I didn't come to GOALS then half the time I'd just be sitting in me house*
Child B4	*and I feel like if I'm in I just eat because I'm bored*
Child B3	*me he's like me*

One of the motivating factors for attending GOALS was the opportunity to earn points and win a prize. Furthermore, attending GOALS itself was seen as a positive motivator to help children achieve their goals at home. Children described how having someone check their progress on a weekly basis kept them organised and made them more determined to change, as they feared looking "stupid" if they failed to complete their goals.

Child D1	*mainly I only mostly do my goals because I know I'm coming here and if you've failed it you know what I mean it makes you look stupid*
Facilitator	*so do you think you might be more likely not to do your goals or carry on with them if you haven't got GOALS to come to of a Thursday*
Child D1	*if you're coming to goals you're more determined to try harder because you'll look stupid*

Being accepted. Like their parents, many children expected GOALS to be like a "boot camp", and were pleasantly surprised at the healthy living approach. They felt the staff were friendly and supportive, which gave them confidence to talk openly about their feelings as they knew they would not be judged or told off: "*people from GOALS don't care if you're overweight obese tall thin small midgy anything*" (child G1). Children also talked about the supportive peer group environment. They described how everyone was the same and no-one was left out, so this gave them the confidence to join in activities and to make new friends.

Many of the factors outlined above are illustrated in the following exchange.

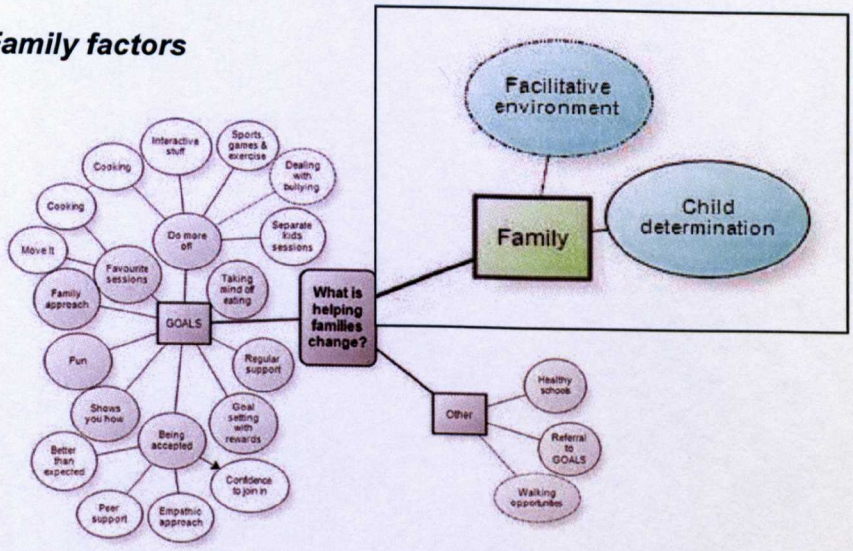
Child K2	*I think I'm glad I stayed at it because I've made more friends and confidence has built up a bit*
Facilitator	*and it's easier for you to come week by week*
K2	*and it's easier to talk to people because they don't tell you to go away or you know "you're not fit to be with us because so and so and how you look" but they actually go "oh hi, how are you today?" and "do you want to come and join us?" and things like that...*
Child K4	*like I said earlier I thought it was gonna be one of those things where you were gonna work us to death but as I came and*

met…[GOALS staff member] *it was fun because they were telling us lots of things like* [she] *told me if I keep growing I can be a basketball player or sort of play basketball and then once I heard about you* [facilitator] *I thought because you were gonna be doing Move It I thought it was gonna be dead fun to do Move It*

Facilitator *and are you enjoying it*

Child K4 *yeah I'm really enjoying it*

Family factors



Children did not speak of many family-related factors during the focus groups, though one group in particular talked about how their mums had stopped bringing so many sweets and crisps into the house, creating a more facilitative environment.

> *at home we've had different fruit in our house in our fruit bowl and we've had less chocolate because my mum used to buy big boxes of chocolate and they used to be out where you could see them and when you can see them you tend to eat them don't you* (child A1)

When asked how confident they were about keeping up the changes they had made, several children displayed a determination to continue with their healthy behaviours.

Facilitator *do you think there's anything we could help you with in terms of maintaining your goals after we've*

Child G1 *what does maintain mean*

Facilitator *it means keeping things going keeping things up*

Child G2 *no*

Facilitator *no*

Child G1 *we'll still do them won't we*

Facilitator *yeah you feel confident in it*

Child G1 (overlapping) *you never give up on yourself*

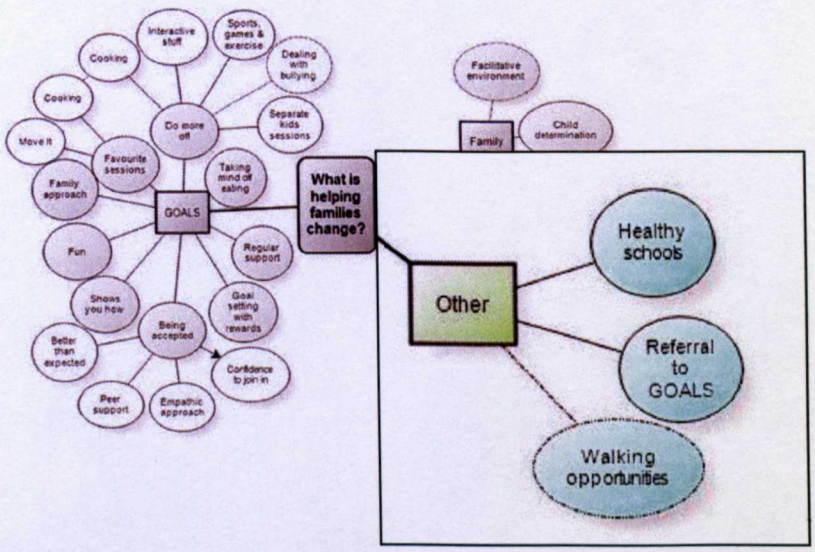
Facilitator *that sounds like a good philosophy*

Child G2 *and always try again*

Other children were a little less sure, though were still hopeful they could continue with their changes.

> *I think I might slip a bit once I've finished GOALS but hopefully I might be able to adjust to my new lifestyle* (child K2)

Other factors



The other positive factors that emerged through the child focus groups were the **referral process to GOALS**, ways in which **schools** were supporting healthy eating and physical activity, and - in one group only - an awareness of **walking opportunities** in everyday life.

A few children spoke positively about being referred to GOALS. Unlike their parents, however, their responses were matter of fact and contained little emotion.

Facilitator *with regard to how you all came to GOALS by being referred by SportsLinx and the doctors and stuff like that how do you feel that process went*

Child K4 *SportsLinx I thought that went really well*

A couple of children mentioned they had learned about the eatwell plate in school or SportsLinx were coming in to do nutritional sessions, and others had the idea that GOALS could run in their school during lunchtime. One child thought it would be easier to keep up the physical activity because *"PE in school is like dead strict"* (child C4). In one group, children discussed possibilities for increasing their walking

through everyday activities such as visiting car boot sales and walking around shopping centres.

5.3.3 What challenges are families facing?

As with the facilitative factors, parental views on challenges were distinguished by whether they were *challenges in attending GOALS*, or whether they were challenges families were facing in *making changes to their physical activity and dietary behaviours outside of GOALS*. For the children the conversation focussed on aspects of GOALS they thought could be improved, and such a distinction was again not as apparent. Figures 5.5 and 5.6 show the key themes that emerged across the parents (figure 5.5) and children's (figure 5.6) focus groups for the research question "what challenges are families facing?".

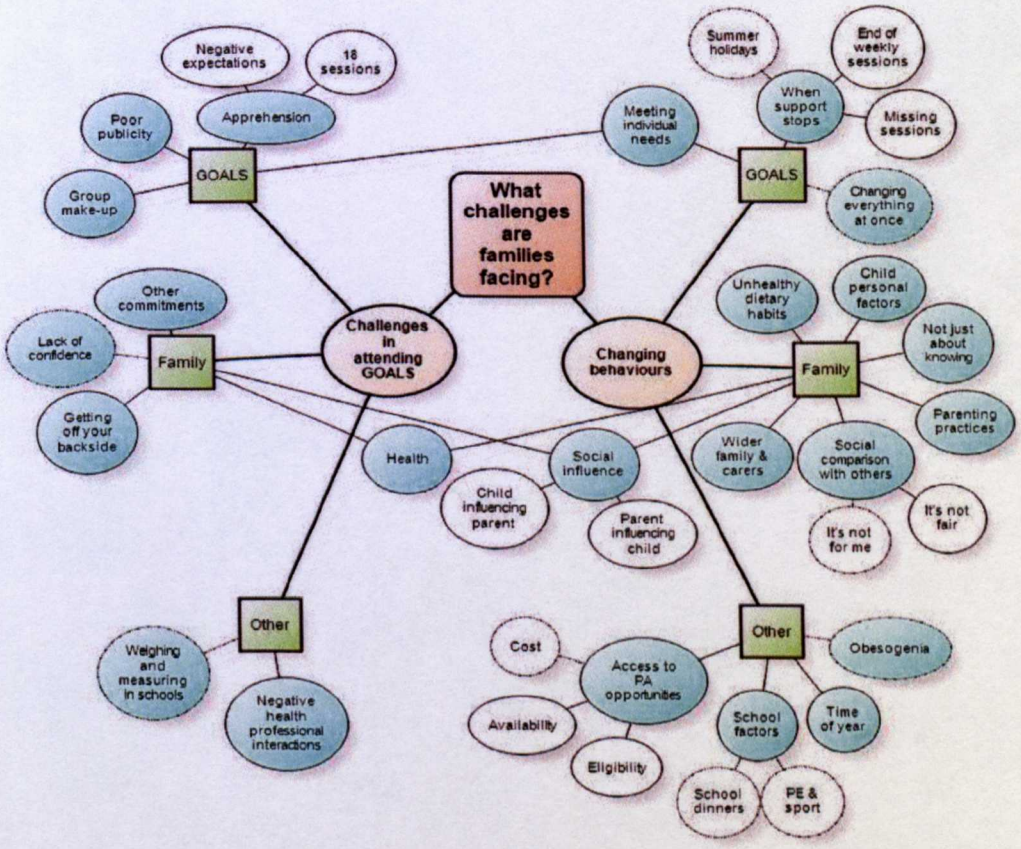


Fig 5.5 Challenges in lifestyle change – parents' views. Blue circles represent emerging themes in each of the pre-determined categories. White circles represent subthemes of the theme to which they are associated. Dashed outlines indicate themes/subthemes that emerged from only 1 or 2 groups.

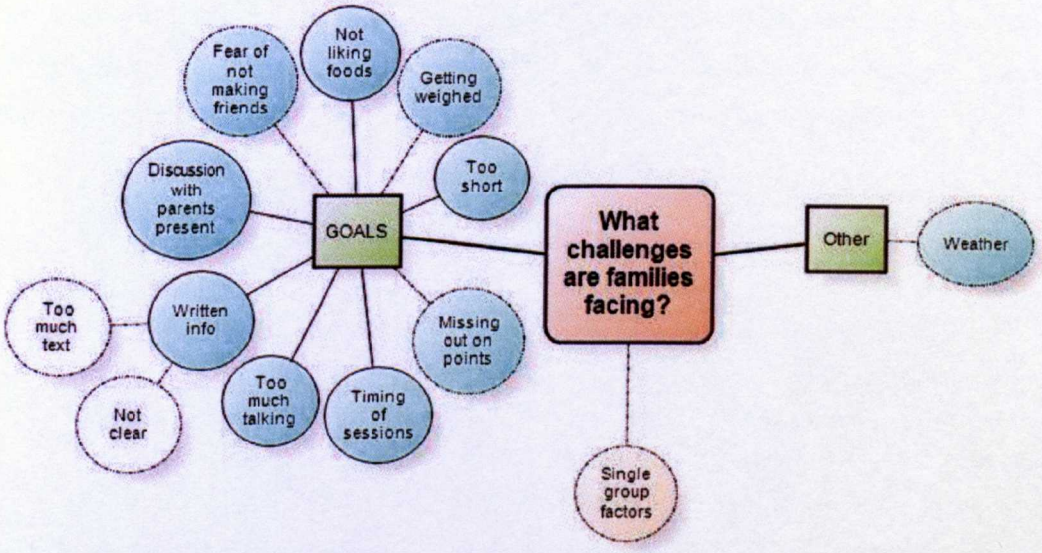
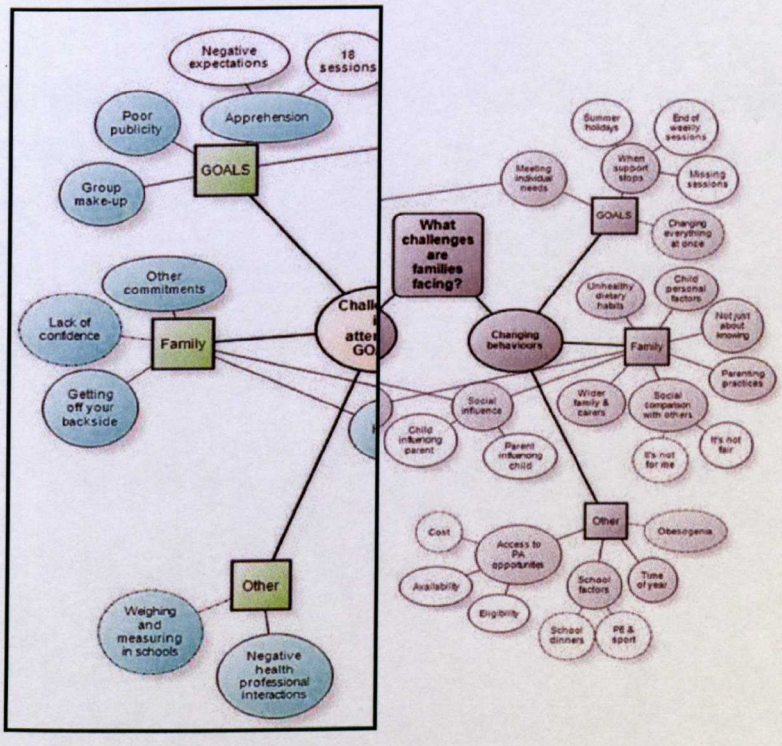


Fig 5.6 Challenges in lifestyle change – children's views. Blue circles represent emerging themes in each of the pre-determined categories. White circles represent subthemes of the theme to which they are associated. Dashed outlines indicate themes/subthemes that emerged from only 1 or 2 groups. Due to the diversity of responses between groups, a separate theme for single group factors was identified.

5.3.3.1 Parents' views

5.3.3.1.1 Challenges in attending GOALS



Parents raised challenges in attending related to GOALS itself, the family and other factors. **GOALS factors** were mainly challenges related to starting the intervention in the first place, such as poor publicity, and apprehension about the intervention. Some parents had negative expectations of what the intervention might entail, and others felt the fact the intervention was marketed as 18 sessions was off-putting.

> *it's not advertised enough because* [my daughter] *was in hospital four days before this nurse came on duty and introduced us to it* (mother A2)
>
> *well he thought he was coming here to get put on a strict diet...he didn't understand it at first and that's one thing that did frighten him* (mother D1)
>
> *I didn't tell* [my daughter] *how many lessons there was before we first started it was only when someone let it slip here and I'm thinking oh god I hope she's not listening because I thought if you say 18 weeks to someone they think I'm not sticking at that* (mother B2)

Parents also mentioned the group make-up could act as a deterrent. Examples included children feeling different to others in the group, other children in the group already knowing each other, and negative attitudes from other adults in the group. These challenges affected families most during the early stages of the intervention, and as GOALS progressed they were often no longer an issue.

> *He's been here most weeks probably as the only boy hasn't he...I think that bothers him a little bit but it doesn't seem to bother him now though...he did the first night he came he just looked at me and said "there's no boys" and I said "don't worry about it" you know (mother E4)*

Family factors focussed on the challenge of getting to the weekly sessions, such as other commitments coinciding and personal factors (e.g. tiredness or lack of confidence) that might deter families from attending.

> *so she went "well there's this GOALS thing now" and I said "when is it" because I was worried about it fitting in with work and I'm gonna work full time with two kids and then go to this at the same time and do this and do that* (mother H1)

Facilitator	*what are you finding challenging so far, you know you've been six weeks so far and about making the changes and*
Mother C1	*yeah getting off your backside to come*
Facilitator	*to come here*
Mother C1	*yeah that's the main one whereas at that time of night it's tea time you sit and put your pyjamas on, you know telly - you're off your backside you're making an effort to get out*

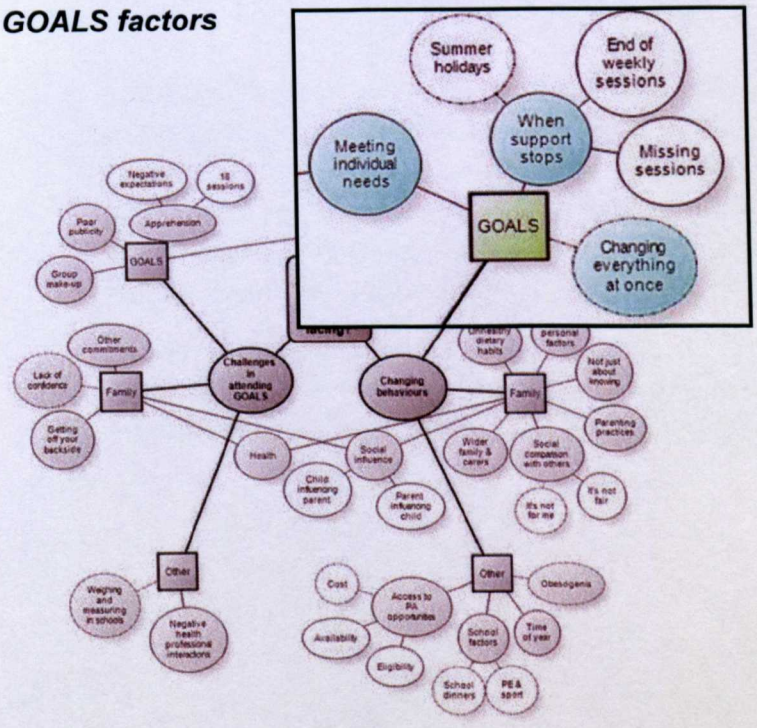
The two **other factors** focussed on negative experiences when being referred to GOALS through either weighing and measuring in schools (*Sports*Linx, Boddy et al., 2010) or by a health professional. Notably the same two referral routes emerged as facilitative when the interactions involved were positive (see section 5.3.2.1.1).

> *I was a bit upset to be honest with you because I got a letter saying because your son is overweight…and I was quite annoyed at first…it was just the way it was put and I thought because I know* [my son's] *big but I wouldn't really have classed him as having a weight problem as much as other people that I've seen and I thought the way they put it I was a little bit upset when I first read the letter and it's like a dig at you isn't it…when they're writing to you it's like a dig at you as if you're not bringing your child up properly or something* (mother D2)

> *I felt like going home with* [my daughter] *at the time she said like she was fat and she just said your child's fat and overweight I felt like grabbing her out the school and running and running and running and running without stopping* (mother E1)

5.3.3.1.2 Challenges in changing behaviours

GOALS factors



The main challenge parents were experiencing with the GOALS intervention was an anxiety about the weekly support stopping. Parents were concerned about losing momentum when the sessions stopped over the six week summer break, and – unlike the children – showed little confidence in keeping up their changes after the

intervention finished. Parents also spoke about the challenge of "getting back into it" after they had missed sessions.

> *I was thinking that I was a little bit, I wouldn't say worried...but at least if you're coming each week they're saying to you "what's your goal next week da da da" whereas if we're gonna break for those weeks you're on your own* (mother G2)

Mother D1 *well I know it finishes in eighteen weeks but it's a pity because I think after eighteen weeks they might go back into their own little routine and that's what I'll be honest I'm frightened of that*

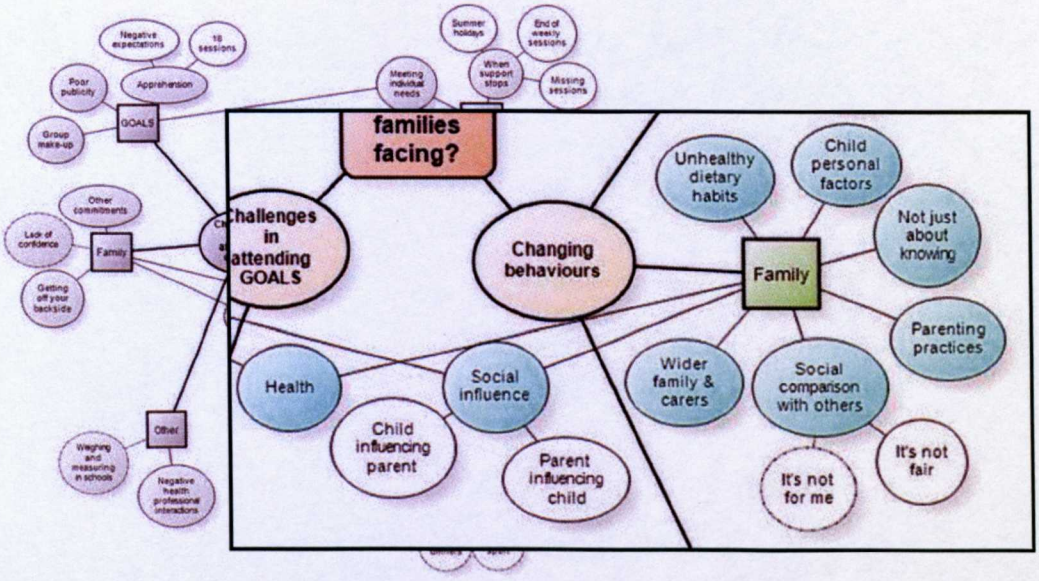
Facilitator *right ok*

Mother D1 *cos I think that's what's gonna happen*

In terms of the GOALS approach, a few groups spoke about the challenges of meeting individual needs in a group setting with such mixed ages, preferences and abilities; some parents felt their children did not enjoy or were too young/old for some of the activities and another suggested her daughter might benefit from more individual time. Some parents had felt initially as though they needed to try and change everything at once, but had since recognised the dangers of this approach.

> *I think the problem once you put people in a group is you've got real mixed ability you've got mixed ages...and so those children the perception I mean* [my son] *said to me a few weeks ago "this is for babies" I said "no you're gonna do it you're gonna crack on with it" and I know what he meant and I understood him but I understood that you've got to put something on that will appeal to everyone and it's not easy to personalise it* (father J2)
>
> *that's why we found it so difficult because we've been trying to do every single goal every week - every time we've added a goal we're doing both and that's why we've struggled...we were trying to do everything* (mother K4)

Family factors



Parents talked of many challenges they were facing in trying to change behaviours at home, with similar themes arising across groups. Challenges included **individual predisposing factors** (such as child personal factors, health issues, existing habits), **factors not directly linked to parent behaviour** (such as lack of support from wider family and carers, social comparison with others) and **factors linked to parent behaviour** (such as social influence, parenting practices, and putting what you know into practice).

Individual predisposing factors. Parents mentioned several dietary habits that were proving a challenge to change, such as eating habitually at certain times (e.g. in the evening, or when just in from school), increasing water consumption or getting children to eat vegetables. Parents also referred to child characteristics they felt made change more of a challenge for them, such as their child being younger than others in the group. A couple of parents referred to their children as "lazy". A number of parents mentioned how health or injury had got in the way both of attending GOALS sessions and of changing behaviours at home.

Mother K3	*do you know what I mean so I've only been to like three or four*
Facilitator	*so you've not got into the gist of it*
Mother K3	*so I haven't really got in I've been coming then something's happened the next week where* [my daughter] *done her arm*

in then she weren't well and it's like just trying to get back into it again

Factors not directly linked to parent behaviour. Parents appeared frustrated with family (and other carer) influences that were outside of their control. They described a lack of support from non-attending family members whose behaviour would often undermine their good efforts, for example by taking the child to fast food outlets or bringing "junk food" into the house. One mother even described how she had sacked her child-minder for feeding her son from the local chip shop.

Mother H1 *I sacked our child minder last week*

Mother H3 *did you*

Mother H1 *because when I picked him up he had a fish cake and chips in his hands I was fuming*

Mother H3 (gasp)

Mother H1 *cos I haven't been near the chippy for ages plus he'd got sunburnt as well*

Mother H3 *but* [my ex]

Mother H1 (overlapping) *I thought no I'm not doing all that for someone to ruin it*

Mother H3 *he'll go to mcdonalds and buy her a hamburger and not get her chips and I said "that's not the way to do it, I'd rather you go and cook her something proper" and then starve her all day and then she comes back to me and she says I'm starving and I end up screaming at him*

Parents also described the sense of injustice they (and children) felt when children's siblings or friends appeared to be able to eat all they wanted.

Mother H3 *plus she's got a friend... she's so skinny so she can eat what she wants and that's*

Mother H2 (overlapping) *that's difficult*

Mother H3 *and you feel like crying... I was out with my friend who's daughter's like that and she's out buying crisps and sweets and I'm looking at her thinking I wish* [my daughter] *was like that, I'm nearly in tears*

Mother H2 *yeah* [my son] *was in tears a few weeks ago and he was just complaining why for example that one of his friends should eat this and that and they don't have to you know stop*

At the same time, some parents struggled to engage their non-referred child in the change process as these children viewed it as something that was "not for them." In the following example, the second child was also overweight.

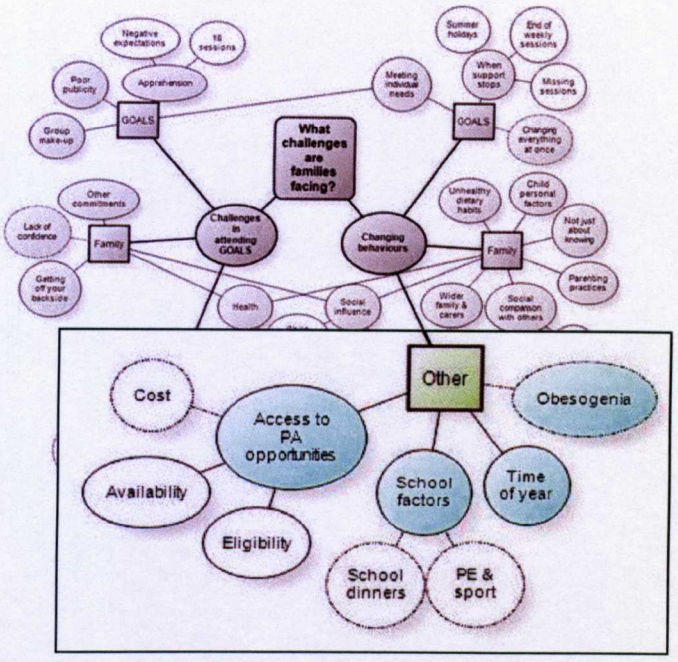
> *I think that what might be a problem is that…it was because of* [my first son] *that we really came here because he's the one that's under the doctor and got the weight problem…so I don't know maybe* [my second son's] *just thinking we're only doing it for* [my first son] *so why should I really bother you know* (mother D3)

Factors linked to parent behaviour. Parents acknowledged changing health behaviours was not as simple as just "knowing what to do". They sometimes struggled to know the most appropriate way to make changes, such as how to keep "junk food" as a treat without it being seen as a reward.

Mother H1	*I say just have one of them then you don't have nothing else as a treat for that day then the next day you just have one and then you work it off*
Mother H4	(overlapping) *but then do you not find that you get well "I've been good" and then they want it and I'm thinking do I treat it as a treat do you know what I mean*

Parents described instances where their child could have a negative influence on them, for example if they did not want to attend GOALS or do something active. Equally, a few parents were aware they could be a negative influence on their child, and one parent openly acknowledged "*I don't like doing the cooking, I hate it with a passion"* (mother K4).

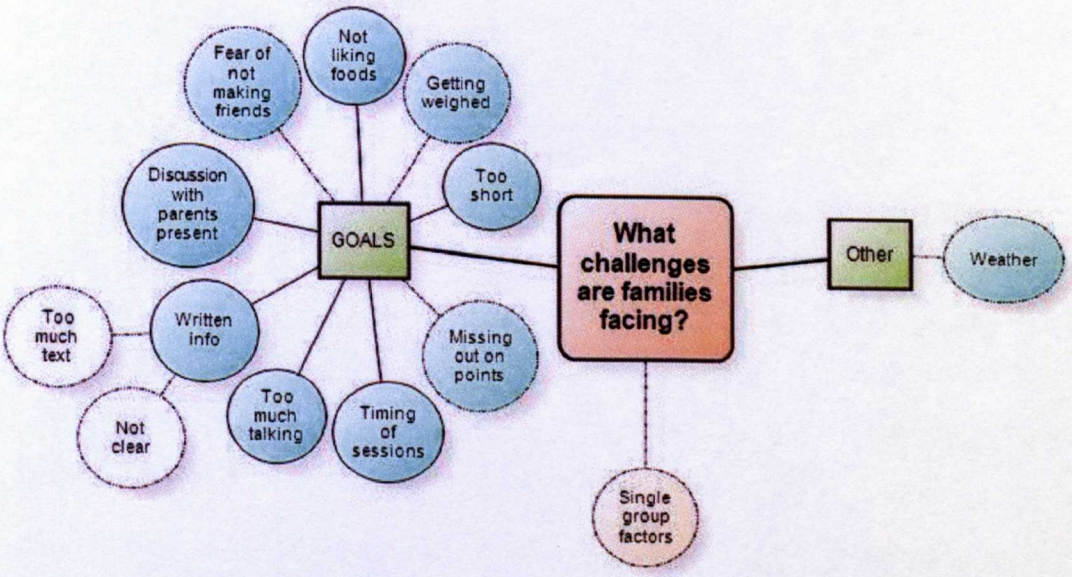
Other factors



The main challenge parents mentioned outside of GOALS or the family concerned a lack of access to physical activity opportunities for children. Parents felt there were not enough activities available for children, and several parents described instances where activities were available (for example the local council leisure facilities) but their children were ineligible to take part through being too young or not tall enough. One group also mentioned the cost of activities as being a deterrent.

Other challenges mentioned were a lack of supporting action from schools (such as continuing to provide unhealthy dinners or replacing PE with other lessons); influence of "obesogenic" temptations (such as ice-cream vans pulling up outside or sedentary computer games); and the time of year (several groups mentioned it was a particularly challenging time as Christmas was drawing near and the nights were cold and dark).

5.3.3.2 Children's views



The challenges discussed during child focus groups focussed primarily on GOALS, with more between-group variation than for the parents. Most themes emerged from only 2 or 3 groups, and there was a range of issues that were raised in single groups only, for which a separate theme was created. Children did not raise any challenges related to the family, most likely because the questions asked did not prompt them to do so.

Children felt GOALS could be improved by making sessions more interactive. They felt there was too much talking in some of the sessions, particularly Target Time. Some children felt discussion should be left to the parents, and noted they would feel more comfortable opening up if they had separate sessions from the parents.

> *I don't like it when we talk too much because I know it's good to like express your feelings like that but I don't really like talking too much because it's more for the adults really… the adults are better at it and they understand more and they know how we feel and we don't have to say it ourselves because we might be a bit scared to say it but they just say it straight away* (child K2)

Facilitator	*how do you feel about coming to GOALS with your parents or adults that come with you how do you feel about that*
Child B3	*strange because you don't really talk about yourself in front of your parents do you*
Facilitator	*yeah that's interesting that*

Child B3 *you wouldn't do it in the privacy of your own home... so why would you do it here in front of other people's parents*

Other negative aspects of GOALS included trying new foods that were "horrible", being weighed, and missing out on points if they could not attend a session. Some children felt the information in the handbooks could be made more exciting by including more fun pictures and less text, and could also be made clearer.

A few children talked of their fear of making new friends when they first started GOALS but all had since found out this was not the case. Several groups thought GOALS was too short, and would like the support to be provided for longer (*"what ever you do in four months you can easily undo in one month"*, child D1). Some children would have preferred sessions to be at the weekend, on a different day or at a later time but there was no group consensus on this.

The only factor external to GOALS that was mentioned was the weather, where a couple of children commented how it would be easier to attend GOALS if it were run in the summer.

Single group factors. Issues that were mentioned included a fear of joining in Move It when the group size was too big (and included heavy boys); a difficulty getting to know others' names; poor health preventing parents attending; walking home from school being boring; a fear of telling their friends about GOALS; not liking the cooking; and the Move It getting a bit boring when they did the same games. One child (sibling C1) said he did not enjoy GOALS but the facilitator was not able to find out the reasons behind this.

5.3.4 What are the lived experiences of families with overweight children?

Figure 5.7 shows the cross-category themes that emerged to provide an insight into the lived experiences of families with overweight children. These included *parental fears*, *parents' feelings about their own weight*, *daily life*, *concerns about what others think*, *bullying* and *poor body image*.

Parental fears. Many parents expressed anxiety around their children's weight. There was some confusion around the causes of overweight, and several parents expressed guilt and a feeling it was their fault. Some parents did not perceive their children to be as overweight as they were, and one mother described a recent event that had made her realise the extent of her daughter's weight issue.

I went to her school play today right and she was a king…and they're all on stage and I was looking at her as she walked up she said her little bit and I was like god she just looks so big compared to all the other kids…I'm just thinking oh my god she looks massive whether it's in what she had on I don't know but she just looked massive today when I was seeing her in that play (mother K3)

Parents expressed the difficulties they faced in promoting healthy messages about weight, and the challenge of ensuring they were doing more harm than good.

Mother H1 *you feel like you're punishing them don't you*

Mother H2 *yeah*

Mother H4 *and it's not their fault is it*

Mother H2 *but I think they realise by now they realise that it is for their own good you know and that's the good thing but it's just the feeling that they have inside*

Some parents feared an over-emphasis on weight might lead children to develop eating disorders, yet they also worried about the impact of being overweight as children grew older. Some parents were unsure how to talk to children about weight issues, or how to manage the lifestyle change when there were healthy weight

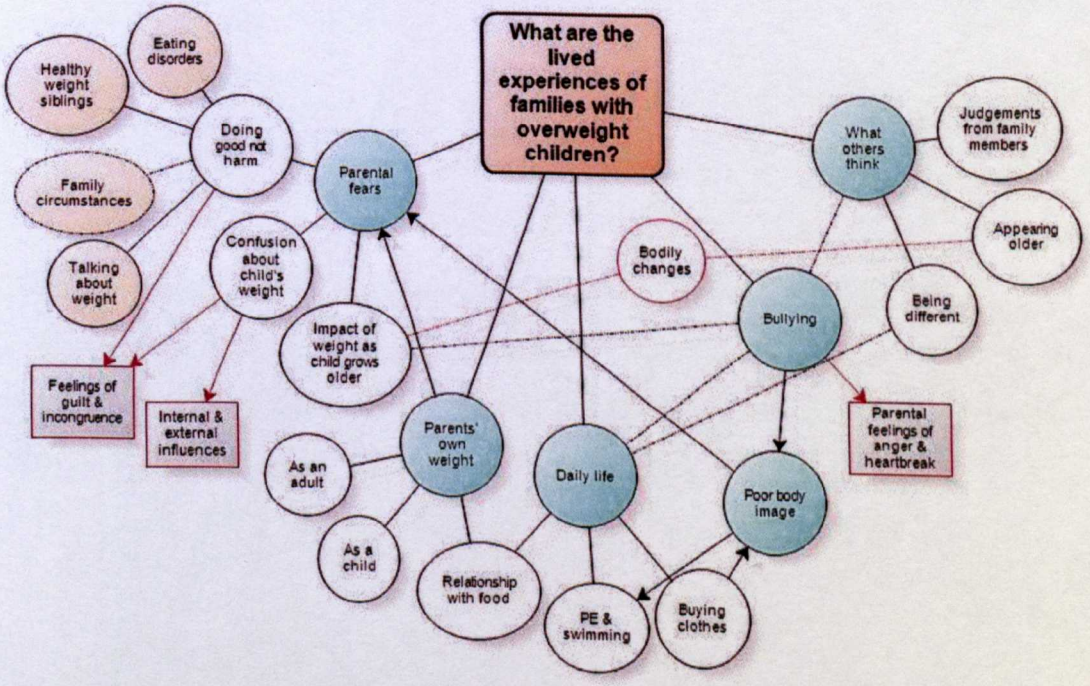


Fig 5.7 Lived experiences of families with overweight children – views from focus groups with parents and children. Blue circles represent emerging themes, and white circles represent subthemes of the theme to which they are associated. Further subthemes are represented in pale orange. Dashed outlines indicate themes/subthemes that emerged from only 1 or 2 groups. Boxes outlined in red present psychological components linked to themes/subthemes.

siblings in the family. A few parents expressed concern about the effect of adverse family circumstances on their child's future, such as exposure to domestic violence.

> *they reckon more and more boys are becoming anorexic... I didn't want that for him do you know what I mean I want him to grow up and be a healthy person I don't want him to be totally obsessed with his weight... I just want him to be healthy not necessarily skinny because my friend's got two children and they are both so thin but she takes them to macdonalds three or four times a week and I know for a fact that they're always getting colds* (mother B1)

> *people still look and people will still judge and look at you...because you are overweight and that's the thing that's wrong with this society cos I'm really concerned with* [my daughter] *going into senior next year and she's gonna get picked on I know for a fact she will be cos of her weight and I don't want that for her* (mother E5)

> [My healthy weight daughter's] *only ten she's eleven in a couple of weeks she might get to a point in twelve months' time where she puts loads of weight on that's what I was like I was a skinny rake and then when I was thirteen all of a sudden I just went and put on a load of weight so I think that might happen to her...cos I always think what if* [my overweight son] *ends up being thin and she ends up being fat...how am I gonna deal with it then because she just thinks she can eat what she likes and there's no consequence whereas* [my son] *knows if he over eats he's gonna put the weight on* (mother D2)

> *the only thing I find difficult is trying to explain to* [my daughter] *that she's not fat you know...I can't deal with the feeling side, I can't explain it. I know what I want to say, I'm wanting to say "you're gonna grow, you're gonna this" and she doesn't understand* (mother A1)

Parents' feelings about their own weight. A few parents mentioned the fact they were overweight themselves and talked about their experiences of trying to lose weight. Some parents drew on their experiences of being overweight, either as a child or as an adult, to help understand the challenges their children were facing.

> *you mention weight to a child that's overweight and they become defensive you know and it's like ourselves and I know because I'm overweight that you do become very* [defensive]*...and you're making excuses constantly for being overweight and you put this face on as though you're happy and deep down you're crying out for help (mother C6)*

Daily life, concerns about what others think, bullying and poor body image. For many of the children attending GOALS, daily life involved difficult relationships with food, bullying, and low perceptions of physical self-worth. Routine activities such as taking part in PE or buying clothes were a "nightmare", heightening

children's feelings of "being different" and providing consistent opportunities for others to make judgements.

I think with [my daughter] *since she's been about seven her life has been around eating properly* (mother A2)

Child B4 *I think they should talk about bullying because everyone gets bullied over this*

Facilitator *yeah ok*

Child B4 *and I sometimes punch*

Facilitator *yeah so you feel as though sometimes you get very frustrated and very angry as a result of experiencing bullying yeah*

Child B3 *he's way too much like me*

the nightmare we've had for so long when you go to try clothes on and she's in tears some days and I come out and I'm upset and I get bad tempered with her (mother B2)

[my daughter's] *had some comments from school made and then* [she] *wouldn't eat...she was coming in and...not eating her packed lunch not eating her tea not eating this not eating that and it's devastating to watch... she was supposed to be her best mate they've known each other* [since] *they were this high and she was the one that turned round and went oh "you've got a fat tummy whereas I've got a lovely figure" and that was it it's triggered it all off* (mother A1)

Mother B2 *but just because she's taller they think oh she's older she shouldn't be that big she should be...taking more pride in her appearance...she's eleven you know so it is a lot what people outside their impressions*

Father B4 (overlapping) *they like stereotype people yeah*

Mother B2 *yeah it is it's stereotyping*

some kid said to [my daughter] *in the club where we go on a Thursday... "I know why you're fat because your mum's fat" and my heart just sank for her and I just looked and I just thought I'm just gonna stand here and wait, because* [my daughter] *won't answer no one back normally and she stood there and I said she shouldn't have said it but she said to her "I know why your teeth are so big because your dad's are" and I thought no good on you* (mother C1)

Mother D3 *even at school when he gets changed for PE he gets changed in a different room to everybody else there's actually a little room next to the changing room and he actually gets changed in there...*

Mother D2 *that upsets me that doesn't it*

Mother D3 *...well I'll be honest he's got man boobs cos he's big like sort of thing*

Mother D2 *but a lot of big kids have*

Mother D3 (overlapping) *I know they have but it really*

Mother D2 (overlapping) *he probably thinks he's the only one*

Mother D3 *yeah I know but that just really bothers him and that's why he will not go swimming and that's why he gets changed on his own like in a room next door I mean it wasn't the school's idea it was his idea he said to me you know "mum can you go and do I don't wanna get changed in the changing room with the other lads"*

[my daughter] *was getting to the point where she was wanting a weigh every day and I thought oh we can't have this she gets to her nan's last weekend and her nan let her get on the scales... and she said me nan's shown me I've got to lose a stone and I thought oh we're doing all this good work here and...I think it's them comments that's what sticks in her head and she comes home and I'm thinking we're doing really well...and then her nan turns round and says something like that...I said "don't take no notice of it" I said "your nan doesn't know what she's talking about"* (mother A1)

5.4 Discussion

Qualitative research is needed to help us understand why childhood obesity interventions may be more or less successful (Oude Luttikhuis et al., 2009). This qualitative study aimed to build on the outcome data from study 1 by providing an insight into the experiences of families taking part in GOALS. Focus groups were conducted with parents and children during week six of GOALS, and a thematic analysis carried out to elucidate factors that were helping families change and challenges families were facing. The study also explored factors of everyday life for families with overweight children, in an attempt to better understand the context in which changes were taking place. The discussion will consider the findings in terms of:

- the perceived changes families had made to their physical activity and eating behaviours;
- motivation to attend GOALS;
- behaviour change techniques that were helping families change;
- participant experiences of the whole family approach;
- entering and leaving GOALS; and
- lived experiences of families with overweight children.

5.4.1 Changing physical activity and eating habits

Although the focus groups were conducted relatively early in the GOALS intervention, families reported changes in line with the majority of the dietary and physical activity objectives set out in table 3.1. The fact there were few differences between the changes reported by families at this 6-week point and the changes reported by parents post-intervention (see section 4.3.8) indicated families had begun implementing changes early on in the intervention. In a habit formation model (Wood et al., 2002), it might be hypothesised that at the 6-week point behaviours were still taking significant conscious effort to perform, whereby at the end of the intervention processes were becoming more habitual. As both would be manifest the same externally, however, we cannot draw this conclusion specifically from our data. Furthermore, research from Lally and colleagues (2010) suggests some individuals will adopt a new healthy habit in as little as 18 days (thus well within the 6-week timescale), whereas others take as long as 254 days (well outside the 6-month intervention). Further research using a measure such as the Self-Report Habit Index (Verplanken & Orbell, 2003) is needed to understand the level of habituation with which behaviours are performed at different time points.

5.4.2 Motivation to attend GOALS

There was substantial agreement between parents and children on the elements of GOALS that motivated them to attend, and these closely mirrored those reported in other UK qualitative studies (e.g. Dixey et al., 2006; Murtagh et al., 2006; Staniford et al., 2011; Stewart et al., 2008a, 2008b). Despite apprehension before joining, both parents and children enjoyed GOALS and spoke positively of the non-judgemental, healthy lifestyle approach. Being around similar others helped parents realise they were not on their own and helped children feel accepted, make friends and gain confidence. Although parents appeared to understand GOALS was about making changes for the whole family, their main motivation to continue attending was for their children. In the majority of cases the child was the driving force to get their parent "off their backside" to GOALS each week, some parents suggesting if their child no longer wished to attend it would be easy for them not to come. There were a few exceptions, however, where the parent showed a determination to keep their child coming because they knew – despite the child's occasional reluctance to leave the house – the child enjoyed GOALS once they were there and it was ultimately helping them.

Motivations for joining in the first place were not discussed in depth in this study, but several parents talked about their wish to prevent their children following the same

(unhealthy) path they had followed, and a few parents mentioned immediate health or psychosocial concerns for their children. This combination of short-term and long-term perspectives was also observed by Grønbæk (2008), who interviewed 53 families embarking on childhood obesity treatment. Grønbæk found all families had a short-term motivation to seek treatment (e.g. avoiding bullying, appearance, physical ability) and two-thirds also had a longer-term motivation (e.g. preventing future health complications, easing the transition through puberty). Although not all raised in the context of motivation to attend GOALS, all the factors identified by Grønbæk were also mentioned by the families in this study.

5.4.3 Behaviour change techniques that were helping families change

Table 5.6 maps the facilitators mentioned by families onto Abraham and Michie's (2008) taxonomy of BCTs. Again, there was substantial overlap between the techniques mentioned by children and parents in our study and the BCTs that emerged as effective in family-based childhood obesity treatment elsewhere (Golley et al., 2011; Stewart et al., 2008b). BCTs were either instigated as a core component of GOALS (e.g. goal setting, opportunities for social comparison), or were related to changes the family were making at home (e.g. environmental restructuring). In some cases, BCTs were both instigated as a core component of GOALS and put into practice by families at home (e.g. provide contingent rewards, prompt identification as a role-model).

5.4.4 Whole family approach

In their review of child weight-related interventions involving parents, Golley and colleagues (2011) found effective interventions had a *"higher degree of meaningful parental involvement"* (p.127). As outlined in section 2.4.2, the level of parental involvement varies greatly even within interventions that consider themselves "family-based." GOALS differs from many UK-based interventions (e.g. Rudolf et al., 2006; Sacher et al., 2010; Stewart et al., 2005) in its focus on changing the parent's own physical activity and eating behaviours, as well as the child's. This whole family approach was deemed positive by both parents and children. As children's understanding increased, parents found it helpful to refer back to GOALS when instigating changes at home and noticed children became less resistant and more

Table 5.6 BCTs used by families during the process of making changes to their physical activity and eating behaviours. Italic figures in parentheses refer to the technique's corresponding number on Abraham and Michie's (2008) taxonomy.

BCT	Golley et al. (2011) behavioural change process	Put in by	Example quote/s
Prompt specific goal setting *(10)*	Facilitate motivation to change	GOALS	*I like it when we set a target to do more exercise at home* (child A1)
Prompt self-monitoring of behaviour *(12)*	Facilitate motivation to change	GOALS / Family	*we've noticed that when we first filled our forms out that* [my daughter] *isn't really getting that much exercise of a night...it was a bit of an eye-opener really* (mother J1) *we've got this massive this huge big chart we're putting all the stars and stickers on* (father J2)
Provide contingent rewards *(14)*	Provide relevant info & advice/behaviour change strategies	GOALS / Family	*I think that the points thing is good* (child K4) *I told her if she loses two stone by the time she's thirteen I'll buy her I'll take her to Armani in the met quarter and buy her an outfit* (mother B2)
Environmental re-structuring[a]	Provide relevant info & advice/behaviour change strategies	Family	*if you don't bring it in the house they can't eat it* (father B4)
Set graded tasks *(7)*	Build self-efficacy (and independence)	GOALS	*so I don't wanna set the goals too high if we can keep the goals we've got and try and maintain them until we're in a routine...and then we can up them* (adult A1)
Model or demonstrate the behaviour *(9)*	Build self-efficacy (and independence)	GOALS	*it helps you learn how to cook because if you're older and it'll help you to cook...healthier options* (child E5)
Provide opportunities for social comparison *(19)*	Build self-efficacy (and independence)	GOALS	*if you come here everyone's the same aren't they* (child B2)
Plan social support or social change *(20)*	Build self-efficacy (and independence)	GOALS / Family	*having the support of other people as well you don't feel as though you're on your own* (mother H4) *if the kids are up for it you get your motivation from them because you're doing something good for them* (mother A1)
Prompt identification as a role-model *(21)*	Build self-efficacy (and independence)	GOALS / Family	*I think the kids get a bit of a buzz out of seeing mum and dad doing the running or whatever* (mother J1) *I think why she said she'll have fruit this week is because she's been watching me of a night* (mother A2)
Prompting generalisation of a target behaviour[a]	Build self-efficacy (and independence)[b]	GOALS	*we've had that stir fry we have had quite a few times but now he'll do that* (father G1)
Prompt review of behavioural goals *(11)*	Prevent and manage relapse	GOALS	*it gives you that positive incentive because you've got somewhere to come* (mother A1)

[a] BCT was not included in Abraham and Michie's 2008 taxonomy but was undergoing validation at the time of study and has since been added to the extended taxonomy (CALO-RE, Michie,et al., 2011)

[b] BCT was not listed in Golley et al's (2011) paper therefore was categorised into the appropriate behavioural change process by the author.

accepting of parental prompts. Being together with children in the sessions also allowed a unique opportunity for each to observe the other, increasing parents' efficacy beliefs for what children could do (e.g. handling knives in the kitchen) and allowing the parent to role-model positive behaviours (e.g. having fun during the physical activity sessions). However, when it came to the discussion of sensitive topics both parents and children felt it would be beneficial to have separate child and parent sessions as both would be able to open up more in the others' absence.

There was also evidence that the whole family approach was taken into the home environment. Returning to Taylor et al.'s (1994) socialisation model of child behaviour, parents provided examples of how their own behaviour and cognitions were interacting with their child's behaviour and cognitions to support positive change. For example, parents increased their awareness and efforts to increase their family's physical activity (parent cognition and behaviour). Prior to GOALS, this might have created resistance in the child (child behaviour) but as children's confidence to take part in physical activity increased (child cognitions), they became less resistant when parents suggested going out to the park to play football. Rather than strict rule enforcement, the social influence described by parents in this study was of an authoritative nature; parents worked together with the child to make changes. Similarly, Stewart et al. (2008b) found the social influence asserted by parents who had taken part in a behavioural change intervention was more authoritative (firm but fair), whereas the social influence asserted by parents who had received standard dietetic treatment was more authoritarian (strict rule enforcement). Authoritative parenting has been associated with less risk of obesity-inducing behaviours in the home (Sleddens et al., 2011).

Whilst involvement of parents was seen as a positive factor, the majority of parents who attended were mothers and there were challenges in achieving the whole family approach. As with Staniford et al.'s (2011), Dixey et al.'s (2006) and Stewart et al.'s (2008a) participants many of the parents in our study felt their efforts were being undermined from non-attending family members – in particular grandparents and fathers who no longer lived with the child. Despite attempts to promote healthy lifestyle change for the whole family, some parents also faced a challenge engaging their non-referred child in healthy lifestyle changes, even if the second child was also overweight. This was because of a perception – either from the child or the parent themselves – that it did not matter as much if this second child was not eating healthily or being physically active. This created a tension for these parents, who on the one hand felt cruel if they forced changes on the non-referred child, yet

on the other hand felt guilty if they placed unfair expectations on the child who was referred.

5.4.5 Entering and leaving GOALS

The majority of families were referred to GOALS either via the SportsLinx project (Boddy et al., 2010), where they were sent a letter after their child was weighed and measured in school, or via a health professional (e.g. school nurse, GP, dietitian or paediatrician). Parents described both positive and negative experiences, and with them mixed emotions. Whilst many parents described the negative aspects of the referral process, it was also an instrumental event that prompted them into action:

> *but that doctor in* [hospital] *done my head in to be honest with you he was very dictatorial...he wasn't very nice with her to be honest with you it was like..."if you can't lose weight then your asthma is not gonna get any better" and that's I thought "right you I'll show you"...and that's where it started* (mother B2)

Whether parents experiences were positive or negative, what was clear in this study was the important role of those initial communications in *identifying and motivating readiness to change* (Golley et al., 2011). This is somewhat concerning given the negative views of obesity held by many health professionals (Budd et al., 2011) and the perceived lack of efficacy of GPs and nurses in tackling childhood obesity (Walker et al., 2007). Training is needed to support primary and secondary care practitioners to raise child weight issues in a sensitive, non-judgmental manner. Furthermore, the parents in the current study were a compliant group by virtue of the fact they had decided to attend GOALS. Of the 300+ parents who received invite letters to GOALS because their child was overweight, approximately 10% opted to attend. Further research is needed to understand how we can engage the far greater proportion of families who do not take positive action when their child's weight issue is brought to their attention.

When it comes to leaving GOALS, the overwhelming feeling from parents and children in this study was they wanted the support to go on for longer. Some children did express a confidence in being able to keep up their changes, but this was possibly due to the early stage they were at in the intervention and Dixey and colleagues (2006) suggested that over time children may lose their motivation as attendance becomes more of a social event. Parents, however, expressed a fear of not being able to keep up their healthy changes without professional support. This view is reported consistently by parents attending family-based childhood obesity treatment interventions (Dixey et al., 2006; Staniford et al., 2011; Stewart et

al., 2008a) and is a stark contrast to the view of health professionals that treatment interventions should *"create individuals who leave treatment with the confidence they can sustain healthy changes made independently"* (Staniford et al., 2011, p.235).

5.4.6 Lived experiences of families with overweight children

As outlined in Davison and Birch's (2001) ecological model (see section 2.2.1), children's physical activity and eating behaviours are influenced by many factors external to the family and GOALS and the behavioural change process must be considered within the context of their wider lives. The transferability of the current findings are reinforced by the overlap with other studies investigating family perspectives surrounding childhood obesity (e.g. Curtis, 2008; Staniford et al., 2011; Stewart et al., 2008a). As with the families attending WATCH-IT (Dixey et al., 2006; Murtagh et al., 2006), parents and children attending GOALS described many psychosocial challenges associated with their child's weight. Many of the children experienced bullying, judgement from others and had a poor body image. Parents experienced fears and in-congruencies in addressing the health aspects associated with their child's weight whilst at the same time protecting their child's psychological wellbeing. Several families spoke also of the challenges associated with the school environment, such as negative experiences during PE. This negative perception of PE was a factor also observed by Curtis (2008) in focus groups with secondary school-aged children who were obese. A multi-system approach is required to support these children and prevent them facing these negative experiences day in day out. And in considering how we can best help families with overweight children make changes to their eating and physical activity behaviours we must support them also to develop coping strategies to deal with this daily onslaught of prejudice.

5.4.7 Limitations

When interpreting the findings of this study, it is important to acknowledge the diversity between focus groups, particularly the child groups. For practical reasons, groups varied widely by child age and gender (yet each group was relatively homogenous within) and were conducted by different facilitators. An effort was made to reduce facilitator effects through common training and a focus group guide. This was supported by an approach to analysis aimed at enhancing the credibility and dependability of findings (described in section 5.2.4), for example through considering the style of facilitator questioning or existing rapport with the families whilst interpreting meaning. Themes that arose in only one or two groups were included (but highlighted as such) on the basis non-discussion of a theme did not

necessarily mean it was unimportant (Kidd & Parshall, 2000), and could have been a result of the questions asked or the facilitator's style. However, there were also perceived benefits of involving multiple facilitators. A vast amount of data was collected from a diverse sample that was representative of the GOALS population. This would not have been possible with a single researcher and the approach taken served to enhance the transferability of findings.

The fact facilitators were GOALS staff members and known to groups already may have led children and parents to give more socially desirable answers. Yet as families by this time were aware of the non-judgmental ethos of GOALS, this established rapport between the facilitator and the group may have encouraged families to open up about issues they would not otherwise have done. The delivery experience of GOALS staff members also helped validate the findings throughout the research process, for many of the themes "rang true" to what practitioners were hearing from families on a weekly basis.

It must be acknowledged parents and children were not directly questioned about BCTs in this study, and the factors that were identified emerged spontaneously through families talking about the changes they were making. Therefore these findings can be interpreted only as an example of the techniques families were putting into practice and further research is required before conclusions can be drawn about which BCTs are most effective in facilitating change in childhood obesity treatment.

5.4.8 Conclusion

This study provided an insight into the experiences of families attending GOALS, focussing on what factors were helping them change, what challenges they were facing and the wider context in which they were making these changes. Families reported changes to their physical activity and dietary behaviours at six weeks that were aligned with the GOALS objectives. They described the facilitative use of a range of BCTs in this process, such as goal setting with rewards, self-monitoring, modelling and social support. The high level of agreement between our findings and other qualitative studies in childhood obesity treatment (e.g. Dixey et al., 2006; Staniford et al., 2011; Stewart et al., 2008a) points to some clear areas of need to improve the provision of childhood obesity treatment in the UK.

Firstly, a key factor motivating families to attend childhood obesity treatment interventions is the social support they gain from empathic staff and from being with similar others. The non-judgemental environment provides a stark contrast to the

daily onslaught of prejudice in the outside world. Yet the safety of this environment needs to be balanced with the promotion of long-term behaviour change. For example, Dixey and colleagues (2006) questioned whether, if children feel happier about their weight because they feel accepted and have friends the same size as them, they have less incentive to lose weight. Furthermore, a consistent factor that emerges through these qualitative studies is a lack of confidence in continuing changes beyond the intervention and a need for continued support. Whilst this issue requires serious consideration from policy-makers, efforts also need to be made to bridge the gap between the safe group environment and the outside world in which changes have to be maintained.

Secondly, parents consistently report the struggle they face with non-attending family members undermining their efforts to change the family's behaviours. Further research is needed to explore how interventions can better engage family members such as fathers and grandparents.

Thirdly, how families are initially approached about their child's weight may play an instrumental role in whether they seek treatment and ultimately, in the child's future. Many families report negative exchanges with health professionals and there is a need for wide-scale training to better equip health professionals to approach the issue of child weight in a sensitive and appropriate manner.

This study described some of the processes of change families were going through after six weeks of attending a family-based childhood obesity treatment intervention. It is a snapshot of participant experiences at six weeks, and "facilitators" in this sense only refers to what helped families change to this point and what kept them attending GOALS. However, as 33 of the 36 families in this study went on to complete GOALS, it might be inferred the factors identified were effective in facilitating compliance at least until the external support ceased. What this study cannot tell us is:

- Whether the factors identified as facilitators to change at six weeks are the same as those required to maintain behavioural changes in the long-term
- Which BCTs are effective in promoting sustained behaviour change
- Which family factors are important in promoting sustained behavioural change, and how these interact with the BCTs used

Study 3 aims to address these factors through a long-term follow up of families who attended GOALS during September 2006 and March 2009.

5.4.9 Take home messages

- ***Encouraging families to register for group-based childhood obesity treatment.*** From the first point of contact it is important both referring practitioners and intervention staff help families feel accepted and understand they will not be judged or told what to do. It should be made clear the intervention is not a "boot camp", but will focus on small healthy lifestyle changes at home. This can be achieved through explaining concepts in lay terms, listening, showing empathy, and adopting a friendly nature. Training in basic counselling skills will help practitioners develop these skills further.

- ***Motivating families to continue attending the intervention.*** Factors that motivate families to attend group-based childhood obesity treatment include social support, being in the same boat as others, and child enjoyment. Children enjoy sessions that are practical and interactive (e.g. cooking sessions, sports, games) and *show them how to do things* rather than *tell them what to do.* To improve child confidence, physical activity sessions should be varied and fun, encouraging children to focus on their own achievements rather than competition with others.

- ***Supporting families to change physical activity and dietary behaviours at home.*** BCTs that can be effectively used to support gradual changes at home include *prompt specific goal setting, prompt self-monitoring of behaviour, provide contingent rewards* and *environmental restructuring.* The shared learning that occurs through a family-based approach supports parents to put messages into action at home. It is important "one rule for all" is encouraged to promote healthy eating and physical activity for the whole family (regardless of weight). Non-attending family members might be involved through the provision of newsletters, "bring a buddy" week, or setting targets that involve the relevant family members.

- ***Preparing families to maintain changes to their physical activity and dietary behaviours when the intervention finishes.*** To enhance parent and child self-efficacy to maintain behavioural changes, BCTs should focus on changes that are independent of attendance at the weekly intervention (e.g. practicing dietary behaviours at home until they become habitual, seeking opportunities to be physically active outside of the weekly session).

The intervention structure should be sufficiently flexible to allow for individual differences in the amount of change needed, the time it takes for new behaviours to become habitual, and to allow for family commitments preventing regular attendance. For example, a rolling open-group intervention that allows for different durations of support.

Chapter 6

Study 3: Long-term follow up of families who attended a family-based behaviour change intervention for overweight children (GOALS)

Study and aim	Research questions	Key findings
Study 1 **Aim** To measure the potential impact of GOALS on the body composition, lifestyle behaviours and self-perceptions of children and parents who complete the intervention, and explore the relationships between these variables	1. Do children and parents who complete GOALS improve their body composition, as measured by BMI and abdomen-to-height ratio? 2. Are there changes in perceived fitness and health, parent-reported physical activity and diet and child self-esteem after completion of GOALS? 3. How does parent BMI change relate to child BMI SDS change? 4. How does child self-esteem change relate to BMI SDS change? 5. Are there improvements in child BMI SDS change as the GOALS intervention develops over time?	• There was a statistically significant reduction in child BMI SDS (-0.07) that was maintained at 12-month follow up • Parent-reported changes to physical activity and diet showed GOALS was meeting 100% of physical activity objectives and 91% of dietary objectives • There was only minimal change in child self-esteem, but the greatest increases were seen in the children with the poorest self-esteem at baseline • BMI SDS change *from pre-to post-intervention* was correlated with self-esteem change *from pre-intervention to 12-month follow up* in the global and physical appearance domains • There was a strong positive correlation between parent BMI change and child BMI SDS change • There was a significant year-on-year increase in the proportion of children who reduced BMI SDS from pre- to post-intervention
Study 2 **Aim** To qualitatively explore the experiences of families whilst they are taking part in GOALS, discussing perceived changes to their physical activity and eating behaviours, factors facilitating these changes and challenges they are facing	1. What changes have occurred at home during the first six weeks of attending GOALS? 2. What is helping families change? 3. What challenges do families face in making changes? 4. What are the lived experiences of families with overweight children that help practitioners and researchers understand the context in which changes take place?	• Six weeks into the intervention, families reported physical activity and dietary changes similar to those reported post-intervention • Motivators to attend GOALS included the non-judgmental approach, being in the same boat as others, and child enjoyment • Families used BCTs both as a core component of GOALS and to facilitate their behaviour change at home • While the whole family approach was deemed facilitative to change, parents felt their change efforts were undermined by non-attending family members • Referral to GOALS elicited mixed, and sometimes negative, emotions for parents • Parents expressed the need for longer-term support from GOALS • Many psychosocial challenges of living with childhood overweight were described
Study 3 **Aim** To follow up families 3-5 years after they attend GOALS to explore actual and perceived outcomes, parental psychosocial factors associated with positive outcomes and the processes involved in sustaining long-term behavioural change	1. Do children who attend GOALS demonstrate an improved body composition 3-5 years after baseline? 2. How do parents perceive participation in GOALS influences their child's life several years on, and how does this relate to child body composition change? 3. What parental psychosocial factors are associated with positive long-term outcomes for children who attend GOALS? 4. What processes are involved in sustaining long-term behaviour change for families who attend GOALS?	

6.1 Introduction

The aim of childhood obesity treatment is to promote a healthier future for the child, and as such interventions can only be deemed effective if their benefits are sustained in the long-term. GOALS supports families with obese children in making gradual changes to their eating and physical activity habits, with a focus on small realistic changes that can be maintained for a lifetime. Study 1 (chapter 4) showed that children who completed GOALS reduced BMI SDS 6-months and 12-months post-baseline, and families reported increased physical activity and improved diet. Study 2 (chapter 5) then provided a qualitative insight into families' change processes six weeks into attending the 18-week intervention. However we do not know whether the positive outcomes were sustained when regular contact with GOALS ceased, and we know little about the important factors in long-term behavioural change. This study builds on studies 1 and 2 through a long-term follow up of families who attended GOALS between September 2006 and March 2009. A qualitative design is employed to explore the perceived influence of GOALS in the long-term, the processes families go through and the BCTs used in sustaining behaviour change.

In their 2009 Cochrane review, Oude-Luttikhuis and colleagues highlighted several gaps in the existing literature, three of which this study aims to address:

- There is a need for long-term follow up (i.e. beyond 12 months) of intervention outcomes
- There is a need to learn about the psychosocial characteristics associated with long-term success in family-based childhood obesity treatment
- There is a need to learn more about the process of behavioural change in children who are overweight

Long-term follow up is important in determining the sustainability of intervention effects, exploring cognitive and behavioural changes (with or without weight loss) and establishing distal impacts that may not be observable immediately post-intervention (Jones et al., 2011). Yet there are no published follow-up studies beyond 12 months for childhood obesity treatment in the UK, and only a handful of international studies exist (e.g. Braet & Van Winckel, 2000; Epstein et al., 1994; Golan & Crow, 2004; Moens et al., 2010; Reinehr et al., 2007; Vignolo et al., 2008). Whilst many of these studies demonstrated favourable long-term weight outcomes little is known about the perceived long-term success for family themselves, as

qualitative research suggests families may have different perceptions of what constitutes a positive outcome of childhood obesity treatment than health practitioners (Staniford et al., 2011).

Furthermore, whilst family-based obesity treatment interventions are beneficial for some children in the long-term, for others they have little impact (Moens et al., 2010). There is a need to explore why some children respond differently to obesity treatment than others and how practitioners can appropriately target treatments to family characteristics. Whilst studies have investigated the relationship between long-term child weight outcomes and support from family and friends (Epstein et al., 1994), self-reported dietary and exercise behaviours (Togashi et al., 2002) and general maternal and child psychological variables (Moens et al., 2010), no known studies have explored the long-term influence of parental weight-related behaviours, attitudes and parenting style, all of which play a key role in determining child behaviour (Taylor, et al., 1994).

It is well established that parents' own eating and physical activity attitudes and behaviours influence children's eating and physical activity behaviours (e.g. Hood, et al., 2000; Welk et al., 2003). Research also shows general parenting style is associated with childhood obesity-inducing behaviours, with children raised in authoritative homes more likely to eat healthily, be physically active and have a lower BMI (Sleddens et al., 2011). Parents may approach their child's weight issue in different ways. They may attribute their child's weight to either external or internal factors, have different motivations for seeking treatment and different ideas about who should take part in the lifestyle change process (Grønbæk, 2008). Parents may also have differing levels of concern about their child's overweight (Trigwell et al., 2011). Given the important role of parents in the child's long-term behaviour change, it is of interest to explore the relative influence of these parental psychosocial variables and how they interact to influence long-term outcomes.

Whilst there is a body of research investigating the psychological and behavioural factors associated with successful weight maintenance in adults (e.g. Byrne, 2002; Stuckey et al., 2011), little is known about the processes involved in achieving long-term weight control for children who are overweight. If we can understand the processes families go through to achieve long-term change, we can improve the design of interventions to support other families to achieve the same. In study 2 a number of BCTs were identified as facilitators to change during the early stages of intervention (see table 5.6). It is not known which techniques are most important in

enabling families to make sustained changes to their eating and physical activity habits, and how these techniques interact with family characteristics.

It is clear a "one size fits all" approach may not be feasible for childhood obesity treatment. Evaluation of childhood obesity treatment interventions relies heavily on BMI SDS change (e.g. Oude Luttikhuis et al., 2009), yet families themselves may have different perceptions of "success" (Staniford et al., 2011). To date, no long-term follow-up studies of family-based childhood obesity treatment have been carried out in the UK and international studies have all been quantitative in nature. Qualitative research is needed to explore the deeper attitudes, feelings and processes of families who successfully maintain behavioural changes to provide an insight into a) whether attendance at GOALS is associated with positive outcomes several years later; b) the parental psychosocial characteristics of families with the most positive outcomes; and c) the factors that are important in the change process.

6.1.1 Study Aim

The aim of this study is to follow up families 3-5 years after they attend GOALS to explore actual and perceived outcomes, parental psychosocial factors associated with positive outcomes and the processes involved in sustaining long-term behavioural change.

6.1.2 Research Questions

1. Do children who attend GOALS demonstrate an improved body composition 3-5 years after baseline?
2. How do parents perceive participation in GOALS influences their child's life several years on, and how does this relate to child body composition change?
3. What parental psychosocial factors are associated with positive long-term outcomes for children who attend GOALS?
4. What processes are involved in sustaining long-term behaviour change for families who attend GOALS?

6.2 Methods

6.2.1 Research Design

The study took a "positive deviance" approach, defined by Stuckey and colleagues (2011) as "*an inductive approach to determine successful practices of individuals who succeed where most tend to fail*" (p.565). Retrospective semi-structured

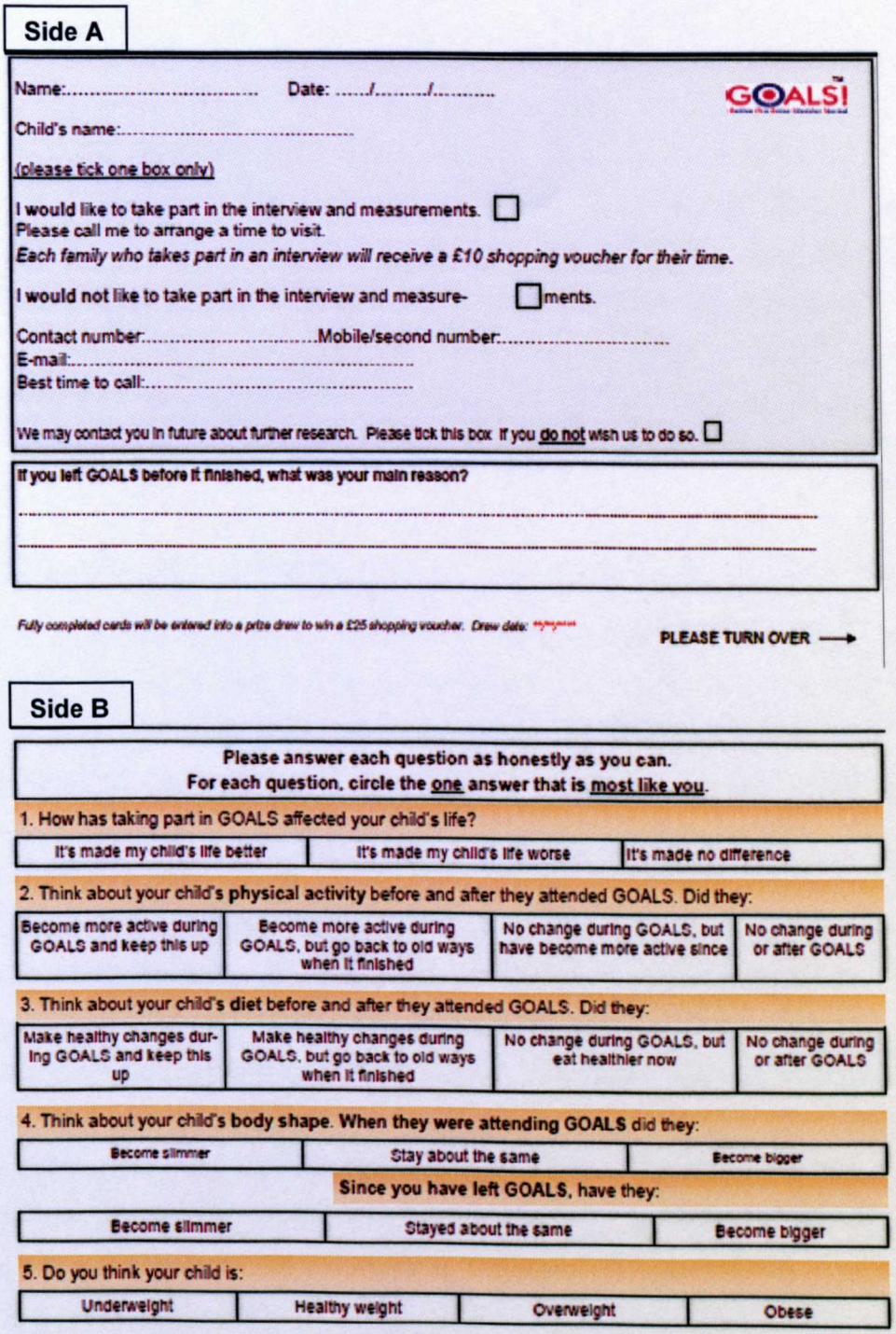
interviews with parents were used to explore perceptions of the long-term outcomes of their child's obesity treatment, and the psychosocial factors associated with sustained behavioural change. Analysis was focussed on identifying the characteristics of the families with the most positive long-term outcomes to learn how we can improve childhood obesity treatment for other families.

Retrospective interviews have been used elsewhere to explore parental perspectives of childhood obesity treatment (Stewart et al., 2008a, 2008b) and to explore the psychological characteristics of previously-obese adult weight "regainers" versus weight "maintainers" (Byrne et al. 2003). Qualitative interviews are useful both in elucidating feelings, attitudes and behaviours involved in the maintenance process and in generating hypotheses that can be tested through prospective quantitative methodology (Byrne, 2002).

6.2.2 Participants and Recruitment

Participants were families who attended the GOALS intervention between September 2006 and March 2009. All families in cohorts who had a mean age <12 years at the time of the intervention (see figure 3.1) and consented to research participation were eligible (defined as "child" cohorts by Oude-Luttikhuis et al., 2009). Children were excluded if they were considered "at risk" (n=2), if they were referred to the Child and Adolescent Mental Health Service (CAMHS) for psychological support whilst they were at GOALS (n=2), if they had taken part in the GOALS formative phase prior to attending GOALS (n=1) and if they had returned to GOALS since the study period and completed the intervention (n=3). The child for whom the family was referred to GOALS plus the main parent/s who participated in GOALS were included. Where there were other adults in the family who wished to take part in the interview they were also invited to do so. Siblings present at the time of the visit were given the option of having their height and weight taken.

Parent/s from all eligible families were sent a letter and information sheet to their home address. An A5-sized reply card (see figure 6.1) was provided that asked parents to indicate whether they would like to take part in the follow-up visits (interview and measurements), and to complete five multiple choice questions about their child's lifestyle.



Side A

Name:..... Date: ...../...../.....

GOALS™

Child's name:.....

(please tick one box only)

I would like to take part in the interview and measurements. ☐
Please call me to arrange a time to visit.
Each family who takes part in an interview will receive a £10 shopping voucher for their time.

I would not like to take part in the interview and measure- ☐ments.

Contact number:.....Mobile/second number:.....
E-mail:.....
Best time to call:.....

We may contact you in future about further research. Please tick this box if you do not wish us to do so. ☐

If you left GOALS before it finished, what was your main reason?

.....

.....

*Fully completed cards will be entered into a prize draw to win a £25 shopping voucher. Draw date: **/**/*****

PLEASE TURN OVER ⟶

Side B

Please answer each question as honestly as you can.
For each question, circle the one answer that is most like you.

1. How has taking part in GOALS affected your child's life?

It's made my child's life better	It's made my child's life worse	It's made no difference

2. Think about your child's **physical activity** before and after they attended GOALS. Did they:

Become more active during GOALS and keep this up	Become more active during GOALS, but go back to old ways when it finished	No change during GOALS, but have become more active since	No change during or after GOALS

3. Think about your child's **diet** before and after they attended GOALS. Did they:

Make healthy changes during GOALS and keep this up	Make healthy changes during GOALS, but go back to old ways when it finished	No change during GOALS, but eat healthier now	No change during or after GOALS

4. Think about your child's **body shape**. **When they were attending GOALS** did they:

Become slimmer	Stay about the same	Become bigger

Since you have left GOALS, have they:

Become slimmer	Stayed about the same	Become bigger

5. Do you think your child is:

Underweight	Healthy weight	Overweight	Obese

Figure 6.1 Reply card sent to parents in the post

Parents were asked to complete and return the card within two weeks and all completed cards were entered into a £25 prize draw to thank participants for their time. Consent to use the feedback supplied on the reply cards was implied by the return of the card. After two weeks, participants who had not replied were telephoned to offer them another chance to take part. They were given the option of agreeing or declining over the phone, or taking some more time to think about it.

For parents who agreed to take part, a convenient time was arranged to visit them at their home.

A convenience sampling strategy was adopted whereby all families who responded were included. Initially invites were sent only to parents who attended after September 2007, in an attempt to focus on participants who took part when the intervention was most refined. However, after the response period and follow-up telephone calls participant numbers remained low therefore a further batch of invites was sent to families who took part between September 2006 and September 2007. After responses to this mail-out were received it was felt participant numbers were sufficient and there was no need to carry out telephone follow-ups for this earlier cohort.

6.2.2.1 Sample characteristics

Of the 113 families who were invited to participate, 22 responded with follow-up information. Six families opted not to take part in the follow-up visits and one family was excluded due to difficult personal circumstances at the time. Therefore 15 follow-up visits were conducted (14 of whom had completed GOALS). Table 6.1 shows the demographic characteristics of the families who took part in follow-up visits. Of these, eight families (B, C, D, E, I, J, M, O) returned the reply card within the initial response period, seven families (A[7], F, G[8], H, K[9], L, N) were recruited through telephone calls. In two families, children indicated they would also like to take part in the interviews and it was deemed unethical to deny them this opportunity. Therefore joint interviews were conducted for these families (I and M). The duration from baseline to follow-up ranged from 3 years (36 months) to 5.25 years (63 months), with a mean follow-up duration of 4 years (47.5 months). Of the 15 families, 13 (87%) lived within the 50% most deprived neighbourhoods in England according to the 2010 Indices of Multiple Deprivation (Department for Communities and Local Government, 2011), which was comparable to the study 1 population (88%[10]). However the proportion of families living within the 10% most deprived areas was lower in the follow-up sample (47% vs 64% in study 1).

---

[7] Family A was not sent the written information as the mother was unable to read

[8] Family G initially said no after the telephone call, then changed their mind

[9] Family K was recruited when I bumped into them in the street – said they had been meaning to return the card but had been really busy

[10] While a rough comparison can be drawn, it must be noted in study 1 neighbourhoods were ranked according to the 2007 Indices of Multiple Deprivation, whereas in this study the 2010 Indices of Multiple Deprivation were used

Table 6.1 Demographic characteristics of families who were interviewed (family in bold dropped out from GOALS)

	Child sex	Child age pre (years)	Child age at F/U (years)	Severity of child obesity at baseline[a]	House-hold[b]	Child position in family	Who was interviewed	Parent education[c] & employment	Post-code area[d]	Ethn-icity[e]	GOALS status[f]	GOALS attendance (months)[g]
A	Female	5.88	9.97	Moderate	SP	Only	Mother	0 / voluntary work	5	WB	F/U	67% (48)
B	Female	11.38	14.58	Moderate	SP	Youngest of 2	Mother	1 / carer	3	WB	Comp	67% (38)
C	Male	9.69	13.69	Severe	2-P	Youngest of 2	Mother/ father	1 / clerical officer & LT sick	1	WB	Comp	61% (48)
D	Female	7.45	10.50	Moderate	SP	Oldest of 2	Mother	1 / homemaker	1	WB	Comp	89% (36)
E	Male	10.73	14.97	Moderate	2P	Youngest of 5	Mother	*/victim support manager & unknown	<1	WB	Comp	78% (49)
F	Male	5.42	9.00	Severe	SP	Youngest of 2	Mother	2 / care practitioner	1	WB	F/U	94% (44)
G	Female	12.99	16.22	Mild	SP	Twin	Aunt	0 / warehouse person	<1	WB	Comp	89% (39)
H	Female	10.25	14.39	Moderate	2-P (step)	Only	Mother/ stepfather	1 / PA & office manager	2	WB	F/U	67% (48)
I	Male	12.69	17.29	Moderate	2-P	Only	Mother/child	* / prison officer & unknown	6	*	F/U	100% (56)
J	Male	9.03	14.25	Mild	2-P	Youngest of 2	Mother	* / business support asst & unknown	5	WB	F/U	95% (63)
K	Male	9.02	12.72	Severe	2-P	Only	Mother	2 / cover supervisor & electrician	1	WB	F/U	83% (44)
L	Female	10.61	13.72	Mild	2-P	Oldest of 4	Mother/father	1 / sales assistant & shop owner	5	Mixed	Comp	89% (37)
M	Female	10.01	14.65	Mild	2-P	Only	Mother/father/ child	2 / nurse & teacher	1	WB	F/U	94% (56)
N	**Male**	**14.47**	**18.64**	**Moderate**	**2-P**	**Youngest of 2**	**Mother**	**2 / homemaker & unknown**	**2**	**WB/I**	**D/O**	**6% (49)**
O	Female	10.14	14.86	Moderate	2-P	Twin	Mother	*/ homemaker & unknown	7	WB	F/U	83% (57)

[a] Mild obesity = BMI SDS 2.00-2.66; Moderate obesity = BMI SDS 2.67-3.34; Severe obesity = BMI SDS ≥ 3.35; [b] SP = single parent; 2-P = two parent; [c] Highest level of education between both parents 0 = none; 1 = secondary/vocational; 2 = professional/degree; * = two-parent family where second parent education unknown; [d] Postcode ranking according to the Indices of Multiple Deprivation for England 2010; <1 = 1% most deprived; 1 = 10% most deprived; 2 = 20% most deprived; 3 = 30% most deprived; 5 = 50% most deprived; 6 = 50% least deprived; 7 = 40% least deprived; [e] WB = Whiter British; Mixed = White British mother / Asian British and Pakistani father; WB/I = White British/White Irish; * = ethnicity unknown; [f] F/U = completed and attended 12-month follow up; Comp = completed but did not attend 12-month follow up; D/O = dropped out; [g] Number of months between starting GOALS and the follow-up interview

6.2.3 Protocol

Families were each visited in their home for approximately 1.5 hours. At the start of the visit, parents and children were given another opportunity to read the participant information sheet and were asked to sign written consent (parents) and assent (children) for their participation. Once consent was obtained, parents took part in a semi-structured interview in a private space in their home. Height, weight and abdominal circumference measures were taken from children and parents at the end of the visit (according to the protocol outlined in sections 4.2.3.1 and 4.2.3.2). To thank families for their participation, each parent received a £10 shopping voucher and each child a pedometer.

6.2.3.1 Semi-structured interviews

Interviews ranged from 23 to 72 minutes long, with an average duration of 53 minutes. A semi-structured guide was developed with four sections designed to address research questions 2 to 4 (see table 6.2). To allow participants' stories to flow interviews were conducted with a conversational tone whereby questions acknowledged, linked, and followed on from participant responses. Therefore the order in which the four topics were covered varied between interviews.

My role as researcher-practitioner. As the sole researcher in this study, it was important to consider the potential influence of my role as GOALS project manager on the interview process. On the one hand, the trust I had already established with families in this study was deemed a strength. People might be more comfortable inviting someone into their homes if they are known to them already, more willing to open up about sensitive topics (e.g. parenting) and the conversation deeper than it would be if the researcher were a stranger. Conversely, there was a concern that my "project manager" persona might lead participants to give socially desirable answers, or even to refuse participation if they felt their results would not be favourable for GOALS.

Throughout the study I considered the effects of my researcher-practitioner role, and recorded feelings, thoughts and experiences in a research log which I discussed regularly with the supervisory team. In both the written information and my verbal explanations, every effort was made to help participants recognise the importance of their contribution regardless of whether they felt GOALS had helped them.

Table 6.2 Interview guide mapped onto the research questions

Research Question	Interview section	Interview question/s	Prompts / probes
2. How do parents perceive participation in GOALS influences their child's life several years on, and how does this relate to child body composition change? **4. What processes are involved in sustaining long-term behaviour change for families who attend GOALS?**	Perceived child outcome from GOALS	Tell me about your child's life at the moment. On your reply card you say GOALS has made your child's life better / made it worse / not changed it. Tell me more about this. On your reply card you say your child has kept up changes to their physical activity/diet/become slimmer, how have they done this? OR You say your child hasn't managed to keep up changes to their physical activity/diet/they have continued to gain weight, what prevented them?	• How active are they? How is their diet? Are they happy? • Has GOALS influenced you and other family members? • For diet / PA / other - give me some examples of what has changed about... • If dropped out – what was your main reason for leaving the programme? • What role have your child's friends and family played in helping / preventing them leading a healthy lifestyle? • Have you received any support from the GOALS team since leaving GOALS? If so, what type of support (e.g. Move It sessions, telephone, research projects)? How could the support provided have been improved? • If you hadn't have been to GOALS, how do you think things would be now?
3. What parental psychosocial factors are associated with positive long-term outcomes for children who attend GOALS?	Parent's own weight diet, and physical activity	Tell me about your diet. Tell me about your physical activity. Tell me about your relationship with weight. (If not covered yet) you say on your reply card you kept up changes to your physical activity/diet/became slimmer, how have you done this? OR You say you haven't managed to keep up changes to your physical activity/diet/you have continued to gain weight, what prevented you?	• How would you describe your relationship with food? Do you eat regular meals? Would you consider your diet healthy? Did your diet change as a result of GOALS? • How active do you consider yourself? Do you enjoy physical activity? What have your past experiences of exercise and sport been like? Did your physical activity change as a result of GOALS? • Is your weight important to you? How do you control it? Are you currently happy with your weight? How do you feel when you are not happy with your weight? Do you have a history of losing or gaining a lot of weight? Did your relationship with weight change as a result of GOALS? • How do you feel your attitudes have affected your child's weight management?

Research Question	Interview section	Interview question/s	Prompts / probes
	Approach to child weight	Do you remember what your main reason was for joining GOALS and what you hoped to get out of it? Do you remember how you felt when you finished GOALS?	• At the time, why did you think your child was overweight? Is your view on this still the same? (if not, what part did GOALS play?) How important is your child's weight to you? • At the time, which family members did you feel should take part in the lifestyle change process? Is your view on this still the same? Which family members did actually make lifestyle changes? • Looking back, would you change anything about the way you approached your child's weight issue? And the way you approached GOALS?
Continued from previous page ***(3. What parental psychosocial factors are associated with positive long-term outcomes for children who attend GOALS?)***	Parenting style	How often do you talk with your child about their weight, diet or physical activity? Tell me about good or bad food habits in your family Tell me about good or bad physical activity habits in your family Tell me about the way you communicate with your child Did going to GOALS change your relationship with your child in any way?	• How would you describe these conversations? If your child was upset about their weight how would you deal with it? Does physical activity, food & weight cause arguments in your family? • What do you feel your role is as a parent when it comes to food? Do you have any "food rules"? Who makes these rules? What do you do if your child breaks these? Who chooses what your child eats? • What do you feel your role is as a parent when it comes to physical activity? Do you have any "physical activity rules"? Who makes these rules? What do you do if your child breaks these? Who chooses what physical activity your child does? • For example, how do you deal with a situation where your child misbehaves? Do you get angry? • If you threaten to do something, do you always follow it through? How often do you "give in" to your child? • Do you ever spoil your child?

As an experienced qualitative researcher with training in basic counselling skills, I was able to listen actively, show empathy and communicate in a non-judgemental manner to allow participants to feel at ease. Throughout the research process I sought to achieve a fair and trusting relationship with participants, enhancing the authenticity of our shared interview experience. If a participant was not comfortable answering a question, they were not required to do so. Throughout each interview, I paraphrased and probed to check my understanding of participant meaning and challenge my assumptions. This quest for fidelity continued throughout the analysis and interpretation process by allowing my post-interview perceptions to be challenged by what the words themselves were saying. For *"it is an increasingly common pattern in our culture for each one of us to believe, 'every other person must feel and think and believe the same as I do'"* (Rogers, 1961 in Kirschenbaum & Henderson, 1990, p.22). Recognition of this human tendency was crucial in reaching an understanding that went beyond what I expected to find.

6.2.4 Analysis

Mean differences between baseline and follow-up body composition measures were calculated. All interview data was transcribed verbatim, anonymised and entered into NVivo version 9.2 for analysis. Throughout the analysis process, I met with the supervisory team to triangulate emerging concepts and discuss the most appropriate methods for presentation. Two stages of analysis were conducted: *psychosocial profiles of families* and *cross-case processes of change.*

6.2.4.1 Psychosocial profiles of families

To explore the psychosocial factors associated with positive long-term outcomes, a standard cross-case interpretative analysis (e.g. content analysis, thematic analysis, framework analysis) was not deemed appropriate. Instead a unique method for analysis and representation was developed, drawing on the pen profile framework used by the Department of Health in their Consumer Insight Summary (2008). The method aimed to enhance the usability of findings for practitioners and policy-makers by creating psychosocial profiles of families with different long-term (perceived) outcomes. Each transcript was first read as a whole and concepts relevant to research questions 2-4 extracted, creating a profile for each family of their *perceived success, parent relationship with weight, diet and physical activity, approach to child weight issue* and *parenting style.* In creating each profile, meaning was drawn both from micro-units of discourse (e.g. individual utterances or accounts of experiences) and from the broader context of the interview. For example, the same concept may have arisen at several points in the interview and it

was important in gauging understanding that these micro-units were not extracted in isolation. The 15 profiles were then compared and contrasted to look for similarities in perceived "success" and the behaviour change journey, all the time referring back to original transcripts to verify emerging concepts. On the basis of this analysis "clusters" of families were formed and a summary for each cluster was created to highlight the psychosocial factors that characterised each group of families.

6.2.4.2 Cross-case processes of change

Behavioural change strategies were extracted from each interview transcript and entered into an Excel spreadsheet as a list. Where two entries represented the same concept they were collapsed into one broader theme. This process of collapsing into broader themes continued until saturation was reached (i.e. each remaining entry was distinct from the others). Family and cluster codes were logged against each theme to determine which clusters had referred to each process as a means of helping their behaviour change. From this it was possible to distinguish those behaviours practiced by the sample as a whole from those behaviours practiced only by the clusters who had maintained their behaviour change.

6.3 Findings

6.3.1 Reply cards

6.3.1.1 Families who returned reply cards but opted not to take part (n=6)

Of the six families who returned reply cards but opted not to take part in the interviews and measurements, four (three of whom completed, the other attended only 2/18 sessions) said GOALS had made their child's life better, saying their child had maintained some healthy changes and had become slimmer or was a healthy weight. Two families however (one completed, one attended only 3/18 sessions) said GOALS had made no difference, their child had gone back to their old habits and was the same or bigger than they were before GOALS.

6.3.1.2 Families who were interviewed (n=15)

For the families who were interviewed, the reply cards were used as a discussion point to further understand their perceived outcomes from GOALS. In some cases, a new understanding emerged through the interaction of the interview that did not match the multiple choice responses provided on the reply cards. For example, in response to the question "how has taking part in GOALS affected your child's life?",

family G ticked "it's made my child's life better" but through the interview it emerged GOALS had made little difference. Conversely, family M ticked "it's made no difference" but during the interview acknowledged this probably did not do it justice and spoke of many ways in which GOALS had improved their lives. Therefore for the families who were interviewed, I did not feel it appropriate to present reply card data in isolation of the surrounding context. Instead, the reply card responses were used to triangulate with the interview data to give a more complete understanding of each family's perceptions.

6.3.2 Child and parent body composition change

6.3.2.1 Family who dropped out (n=1)

The child from family N attended GOALS only once with his mother when he was 14 years old. He was moderately obese at the time (BMI SDS 3.33; abdomen-to-height ratio 0.69). At follow-up when he was 18-years old, his BMI SDS had dropped to 1.79 (a change of -1.54) and his abdomen-to-height ratio to 0.54 (a change of -0.15). His mother was overweight, with a BMI of 29.15 at baseline that had reduced to 25.83 at follow-up (a change of -3.32).

6.3.2.2 Completed families (n=14)

Mean child BMI SDS reduced from 2.96 $\pm$ 0.71 pre-intervention to 2.49 $\pm$ 0.78 at follow-up, with a mean change of -0.47 (range -1.75 (Family I) to 0.35 (Family A[11])). Of the 14 children measured, 11 had a lower BMI SDS at follow-up than pre-intervention and 8 had a lower abdomen-to-height ratio. The mean change in abdomen-to-height ratio was -0.03 (range -0.19 (Family I) to 0.12 (Family A)). Mean BMI SDS change from pre- to post-intervention for this sub-sample (-0.09 $\pm$ 0.17) was comparable to the study 1 population (see section 4.3.3.1).

Mean parent BMI reduced marginally from 32.98 $\pm$ 8.10 to 32.16 $\pm$ 8.37, with a mean change of -0.82 (range -10.71 (Family B) to 3.64 (Family D)). 8/14 parents had a lower BMI at follow-up than pre-intervention, and 10 had a lower abdomen-to-height ratio (mean change -0.03, range -0.14 (Family B) to 0.04 (Family I)).

[11] Although family A had the most negative BMI SDS response from pre-intervention to follow-up, this was mostly due to the increase that occurred while the child was attending GOALS (0.32), with an increase of only 0.03 in the three and a half years that had elapsed since GOALS finished.

6.3.2.3 Association between BMI SDS change and time since baseline

There was a strong positive correlation between the magnitude of BMI SDS change from pre-intervention to follow-up and the months that had elapsed during this time ($r = -0.563$; $p=0.029$), with those who had attended GOALS the longest time ago demonstrating the greatest reduction in BMI SDS. It was also notable that the four children with the lowest BMI SDS at follow-up were those for whom the longest time had elapsed since baseline (families M, I, J, O; BMI SDS range 1.39 to 1.71).

6.3.3 Interview data

Fifteen families were interviewed (see table 6.1). All had completed the full GOALS intervention except one family (family N) who dropped out. Findings are presented in two sections. *Section 6.3.3.1* addresses families' perceptions of the long-term outcomes from GOALS (research question 2) and explores the psychosocial factors associated with different perceived outcomes (research questions 3 and 4). *Section 6.3.3.2* presents a cross-case analysis to explore the processes that helped families maintain behavioural changes (research question 4).

6.3.3.1 Perceived long-term outcomes of GOALS and psychosocial factors associated with different perceived outcomes

There was much heterogeneity in the perceived long-term outcomes from GOALS. Family profiles were analysed according to *perceived* outcomes, which did not always relate to the child's *actual* weight outcomes. Six clusters of families emerged, based on similarity of "perceived success" (child outcome, changes made and maintained, and the role GOALS played in the process). Table 6.3 shows the defining characteristics and families belonging to each cluster. Clusters 1-4 (9 families) made and maintained changes following participation in GOALS but their perceived child outcome, magnitude of changes and how they occurred varied. Cluster 5 (2 families) maintained some changes since GOALS, but struggled to keep others up. Cluster 6 (4 families) made few changes as a result of GOALS and felt it had little impact.

Table 6.3 Main cluster features related to perceived outcomes and parental characteristics. FU = follow-up; PA = physical activity

Cluster (families)	Child sex	Child age at FU (mean months since baseline)	Child BMI SDS		Perceived success			Mother or main carer relationship with weight and related behaviours	Approach to child weight issue		Parenting style
			Mean change (pre- to FU)	*Mean at FU*	*Child outcome*	*Lifestyle changes (PA and diet)*	*Role played by GOALS*		*Parental concern*	*Perceived causes*	
1 (I & J)	Male	14-17 years (59.5)	-1.17	1.47	Very positive	Small gradual changes maintained	Life-changing	Positive attitude to healthy eating and PA, maintain discipline through long-term attendance at Weight Watchers	Very important at time, but never made it a big issue	Internal and external	Authoritative
2 (B & C)	Both	13-14 years (43)	-0.51	2.84	Very positive	Big changes maintained over last couple of years	Enabled life-changing processes	Always battled with weight, had a "wake-up call" and now established healthy relationship with food and PA	Very important	Internal (external in past)	Authoritative, (with permissive aspects in past)
3 (L, M & O)	Female	13-14 years (50)	-0.60	1.77	Positive	Small gradual changes maintained	Raised awareness	Positive attitude to healthy eating and PA, but "could do better" at times	Important without "over-taking"	Internal and external	Authoritative
4 (A & F)	Both	9 years (46)	-0.33	3.63	Some positives, but still struggles	Big changes maintained	Life-changing	Eats healthily and is physically active, primarily for child's sake	Extremely important – rules daily life	Mostly external, some internal	Authoritative, permissive & authoritarian aspects
5 (E & K)	Male	12-14 years (46.5)	-0.18	2.90	Some positives, not there yet	Kept up some changes, others have lapsed	Made a positive difference	Weight been up and down all of life, wants to lose it but easier said than done	Important in relation to child happiness and health	Internal (external in past)	Mixed
6 (D, G, H & N)	Both	10,14,16, 18 years (43)	-0.49	2.43	Mixed	Made few changes	Little impact	Battled with weight all of life, "fits and starts" of healthy eating and PA	Not overly important, but wants child to be happy and healthy	Mostly external, some internal	Authoritative, permissive & authoritarian aspects

In the section that follows the key psychosocial characteristics of each cluster are described under four headings, as pre-determined by the interview structure:

- *Perceived success:* child outcome, magnitude of changes and how they occurred, impact of GOALS
- *Approach to child weight issue:* importance of addressing child weight, perceived causes of child weight (internally or externally controlled)
- *Mother/main carer relationship with weight and related behaviours:* parent/s weight history, diet and physical activity attitudes and behaviours
- *Parenting style:* behaviours demonstrating aspects of Baumrind's (1966) parenting typologies (see section 2.2.2.1 for an explanation of these typologies)

Each summary is supported by a figure that illustrates the cluster characteristics with verbatim participant quotes. Each quote is anonymised and labelled by the participant's position in the family (e.g. mother, father, child) and the family they belong to (e.g. A,B).

Cluster 1 (figure 6.2)

Perceived success. GOALS was perceived to be life-changing and mothers were very positive about the impact it had both on their child's lifestyle and their child's body composition. They had maintained small, gradual dietary changes (e.g. making packed lunches healthier, switching to lower fat milk, reading food labels) and both boys had become very active (e.g. training with an athletics club, going to the gym, playing rugby, badminton, football). Mothers felt GOALS had come along at the right time and was a turning point in their child's future. When GOALS finished both mothers were confident they would keep the changes up, and felt there was little need for any further support from the programme.

Approach to child weight issue. These families joined GOALS because both mothers knew they "had to do something" to help their sons. Changes occurred almost effortlessly and the child's weight was never made into a big issue. Mothers perceived a variety of external (e.g. other members of the family being "like that" at the child's age) and internal (e.g. not doing enough physical activity and eating too much) reasons for the child becoming overweight.

Mother/main carer relationship with weight and related behaviours. Both mothers had a positive attitude to healthy eating and physical activity but a propensity to snack on unhealthy foods if they were available to them. They were the most consistently active mothers from the sample, and both had improved their physical activity through GOALS. They both attended Weight Watchers as a long-term support mechanism to keep them disciplined.

Parenting style. Both mothers described aspects of an authoritative parenting style, such as granting their child autonomy, demonstrating openness and encouragement, and monitoring change to ensure things did not slip. Regulation was rarely needed for these children, for their motivation was a key factor in maintaining changes.

Cluster 1 (families I & J)

Perceived Success

Very positive child outcome

He just feels much happier…because he's lost the weight and he's grown taller, he's just happy about him (mother, J)

Small gradual changes maintained

The great way that you did it was by weaning him off slowly… this week maybe have a pack [of crisps] *less… next week have a little bit less and it came to the point where he didn't really miss them* (mother, J)

He doesn't have toast with butter on…he has fruit now instead of that and he has that ice cream now or an ice pop rather than that, it was easy, it was effortless (mother, I)

GOALS came at the right time and was a life-changing experience; happy with it ending when it did

GOALS sort of was at the right time and was the saving grace really to change the path that [my son] *was going on. Had it not been there I don't know what would have happened really* (mother, I)

Approach to child weight

Very important at time, but never made it a big issue

I knew how it was affecting [my son]. *I had to find some way of stopping the rot - things had to change. And there was a big article in the Liverpool Echo about GOALS and about this boy…and when I read it I thought it sounds like* [my son]… *the timing was just amazing, it was meant to happen* (mother, J)

Being an overweight child was never made into an issue… because he was only a little boy really… and I didn't want that to be an issue but knew if it carried on it would have been (mother, I)

Internal and external causes

I think some of it's got to be [hereditary] *because you know thinner girls have thinner mums… so it's going to be about your make up hasn't it some of it…but then you have to take control of another big chunk of it yourself don't you* (mother, I)

Mother/main carer relationship with weight, diet & PA

Positive attitude to healthy eating and PA, maintain discipline through long-term attendance at Weight Watchers

It's just a little hobby that I have going - the Weight Watchers and trying to lose weight - I've always done that really so if I can get a few more tips then all well and good…but the main thing was [my son] *without a shadow of a doubt* (mother, I)

I could quite easily sit and eat a huge chunk of fruitcake, Christmas cake, mince pies - stuff like that…I've got to be really strict and say no sometimes - I don't have them because I can't trust myself… in a way I need the discipline of going to Weightwatchers to be weighed (mother, J)

It [my weight] *doesn't really bother me a great deal, but I do go the Weight Watchers and I do go to my Zumba and I do go the gym and eat healthy* (mother, I)

Parenting style

Authoritative

Connection

We've always been dead close (mother, I)

Regulation

Just kind of monitoring it you know… "it's alright to have that but maybe not too often…or you've had that this week so maybe, you know… don't want that again" (mother, J)

He's just done this Kenya thing that would a cost a lot of money…which my mum and myself maybe could have got the money and paid out, but he had to earn it (mother, I)

Autonomy granting

He's very careful about what he eats, remember a couple of years ago and we were going on holiday…so I'm in the airport "well I can eat whatever I want it's holiday, I'm having chocolate"…[child responds] *"you may not be watching your figure but I'm watching mine"…and he's like this little devil on my shoulder stopping me from being naughty…he's just so disciplined* (mother, I)

Figure 6.2 Psychosocial characteristics of cluster 1

Cluster 2 (figure 6.3)

Perceived success. Whilst parents felt GOALS was instrumental in their change process, things did not "click into place" for some time after the intervention finished. But when change did occur it was overwhelmingly positive; mother and child were going through the weight-loss process together and both families spoke about healthy eating and physical activity as a way of life. Children were physically active (one excelling in rugby, the other enjoying the gym and dancing with friends) and in control of their eating. When they left GOALS, neither family attended their follow up and – whilst one parent felt it would have been good for the Move It sessions to continue – the other felt they needed time to come away and do it themselves.

Approach to child weight issue. Parents actively sought help for their children through their doctors. Their child's weight issue was of extreme concern because neither wanted their child to go through life the way they had. Whilst in the past they had attributed their child's weight to external factors (e.g. being big built) they now blamed themselves, expressing shame and regret for the behaviours that had perpetuated their child's obesity (e.g. feeding their child to keep them happy).

Mother/main carer relationship with weight and related behaviours. Having been a battle all their lives, weight was an emotive issue for these mothers. During the years that followed GOALS both hit "rock bottom" and went through a psychological shift, waking up to the fact they needed to change for their child. Both mothers had since lost weight and their relationship with food was better than it had ever been.

Parenting style. Although both families now described practices associated with an authoritative style they described permissive tendencies in the past, giving examples of behaviours they associated with love and protection at the time that they now believed had been "killing" their children.

Cluster 2 (families B & C)

Perceived Success

Very positive child outcome

It's a different kid four years ago totally… I mean even some of the kids in his [rugby] *team, his match fitness he can run rings round them and can stay on the pitch for a couple of hours and when they're on track jog past them and little skinny kids who you know are out of breath before him* (mother, C)

Now she goes to gym, she goes to dance, she goes out with all her friends, she goes ice-skating…but back then she never done nothing…because she never had the confidence to go and do it (mother, B)

Big changes maintained over last couple of years

It kind of all just clicked into place… especially the last couple of years (mother, C)

GOALS equipped them with the knowledge, skills and awareness that enabled them to change their lives; happy with it ending when it did

I don't care what anyone says you do need a kickstart … to make you aware and to educate yourself on what you're doing (mother, B)

Approach to child weight

Very important issue – sought help to prevent child going through the same negative experiences the mothers had all their lives

I don't want to go back where I was and I don't want her to either. I want her to be happy in her life and, I don't care what anyone says, if you've got weight on you you're not happy - it makes you miserable, it makes you lazy (mother, B)

Used to attribute weight to external causes, now blame themselves (internal)

I think we were basically slowly killing him if I look back on it (father, C)

We let him down big time in not taking control of that sooner and letting him get to that state… he was always a chubby child anyway wasn't he from the day he was born… but we couldn't keep making that the excuse (mother, C)

When she was in primary school or junior school I'd pick her up with a bar of chocolate in my pocket… and I'm so sorry I done that because it was me that give her the habits of eating that junk (mother, B)

Mother/main carer relationship with weight, diet & PA

Always battled with weight, had a "wake-up call" and now established healthy relationship with food and physical activity

I knew I'd hit that rock bottom when I looked at myself in that mirror…and I thought God you're so big and you're going bigger and bigger and bigger…and I thought I can't do this, I feel so ashamed… I've got to think of there's only me in my kid's lives. I was overweight, I was unhealthy. What if I died? Who'd look after my kids? They'd have no one…it was a wake-up call for me (mother, B)

I have a good relationship with food now…I didn't used to think about what I ate really much to be honest…then I kind of hit 40 had a bit of a breakdown…and then I just thought no I need to start watching what's going on and what I'm eating and you know… (mother, C)

I thought I can't be on to him about food all the time if I want to sit there and eat a load of rubbish (mother, C)

Parenting style

Authoritative, with permissive aspects in past

Current authoritative aspects

I always tell my kids every single day I love them and how gorgeous they are (mother, B)

He makes them choices himself now certainly if he was making the wrong ones this time I would make sure that we just re-educated him slightly but he's not doing that 'cos he's being healthy and his rugby means too much…that's a real positive (mother, C)

Past permissive aspects

If it made life easier for [him] *to not be kicking off over that other packet of crisps or some more pudding or cake he wants then we just did give it to him and it's horrible to think that we done that* (mother, C)

I used to think that by buying sweets I was treating them, but I wasn't I was killing them - I was killing them with kindness (mother, B)

Figure 6.3 Psychosocial characteristics of cluster 2

Cluster 3 (figure 6.4)

Perceived success. Families already led a relatively healthy lifestyle, and as such felt there were few changes to be made. GOALS did, however, raise awareness of issues that might otherwise have escalated to something more serious. All children were doing some form of regular physical activity, had a healthy relationship with food and were now happy in themselves and with their body size[12]. Small changes were made as a family (e.g. reducing portion sizes) and were kept up.

Approach to child's weight issue. Although their child's weight had not been an issue, once it was brought to their attention (through weighing and measuring in schools) parents were committed to solving the issue. Fathers expressed disbelief that their daughter was overweight, whilst mothers were upset and expressed concern. Both external (e.g. genes) and internal (e.g. over-sized portions) potential causes of the child's weight were cited.

Mother/main carer relationship with weight and related behaviours. Within all households, active and healthy living was encouraged without making it an issue. Mothers were characterised by phases of eating healthily and being active, acknowledging they "could do better" at times.

Parenting style. Parents described predominantly authoritative parenting approaches, displaying warmth and connection (e.g. talking through a child's weight concerns), setting reasoned boundaries (e.g. cooking only one meal at tea-time), and giving children some responsibility for their healthy living (e.g. planning meals together).

[12] For child M the initial effect of GOALS was negative. She described her shock at finding out she was obese and realising she was "massive", which in turn led her to comfort eat. She hated GOALS for making weight an issue and for turning previously enjoyable activities (e.g. dance, ju-jitsu) into chores. Whilst these perceptions stayed with the child for several years, she had since lost weight, regained her confidence and begun to enjoy exercise. Despite the negative effects at the time, both the child and her parents felt GOALS had made a positive impact on their lives and their lifestyle was now improved as a result.

Cluster 3 (families L, M & O)

Perceived Success

Positive child outcome

I'm feeling loads better now about myself… I used to hate exercise, like really hate it, but now it's a lot more fun …I've cut back on like eating loads…and I don't have to eat everything on my plate, I can leave bits and it's ok (child, M)

Small gradual changes maintained

What it made me do is think about lots of little things that I was doing and maybe just change them a little bit…you don't feel then as if you've done some major life overhaul but they just impact slowly on what's going on (mother, O)

Already led a fairly healthy lifestyle, but GOALS raised their awareness about their child's weight issue, eating and physical activity

She walks to school rather than gets the bus and just little things like that which all makes the difference…as to her diet… I think she's just a bit more aware of what she's eating (mother, L)

I don't think without GOALS I'd have recognised that my child was overweight (mother, M)

Approach to child weight

Important without "over-taking": was never considered an issue before they received the invite to GOALS

Do you know what I thought when I got the letter – "cheeky bastards, me daughter's not overweight at all, they've got a cheek haven't they, you know she's healthy she's fine"…it wasn't an issue on our side (father, L)

She's conscious of it but she doesn't let it overtake her…what she does do is kind of be positive about it rather than dwell on it (mother, O)

Internal and external causes

When she was young she used to drink a lot of milk …and I do think that that's where the… weight developed from (mother, L)

She'd spent all her life with skinny twig twin sister…virtually more or less eating the same food… …what GOALS did it sort of made her realise "yes, it's not really my fault…it's partly my fault, there are things I can do - but at the same time I'm never gonna be one of those people who's stick thin." (mother, O)

Mother/main carer relationship with weight, diet & PA

Positive attitude to healthy eating and PA, but "could do better" at times

I wouldn't say I've got the best diet in the world but I'm always planning to change it and every so often I'll have a bit of a health kick (mother, O)

There are times…where I'll have done a long stint in work and I'll have ate nothing but biscuits and cakes…and then I'll have time off… I still do eat bigger portions than the average person I should imagine but I eat regularly - I'll have breakfast, lunch and tea and I lose weight. Although I'm eating more it's because I'm eating the right foods and not just a carbohydrate hit (mother, M)

He'll [5-year old son] *say to me…"mum you'll go fat again, are you gonna go on your running machine? Are you gonna start doing your exercises again?"* (mother, L)

Parenting style

Authoritative

Connection

There then comes this changeover point as they come into the teenage [years] *- physically they don't really need you…'cos I mean they can prepare their own lunch… they can actually do things for themselves. But emotionally I think as teenagers they actually need you almost more* (mother, O)

Regulation

The children aren't fussy, they're not these kids who go "I'm not eating that"… and this is where I dig my heels in - I cook one meal and we're all eating the same (mother, L)

Autonomy granting

I haven't pushed you into it [running] *because I want you to choose…when you want to come out* (father, M – to daughter)

Figure 6.4 Psychosocial characteristics of cluster 3

Cluster 4 (figure 6.5)

Perceived success. Parents felt frustrated they were doing all they could to help their child yet the obesity was still a major concern (both children had experienced bullying at school, continence issues and behavioural or psychological difficulties). This cluster, however, made and sustained the most dramatic changes and parents viewed GOALS as life-changing. They stopped buying "junk" food, reduced portion sizes and were eating a healthy diet of fresh foods. For one family, physical activity (e.g. gym, swimming, football) had become a daily priority. Both mothers felt they would have benefited from continued support from GOALS.

Approach to child weight issue. Perceived causes of child weight were mixed. One mother put it down to how much her daughter used to eat (internal), the other felt her son had always been big and there was a genetic element to it (external). Parents' daily lives were ruled by efforts to manage the child's weight, both to help their child now (e.g. psychological issues) and in the future (e.g. preventing obesity-related co-morbidities).

Mother/main carer relationship with weight and related behaviours. When their child was referred to GOALS by the school nurse, mothers (healthy and overweight respectively) were surprised they were also expected to make lifestyle changes. Through GOALS they developed a healthy relationship with physical activity and food, motivated by the ongoing need to help their child.

Parenting style. Both mothers described authoritative (e.g. talking things through with child), permissive (e.g. rewarding child with food) and authoritarian (e.g. getting angry with the child) elements, though appeared to have become more authoritative since attending GOALS. This was particularly the case for one mother who had received parenting education for her son's behavioural issues.

Cluster 4 (families A & F)

Perceived Success

Some positive changes for child, but still struggles with their weight

Even though it hasn't changed physically - I think mentally it's doing something for him…it makes him feel good as well when he exercises (mother, F)

The children in school are skitting her because like they're saying she's fat - she's told the doctors in Alder Hey that she wants to kill herself (mother, A)

Big changes maintained

I've stopped all buying chippy stuff and things but I used to buy them like every other day or maybe like three times a week but now I don't even buy them once… I either use all my frozen stuff or tinned stuff or I make my own stuff… what's left I put in the cartons I put in the freezer (mother, A)

GOALS seen as a life-changing experience; would have liked regular support to continue

If I probably hadn't gone to GOALS then I probably would have just given up anyway and gone "oh forget it, he's probably just going to put weight on he's just going to be like that" - so it has changed his life (mother, F)

Approach to child weight

Extremely important – rules daily life; initially expected GOALS to be for child only

I don't want her getting ill you know I don't want her in hospital with [diabetes] *and, you know, you see all these girls on the telly getting all operations by getting all the fat taken away* (mother, A)

When I started GOALS… you said the parents get weighed as well…I wasn't expecting that because I wasn't thinking of me losing weight - I was thinking of me going and [my son] *doing the work and me getting told I was to help* [my son] (mother, F)

Mostly external, some internal causes

'cos she was eating quite a lot you know she eats and eats and eats and eats… I used to like buy loads of packets of biscuits and crisps…but all that's stopped now, I don't bring anything in - I just bring all the healthy stuff (mother, A)

I think it's all down to genetics with his weight anyway because I'm doing everything I'm doing and if I wasn't doing that he'd be 5 stone heavier than he his… he's just not losing the weight,I'm putting the exercise in, I'm putting everything else in and he just keeps gaining and gaining (mother, F)

Mother/main carer relationship with weight, diet & PA

Eats healthily and is physically active, primarily for child's sake

If I hadn't have had the problem with [my son]*...then I'd have probably been one of them… "let's try this diet, let's go to Weight Watchers"… it's constantly every day isn't it 'cos I have to watch what I eat and it's the exercise* (mother, F)

It's just basically…what yous have told me what to do, you know…and basically keep the activities up - it's just remembering everything and putting everything in order. Well it's the activities, the dinners, the swimming, the dancing - it's just like putting everything in place each day and basically that's how come I've…kept all this going you know for [my daughter] *and myself really* (mother, A)

Parenting style

Authoritative, permissive, authoritarian aspects but have changed some practices over time

Authoritative

I think [my daughter] *doesn't like me sometimes for doing it* [restricting "treats"]*… "but I'm not cruel because I'm watching your weight, plus I'm watching myself" I say," I'd love to eat them all…and then the next day you put on loads of calories"… I said "we don't want that"* (mother, A)

Permissive - authoritarian

At first I was just…basically letting her do what she wants, but because I've gone to GOALS and now I know… I've found that if I blackmail her with a friend she will do certain stuff for me… if I say "oh I'm not having your friends in tomorrow because you won't help me" it gets on her nerves (mother, A)

I probably used to when I get annoyed with him shout at him and whatever and go "grrrr!" but it just made it a 100 times worse - the only way to affect [my son] *is now by saying horribly "I'm not taking you the gym tomorrow"* (mother, F)

Figure 6.5 Psychosocial characteristics of cluster 4

Cluster 5 (figure 6.6)

Perceived success. Families had positive outcomes during GOALS but they missed the regular support when it finished and their lifestyles had gone in "fits and starts" since. The children were still more active, however, and some dietary changes were maintained (e.g. eating breakfast, cooking from fresh, eating fewer takeaways, eating more fruit and vegetables). Both children had lost weight in the weeks preceding the interview (one through Slimming World, the other through the family's recent health kick) and, while they were more confident than they used to be, mothers thought the children would be happier if they lost more weight.

Approach to child weight issue. It was easy at the time to attribute the child's weight to external causes (e.g. having the "family's frame"), but both mothers could now see why their son was overweight (e.g. "eating loads of crap" and not getting enough exercise). While it was important for their child to lose weight, both were conscious of the psychological risks of focussing too much on weight.

Mother/main carer relationship with weight and related behaviours. For the mothers in this cluster, their weight had been up and down all their life. One mother described herself as an "emotional eater" with a "not very good" relationship with food, the other married at 18 years then it was "baby after baby" so exercise was just a "no go". Both recognised the need to lose weight, but knew it was easier said than done. Their weight battle was made harder by depression, assaults at work and health issues in the previous 10 years.

Parenting style. The parenting styles of these mothers were mixed. Whilst both described authoritative aspects (e.g. encouraging their child to take responsibility for their healthy lifestyles), one mother also made reference to authoritarian (e.g. threatening physical punishment) and permissive tendencies (e.g. spoiling child).

Cluster 5 (families E & K)

Perceived Success

Some positive outcomes for child, but not yet where they'd like to be

Since he's gone to secondary school things have changed… he's done a lot of football, he does rugby and he's lost a lot of weight…I wouldn't say he's happy with himself, but I'd say if he lost a little bit more weight I think he'd be happier (mother, E)

Kept up some changes, others have lapsed – go through "fits and starts"

I've always had breakfast since GOALS whereas I never had breakfast full stop (mother, E)

We would start eating the wrong things… and then we'd knock it on the head and then we'd go for like a good months and months…and then it would start slipping again. But then…because of the GOALS we realised a lot easier. (mother, K)

GOALS made a positive difference, would have liked regular support to continue

I did feel like it had done us good but as I said I just felt really sad it was over - it would have been nice to have carried it all on (mother, K)

Approach to child weight

Important in as far as it relates to child health and happiness, but fear of over-emphasising it

While I want [my son] *to lose weight I don't want him to become paranoid about it, because there is a lot of boys now who've become anorexic and I don't want it to happen to him* (mother, K)

Mostly internal, some external causes

If I had a baby now…where you give the baby a biscuit, I wouldn't I'd give them a piece of apple. I'd just change the routine and what they're actually eating because my motto was…"as long as he's eating, I know he's healthy" and that was the way I used to think…because we've always had [my older son] *who's never ate… when* [my younger son] *come along and eat anything we were just happy.* (mother, E)

It was my fault…I mean since he was a baby he's always been a hungry…and I used to just give it to him…he used to have a bottle every 2 hours…he was drinking 7 ounces every 2 hours (mother, K)

Mother/main carer relationship with weight, diet & PA

Weight been up and down all of life, wants to lose it but easier said than done

I'm a comfort eater. When I'm upset I eat all the wrong things and I know I eat too much because my portion sizes sometimes can be big… basically I've been struggling with my weight all my life. I'm 45 in January…officially middle-aged and I want to lose it because basically I don't want to die young...but as I said it's easier said than done… the mind is willing but the body's weak…the mind's weak sometimes as well. (mother, K)

My weight's just gone up and down, up and down…it was only I went the hospital 3 weeks ago to the women's [hospital] *and I need an operation and they said they can't do it…the doctor said my BMI had gone from 35 to 41 then I thought no that's out of order now so I know myself I had to change* (mother, E)

Parenting style

Both displayed some authoritative aspects, one mother also some authoritarian and permissive tendencies

Authoritative

One kid used to always call him "fatty" and I'd say so what did you do…I'd say well that kid might have something…something different about him - everyone's not the same, we've all got different shapes, bodies, sizes and we'd go over it that way and he'd feel happier (mother E)

Authoritarian

I actually said to him "don't you ever speak to me like that again, I'm putting up with it from the little gets in work I'm not putting up with it from you. Because don't forget I'm your mother and I could physically punish you if I want to…I've got no problem smacking you if I need to". And he went "I know". But I don't need to I just have to shout. (mother, K)

Permissive

If he asks for something and if we've got the money he knows that he probably will get it (mother, K)

Figure 6.6 Psychosocial characteristics of cluster 5

Cluster 6 (figure 6.7)

Perceived success. Families had a good idea of what they "should" be doing, but lacked the motivation to do it consistently. They enjoyed GOALS at the time but it had little impact on their lives. They felt there was little else the intervention could have done to support them, for they knew what to do - it was up to them to make the changes. Three families however felt GOALS had made them more aware of healthy eating and gave examples of positive dietary practices (e.g. limiting portions, planning meals, eating fruit and vegetables). The other family only attended one session of GOALS because it was too far to travel, however the child had since lost weight himself. Perceived child outcomes varied within the cluster.

Approach to child weight issue. Parents were unsure about the causes of their child's weight issue, citing both external factors (e.g. feeling unable to control whether child lost or put on weight) and internal factors (e.g. recognising it is their choice what their child was eating). The child's weight was deemed important in as far as they were healthy and happy in themselves, and GOALS was seen as something they would try out to see if it helped.

Mother/main carer relationship with weight and related behaviours. For these mothers, their weight had been up and down all their lives. They were not "not happy" with their weight, yet recognised they "should do more" for their children's sake. Their dietary habits varied from fussy eating and liking all the "wrong things", to constantly craving food, to episodes of skipping meals and bingeing.

Parenting style. Parents described practices of an authoritative (e.g. monitoring intake), permissive (e.g. giving in "for an easier life") and authoritarian (e.g. "screaming" at child) nature. For two of the families promoting healthy eating was a constant "battle", the children protested against the food they were being given (but ate it anyway) and were constantly "in the cupboards" looking for snacks.

Cluster 6 (families D, G, H & N)

Perceived Success

Mixed child outcomes

Her diet's the same…she's cut out the crisps but she'll still go in the cupboard and help herself to whatever else is in there (mother, D)

Made few changes as a result of GOALS, aware of what to do in "theory" but difficult to put into practice

I wouldn't suggest that there was anything when we went to GOALS that was Earth-shattering…the good intentions were already in there it's just that sometimes…you don't necessarily run along that path (father, H)

GOALS was a positive experience at the time, but had no lasting impact; there was little more GOALS could have done to support them

I think she did enjoy it but I don't know if anything stayed with her or not (aunt, G)

Even if you had a person appointed to you to keep a check on you chances are…people just go their own way and do their own thing…a lot of these things are inbuilt aren't they (mother, N)

Approach to child weight

Not overly important, but wants child to be happy and healthy – laid back approach to GOALS, thought they would try it out and it might help

I thought…it wouldn't have done [my son] *any harm* [to] *sort of get a check on his weight…and probably myself - I was probably a bit overweight then aswell, so that was about it really* (mother, N)

I think now she's getting older it's getting more and more important… you can get away with it when [they're] *younger… I'd rather catch it now and do something about it now before she does start secondary school* (mother, D)

Mostly external, some internal causes

She'd go through phases where she'd seem to be a lot overweight and then she'd kind of lose it and then put it on again but we didn't do anything different (mother, H)

I suppose the bottom line is it's my choice what [foods] *I'm giving them so it all starts with me* (mother, D)

Mother/main carer relationship with weight, diet & PA

Weight been up and down, goes through health kick every now and again

Every now and again when I find my weight going up I go back on it [Slimming World diet] *again* (mother, N)

Every now and again…the notion takes me, you know, just do it - maybe a holiday coming up or you go Christmas or whatever - and then I do it and then…you might not go one week and then you just sort of say "oh I'll just leave it" (aunt, G)

I had battles with it [weight] *all my life. I know inside out what I should do and shouldn't do, what I should eat and what's good for me and what isn't. But I'm also the same as* [my daughter] *as in even when you're not hungry you're thinking about something to eat and it's keeping a lid on that* (mother, H)

Parenting style

Authoritative, permissive and authoritarian aspects

Authoritative

Setting a good example - making sure that she's having the right things [foods] *that she needs and trying to limit what she doesn't need basically, or trying to get her to do it herself* (mother, H)

Authoritarian

[what do you do in a situation where they misbehave?]

Scream at them…you know what I mean, shout at them like (aunt, G)

Permissive

With [my younger son] *he's on and on and on and on and on "I wanna, I wanna, I wanna, I wanna" - then in the end it's just like "fine go and do it" to shut him up* (mother, D)

Figure 6.7 Psychosocial characteristics of cluster 6

6.3.3.2 What factors helped families maintain their changes?

Families mentioned a vast range of facilitators for their behavioural change, relating both to the GOALS intervention itself and to behaviours practiced by families at home. This section first outlines the components of GOALS perceived as facilitative in maintaining behavioural changes, before discussing the behaviours practised by families at home: a) across clusters regardless of whether they maintained changes, b) for those who maintained the most changes (clusters 1 to 4) and c) for those who maintained the fewest changes (cluster 6).

6.3.3.2.1 Factors related to the GOALS intervention

Table 6.4 shows the components of GOALS perceived to be facilitative in *maintaining* behavioural changes. As can be seen from the table, there was much similarity between the facilitators identified by families in *maintaining* their changes in the long-term and the facilitators identified by families in *making* changes six weeks into the intervention (see section 5.3.2). Factors included motivators for attending GOALS at the time (e.g. regular support, non-judgemental environment), elements that made things easier at home by raising child awareness (e.g. receiving messages from someone other than their parents, being in the same boat as others, providing a platform for discussing healthy lifestyles at home) and specific sessions that motivated families to instigate changes at home (e.g. visual demonstrations of fats and sugars, portion sizes, cooking sessions).

6.3.3.2.2 Behaviours practiced by families across clusters

Several behaviours were mentioned in helping families maintain their changes (see table 6.5). The majority of behaviours related to healthy eating, though parental identification as a role-model and the motivation and prompts from children did extend to physical activity.

> *He loves the exercise...I've come in from work and I can't be bothered going...I just feel like getting my pyjamas on, you know, when you've had a bad day and he'll go "come on mum"* (mother, family F)

Many parents had stopped buying "junk food" or were buying healthier options, and many had received support from commercial weight-loss organisations. Several mothers described how they had been brought up to eat everything on their plate because there were "children starving in Africa". Overcoming this guilt was seen as an important factor in facilitating their child's behaviour change. In families with younger children, parents described how they would be "crafty" with the way they presented food or physical activity. For example, using smaller plates to look as

Table 6.4 Components of GOALS perceived to be facilitative in maintaining long-term behavioural change. The table includes factors that were mentioned by at least two families. The second column lists the clusters families who mentioned each factor belonged to.

Description	Clusters	BCT on Abraham & Michie (2008) taxonomy	Example quote
Visual demonstrations of amount of fat and sugar in foods	1-5	Fear arousal[a]	*we stopped eating doughnuts...after you showed us the amount of sugar that was in a doughnut... I have that imprinted on my memory that bag of sugar* (mother, family O)
Incentive of knowing you are going to GOALS each week and someone will be reviewing your progress	3-5	Prompt review of behavioural goals *(11)* / prompt review of outcome goals[a]	*I think because with GOALS when you're meeting up every week it gives you that incentive* (mother, family F)
Being with others in the same boat	2-6	Provide opportunities for social comparison *(19)* / Plan social support or social change *(20)*	*well I think with GOALS when they go there... they see other kids are in the same situation, they know they're not segregated sort of thing...it's not just them that are going through them problems* (mother, family B)
Non-judgemental, fun environment – showing you ideas for doing things rather than telling you what to do	1-6	Provide instruction on how to perform the behaviour[a]/Model or demonstrate the behaviour *(9)*	*it wasn't just like "you need to do more exercise and you need to eat better" - it actually taught us like how to* (child, family M)
Introducing techniques to reduce portion sizes, such as smaller plates, or saving food until next day	1-6	Provide instruction on how to perform the behaviour[a]/Model or demonstrate the behaviour *(9)*	*I remember what you said about portion and if the plate looks bigger and you fill it out more it looks like they're having more* (mother, family F)
Introducing children to cooking and taking the time to involve them	2-6	Provide instruction on how to perform the behaviour[a]/Model or demonstrate the behaviour *(9)*	*you need to let them get their hands stuck in get involved and you watch the difference in their diet now* (mother, family L)
Being taught about healthy living by someone other than their parents	3 & 6	n/a	*I think then they tend to listen to other people more so than parents so I think that maybe that's where it helped* (mother, family L)
Provided a platform for discussing healthy eating and physical activity in a non-threatening way	3,5 & 6	n/a	*I think it would have been harder to explain for her to understand no and why she had to cut down than it was, because she'd been to GOALS and she had that understanding I think that made that side of it easy* (mother, family H)

[a] BCT was not included in Abraham and Michie's 2008 taxonomy but has since been added to the extended taxonomy (CALO-RE, Michie, et al., 2011)

Table 6.5 Behaviours practiced by families across clusters, regardless of whether they had maintained changes. Behaviours are included if they were mentioned by at least two families. The second column lists the clusters families who mentioned each behaviour belonged to.

Description	Clusters	BCT on Abraham & Michie (2008) taxonomy	Example quote
Planning meals	2,3,4 & 6	Action planning[a]	*we did go through a stage of going through like a recipe book and looking at like what we could make and then like we'd plan our meals for the week* (father, family M)
Bringing less high fat, high sugar foods into the house	2-6	Environmental re-structuring[a] (making unhealthy foods less available[b])	*I do not buy junk food whatsoever - I only buy fresh food* (mother, family B)
Being "crafty" in the way food or physical activity are presented	3, 4 & 6	Environmental re-structuring[a] (covert[c])	*I'll just mash the veg up into her one and hide it in the fish pie* (mother, family D)
Parent role-modelling	1-6	Prompt identification as a role-model *(21)*	*I think it would be quite hypocritical to like you know kind of take* [my daughter] *and go "well you've got to eat like that, but we're going the chippy"* (stepfather, family H)
Trade-off rules – asking children to perform a matching healthy behaviour for an unhealthy behaviour	3 & 5	Provide contingent rewards *(14)*	*we had a little rule going if they're gonna eat junk or sweets then they had a piece of fruit* (mother, family L)
Attending a commercial weight-loss organisation (mother/carer and sometimes child)	1,2,3,5 & 6	Plan social support or social change (20)	*in a way I need the discipline of going to Weightwatchers to be weighed* (mother, family J)
Motivation and prompts about healthy living from child	1-6	n/a	*he was making sure "mum I need to eat 5 pieces of fruit a day, I need to do this" so we did change* (mother, family E)
Allowing yourself to leave food on the plate	2,3 & 5	n/a	*I remember her saying" try leaving just one mouthful on your plate", and it was killing me to do it at first but now I'll quite happily go "I'll leave that now I'm full"* (mother, family K)

[a] BCT was not included in Abraham and Michie's 2008 taxonomy but has since been added to the extended taxonomy (CALO-RE, Michie et al., 2011); [b] distinguished from the environmental restructuring in table 6.6 by its focus on *making unhealthy foods less available*; [c] distinguished from the environmental restructuring in table 6.6 by its *covert* focus (i.e. the fact it is hidden from the child)

though there was more food, mashing vegetables up with potato, or promoting physical activity that did not "look like exercise".

6.3.3.2.3 Behaviours practiced by families who maintained the most changes (clusters 1-4)

Table 6.6 shows behaviours that were reported only by families who maintained their behavioural changes. The one common aspect across all four clusters was that parents were committed to and took responsibility for the change process. How this was manifest varied according to child characteristics and family context, but

Table 6.6 Behaviours practiced by families who maintained the most changes to their eating and/or physical activity habits in the long-term. Behaviours are included if they were mentioned by at least two families. The second column lists the clusters the families who mentioned each behaviour belonged to.

Description	Clusters	BCT on Abraham & Michie (2008) taxonomy	Example quote
Putting up reminders on the cupboard	1	Teach to use prompts or cues *(15)*	Child I *look in the biscuit cupboard, there's a picture of herself* Mother I *fat so I'll stop eating biscuits*
Buying a dog	2 & 3	Teach to use prompts or cues *(15)*	*that was the reason I bought the dog as well...just as an incentive to go out there and do the walking* (mother, family B)
Prompting self in relation to food behaviours	1 & 2	Prompt self-talk *(22)*	*when I go shopping... it's about looking and thinking "do we really need that? no we don't need that, I'll buy that instead"* (mother, family J)
Pre-preparing snacks to store in the fridge/freezer	1,2 & 4	Environmental re-structuring[a] (to make healthy foods more available[b])	*Grapes,cherries, apples, banana - I'll chop them up... I put them in those containers and put them in the fridge for two or three days* (mother, family A)
Small gradual steps – no pressure to be the "biggest loser"	1 & 3	Set graded tasks *(7)*	*it wasn't til we was through GOALS that we all completely changed onto semi-skimmed milk - so it was just little things like that* (mother, family L)
Comparison with how they used to be	1,2 & 3	n/a	*he will look at that picture from GOALS, he will have a sly glance - 'cos we used to have it on the wall in the kitchen... and he'll go and just carry on doing what he's doing. I think with him looking back he's saying to himself "I'm not going to get that way again"* (father, family C)
Parent taking responsibility for the change process	1-4	n/a	*we'd committed ourselves we were determined to see it through to the end* (mother, family J)
Child's enjoyment of physical activity	1,2 & 4	n/a	*he's made up with his rugby- it's like his life* (father, family C)
Drinking instead of eating when "hungry"	1 & 3	n/a	*we used to ask him you know ask him are you really hungry or have a drink you know have a drink of water we'll try that first* (mother, family J
Sports performance as a motivator to stay fit	1 & 2	n/a	*he knows he's got to be top notch to stay in this team 'cos they don't have no messing about you know* (mother, family C)
Making eating a sociable time for the family	3	n/a	*rather then sitting watching the tele with food on our laps we've started eating at a table it's become more of a social thing* (child, family M)

[a] BCT was not included in Abraham and Michie's 2008 taxonomy but has since been added to the extended taxonomy (CALO-RE, Michie et al., 2011); [b] this is distinguished from the environmental restructuring in table 6.5 by its focus on *making healthy foods more available*

essentially the parent acted however they felt it necessary to prioritise their child's future health. Several of the behaviours served to break down negative habits by bringing previously automated processes into consciousness. For example, parents encouraged children to consider whether perceived hunger could be thirst or asked themselves if they really needed to buy a particular food. For some families, the child's enjoyment of physical activity was a key motivator; and for two of the boys performing in sports at a high level had a knock-on effect in motivating them to stay fit and eat healthily. Other facilitative processes included making healthy snacks easily accessible, eating dinner together as a family, and buying a dog. Owning a dog helped not only in increasing physical activity but for one mother it also made her feel less guilty about leaving food as she could give it to the dogs. The gradual approach to change was perceived to work well, particularly for clusters 1 and 3 for whom change was about making small changes without making it a "big deal".

> *He loved crisps...and the great way that you did it was by weaning him off slowly, you know, this week maybe have a pack less you know next week have a little bit less and it came to the point where he didn't really miss them* (mother, family J)

Several of the families described how their child hated looking back on how they used to be, and used this as a motivator to keep up their changes. The child from family M validated this herself, suggesting that GOALS was always in the back of her mind and she did not *"want ever to be like that again."*

6.3.3.2.4 Behaviours practiced by families who maintained fewest changes (cluster 6)

There was one type of behaviour that was reported only by cluster 6 parents. This involved offering a monetary reward if the child performed a certain behaviour or reached a certain outcome.

> *I'm not gonna go and pay to go if you're not gonna have lost weight* (aunt, family G [referring to Slimming World])
>
> *She's been told if she gives up crisps then my mum and dad will put two pounds in her money box at the end of the week* (mother, family D)

6.4 Discussion

This study adopted a retrospective interview design to provide a unique insight into the experiences of families who attended a childhood obesity treatment intervention (GOALS) 3-5 years earlier, building on the findings from studies 1 & 2 to ask whether positive outcomes were maintained in the long-term and what factors were

important in the behaviour change process. The study took a "positive deviance" approach (Stuckey et al., 2011), with analysis focussed on identifying the characteristics of the families with the most positive long-term outcomes to learn how we can improve childhood obesity treatment for other families.

Whilst the majority of families reported some positive long-term outcomes, there was much heterogeneity in the way parents perceived their behaviour change process. Six psychosocial profiles emerged, each with different needs and each interacting with GOALS in different ways to take them to the current point in their lives. The discussion that follows will address the research questions in several subsections. I will first consider how the long-term child weight outcomes related to parents' perceptions of "success" (research questions 1 & 2), before going on to explore the role of parental psychosocial factors (research question 3) and the processes involved in sustaining behaviour change in the long-term (research question 4). I will then summarise the characteristics of the most "successful" families and consider the implications of these findings for practice.

6.4.1 Long-term outcomes from GOALS

6.4.1.1 Child BMI SDS change

For the 14 children who had completed GOALS, there was a mean BMI SDS change between baseline and 3-5 year follow-up of -0.47, with 11/14 (79%) children having a lower BMI SDS at follow-up than when they started GOALS. Although the current sample was a lot smaller, these findings are similar to those reported by Braet and van Winckel (2000) who in a 4.6 year follow up found 78/109 (72%) of children who had participated in a cognitive behaviour treatment programme for obese children showed no further increase in percentage overweight. The absolute change in BMI SDS was also comparable with the results of a 4 year follow-up study that showed a mean BMI SDS reduction of 0.48 for children who had taken part in an outpatient obesity intervention programme (Reinehr et al., 2007). However in Reinehr et al.'s study the majority of the reduction occurred during the first 3-months of intervention itself, with very little change thereafter. The BMI SDS reduction in the current study was far more gradual, with a change of only 0.09 after the six-month intervention. Furthermore the children with the greatest weight-loss at follow up were those for whom the greatest time had elapsed since GOALS, suggesting weight-loss was a gradual process that continued after the intervention had finished. For if we consider only the four families whose follow-up duration was 4.5 - 5 years the mean BMI SDS reduction was 1.08 and none of the children were

obese any longer. This magnitude of change was more in line with that of Vignolo and colleagues (2008) who found a five-year BMI SDS reduction of 1.49 following participation in a family-based multidisciplinary intervention that focussed on gradual, steady behaviour change (and de-emphasised weight loss). Unfortunately in Vignolo et al.'s study, however, the interim measures were not reported and therefore it was not possible to assess at what stage the reduction had occurred.

6.4.1.2 Defining "success"

The different patterns of weight change observed in my study and Reinehr et al's study (2007) raises the question of what constitutes a positive outcome in childhood obesity treatment. Braet and van Winckel (2000) defined "successful" children as those who had no percentage overweight increase from baseline. In a similar manner, it would have been possible to cluster families in the current study based on the degree of child BMI SDS change at follow-up. Yet data that emerged through the interviews suggested the child's *actual* weight change was only one factor in the long-term *perceived* outcome of attending GOALS, and in some cases the two bore little relation to each other. For example, at follow up the child in family L was mildly obese and perceived by her parents to be physically active and eat healthily. Yet her BMI SDS had increased by 0.17 since baseline. Conversely, the child in family H was moderately obese, still struggled with unhealthy snacking and according to her parents was very reluctant to do physical activity; yet her BMI SDS had decreased by -0.45 since baseline. Whilst in academic and public health arenas childhood obesity treatment continues to be evaluated by child weight outcomes, parental perceptions of positive outcomes are more likely to focus on behavioural change (Staniford et al., 2011) or child psychosocial wellbeing (Stewart et al., 2008a). Perhaps the most appropriate way to assess whether an outcome is deemed "positive" is to consider the potential effect for the child's future; *"if an intervention successfully changes cognitions and behaviours and these changes are maintained, an impact on weight may ultimately be achieved"* (Jones et al., 2011, p.179-180). Yet if an impact on weight is achieved without the corresponding changes in cognitions and behaviours, the child might be more susceptible to relapse. Therefore to learn about the psychosocial factors of sustained behavioural change it was necessary to cluster families by cognitive and behavioural characteristics rather than by BMI SDS change per se.

The majority of parents reported children to have increased in confidence and provided many examples of positive dietary (e.g. reduced portion sizes) and physical activity (e.g. joining sports clubs) changes. Parental views of the long-

term influence of GOALS varied from indifferent to life-changing; 11 of 15 families (clusters 1 to 5) felt GOALS had a positive lasting impact on their child's lives, 4 families (cluster 6) felt it made little difference. For families from clusters 1 to 5 however, GOALS impacted on their lives in different ways. For some the impact was realised immediately, with changes to physical activity and dietary behaviours made whilst attending the intervention and maintained thereafter. For others change was less immediate, but GOALS equipped them with the knowledge, skills and awareness that enabled them to change their lives in their own time. For others still, GOALS was the instigator of some changes, but perhaps was not enough to ensure long-term positive outcomes.

For the cluster who perceived GOALS had made little difference to their lives, this did not necessarily mean their children had a less positive outcome than others. Indeed two children in this cluster demonstrated average to high BMI SDS reductions from baseline. Nor did it mean these families were living the least healthy lifestyles of the sample at the time of interview. What did characterise this cluster however was the perception that very little change had taken place in their (physical activity and eating) behaviours and attitudes since before GOALS.

The aim of GOALS was to support families in making gradual, sustainable changes to their physical activity and eating behaviours. Based on this premise, the four clusters that made and maintained changes to their physical activity and/or dietary behaviours were considered "successful" (clusters 1 to 4). However, in drawing conclusions it was taken into account that cluster 4 did not perceive a high level of success and still experienced daily struggles related to their child's weight.

6.4.2 Relationship between parental psychosocial factors and long-term outcomes

6.4.2.1 Approach to child's weight issue

Parental approaches to their child's weight issue varied across clusters. For some, their child's weight was deemed extremely important and tackling it was a central component of their lives. For others, it was perceived as less of an issue as long as the child was happy and healthy. The common factor across the four clusters who maintained their changes (clusters 1-4) was the serious priority they placed on changing behaviours related to the child's weight, even when it had not previously been a concern to the family.

As with the families in Grønbæk's study (2008), both short-term (e.g. bullying) and long-term (e.g. prevention of following the same path as their mothers) motivators to seek help were reported. Other than cluster 2 parents who pro-actively sought help for their children through their doctors, all families were referred to GOALS through "reactive" methods. Some families were looking for help at the time (e.g. cluster 1), others did not consider the weight an issue before it was raised (e.g. cluster 3).

Research with adults suggests a belief that they can control their weight enhances their chances of maintaining weight loss (Byrne, 2002). In the current study, there was no clear difference in control-beliefs related to the child's weight between families who were more or less successful at maintaining behavioural changes. All clusters acknowledged some internal (e.g. over-eating, insufficient physical activity) and some external (e.g. genes, steroid medication) causes for their child's overweight, and recognised they were able to do something about it; *"if we are the cause we can also be the effect" (*father, M). However, for some families the perceived control of the "cause" of the weight was not aligned with the perceived control of the "effect" on the weight. The mother from family F, for example, felt strongly her son's obesity was caused by external factors (genetic/medical). Whilst she was acutely aware of her role in controlling his obesity through physical activity and healthy eating, she viewed this not as a way of controlling an *internal* obesity issue but as a way of preventing an *external* issue from getting worse. Being aware of such control-attributions might help practitioners tailor support to parental needs. For example, BCTs might be used to enhance parental self-efficacy for controlling their child's weight.

6.4.2.2 Mother/main carer relationship with weight, diet and physical activity

Mothers' psychological characteristics have been found to be more important in child weight-loss than fathers' psychological characteristics (Favaro & Santonastaso, 1995) and the current study sought to explore the effect of the maternal relationship with weight, diet and physical activity on long-term child outcomes. There were common factors across clusters, in that all mothers reported going through phases of eating more healthily and doing more physical activity. However these "fits and starts" were most pronounced in the least successful clusters (5 and 6) where the majority of mothers continued to "battle" with their weight. In contrast, mothers from clusters 1 to 4 appeared to have reached a stage at which they felt in control of their weight (despite having vastly different weight histories). Mothers in cluster 2 had a history of emotional eating and obesity, but both described a psychological "wake-up call" that acted as a trigger to change their lifestyles. The children in this

cluster appeared to be as in control of their eating as the children whose mothers did not have a negative weight history. Therefore it was not maternal weight *history* that was associated with sustained behavioural change, but *current* maternal relationship with weight and related behaviours. There were possibly bi-directional influences at play in this association. For unhealthy parental dietary practices are known to influence the development of excess body fat in childhood (Hood et al., 2000) and it is possible the continuation of these practices will act as a barrier to sustaining child behaviour change. Yet at the same time both mothers in cluster 2 cited their children's lifestyle change process as a motivator for their own behaviour change. Regardless of the direction of causality, the current findings suggest maternal relationship with weight and dietary behaviours presents a potential and important target for intervention in childhood obesity treatment.

Whilst many of the mothers had improved their relationship with food through attending GOALS, only a minority had taken up a regular physical activity routine and few described physical activity levels sufficient to reach the current recommendations for adults in the UK (Department of Health & Physical Activity Health Improvement and Protection, 2011). Mothers described barriers such as lack of motivation, poor health or lack of financial resources, and many recognised – whilst they whole-heartedly supported their child's physical activity - they themselves were not as active as they should be. Since parental physical activity has been associated with child physical activity (Biddle et al., 2011), and physical activity is a behaviour that influences child weight (Davison & Birch, 2001), it is important practitioners support the adoption of physical activities that are sustainable when the weekly intervention sessions finish.

6.4.2.3 Parenting style

The findings of this study support the wealth of research that associates an authoritative parenting style with lower risk of obesity-inducing behaviours (Sleddens et al., 2011) and the growing evidence for the promotion of authoritative parenting as an effective strategy for treating childhood obesity (Gerards et al., 2011). Whilst all clusters reported some authoritative elements in their parenting, these elements came through most strongly in clusters 1 to 3, who also exhibited the most confidence in their child's long-term outcomes. For cluster 2, however, this was not how it had always been but was the result of a change in parenting practices. This again supports the notion that parental psychosocial factors are changeable and should be targeted through childhood obesity treatment. Whilst the GOALS intervention promoted specific parenting practices of an authoritative nature

(e.g. through encouraging parents to praise their children, limit their treats etc.) it did not directly address general parenting, and it is not clear why some parents adapted their parenting style more than others following attendance at GOALS.

6.4.3 Processes involved in sustaining long-term behaviour change

6.4.3.1 GOALS factors

The positive components families recalled about GOALS several years after attending were comparable to those families cited at the time (see section 5.3.2), and were similar to those identified in other studies of parental perceptions of childhood obesity treatment (e.g. Dixey et al., 2006; Staniford et al., 2011). Parents felt GOALS provided a non-judgmental environment through which children gained confidence through being in the same boat as others. Change was made easier at home because children were learning about healthy living from someone other than their parents in a fun interactive manner, which in turn gave parents a platform to discuss weight-related behaviours at home in a non-threatening way. Some parents also spoke about the weekly incentive of knowing someone was reviewing their progress towards their goals. Sessions that instigated immediate and lasting change were those with a visual element, specifically the demonstration of the amount of fat and sugar in foods and the demonstration of techniques for reducing portion sizes.

6.4.3.2 Behavioural strategies practised by families

All clusters recognised the importance of being a positive role-model (though the extent to which they put this into practice varied), and all clusters spoke of instances where the child motivated or prompted them to engage in healthy behaviours. Examples of facilitative strategies reported across clusters regardless of whether they had maintained changes included restructuring the environment to make unhealthy foods less available, planning meals and allowing food to be left on the plate. Many mothers also gained social support through attending commercial weight-loss organisations.

From a positive deviance angle, it was the strategies of those families who maintained most changes that were of most interest. Whereas parents from all clusters reported experiences where their child had been a positive social influence, only the parents in clusters 1 to 4 demonstrated a positive commitment to take responsibility for their child's behaviour change. This contrasts with early research from Cohen and colleagues (1980) that showed children whose weight was more regulated by their parents were more likely to regain weight. This is possibly due to

the fact Cohen et al. focussed on *weight* regulation, whereas parents in the current study described regulation of *behaviour change*. For there is increasing evidence showing that – when parental regulation is focussed on healthy lifestyles and authoritative in nature – engaging parents as the agent of change is an effective strategy in childhood obesity treatment (Golan et al., 2006; Golan & Weizman, 2001; Golan et al., 1998; Golley et al., 2007).

Further strategies described by the "successful" families included using prompts and reminders (e.g. putting pictures on the cupboard, buying a dog to prompt going for a walk), restructuring the environment to make healthy foods readily available (e.g. chopping up fruit and leaving it in the fridge), and bringing previously automated processes into consciousness (e.g. stopping and thinking before buying foods, considering whether perceived hunger might be thirst). Whilst children from all clusters enjoyed some types of physical activity, for the children who had changed the most physical activity had become a key part of their life. In families C and J the child's enjoyment and motivation for their sports was a driver not only to continue with the physical activity but also to eat healthily and keep their weight down. Parents described how several of these children "hated" looking back at photos of how they used to be, and used this as a motivator to keep up their healthy lifestyles. For these families, these strategies served to make weight control a conscious part of their lives (without necessarily making it an "issue"). Such conscious control is also believed to be an important factor in adult weight-loss maintenance (Byrne et al., 2003) and many of the practices described by parents in this study were also described in Stuckey et al.'s (2011) positive deviant analysis of successful weight control practices in adults (e.g. reading food labels, following a consistent exercise routine, and looking at older pictures of themselves to motivate them to stick to their plan).

It is notable the number of strategies cited in table 6.6 appeared to be directly related to the level of perceived success, with the highest numbers of facilitative behaviours described by cluster 1, then cluster 2, then cluster 3, then cluster 4. Whilst it is possible this is due to the positive outlook of cluster 1 (i.e. they were enthused to tell me more), it suggests the greatest success is achieved if several behavioural strategies are combined and, in the case of cluster 1, it was possible to implement these behavioural strategies without making it a "big deal".

Mapping the strategies described onto Abraham and Michie's BCT taxonomies (Abraham & Michie, 2008; Michie et al., 2011, see tables 6.4 to 6.6), BCTs that facilitated long-term change were instigated both by GOALS and by families

themselves. For the most successful families BCTs included *using prompts and cues, environmental re-structuring* and *self-talk* but importantly other psychological (e.g. the right time for change) and behavioural (e.g. regular physical activity participation) factors played a role. It is important when promoting long-term behavioural change in obese children that multi-layered familial influences are given due consideration.

6.4.4 Family heterogeneity and implications for practice

In this study six different "clusters" of families were identified, four of whom had maintained changes to their physical activity and eating behaviours, one had maintained some changes and one had maintained few changes. Each cluster perceived their behaviour change process differently and interacted with GOALS in a different manner. Given that it can take anything from 18 to 254 days for one simple health behaviour to become habitual (Lally et al., 2010), the six-month GOALS intervention may be unnecessarily long for some families yet for others may not be sufficient for behaviours to become habitual. The amount of effort required to sustain health behaviours after attending GOALS may depend on the level of automaticity with which the new behaviours are performed at the point of leaving. This hypothesis was supported to some extent by the current findings. Clusters 1 and 3 established small, habitual changes whilst at GOALS and maintained these after leaving with very little effort. For the other clusters, changes were either slow to occur (cluster 2) or were reliant on attendance at the weekly session (clusters 4, 5 and 6) so only when there was a strong psychological determination after leaving GOALS were these maintained.

In adults, failure to achieve pre-determined weight goals has been found to inhibit transition from weight management programmes (Cioffi, 2002). Similarly, in clusters 4 and 5 where families did not feel they had reached the point they had hoped when GOALS finished (psychologically, physically or behaviourally), they expressed a wish that the weekly support had continued for longer. Other families (clusters 1,2,3 and 6), however, felt they had received all the support they needed and it was up to them to take control of their own lifestyles. Even cluster 6 who had maintained few changes felt there was little else GOALS could have done, acknowledging it was only they who were getting in the way of making further changes.

> *There's nothing that gets in the way apart from me - I need to change things and I know that I haven't even got an excuse why I don't* (mother, D)

This data suggests childhood obesity treatment needs to be designed with the flexibility to address individual family needs, with length of intervention based not on X number of weeks but instead on the family's stage in the behavioural change process.

6.4.5 Limitations

This retrospective interview study focussed on parental perceptions of success following participation in GOALS. Although some objective data were collected (BMI SDS, abdomen-to-height ratio), participant numbers were small and caution must be taken when interpreting the observed child BMI SDS reduction. It is notable also that the child who attended only one session of GOALS reduced his BMI SDS substantially. Other follow up studies have shown obese children to lose weight without intervention (e.g.Golan & Crow, 2004), but the question that must be considered is whether the necessary changes have occurred for this weight loss to be maintained in the long-term (see section 6.4.1); the child in family N, for example, reported poor dietary habits in relation to the rest of the sample.

It must be acknowledged that parenting style was assessed qualitatively through this study, using concepts based on the Parenting Styles and Dimensions Questionnaire (Robinson et al., 1995). As most children were teenagers and genuinely well-behaved the direct questions were sometimes not appropriate to ask and at times failed to elicit the necessary information. However, discourse relevant to parenting style arose throughout the interviews and this was taken into consideration in the analysis. It was also not possible with the research method used to determine low & high (or absence of) instances of each parenting typology and – where there were aspects of more than one typology in a particular family - to determine which typology was most prevalent. Further research is required to explore the association between authoritative parenting style and long-term positive outcomes following childhood obesity treatment.

Parenting and weight issues are sensitive topics, and there was a risk in the current study parents might tend toward socially desirable answers for fear of appearing a "bad parent". I felt the retrospective interviews eased this fear, as parents could talk openly about undesirable past practices by dissociating from the person "they used to be". This shed light on psychological issues and parenting practices that might not have come through at the time. Perhaps only in hindsight could parents reflect on the "mistakes" they were making at the time. There was also a sense of shared learning that took place during the interviews, whereby the conversation itself was a

process through which parents reached a deeper understanding of their experiences. This shared learning demonstrated the strength of the constructivist approach in qualitative research.

This study focussed on parental behaviour and psychosocial factors only, which form only part of Taylor's (1994) socialisation model of child behaviour (see figure 2.3). It did not address the family environment, psychosocial factors of the second parent, nor child behaviour and characteristics. Child age and gender varied between clusters (for example, the children in cluster 4 were both younger when they attended GOALS than the other children), but due to the small numbers it is unclear whether these were influential factors in the behavioural change process or whether the differences had emerged by chance. Furthermore, the conclusions from this study are based on parental perceptions only (albeit with input from the children in families I and M), and thus cannot be taken as representative of children's current behaviours and feelings. Further research is required to explore children's perceptions of the change process and elucidate the influences of child and family environment factors.

6.4.6 Conclusion

The findings of this study showed that "success" in childhood obesity treatment is not a black and white concept and behaviour change is not a linear process. Interventions continue to be evaluated through child weight outcomes, yet for the parents in this study child lifestyle behaviours, child happiness and child health appeared to be the most important factors. The way in which GOALS impacted on families' lives depended on numerous factors, including their physical activity and dietary behaviours at baseline, their psychosocial profile, and the behavioural strategies they employed to maintain changes. There were however six factors that characterised the families with the most positive long-term outcomes:

- It was a serious priority to change behaviours related to the child's weight
- Parents took responsibility for the behaviour change process
- Mothers had reached a stage of feeling in control of their own weight
- Parenting style was predominantly authoritative
- Physical activity had become a way of life for the children
- Weight-control was a conscious process

This is not to say all successful families displayed this profile when starting GOALS. The findings showed that for some families (e.g. cluster 2) parent psychosocial

change occurred even though the intervention did not target it specifically. And for these families, long-term outcomes were overwhelmingly positive. It was where psychosocial change was perhaps needed but did not occur that parents experienced an ongoing psychological battle. This was demonstrated in the frustration of cluster 4, the maternal problems of cluster 5, and the intention-behaviour gap of cluster 6.

Whilst participant numbers in this study were small, the findings do provide an insight into the heterogeneity of child outcomes following participation in family-based childhood obesity treatment. One size may not fit all, and these findings suggest behavioural change strategies should be tailored to parental psychosocial characteristics and the magnitude and timescale of behavioural changes required.

6.4.7 Take home messages

- There is much heterogeneity in the way families respond to childhood obesity treatment and the effect this has on long-term outcomes. A baseline assessment of familial psychosocial factors should be undertaken to inform family targets and BCTs used. This assessment should cover the family's current lifestyle (and extent of change required), the mother's relationship with weight and dietary behaviours, parenting style, and the family's approach to the child's weight issue (including stage of change).

- During the intervention it is important to raise children's self-efficacy for physical activity through fun and inclusive sessions. Parents should support children to try a range of physical activities to find something that appeals to them, encouraging participation whilst granting the child some autonomy in choosing their activities.

- A flexible programme of follow-up support should be tailored to family needs, reducing the pressure on those who would rather not be followed-up and targeting resources to those who need ongoing professional support. As the intervention draws to a close, parental feelings about follow-up and self-efficacy to continue changes should be assessed to determine the most appropriate pathway.

- All families attending childhood obesity treatment should be encouraged to use multiple behavioural change strategies to enhance their chances of

long-term success. Effective BCTs include *environmental restructuring*, *using prompts or cues,* and *self-talk.* Other behavioural strategies include bringing automated processes into consciousness to break negative habits (e.g. drinking instead of eating when "hungry"), comparisons with the past (e.g. looking back at the negative aspects of being overweight), and making eating a sociable time for the family (e.g. eating together at the table). An authoritative parenting style should be encouraged, with parents taking responsibility for their child's weight control through a focus on healthy living for the whole family.

Chapter 7

Synthesis of findings

Study and aim	Research questions	Key findings
Study 1 **Aim** To measure the potential impact of GOALS on the body composition, lifestyle behaviours and self-perceptions of children and parents who complete the intervention, and explore the relationships between these variables	1. Do children and parents who complete GOALS improve their body composition, as measured by BMI and abdomen-to-height ratio? 2. Are there changes in perceived fitness and health, parent-reported physical activity and diet and child self-esteem after completion of GOALS? 3. How does parent BMI change relate to child BMI SDS change? 4. How does child self-esteem change relate to BMI SDS change? 5. Are there improvements in child BMI SDS change as the GOALS intervention develops over time?	• There was a statistically significant reduction in child BMI SDS (-0.07) that was maintained at 12-month follow up • Parent-reported changes to physical activity and diet showed GOALS was meeting 100% of physical activity objectives and 91% of dietary objectives • There was only minimal change in child self-esteem, but the greatest increases were seen in the children with the poorest self-esteem at baseline • BMI SDS change *from pre-to post-intervention* was correlated with self-esteem change *from pre-intervention to 12-month follow up* in the global and physical appearance domains • There was a strong positive correlation between parent BMI change and child BMI SDS change • There was a significant year-on-year increase in the proportion of children who reduced BMI SDS from pre- to post-intervention
Study 2 **Aim** To qualitatively explore the experiences of families whilst they are taking part in GOALS, discussing perceived changes to their physical activity and eating behaviours, factors facilitating these changes and challenges they are facing	1. What changes have occurred at home during the first six weeks of attending GOALS? 2. What is helping families change? 3. What challenges do families face in making changes? 4. What are the lived experiences of families with overweight children that help practitioners and researchers understand the context in which changes take place?	• Six weeks into the intervention, families reported physical activity and dietary changes similar to those reported post-intervention • Motivators to attend GOALS included the non-judgmental approach, being in the same boat as others, and child enjoyment • Families used BCTs both as a core component of GOALS and to facilitate their behaviour change at home • While the whole family approach was deemed facilitative to change, parents felt their change efforts were undermined by non-attending family members • Referral to GOALS elicited mixed, and sometimes negative, emotions for parents • Parents expressed the need for longer-term support from GOALS • Many psychosocial challenges of living with childhood overweight were described
Study 3 **Aim** To follow up families 3-5 years after they attend GOALS to explore actual and perceived outcomes, parental psychosocial factors associated with positive outcomes and the processes involved in sustaining long-term behavioural change	1. Do children who attend GOALS demonstrate an improved body composition 3-5 years after baseline? 2. How do parents perceive participation in GOALS influences their child's life several years on, and how does this relate to child body composition change? 3. What parental psychosocial factors are associated with positive long-term outcomes for children who attend GOALS? 4. What processes are involved in sustaining long-term behaviour change for families who attend GOALS?	• Mean BMI reduction for the children who completed GOALS was -0.47 • Whilst most families perceived positive long-term outcomes, there was much heterogeneity in their perceived behaviour change process • Actual weight change was only one factor, and was sometimes quite different from the long-term perceived outcome of attending GOALS • Six factors characterised families with the most positive long-term outcomes: - It was a serious priority to change behaviours related to the child's weight - Parents took responsibility for the behaviour change process - Mothers had reached a stage of feeling in control of their own weight - Parenting style was mostly authoritative - Physical activity had become a way of life for the children - Weight-control was a conscious process

7.1 Introduction

The aim of this study was to evaluate the feasibility of a family-based behaviour change intervention for overweight children (GOALS) and qualitatively explore the psychosocial process of long-term sustained behavioural change in families with overweight children. Following a review of the literature (chapter 2), the thesis began with a comprehensive overview of the GOALS intervention framework and a description of the delivery processes during the feasibility phase (2006-2009) on which the study was based (chapter 3). This was followed by three original studies (chapters 4, 5 and 6) designed to increase understanding of whether GOALS was achieving its objectives, and – if so - the mechanisms through which it was helping families change their physical activity and eating behaviours.

This synthesis will draw on the findings from all three studies to first discuss what constitutes a "successful" outcome in childhood obesity treatment, before proposing a theoretical model for health behaviour change in overweight children, and outlining implications for improving policy and practice in childhood obesity treatment. Finally, I will reflect on my experience of developing and evaluating a complex behaviour change intervention for obese children and will conclude with some recommendations for further research.

7.2 Determining "success" following treatment for childhood obesity

Study 3 showed parental perceived success, lifestyle behaviours and actual weight change do not necessarily go hand in hand. As discussed in section 6.4.1.2, this raises the question of how "success" should be determined in lifestyle approaches to childhood obesity treatment. Are positive changes to eating and physical activity behaviours plus increased self-confidence sufficient without accompanying weight-loss? And conversely, should weight-loss without the accompanying behavioural change always be classed as a successful outcome?

7.2:1 The danger of focussing on short-term BMI SDS change

Physical inactivity is a better predictor of morbidity and mortality than obesity per se (Blair & Brodney, 1999), and as such a child who becomes a "healthy weight" adult but is physically inactive may be more at risk of future cardiovascular disease than a child who remains obese as an adult but is physically active. Furthermore, regular physical activity is believed to be an important contributing factor to adult weight-loss maintenance (Stuckey et al., 2011), and current UK physical activity guidelines

suggest children who are overweight need more daily physical activity than their healthy weight peers if they are to improve their weight status (Department of Health & Physical Activity Health Improvement and Protection, 2011). In support of these factors, it was notable that the children in the current study with the most positive outcomes (clusters 1 and 2) had increased their physical activity levels dramatically since before GOALS.

Yet, even though national guidelines recommend child weight control should be achieved through behavioural changes to physical activity and diet (NICE, 2006), childhood obesity treatment interventions continue to be evaluated by child BMI SDS reduction (e.g. Oude Luttikhuis et al., 2009). Furthermore, it is often short-term BMI SDS change on which conclusions are drawn. In a National Health Service focussed on evidence-based commissioning, cost-efficiency and competition between providers (Department of Health, 2010) this is a worrying state of play. For the results of the current study suggest short-term BMI SDS change may be a poor indicator of the long-term outcomes of childhood obesity treatment.

In chapter 6 it was noted that the small sample of children who attended follow up reduced BMI SDS gradually over a number of years, and those with the greatest weight-loss were those for whom the greatest time had elapsed since GOALS. There is no known comparative data for UK-based childhood obesity interventions, but data from a successful family-based behaviour change intervention for obese children in Germany shows how the long-term effects of interventions can follow different patterns. The 1-year "Obeldicks" intervention (Reinehr et al., 2010) is divided into three phases: a 3-month *intensive phase* that involves group treatment for parents and children focussed on nutrition education and eating behaviour; a 6-month *establishing phase* that involves individual psychological care for the family; and a 3-month phase with minimal therapeutic input based on *accompanying the families back to their every-day lives.* Children take part in a physical activity class for the whole year.

Figure 7.1 compares the child BMI SDS change observed after participation in GOALS with the child BMI SDS change reported in a 4-year follow up of the Obeldicks intervention (Reinehr et al., 2007). It can be seen from the graph that both interventions were successful at achieving long-term BMI SDS reduction in obese children. Yet the mechanisms through which this was achieved were

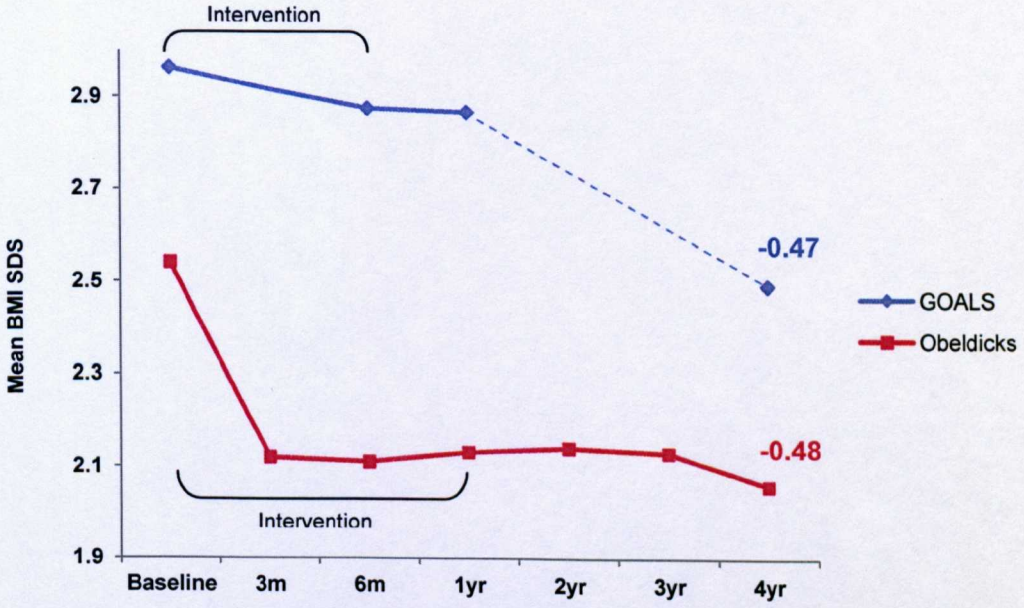


Fig 7.1 Pattern of child BMI SDS change after completion of GOALS, compared with pattern of child BMI SDS change after participation in "Obeldicks" (Reinehr et al., 2007). Although this data is based on Reinehr et al,'s 2007 paper, a consistent pattern of results was reported for different cohorts of children who had participated in Obeldicks at 2-year (Reinehr, et al., 2006) and 5-year follow up (Reinehr, et al., 2010). Data was not available for GOALS at 2 and 3 years, therefore the trend over this period is estimated with a dashed line.

different. In Obeldicks a highly significant BMI SDS reduction was seen during the 3-month intensive phase of the intervention and was maintained thereafter. Reinehr et al. found the amount of weight lost during the initial 3-months to be predictive of later success (Reinehr et al., 2007). In contrast – and as hypothesised in chapter 4 (section 4.4.4.2) - the focus on small, sustainable changes at GOALS appeared to have a gradual, more steady impact on weight that continued beyond the intervention period. And families with the most dramatic weight losses during the 6-month intervention were not necessarily those with the most positive long-term results. Whilst it is not possible to generalise the GOALS results beyond the 14 completing children who attended follow up, this comparison serves to illustrate the importance of long-term follow up in childhood obesity research and the danger of assessing the impact of treatment interventions purely on BMI SDS change in the short-term.

7.2.2 The psychosocial wellbeing of the child

For the parents in study 3, the psychosocial wellbeing of their child was perceived to be an important factor in determining "success". Some authors have expressed concern that childhood obesity treatment might harm children's self-esteem through an increased focus on weight, diet and physical activity (O'Dea, 2004). Yet both during GOALS and at 4-year follow up, parents in this study described how the

experience of *"being in the same boat"* as others increased children's confidence, and the data from study 1 suggested children who lost the most weight during GOALS had a more positive self-esteem at 12 months. Despite these general trends however, self-esteem did decrease in some individual children. The qualitative exploration in study 3 provided some insight into the possible mechanisms underpinning this.

In the manual for the Self-Perception Profile for Children (SPPC, Harter, 1985), Harter highlights the influence of the child's *"social comparison group"* on their self-perceptions. Such social comparison is of particular relevance in childhood obesity treatment, where children are – for the first time in their lives - placed in an environment where all the other children around them are overweight. Although this was a positive factor for many children attending GOALS, two contrasting examples in study 3 showed the negative effects it could have.

For the first child, who was not previously aware she was overweight, entering this environment made weight an issue where it never had been before. She described how she felt fat (*"like subconsciously...it was like well 'you're really fat, so you're having to go to like a fat camp' "*) and she started comfort eating because she felt bad about herself.

PW	*How do you look back on the GOALS experience?*
Child M	*Oh it was (exhale of breath) it wasn't GOALS, it was like, it was me like...I don't know, I don't know how to put it...*
Mother M	*I could make a statement for you actually hun - I think you were absolutely mortified when they identified at school that you were obese*
Child M	*...it was like a shock really, 'cos I hadn't really cared 'cos I was only in year 5 so it didn't really matter. And it was then at that point that I realised "oh my God I'm massive"...I felt like really self-conscious when I found out because I'd never really looked at myself like that before*
Mother M	*and I hated GOALS for that at first I hated it for taking my child and making her view herself negatively - I hated it for that, really did, but it has had a positive outcome*

Child M was only mildly obese when she started GOALS and, having previously perceived herself as similar to healthy weight peers, the effect of being labelled as "overweight" and socially compared to other overweight children had a detrimental effect on her self-esteem (though she did comment how – once in that boat - it helped being with others in the same situation). Conversely, for children who are

aware they are overweight and are used to comparing themselves with children slimmer than them, the opportunity to compare themselves with other overweight children might give their confidence a boost. This hypothesis was supported by the data from study 1 that showed the larger children experienced the most positive changes in perceived social acceptance.

However, **a second case** showed how social comparison with other overweight children could also have a negative effect for larger children. Child C was already aware he was overweight, but on arriving at GOALS realised he was the only boy and the most overweight child in the group. He knew GOALS was for overweight children but to him the other children in the group did not look overweight, making him think he must look *"really bad if they're here because they've got a weight issue"*.

> *'cos he was at GOALS with girls who he thought were not that fat... "so if they were here and I'm a lot bigger than them I obviously have got a problem"... he didn't get more confident until after GOALS...cos I think he felt embarrassed* (mother C)

These examples provide some insight into the reasons children respond differently to childhood obesity treatment, and highlight the importance of psychosocial factors when assessing outcomes. Practitioners are urged to be aware of children's self-perceptions and allow opportunities for sensitive, non-judgemental discussion of children's concerns to help promote a positive self-image that is not focussed on weight.

7.2.3 A healthy future for the child

As discussed in chapter 6, perhaps the most important factor in determining "success" following childhood obesity treatment is the likely impact of the changes that have occurred on the child's future. According to parent reports, the most successful children in the current study (clusters 1 to 3) had changed their physical activity, diet and related cognitions, lost weight, and improved self-esteem and confidence. All these factors played a role in the perceived long-term outcomes for the child and when any occurred without the other/s, the perceived outcome was less positive (clusters 4 to 6). Whilst the rationale for moving away from a focus on BMI SDS was outlined above (section 7.2.1), this is not to say weight loss as an outcome should be ignored. Indeed, when parents of children on a community-based obesity treatment programme were asked *"whether it was sufficient for the programme to be the equivalent of a youth club for large children and young people,*

without serious weight loss" (Dixey et al., 2006, p.134) they all responded that it was not. And, like the parents in the current study, they felt it important that their children lost weight for their immediate and future health and wellbeing. Ultimately, it is recommended that childhood obesity treatment interventions are evaluated on the basis of physical, behavioural and psychological outcomes. And when assessing outcomes in the short-term, it is important due consideration is given to the theoretical underpinning of the intervention and – as highlighted in study 1 – the stage in the intervention's life course. The section that follows will consider the mechanisms through which GOALS interacts with family factors to affect these outcomes.

7.3 A socialisation model of health behaviour change in overweight children

This study aimed to increase understanding of how practitioners can intervene from the "outside" to support families to make sustainable changes to their dietary and physical activity behaviours "inside" the family environment. Findings from this study allow hypothetical models to be generated for a) the processes through which GOALS operates to help children change their health behaviour, and b) the familial psychosocial factors that influence the way individual children respond to the intervention. The first model focuses on intervention mediators and is important in providing *"feedback that can lead to systematic improvements in intervention efficacy"*. The second model focuses on intervention moderators and "*can help tailor interventions to the needs of specific subgroups of people"* (Bauman et al., 2002, p.10).

7.3.1 The causal pathway through which GOALS operates to establish an effect

Figure 7.2 draws on the findings from the current study to show the processes through which GOALS operates to achieve the desired behavioural, psychological and physical outcomes. Studies 2 and 3 showed that GOALS facilitated behavioural change in two ways. Firstly, GOALS created an environment that was fun and non-judgmental and allowed families the opportunity to mix with others in the same boat. This motivated families to attend and increased child confidence and self-esteem.

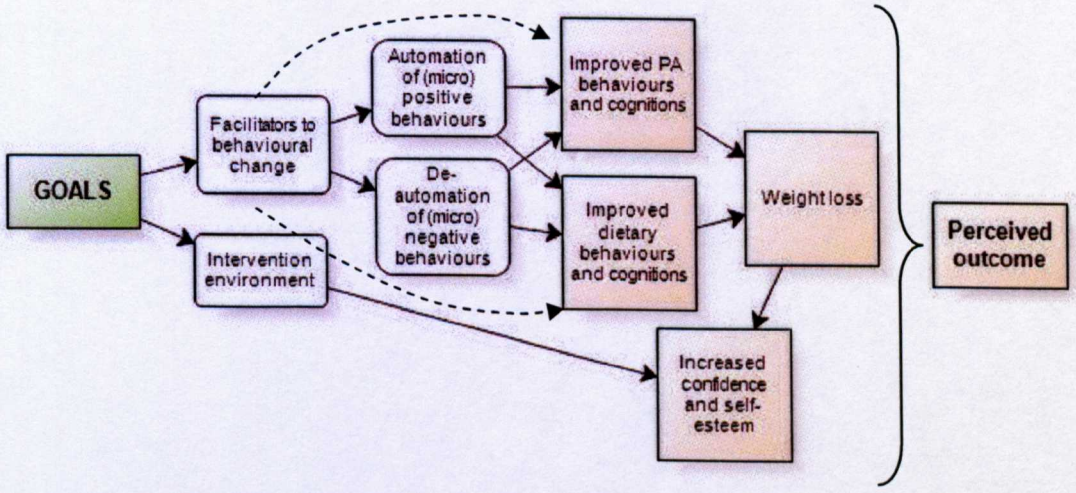


Fig 7.2 GOALS Causal Pathway

Secondly, GOALS facilitated the behaviour change process through regular support, implicit and explicit use of BCTs, and provision of education to enable families to instigate changes at home. As outlined in section 3.2.3, this behaviour change process drew on a habit formation model (see Wood et al., 2002) to promote small, sustainable changes to the family's physical activity and dietary habits. In study 3 examples were provided where goal setting had both encouraged the repetition of new, positive health behaviours (e.g. eating breakfast) and the gradual reduction of established negative behaviours (e.g. eating crisps) until the point they required little or no conscious processing to perform. However, it was also found that for the most successful families at 4-year follow up conscious processing was an important factor in maintaining the complex combination of behaviours that controlled weight. Thus while the current study supports the habit formation model for changing *micro*-behaviours, it also raises the question whether it is necessary, realistic or indeed possible for the more complex components of weight management (e.g. physical activity) to become habitual (as represented by the dotted arrows on figure 7.2).

7.3.2 Familial psychosocial influences on child responses to GOALS

Study 3 showed that families interacted in many different ways with the GOALS causal pathway. Drawing on the combined findings from this thesis, hypotheses can be drawn about the familial psychosocial factors that moderate the way individual children respond to GOALS. This thesis has used Taylor et al.'s (1994) socialisation model of child behaviour as a theoretical basis for exploring the interaction between familial cognitions, behaviours and the environment in determining child behaviour. As Taylor et al. stated "*the objective* [of employing this

theoretical framework] *is to understand the complex mechanisms of influence within the family in order to design better programs"* (p.336). What the framework does not do, however, is address the notion of behaviour *change* in children. Figure 7.3 proposes an elaboration of the model to account for the familial psychosocial factors found to be important in health behaviour change for overweight children in this study.

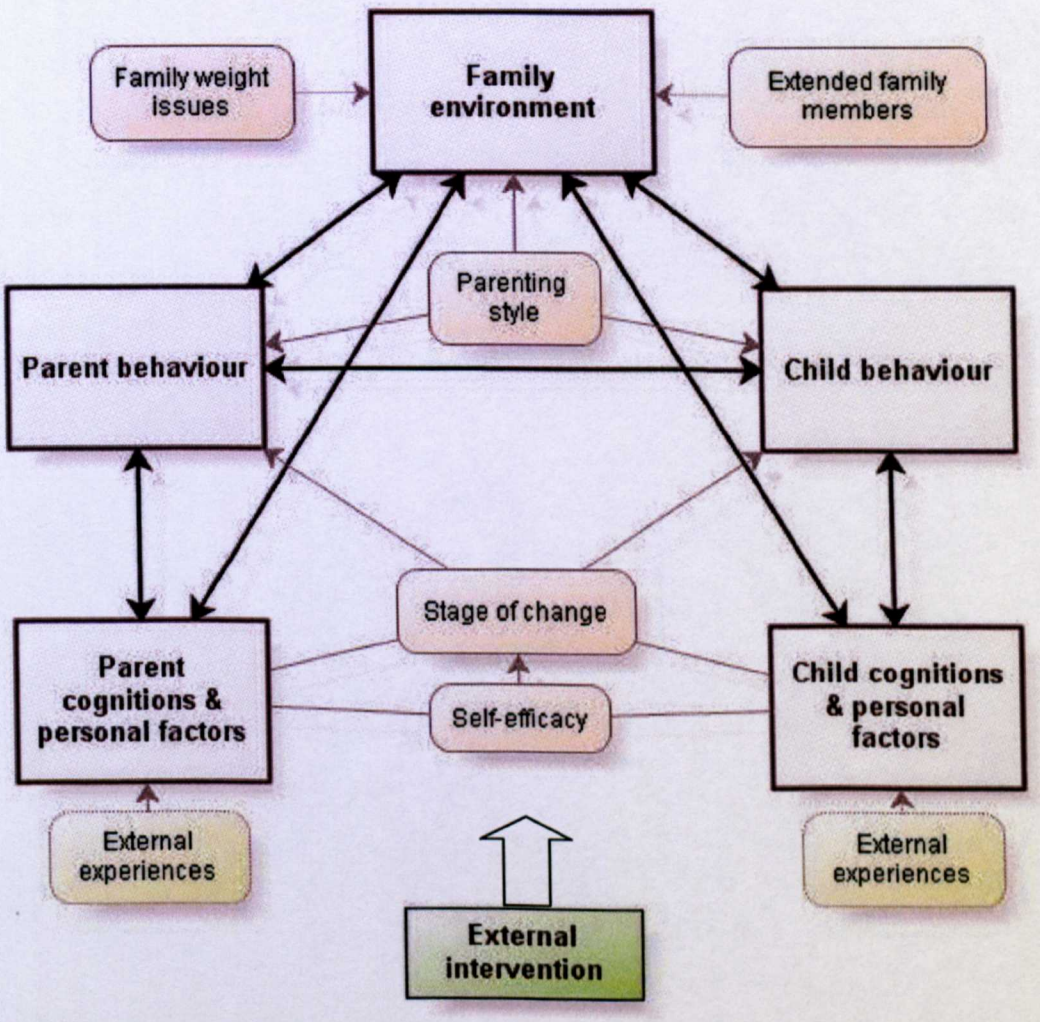


Fig 7.3 Familial influences on health behaviour change in overweight children. Based on Taylor et al.'s (1994) socialisation model of child behaviour which draws on Bandura's (1986) Social Cognitive Theory. The boxes in bold form the backbone of the model which explains child behaviour as per Taylor et al.'s original framework (see section 2.2.2). The pink boxes are psychosocial variables hypothesised to moderate the effect of external behaviour change intervention to treat childhood obesity (e.g. GOALS). The yellow/green boxes acknowledge the influence of weight-related experiences outside of the family on child and parent cognitions (e.g. bullying, buying clothes, school PE). The child and parent "cognitions" boxes have been extended to account also for personal biological and demographic factors (e.g. age, ethnicity).

As with Taylor et al.'s model, and Bandura's (1986) Social Cognitive Theory on which it is based, it is the ongoing reciprocal interactions between the factors in this model that influence the behaviour change process. Many examples have been provided throughout the thesis of how child and parent cognitions and behaviours interact with the family environment to influence child behaviour. Therefore the overview that follows will focus on the familial psychosocial moderators of behaviour change that have been added to the model, supporting each with findings from the current study.

7.3.2.1 Family environment level

At the level of the family environment are the *weight issues in the family* and the influence of *external family members*. In this study, the different relationships with weight in the family affected how children saw themselves and how other family members approached the behavioural change process. As well as the fact that long-term outcomes were less positive when the mother in the family still had an unhealthy relationship with weight (e.g. cluster 5), the weight status of siblings was found to be a factor in how families approached the behaviour change process. Parents in study 2 described how overweight children with healthy weight siblings experienced feelings of it "not being fair" and one mother in study 3 described how GOALS had helped her overweight daughter understand that she was genetically different from her healthy weight twin (dizygotic). Conversely, parents were unsure how to manage the lifestyle change process when there were also healthy weight children in the family, and the healthy weight children themselves expressed resistance as GOALS was "not for them." This was also the case if a child was overweight but was the least overweight child in the family or was not the child who was referred to GOALS. The correlation between these children's BMI SDS change and their parents' BMI change was weaker than that between their referred sibling and their parents' BMI change.

The second moderator at the level of the family environment was the influence of extended family members. This was raised frequently by parents in study 2, and also as a causal factor for the child's overweight in study 3. Parents described how extended family members (e.g. grandparents, non-resident parents) undermined their efforts to change health behaviours in the family by, for example, taking the child to fast food outlets, or feeding them sweets. This is a constantly reported challenge in family-based childhood obesity treatment (e.g. Dixey et al., 2006; Staniford et al., 2011; Stewart et al., 2008a).

7.3.2.2 Behavioural level

At the behavioural level, it is hypothesised that *parenting style* moderates the behaviour change process by influencing the family environment and the direction of social influence between the parent and the child. Parents in study 2 and from all clusters in study 3 described ways in which children had a positive influence on their behaviour, whether it be through motivating them to attend GOALS, through prompting them to make changes, or through being a positive role-model. What distinguished the most successful families, however, was the positive social influence (characterised by authoritative regulation) from the parent/s. This was supported by the finding in study 1 that 77% of cases where parents reduced BMI the child also reduced BMI SDS. Whilst authoritative regulation may not have been necessary for motivated adolescents (e.g. family I), it was key in instigating change for children who were younger (e.g. family H) or more resistant to change (e.g. family C). Conversely, parents with permissive tendencies might be easily deterred by a child who is reluctant to change and parents with authoritarian tendencies might create further resistance in the child by taking away control. In support of this observation the promotion of authoritative parenting has been identified as an effective strategy for treating childhood obesity (Gerards et al., 2011).

The challenges of changing an unmotivated child were further elucidated through findings in studies 1 and 2. In 71% of cases where the child increased BMI SDS the parent also increased BMI. Whilst BMI SDS change cannot be taken as an indicator of a child's motivation, it is an outward proxy of the changes that were occurring at home. It was hypothesised in chapter 4 that *"while family status suggests a positive parental influence will override any negativity from the child, in dyads characterised by a permissive parenting style (Baumrind, 1966) one might expect the child to have a stronger influence"* (p. 85). In support of this, study 3 showed that in families where parents described permissive aspects in their parenting, parents faced more challenges in influencing the change process and perceived outcomes were less positive. The following exchange between parents in study 2 highlights how easy it is for children to impact negatively on the change process, and the importance of parenting style in regulating this.

Mother E4	*just trying to keep it up isn't it*
Mother E3	*yeah*
Mother E5	*and I still find it hard just trying to keep...*[my child] *motivated to wanna do it cos if she doesn't wanna do it then*
Mother E3	*its easy for us to turn and say we won't go then*

7.3.2.3 Cognitive level

Finally, at the cognitive level (but impacting on parent and child behaviour) is parent and child *self-efficacy* for making behavioural changes and their motivation and readiness to change *(stage of change)*. In chapter 3, it was acknowledged that stages of change vary within and between families and different intervention approaches may be required to facilitate their behaviour change (see section 3.2.3). In support of this, the clusters of families that emerged in study 3 were at different stages of change when they started GOALS, had different levels of motivation for addressing their children's weight, different levels of self-efficacy for continuing their changes and different levels of readiness to leave GOALS when it ended. The way in which families responded to GOALS was influenced by these motivational factors, and by the stages of change they went through thereafter. Whilst all families had been in the action stage by virtue of the fact they were attending GOALS, at follow up parental stage of change differed between clusters. Some parents had relapsed back into the contemplation stage (e.g. cluster 6), others described characteristics of the preparation or action stages (e.g. cluster 5) and others appeared to have reached the maintenance stage (e.g. cluster 1).

7.4 Implications for policy and practice

7.4.1 Implications for policy

In a report released in October 2011 (Department of Health, 2011), the British Government recognised the limited evidence on the effectiveness of weight management services and called for a *"more concerted effort...both to synthesise and disseminate emerging evidence about effectiveness and cost-effectiveness and to put in place rigorous evaluation of local interventions"* (p.26). This PhD followed a translational research approach to bridge the gaps between evidence, policy and practice. The GOALS intervention was running across Liverpool for the duration of the study (2006 – present) as part of a multi-level local strategy to promote healthy weight (Liverpool PCT and Liverpool City Council, 2008). The possible effects of this citywide strategy were indicated in recently published data (Boddy et al., 2010), which showed little change in obesity rates in year 5 Liverpool children since the 2003-2004 school year, in comparison to a year-on-year increase in the five years leading up to this period. This is a promising observation, but further headway must be made if Liverpool is to meet the public service agreement set by the previous government to *"reduce the rate of overweight and obese children to 2000 levels by 2020"* (HM Treasury, 2008, p.31).

Whilst childhood obesity remains high on the public health agenda, planned reforms to the NHS (Department of Health, 2010) mean it is unclear who will hold commissioning responsibility for childhood obesity treatment services after April 2013. Lifestyle approaches to childhood obesity treatment fall somewhere between primary health care (in that the service is sometimes the first point of contact for families), secondary care (in that the treatment offered is a specialist service to which eligible children are referred by other health professionals) and public health (in that the care offered is focussed on preventing future morbidity through the promotion of healthy lifestyle behaviours). Considering the findings of the current study in the context of the changing NHS, the following recommendations are made for improving the provision of lifestyle approaches to childhood obesity treatment in England.

- Thought must be given to the most appropriate commissioning bodies for lifestyle-based childhood obesity treatment services.
- Physical, behavioural and psychological outcomes should be taken into account when assessing childhood obesity treatment interventions, and the potential long-term effects considered in the context of the intervention's theoretical approach.
- Child weight management care pathways must recognise the heterogeneity of family needs, allowing the commissioning of interventions that offer tailored (and where necessary long-term) support.
- A multi-level approach must be taken to tackling childhood obesity, and measures taken to reduce the daily stigma suffered by overweight children:
    - Schools should be encouraged to adopt a holistic approach to the promotion of healthy weight (e.g. inclusive and fun-focussed PE, anti-bullying policies, a healthy eating culture).
    - Universal training should be provided for health professionals, community and school staff to encourage consistent promotion of healthy lifestyle messages and enable sensitive and positive referral to childhood obesity treatment interventions. An example of such an approach is the Making Every Contact Count project currently underway in Salford (Partners IN Salford).
    - The concept of "obesity" needs to be reframed nationally – using social marketing to raise awareness, reduce stigma, and focus on the promotion of physical activity, healthy eating and psychosocial wellbeing.

7.4.2 Changes made to the GOALS intervention as a result of study 1 and 2 findings

This thesis was based on a translational research approach (Narayan et al., 2000; Ogilvie et al., 2009) that involved a reciprocal feedback loop between evidence and practice, allowing the ongoing refinement of the GOALS intervention in accordance with the emerging evaluation. Hence changes were made to the intervention as a result of the study 1 and 2 findings, for which data collection took place between 2006 and 2009. Some of the key changes are outlined below.

- ***Staff handbook.*** The messages learned through the feasibility phase were used to develop a comprehensive staff handbook (*"GOALS Staff Handbook: Helping families change"*). Each staff member received a copy of the 107-page manual, which covered the key concepts underpinning Target Time, Fun Foods and Move It, plus practical guidance for running sessions (e.g. structuring sessions, planning and preparation, health and safety) and for working with families (e.g. child protection, confidentiality, tailoring sessions for complex needs).
- ***Delivery of sessions.*** Pragmatic changes were made to the delivery of sessions, such as running Move It during the first hour, allowing more time for cooking sessions and separating parents and children for discussion sessions. A series of "core" sessions was developed on the basis of parent feedback (e.g. portion sizes, visual presentation of fats and sugars in foods) and these sessions were moved to the first six weeks of the intervention.
- ***Rolling programme.*** With effect from April 2011 the intervention was restructured to run as a rolling, open-group programme. Completion is defined by number of attendances (6 for "stage 1", 12 for "stage 2"), but crucially there is no time limit in which families must fulfil those attendances. Families are assigned personal mentors who track their individual progress so they can miss sessions when they need to and continue when they are ready. On completion of 12 sessions, families who need ongoing support may enrol for a further 6 weeks, or may opt to return for 6-weekly follow ups. A simple measure of cardiovascular fitness has been introduced (10 x 10 meter shuttle runs) to evaluate changes in child and parent fitness.
- ***Weighing and measuring protocol.*** A clear protocol has been developed for weighing and measuring families at baseline and for communicating information in a consistent, clear and sensitive manner. Staff members are trained to talk through the weight of every family member who is present,

and to set weight-loss targets of 5-10% (as recommended by NICE, 2006) with adults who are overweight or obese and who indicate they would like to lose weight.

7.4.3 Implications for practice

This thesis has focussed on establishing "what works" in family-based childhood obesity treatment, exploring how practitioners can effectively support families to make sustainable changes to their physical activity and dietary behaviours. Below are recommendations for childhood obesity treatment interventions based on the findings of studies 1 to 3. This is supplemented with a table (table 7.1) highlighting familial psychosocial factors hypothesised to stand in the way of long-term behaviour change (as outlined in section 7.3.2). The table includes ideas for how interventions could be adapted to address these factors, drawn both from the qualitative data from studies 2 and 3 and from my experiences following improvements that were made to the GOALS intervention in recent years (see section 7.4.2 for examples).

7.4.3.1 Recommendations for childhood obesity treatment interventions

- It is recommended childhood obesity treatment interventions move from closed X-week programmes to a rolling open-group approach that allows families to receive support for differing lengths of time according to individual need. Such an approach also has potential to improve retention through reduced waiting times and improved continuity during school holidays.

- It is important children's psychosocial needs are at the forefront of every childhood obesity treatment intervention. The opportunity to be with others "in the same boat" allows positive social comparison that can increase children's confidence and their willingness to get involved in physical activities. However it is important practitioners are aware group-based childhood obesity treatment may affect some children's self-perceptions negatively. For example, if the child were not previously aware they were overweight, or if the child is noticeably more overweight than others in the group. Practitioners are urged to be aware of children's self-perceptions, focus on making sessions enjoyable for children and allow opportunities for sensitive, non-judgemental discussion of children's concerns to help promote a positive self-image that is not focussed on weight.

- Many families have negative expectations of childhood obesity treatment, envisaging a "boot camp" or being told what to do. A non-judgemental,

friendly and positive approach is important in allaying these fears. Children are more likely to listen to messages from intervention staff than from their parents. Staff should promote positive physical activity and dietary behaviours through their words and actions (e.g. through joining in physical activity and cooking sessions).

- A family approach to health behaviour change and, where necessary, weight loss should be encouraged. As outlined in the causal pathway in figure 7.2, the focus should be foremost on changing physical activity and dietary behaviours (which is the mechanism through which weight loss will be achieved). The aim is for weight control to become a conscious ongoing process without it being a *"big issue"*. Reciprocal (parent-child/child-parent) familial role-modelling should be encouraged to promote long-term change.
- When providing for the whole family, the needs of mixed ages and abilities within the group must be accounted for. For example, if a child is older than others in the group, they might perhaps take on a "helper" role or given additional responsibilities. Consideration must also be given to childcare of younger siblings.
- A range of BCTs can be used in family-based childhood obesity interventions. Some may be applied during structured group sessions, others in a reactive manner according to individual family need, others families might be taught to implement themselves at home.
    - BCTs that can be instigated through the intervention itself include *prompting goal-setting, self-monitoring, setting graded tasks, providing contingent rewards, modelling or demonstrating the behaviour, providing opportunity for social comparison, providing social support, prompting generalisation of a target behaviour* and *prompting review of behavioural goals.*
    - BCTs that help families make and maintain changes at home include *action planning, environmental restructuring, positive role-modelling, providing contingent rewards, using prompts or cues* and *self-talk.* Where parents wish to seek *social support* from commercial weight-loss organisations this should be encouraged.
- Parents should be encouraged to take responsibility for the change process and to use practices associated with the authoritative parenting approach (firm but fair). For example, not giving in to their children when they ask for

sweets or crisps, involving the child in family decision-making around food and physical activity and encouraging open discussion about weight.

- Physical activity is an important component of long-term success in childhood obesity treatment yet becoming and staying physically active can be a challenge for many families. Children who are overweight enjoy physical activity as much as any other children, but many lack the confidence to get involved in sports clubs. It is important practitioners work with families to support increases in physical activity outside of the weekly session that focus on fun and enjoyment for the child. To facilitate this parents should be encouraged to support children to try a diverse range of physical activities.
- It is important families are prepared for the transition from the safe intervention environment to continue with their changes at home. To facilitate this process, BCTs that build self-efficacy and independence should be used during the intervention (such as *setting graded tasks*, *modelling and demonstrating behaviours*) and families should be taught coping skills and BCTs that will help them maintain their changes when the regular support ceases. To reduce the chances of relapse, behaviour change should be focussed on encouraging the automation of positive behaviours and the de-automation of negative behaviours (as per the causal pathway in figure 7.2). It is important also to recognise not all families will need, or even want, follow up. If families indicate they are ready to leave the intervention and "go it alone", it is important to give them the space to do so (with potential follow up at a later date when they are ready).

Table 7.1 Familial psychosocial factors hypothesised to stand in the way of long-term behaviour change for overweight children, including ideas for intervention

Psychosocial moderator	Level of moderator	Ideas for intervention
Extended family members	Undermining attempts to change behaviour	Produce factsheets for children to take home to show extended family members what they are doing; Include extended family members in weekly goal setting; Hold an "invite a family buddy" week in which additional family members are encouraged to come and give the intervention a go
Family weight issues	Maternal unhealthy relationship with weight	Work individually with the mother to help her change her cognitions and behaviours (e.g. through focussing her weekly goals on addressing the areas of most concern); Refer to additional psychological support as appropriate
	Internalised fear of leaving food on the plate	Set graded tasks to encourage parent/child to start by leaving one mouthful on the plate, then gradually increase it from there until they become able to leave food based on internal satiety cues
	Non-overweight siblings	Focus on the health benefits of eating healthily and PA for health; Encourage families to adopt "one rule for all", highlighting that it is just as important for family members who are a healthy weight to eat healthily as it is for family members who are overweight; Include non-overweight siblings in all the same activities as the overweight children
	Overweight siblings not considered "overweight" as they are smaller than the referred child	When the family are weighed and measured make sure all family members are treated equally and clear information is provided about the child's weight. This may come as a shock to the parent, so it is important the information is provided in a sensitive, non-judgemental manner and the whole family approach to lifestyle change is re-emphasised.
Parenting style	Permissive (e.g. giving in to child) or authoritarian (e.g. arguing with child) tendencies	Parenting is a sensitive area, and for some parents it may be sufficient to raise awareness through group activities, for example presenting hypothetical scenarios to help them draw their own conclusions about the effect their behaviour is having on the child. Other parents may require a more individualised approach or, if they are motivated and willing, referral to specialist parenting programmes.
Stage of change when initially referred to intervention (consider both parent and child)	Pre-contemplation	These are families who may not previously have been aware the child was overweight, but on learning this information moved quickly through the contemplation stage. It is important practitioners remain mindful of this and concentrate initially on preserving child self-esteem and helping the family understand the issue. Child enjoyment of sessions is a crucial factor.
	Contemplation	BCTs should be used (e.g. *provide information on consequences*) to help raise parental awareness of the importance of addressing the child's weight. Enhance self-efficacy through the early achievement of small weekly goals.
Self-efficacy on leaving intervention (consider both parent and child)	Fearful of relapse / not ready to leave intervention	Arrange ongoing support to *prompt review of behavioural* and *outcome goals;* Continue with goal setting process to automate positive behaviours / de-automate negative behaviours; Work with family to develop coping behaviours to prevent relapse

7.5 Reflections on the research process: strengths, limitations and recommendations for future research

When I was considering applying for the post of "researcher in childhood obesity management" seven and a half years ago, the previous post holder advised me the most important skill for the role was the ability to "juggle a lot of plates." Whilst juggling per se is not my forte, I can see now this was sound advice. My role as an academic researcher funded by public health monies to develop, deliver and evaluate a childhood obesity treatment intervention has brought with it learning, exhilaration, and many challenges. Having been immersed in the delivery and evaluation of GOALS for the past seven years, I do not believe it was possible to put my experiences and pre-conceptions to one side and to conduct research independent of these. Conversely, I regard my position as researcher-practitioner as a strength; the depth of understanding that emerged from this study is far greater than would have been possible for a researcher whose only involvement in childhood obesity treatment was the data collection and analysis that makes up this thesis. I allowed myself to be changed by the research as I saw this is as a crucial part of understanding. The strengths of this constructivist philosophy were further realised in study 3, where understanding was created through the interaction process and I observed participant understanding changing as the interviews went on. In the section that follows I will discuss the strengths and limitations of the research approach I took before making recommendations for future childhood obesity research.

7.5.1 Strengths

This original study addressed several gaps in the existing childhood obesity literature:

- This is the first long-term follow up study of family-based childhood obesity treatment in the UK. It is also the only known study (worldwide) to employ qualitative methodology to explore the parental psychosocial factors associated with long-term success and to explore the long-term behavioural change process for families with overweight children.
- Whilst evidence is fast emerging to support a multidisciplinary family-based approach to childhood obesity treatment (Oude Luttikhuis et al., 2009), little is known about translating this evidence for the purposes of service delivery. Drawing on Medical Research Council guidelines (2000, 2008) for the evaluation of complex interventions, this study focussed on understanding

the "how to" aspects of childhood obesity treatment. The findings were used to produce a theoretical model of health behaviour change in children who are overweight with clear, evidence-based messages for practitioners and policy-makers.

- Behaviour change interventions are seldom reported in enough detail to allow replication (Michie et al., 2009), and little is known about the effective use of BCTs in family-based childhood obesity treatment interventions. This study provided a comprehensive overview of the BCTs used to facilitate behavioural change in children who are overweight. BCTS were mapped onto the available taxonomies (Abraham & Michie, 2008; Michie et al., 2011) to allow comparison between studies and qualitative methodologies were used to explore the BCTs perceived to be facilitators at different stages of the change process.

A key strength of this study was the mixed-methodological approach. Quantitative methods were used in study 1 to investigate physical, behavioural and psychological outcomes and relationships between these. Qualitative methodology then allowed exploration of the mechanisms underpinning the observed effects, focussing on "depth" rather than "breadth" to provide an insight into the process of behavioural change through the eyes of those the study aims to help (i.e. families with overweight children). The follow-up data (study 3) was validated by triangulation with parent focus group data collected six-weeks into the intervention (study 2); there was much agreement between the feelings, emotions and thoughts parents described in retrospect and the feelings, emotions and thoughts parents described at the time. This qualitative process allowed hypotheses to be generated that can now be tested through prospective, quantitative studies.

The link between research and public health action on obesity has been a matter of debate for some time. In a letter to the BMJ in 2008, Lavery (2008) asked frankly *"How many studies into obesity does it take to build one cycle path for children to get to school on?"*. He went on to suggest *"all research stops now"* so that public funds can be spent on action. Whilst Lavery's view is extreme, he has a point. Childhood obesity is one of the most serious public health challenges of the 21st century and policy-makers cannot afford to wait for lengthy trial outcomes before interventions can be implemented in practice. As demonstrated in the current study, this need not be an either-or scenario. By evaluating the GOALS intervention *as it was being implemented in practice* service-users were able to play a key role in the development of the intervention; the delivery team were able to refine the

intervention according to ongoing evaluation; the research team were able to explore the incremental effects on outcomes as the intervention became more refined; and – perhaps most importantly – there was an ongoing reciprocal link between the research taking place and local public health policy.

7.5.2 Limitations

A key challenge of this research was in balancing the needs of public health stakeholders, academic research standards and practical delivery. As can be seen in table 7.2, this created a lack of congruence at several stages of the research process. The methodology was designed to balance these conflicting demands to ensure participant, commissioner and researcher needs were met. As limitations specific to each study were outlined in chapters 4, 5 and 6, the discussion in this section is limited to the overall methodological approach.

It was not ethically viable to conduct an RCT as GOALS was the only available lifestyle support for overweight children in Liverpool and access was required for all eligible children. Whilst the lack of control group meant it was not possible to attribute the observed effects to the intervention, the qualitative data in studies 2 and 3 provided an insight into the relative contribution of GOALS in the behaviour change process. Future studies of this nature should consider the use of either waiting-list controls, or non-randomised comparison groups (e.g. children from a comparative neighbouring area or children who opt-out of the intervention).

The attrition rate in study 1 was high, though not untypical of childhood obesity treatment interventions (Skelton & Beech, 2010). An intention-to-treat analysis would have strengthened the study, but unfortunately there was neither the capacity nor the appropriate ethical approval in place to conduct such an analysis. Whilst the complete case analysis provided important information about the interventions' effectiveness for children who completed, it is recognised further evaluation is necessary before conclusions can be drawn about the effectiveness of GOALS for public health.

The study would also have benefited from objective measurement of physical activity and dietary changes. Unfortunately this was not viable at the time, due to the practicalities of collecting data from families whilst also managing the delivery of the intervention. In selecting outcome measures, careful consideration was given to the acceptability of measures to families, the feasibility of obtaining reliable data, the timing of data collection, ways of minimising intrusion and ensuring families

Table 7.2 In-congruencies between research standards, public health needs, and practical and ethical challenges in childhood obesity treatment

	Research standard	Public health needs	Practical and ethical challenges
Design	• RCT – families randomized to either treatment (standardized intervention) or control (usual care or waiting-list control)	• External validity and practical relevance • Commissioners require service for all eligible families	• Waiting-list control not viable due to short-term funding • No usual care in operation for obese children • Intervention must first be developed to a level it can be expected to have a worthwhile effect – this can take several years • Complex family, group & staff interactions make standardization a challenge
Sampling and recruitment	• Large sample, representative of target population • Clear inclusion & exclusion criteria	• Service needs to be inclusive of all children who could benefit from weight management support • High target numbers	• Slow uptake during early stages • Ethical and moral challenges of targeting obese children • Inclusion of children with co-morbidities and learning disabilities may dilute intervention effect • Distinction between participation in service and participation in research
Attrition	• Low attrition rate • Completion defined by attendance at X% of sessions	• Same as research	• Majority of drop-out occurs for non-study related reasons (e.g. family illness, conflicting commitments, travel difficulties or change in personal circumstances) • May not be appropriate to define completion by attendance at X% of sessions (family commitments make regular attendance a challenge; attendance rate not always linked to lifestyle change efforts at home)
Outcome measures	• Valid and reliable measures, suitable for international comparison • Change in BMI z-score most commonly used	• Same as research	• Reference populations used to define BMI z-score vary internationally • Need also to measure change in PA & dietary behaviours that are targeted by lifestyle change interventions, yet few validated measures of PA & dietary behaviour are feasible for complex family-based intervention within socioeconomically deprived communities
Analysis	• Significance testing • Intention-to-treat • Multilevel modelling	• Progress against pre-defined outcomes	• No capacity to collect follow up data from families who have dropped out • If missing data and small sample, a complete case analysis may be appropriate • Study may be underpowered
Dissemination	• Strict criteria for international peer-reviewed journals with high impact (e.g. sample size, design, methodology) • Knowledge generation from both sig and non-sig effects	• Evidence-base to inform future commissioning • Clear reporting of intervention protocols to allow replication	• Non-RCT research designs may make publication in high impact journals challenging • Competitive funding climate may endanger knowledge share of "lack of impact" studies and areas for improvement

were not "over-researched." As this study was about understanding thoughts, feelings and perceived behaviours, it was felt self-report and qualitative data were the most appropriate methodologies to use.

Whilst the qualitative data provided insight into the intervention components, BCTs and processes used in changing physical activity and dietary behaviours for overweight children, the methods used do not allow conclusions to be drawn about which were the most effective strategies at which stages of the change process. Furthermore as the participants in this study were changing both physical activity and dietary behaviours simultaneously, it was neither possible nor appropriate to separate the two processes and they have been discussed together throughout the thesis. It is acknowledged however that these are quite different behaviours, and further research is required to understand the different psychosocial mechanisms at play when trying to make changes to physical activity and diet respectively.

It is acknowledged that the data in figure 7.1 cannot be generalised beyond the small sample of children who completed GOALS and attended long-term follow up. Study 3 participants were self-selected and it is possible they may represent a compliant group. However, throughout the recruitment process steps were taken to encourage families to come forward regardless of whether they felt GOALS helped, and the fact some families took part who did not feel GOALS had any impact suggests this recruitment strategy was successful. Furthermore, the follow-up sample were comparable with the study 1 population in terms of BMI SDS change during GOALS and only 8 of the 14 children had attended their 12-month follow up, suggesting the sample were not necessarily the most compliant families from the population. Nevertheless, further research with a larger sample is needed to substantiate the long-term pattern of weight change observed in this study.

Finally, this study focussed primarily on the child and the main parent/carer attending GOALS. Further research is needed to explore the impact of the intervention on siblings, non-attending parents and the wider family and the feasibility of the intervention from the perspective of GOALS staff, referring practitioners and public health stakeholders.

7.5.3 Recommendations for research

Based on the findings of this study, and the strengths and limitations identified above, recommendations are made for research in three sections: a) research to substantiate the impact of GOALS, b) research to test hypotheses about the psychosocial processes involved in childhood obesity treatment and c) research approaches to move the field of childhood obesity treatment forward.

7.5.3.1 Research to substantiate the impact of GOALS

- The gradual weight loss pattern observed in children completing GOALS (figure 7.1) needs to be substantiated with a larger sample of children and with follow-up data collected through to adulthood.
- Qualitative research is required to explore children's long-term perceptions of success following participation in GOALS and elucidate the influences of child and other family factors.
- Research is needed to evaluate the effectiveness of the rolling-group structure of GOALS, and to compare the impact of offering differing types of ongoing support (and their interaction with individual family factors).
- Research is required to explore the feasibility of GOALS from the perspective of staff, referring practitioners and public health stakeholders.
- To further assess the effectiveness of GOALS for public health, future research should employ objective measures of physical activity and diet, an appropriate comparator group and an intention-to-treat analysis.

7.5.3.2 Research to test hypotheses about the psychosocial processes involved in childhood obesity treatment

- Research is needed to explore the role of habit in the hypothesised GOALS causal pathway (figure 7.2), using a validated measure (such as the Self Report Habit Index, Verplanken & Orbell, 2003) and asking questions such as: Are the children whose behaviours (physical activity and diet) are most habitual when they leave the intervention most likely to maintain changes, and ultimately to lose the most weight? Is the habit formation process the same for children as it is for adults, and how does the length of time it takes for new behaviours to become habitual in children compare to the time it takes for adults? How does the process of automating a new positive behaviour compare to the process of de-automating an established negative behaviour, and what is the relative importance of each in the causal pathway? To what extent is it possible for physical activity and dietary

behaviours to become habitual, and how much conscious control of weight is optimal?

- Prospective studies are needed to investigate the moderating effects of familial psychosocial factors on the long-term outcomes of childhood obesity treatment. Factors hypothesised to play a role include parenting style, maternal relationship with weight, familial motivation for addressing the child's weight issue and familial readiness to change. Such research should use validated tools (e.g. *Three Factor Eating Questionnaire* (Stunkard & Messick, 1985), *Parenting Styles and Dimensions Questionnaire (Robinson, et al., 1995)*) and focus not only on the level of these factors at baseline, but also on the degree to which they change during intervention.
- Quantitative studies are needed to validate the clusters that emerged through study 3, and explore how interventions can best meet the needs of families characterised by a particular set of psychosocial variables. For example, is it possible to identify which cluster a family belongs to at baseline on the basis of their current behaviours and psychosocial characteristics? And is it possible to offer a "package" of differing levels of support to meet individual family needs?
- Research is needed to establish which BCTs are the most effective at which stages in the behaviour change process for families with overweight children. Questions should ask whether the most effective BCTs for one family are also the most effective for another, and how the behaviour change process differs for physical activity behaviours and dietary behaviours. Research focussed on BCTs should use the available taxonomies (e.g. Abraham & Michie, 2008; Michie et al., 2011) to ensure clear reporting for comparison with other studies.
- Further research is needed to explore how childhood obesity treatment affects children's self-perceptions in different ways, and how interventions can promote a positive self-image in all children. It is particularly important to focus on those who may not have previously been aware they were overweight, or those who are among the larger children in the group.

7.5.3.3 Research approaches to move the field of childhood obesity treatment forward

- It is recommended that childhood obesity treatment interventions are evaluated on the basis of physical, behavioural and psychological outcomes,

taking into account the intervention's theoretical underpinning and moving away from an over-reliance on short-term BMI SDS change.

- Research should consider the multi-level influences on a child's physical activity and dietary behaviours (Davison & Birch, 2001) and explore the potential for multi-level intervention to improve treatment outcomes for children who are overweight (e.g. combining a family-based intervention with improved access to local leisure facilities or whole-school healthy eating policies).
- To move the field of childhood obesity treatment forward, translational research is needed that is of direct practical relevance to public health. The intervention being tested must replicate as closely as possible the intervention as it will run in practice and must be feasible, sustainable and have public health needs at the forefront. This does not mean compromising on academic rigour. But it may mean adopting non-RCT designs, such as observational studies, qualitative approaches or mixed-method studies evaluating services in action. To ensure the impact of high quality, non-RCT childhood obesity research is realised, review boards are urged to appraise research by standards aligned with its position in the overall translational framework (Ogilvie et al., 2009). For example, as with the current study, early stage objectives may be to stimulate research questions or to provide process information for other studies.
- It was noted recently that child health services *"risk being further fragmented by policies promoting competition between providers."* (p. 903, Wolfe et al., 2011). A key strength of translational research is the close link between evidence, practice and policy. Yet when childhood obesity researchers have a stake (intellectual or financial) in the intervention being evaluated this poses a risk to the research community, since publication of "lack of impact studies" may result in a loss of funding to competitors. The process information from these studies is crucial in understanding "how to" deliver and implement interventions and researchers are urged to develop open, honest relationships with stakeholders to ensure conflicts of interest do not endanger the dissemination of knowledge. For a public health problem as complex, widespread and serious as childhood obesity, it is essential that knowledge share comes before competition.

7.6 Conclusion

"Overeating and inactivity bring about the increasing storage of fat. But these symptoms do not befall a child suddenly; they are closely connected with his whole development." (Bruch & Touraine, 1940, p.204)

The role of the family in childhood obesity has been recognised for many years. Yet in 2006 when data collection for this study began very little was known about family-based approaches to childhood obesity treatment. This study bridged key gaps in the literature by conducting a feasibility evaluation of a family-based behaviour change intervention for overweight children (GOALS) and qualitatively exploring the psychosocial process of long-term sustained behavioural change. It was the first UK childhood obesity treatment study to follow children up beyond 12-months, and it was the first known study worldwide to employ qualitative methods to explore parental perceptions of long-term success.

Findings showed GOALS to be a promising childhood obesity treatment intervention, with gradual long-term improvements in child BMI SDS, perceived family physical activity and dietary behaviours and child psychosocial wellbeing. The intervention was positively received by families, who described the use of BCTs both as a core component of GOALS and to facilitate their changes at home. Whilst most families perceived positive long-term outcomes, there was much heterogeneity in their behaviour change process. The most successful families were characterised by an authoritative parenting style, a healthy maternal relationship with weight and a physically active child. For successful families weight control was a conscious process (though not necessarily a "big issue") and parents took responsibility and prioritised the behaviour change process when they needed to.

These findings allowed hypotheses to be drawn about the behaviour change process for families with overweight children, and questioned what constitutes a "successful" outcome of treatment. This is an unstable time for community-based childhood obesity treatment in the UK and a close link between evidence and practice is perhaps more important than it has ever been. The evidence-base has grown substantially in the last decade and it is crucial now that pending reforms to the NHS do not compromise the velocity of learning. It is time for policy-makers, practitioners and researchers to re-group and ask what it is that childhood obesity treatment is trying to achieve; short-term weight loss without sustained cognitive and behavioural change is equivalent to treating a deep wound with a plaster. This

study moved the field of childhood obesity treatment one step forward by providing an insight into the causal pathway that leads to sustained weight loss. It is crucial now that research continues to move forward with a focus on the behavioural change process for children who are overweight, with the ultimate aim of improving intervention effectiveness to ensure a healthy long-term future for children and their families.

References

Abraham, C., & Michie, S. (2008). A taxonomy of behaviour change techniques used in interventions. *Health Psychology, 27*(3), 379-387.

Aicken, C., Arai, L., & Roberts, H. (2008). *Schemes to promote healthy weight among obese and overweight children in England* EPPI-Centre, Social Science Research Unit.

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Anderson, P. M., & Butcher, K. F. (2006). Childhood obesity: trends and potential causes. *The Future of Children, 16*(1), 19-45.

Andrew, S., & Halcomb, E. J. (2006). Mixed methods research is an effective method of enquiry for community health research. *Contemporary Nurse, 23*, 145-153.

Bandura, A. (1986). *Social Foundations of Thought and Action: A Social-Cognitive Theory.* New Jersey: Prentice Hall.

Baranowski, T., Cullen, K. W., Nicklas, T., Thompson, D., & Baranowski, J. C. (2003). Are current health behavioral change models helpful in guiding prevention of weight gain efforts? *Obesity Research, 11*, 23S-43S.

Bauman, A. E., Sallis, J. F., Dzewaltowski, D. A., & Owen, N. (2002). Toward a better understanding of the influences on physical activity: the role of determinants, correlates, causal variables, mediators, moderators and confounders. *American Journal of Preventive Medicine, 23*(2S), 5-14.

Baumrind, D. (1966). Effects of authoritative parental control on child behavior. *Child Development, 37*(4), 887-907.

Berry, D., Savoye, M., Melkus, G., & Grey, M. (2007). An intervention for multi-ethnic obese parents and overweight children. *Applied Nursing Research, 20*, 63-71.

Biddle, S. J. H., Atkin, A. J., Cavill, N., & Foster, C. (2011). Correlates of physical activity in youth: a review of quantitative systematic reviews. *International Review of Sport and Exercise Psychology, 4*(1), 25-49.

Biddle, S. J. H., Gorely, T., & Marshall, S. J. (2009). Is television viewing a suitable marker of sedentary behavior in young people? *Annals of Behavioral Medicine, 38*, 147-153.

Biddle, S. J. H., Markland, D., Gilbourne, D., Chatzisarantis, N. L. D., & Sparkes, A. C. (2001). Research methods in sport and exercise psychology: quantitative and qualitative issues. *Journal of Sports Sciences, 19*, 777-809.

Blair, S. N., & Brodney, S. (1999). Effects of physical inactivity and obesity on morbidity and mortality: currrent evidence and research issues. *Medicine and Science in Sports and Exercise, 31*(Suppl 11), S646-642.

Blamey, A., & Mutrie, N. (2004). Changing the individual to promote health-enhancing physical activity: the difficulties of producing evidence and translating it into practice. *Journal of Sports Sciences, 22*, 741-754.

Blumenfeld-Jones, D. (1995). Fidelity as a criterion for practising and evaluating narrative inquiry. In J. Hatch & R. Wisniewski (Eds.) *Life History and Narrative*, pp.25-35. London: Falmer Press.

Boddy, L. M., Hackett, A. F., & Stratton, G. (2010). Changes in fitness, body mass index and obesity in 9-10 year olds. *Journal of Human Nutrition & Dietetics, 23*(3), 254-259.

Boddy, L. M., Hackett, A. F., Stratton, G. S., & Taylor, S. R. (2007). Efffect on prevalence rates of using three different definitions of obesity in 9-10 year old children. *International Journal of Health Promotion and Education, 45*(1), 11-16.

Braet, C., Jeannin, R., Mels, S., Moens, E., & Van Winckel, M. (2010). Ending prematurely a weight loss programme: the impact of child and family characteristics. *Clinical Psychology and Psychotherapy, 17*, 406-417.

Braet, C., & Van Winckel, M. (2000). Long-term follow-up of a cognitive behavioral treatment program for obese children. *Behavior Therapy, 31*, 55-74.

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

Bruch, H., & Touraine, G. (1940). Obesity in childhood: V. The family frame of obese children. *Psychosomatic Medicine, 11*(2), 141-206.

Budd, G. M., Mariotti, M., Graff, D., & Falkenstein, K. (2011). Health care professionals' attitudes about obesity: an intergrative review. *Applied Nursing Research, 24*, 127-137.

Byrne, S. (2002). Psychological aspects of weight maintenance and relapse in obesity. *Journal of Psychosomatic Research, 53*, 1029-1036.

Byrne, S., Cooper, Z., & Fairburn, C. (2003). Weight maintenance and relapse in obesity: a qualitative study. *International Journal of Obesity, 27*, 955-962.

Cameron, J. W. (1999). Self-esteem changes in children enrolled in weight management programs. *Issues in Comprehensive Pediatric Nursing, 22*, 75-85.

Carnell, S., & Wardle, J. (2007). Measuring behavioural susceptibility to obesity: validation of the child eating behaviour questionnaire. *Appetite, 48*, 104-113.

Cioffi, J. (2002). Factors that inhibit transition from a weight management program: a qualitative study. *Health Education Research, 17*(1), 19-26.

Cohen, E. A., Gelfand, D. M., Dodd, D. K., Jensen, J., & Turner, C. (1980). Self-control practices associated with weight loss maintenance in children and adolescents. *Behavior Therapy, 11*, 26-37.

Cole, T. J., Bellizzi, M. C., Flegal, K. M., & Dietz, W. H. (2000). Establishing a standard definition for child overweight and obesity worldwide: international survey. *British Medical Journal, 320*, 1-6.

Cole, T. J., Faith, M. S., 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.

Cole, T. J., Freeman, J. V., & Preece, M. A. (1995). Body mass index reference curves for the UK, 1990. *Archives of Disease in Childhood, 73*, 25-29.

Cole, T. J., & Green, P. J. (1992). Smoothing reference centile curves: the LMS method and penalized likelihood. *Statistics in Medicine, 11*, 1305-1319.

Coppins, D. F., Margetts, B. M., Fa, J. L., Brown, M. B., Garrett, F., & Huelin, S. (2011). Effectiveness of a multi-disciplinary family-based programme for treating childhood obesity (The Family Project). *European Journal of Clinical Nutrition, 65*, 903-909.

Croker, H., Viner, R. M., Nicholls, D., Haroun, D., Chadwick, P., Edwards, C., et al. (2012). Family-based behavioural treatment of childhood obesity in a UK national health service setting: randomized controlled trial. *International Journal of Obesity, 36*, 16-26.

Cross-Government Obesity Unit. (2008). *Healthy Weight, Healthy Lives: A Cross-Government Strategy for England*. Department of Health and Department of Children, Schools and Families.

Cross-Government Obesity Unit. (2009). *Healthy Weight, Healthy Lives: Child weight management programme and training providers framework*: Department of Health. Electronic copy only - in M-documents-papers

CSIP-NW/Cross-Government Obesity Unit. (2008). *Healthy Weight, Healthy Lives: Commissioning weight management services for children and young people*: Department of Health.

Curtis, P. (2008). The experiences of young people with obesity in secondary school: some implications for the healthy school agenda. *Health and Social Care in the Community, 16*(4), 410-418.

Darbyshire, P., Macdougall, C., & Schiller, W. (2005). Multiple methods in qualitative research with children: more insight or just more? *Qualitative Research, 5*(4), 417-436.

Davidson, K. W., Goldstein, M., Kaplan, R. M., Kaufmann, P. G., Knatterud, G. L., Orleans, C. T., et al. (2003). Evidence-based behavioral medicine: What is it and how do we achieve it? *Annals of Behavioral Medicine, 26*(3), 161-171.

Davison, K. K., & Birch, L. L. (2001). Childhood overweight: a contextual model and recommendations for future research. *Obesity Reviews, 2*(3), 159-171.

Department for Communities and Local Government. (2011). *The English Indices of Deprivation 2010*. London: Department for Communities and Local Government.

Department of Health. (2008). *Healthy Weight, Healthy Lives: Consumer insight summary*. London: Department of Health.

Department of Health. (2010). *Equity and excellence: Liberating the NHS*.

Department of Health. (2011). Healthy Lives, Healthy People: A call to action on obesity in England. In D. o. Health (Ed.). London.

Department of Health, Physical Activity, Health Improvement and Prevention. (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.

Department of Health, Physical Activity, Health Improvement and Protection. (2011). *Start Active, Stay Active: A report on physical activity from the four home countries' Chief Medical Officers*. London: Department of Health.

Dixey, R., Rudolph, M., & Murtagh, J. (2006). WATCH IT: obesity management for children:a qualitative exploration of the views of parents. *International Journal of Health Promotion and Education, 44*(4), 131-137.

Dixey, R., Sahota, P., Atwal, S., & Turner, A. (2001). "Ha ha, you're fat, we're strong": a qualitative study of boys' and girls' perceptions of fatness, thinness, social pressures and health using focus groups. *Health Education, 101*(5), 206-216.

Dugdill, L. (2009). Evaluating professional practice through reflection: professionalism in the workplace. In C. Heaney, B. Oakley & S. Rea (Eds.), *Exploring Sport and Fitness: Work-based Practice* (pp. 48-56). Abingdon, Oxon: Routledge: Open University.

Dugdill, L., Crone, D., & Murphy, R. (Eds.). (2009b). *Physical Activity and Health Promotion: Evidence-based Approaches to Practice*. Oxford: Wiley-Blackwell.

Dugdill, L., Graham, R. C., & McNair, F. (2005). Exercise referral: the public health panacea for physical activity promotion? A critical perspective of exercise referral schemes; their development and evaluation. *Ergonomics, 48*(11-14), 1390-1410.

Dugdill, L., Stratton, G. S., & Watson, P. M. (2009a). Developing the evidence base for physical activity interventions. In L. Dugdill, D. Crone & R. Murphy (Eds.), *Physical Activity and Health Promotion: Evidence-based Approaches to Practice* (pp. 60-81). Oxford: Wiley-Blackwell.

Epstein, L. H., Valoski, A., Wing, R. R., & McCurley, J. (1994). Ten-year outcomes of behavioral family-based treatment for childhood obesity. *Health Psychology, 13*(5), 373-383.

Epstein, L. H., Wing, R. R., Koeske, R., Andrasik, F., & Ossip, D. J. (1981). Child and parent weight loss in family-based behavior modification programs. *Journal of Consulting and Clinical Psychology, 49*(5), 674-685.

Epstein, L. H., Wing, R. R., Koeske, R., Ossip, D., & Beck, S. (1982). A comparison of lifestyle change and programmed aerobic exercise on weight and fitness changes in obese children. *Behavior Therapy, 13*, 651-665.

Epstein, L. H., & Wrotniak, B. H. (2010). Future directions for pediatric obesity treatment. *Obesity, 18*(Supplement 1), S8 - S12.

Favaro, A., & Santonastaso, P. (1995). Effects of parents' psychological characteristics and eating behaviour on childhood obesity and dietary compliance. *Journal of Psychosomatic Research, 39*(2), 145-151.

Fiorino, E. K., & Brooks, L. J. (2009). Obesity and respiratory diseases in childhood. *Clinics in Chest Medicine, 30*(3), 601-608.

Fishman, L., Lenders, C., Fortunato, C., Noonan, C., & Nurko, S. (2004). Increased prevalence of constipation and fecal soiling in a population of obese children. *Journal of Pediatrics, 145*(2), 253-254.

Food Standards Agency. The eatwell plate. **http://www.eatwell.gov.uk/**: Accessed 14 March 2011

Foresight. (2007). *Tackling Obesities: Future Choices - Project Report*. Retrieved from www.foresight.gov.uk.

Gately, P. J., Butterly, R. J., & Cooke, C. B. (1997). The effects of an 8-week diet and exercise intervention on cardiorespiratory fitness and body composition in a sample of obese boys. *Journal of Sports Sciences, 15*, 50-51.

Gately, P. J., & Cooke, C. B. (2003). A residential summer camp intervention for the treatment of obese and overweight children. *Obesity in Practice, 5*, 2-5.

Gerards, S. M. P. L., Sleddens, E. F. C., Dagnelie, P. C., de Vries, N. K., & Kremers, S. P. J. (2011). Interventions addressing general parenting to prevent or treat childhood obesity. *International Journal of Pediatric Obesity, 6*, e28-e45.

Global Health Observatory. Noncommunicable diseases (NDC). Retrieved 5 April 2012, from http://www.who.int/gho/ncd/en/index.html

Golan, M., & Crow, S. (2004). Targeting parents exclusively in the treatment of childhood obesity: long-term results. *Obesity Research, 12*, 357-361.

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

Golan, M., & Weizman, A. (2001). Familial approach to the treatment of childhood obesity: conceptual model. *Journal of Nutrition Education, 33*, 102-107.

Golan, M., Weizman, A., Apter, A., & Fainaru, M. (1998). Parents as the exclusive agents of change in the treatment of childhood obesity. *American Journal of Clinical Nutrition, 1998*(67), 1130-1138.

Goldfield, G. S., Epstein, L. H., Kilanowski, C. K., Paluch, R. A., & Kogut-Bossler, B. (2001). Cost-effectiveness of group and mixed family-based treatment for childhood obesity. *International Journal of Obesity, 25*, 1843-1849.

Golley, R. K., Hendrie, G. A., Slater, A., & Corsini, N. (2011). Interventions that involve parents to improve children's weight-related nutrition intake and activity patterns - what nutrition and activity targets and behaviour change techniques are associated with intervention effectiveness? *Obesity Reviews, 12*(2), 114-130.

Golley, R. K., Magarey, A. M., Baur, L. A., Steinbeck, K. S., & Daniels, L. A. (2007). Twelve-month effectiveness of a parent-led, family-focused weight-management program for pre-pubertal children: a randomized, controlled trial. *Pediatrics, 119*, 517-525.

Goodell, L. S., Pierce, M. B., Bravo, C. M., & Ferris, A. M. (2008). Parental perceptions of overweight during early childhood. *Qualitative Health Research, 18*, 1548.

Griffiths, L. J., Parson, T. J., & Hill, A. J. (2010). Self-esteem and quality of life in obese children and adolescents: a systematic review. *International Journal of Pediatric Obesity, 5*, 282-304.

Griffiths, L. J., Wolke, D., Page, A. S., Horwood, J. P., & ALSPAC Study Team. (2006). Obesity and bullying: different effects for boys and girls. *Archives of Disease in Childhood, 91*, 121-125.

Grønbæk, H. N. (2008). "We've always eaten healthily" Family narratives about causes of their child's obesity and their motivation for taking action. *Nordic Psychology, 60*(3), 183-208.

Guba, E. & Lincoln, Y. (1989). *Fourth Generation Evaluation.* London: Sage.

Hart, K. H., Herriot, A., Bishop, J. A., & Truby, H. (2003). Promoting healthy diet and exercise patterns amongst primary school children: a qualitative investigation of parental perspectives. *Journal of Human Nutrition and Dietetics, 16*, 89-96.

Harter, S. (1985). *Manual for the Self-Perception Profile for Children.* Denver, CO: University of Denver.

Haslam, D., Sattar, N., & Lean, M. (2006). Obesity - time to wake up. *British Medical Journal, 333*, 640-642.

Hill, M., Laybourn, A., & Borland, M. (1996). Engaging with primary-aged children about their emotions and well-being: methodological considerations. *Children & Society, 10*, 129-144.

Hills, A. P., Andersen, L. B., & Byrne, N. M. (2011). Physical activity and obesity in children. *British Journal of Sports Medicine, 45*(11), 866-870.

HM Treasury. (2008). *PSA Delivery Agreement 12: Improve the health and wellbeing of children and young people.*

Holt, N. L., Bewick, B. M., & Gately, P. J. (2005). Children's perceptions of attending a residential weight-loss camp in the UK. *Child: Care, Health & Development, 31*(2), 223-231.

Hood, M. Y., Moore, L. L., Sundarajan-Ramamurti, A., Singer, M., Cupples, L. A., & Ellison, R. C. (2000). Parental eating attitudes and the development of obesity in children. The Framingham Children's Study. *International Journal of Obesity, 24*, 1319-1325.

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

Hughes, A. R., Stewart, L., Chapple, J., McColl, J. H., Donaldson, M. D. C., Kelnar, C. J. H., et al. (2008). Randomized, controlled trial of a best-practice individualised behavioral program for treatment of childhood overweight: Scottish Childhood Overweight Treatment Trial (SCOTT). *Pediatrics, 121*(3), e539-e546.

Hunter, D. J. (2009). Relationship between evidence and policy: a case of evidence-based policy or policy-based evidence? *Public Health, 123*, 583-586.

Hunter, H. L., Steele, R. G., & Steele, M. M. (2008). Family-based treatment for pediatric overweight: Parental weight-loss as a predictor for children's treatment success. *Children's Health Care, 37*(2), 112-125.

Israel, A. C., Solotar, L. C., Zimand, E. (1990). An investigation of two parental involvement roles in the treatment of obese children. *International Journal of Eating Disorders* 5:557-564.

Jackson, D., McDonald, G., Mannix, J., Faga, P., & Firtko, A. (2005). Mothers' perceptions of overweight and obesity in their children. *Australian Journal of Advanced Nursing, 23*(2), 8-13.

Jelalian, E., Hart, C. N., Mehlenbeck, R. S., Lloyd-Richardson, E. E., Kaplan, J. D., Flynn-O'Brien, K. T., et al. (2008). Predictors of attrition and weight loss in an adolescent weight control program. *Obesity, 16*, 1318-1323.

Johnson, L., Mander, A. P., Jones, L. R., Emmett, P. M., & Jebb, S. A. (2008). Energy-dense, low-fiber, high-fat dietary pattern is associated with increased fatness in childhood. *American Journal of Clinical Nutrition, 87*(4), 846-845.

Johnson, R., Welk, G., Saint-Maurice, P.F., & Ihmels, M. (2012). Parenting styles and home obesogenic environments. *International Journal of Environmental Research and Public Health, 9,* 1411-1426.

Jones, N., & Sumner, A. (2009). Does mixed methods research matter to understanding childhood well-being? *Social Indicators Research, 90*, 33-50.

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

Kidd, P. S., & Parshall, M. B. (2000). Getting the focus and the group: enhancing analytical rigor in focus group research. *Qualitative Health Research, 10*(3), 293-308.

Kirschenbaum, H., & Henderson, V. L. (Eds.). (1990). *The Carl Rogers Reader*. London: Constable.

Kitzinger, J. (1994). The methodology of focus groups: the importance of interaction between research participants. *Sociology of Health and Illness, 16*(1), 103-119.

Kostanski, M., & Gullone, E. (2007). The impact of teasing on children's body image. *Journal of Child and Family Studies, 16*, 307-319.

Krane, V., Andersen, M. B., & Strean, W. B. (1997). Issues of qualitative research methods and presentation. *Journal of Sport and Exercise Psychology, 19*, 213-218.

Lake, J. K., Power, C., & Cole, T. J. (1997). Child to adult body mass index in the 1958 British birth cohort: associations with parental obesity. *Archives of Disease in Childhood, 77*, 376-380.

Lally, P., Chipperfield, A., & Wardle, J. (2008). Healthy habits: efficacy of simple advice on weight control based on a habit-formation model. *International Journal of Obesity, 32*, 700-707.

Lally, P., Van Jaarsveld, C. H. M., Potts, H. W. W., & Wardle, J. (2010). How are habits formed: modelling habit formation in the real world. *European Journal of Social Psychology, 40*(6), 998-1009.

Latner, J. D., Rosewall, J. K., & Simmonds, M. B. (2007). Childhood obesity stigma: association with television, videogame, and magazine exposure. *Body Image, 4*, 147-155.

Latner, J. D., & Stunkard, A. J. (2003). Getting worse: the stigmatization of obese children. *Obesity Research, 11*(3), 452-456.

Lavery, N. S. (2008). Stop all further research - and act. *British Medical Journal, 336*, 7.

Lazzer, S., Bedogni, G., Agosti, F., De Col, A., Mornati, D., & Sartorio, A. (2008). Comparison of dual-energy X-ray absorptiometry, air displacement plethysmography and bioelectrical impedance analysis for the assessment of body composition in severely obese Caucasian children and adolescents. *British Journal of Nutrition, 100*(4), 918-924.

Leigh-Hunt, N., & Rudolf, M. (2007). A review of local practice regarding investigations in children attending obesity clinics and a comparison of the results with other studies. *Child: Care, Health & Development, 34*(1), 55-58.

Liverpool City Council. (2011). *The Index of Multiple Deprivation 2010: A Liverpool analysis*. Available to download from http://liverpool.gov.uk/council/key-statistics-and-data/indices-of-deprivation/.

Liverpool City Portal. (2012). Demographics of Liverpool. Retrieved 12 April 2012, from http://www.liverpoolcityportal.co.uk/history/demographics.html

Liverpool Primary Care Trust and Liverpool City Council. (2008). Healthy Weight, Healthy Liverpool: Healthy weight strategy for Liverpool 2008-2011. Available from www.liverpoolpct.nhs.uk.

Maccoby, E. & Martin, J. Socialization in the context of the family: parent-child interaction. In: Hetherington, E. (ed.) *Handbook of Child Psychology: Socialisation, Personality and Social Development*. New York, NY: Wiley, pp.1-101

Mackintosh, K. A., Knowles, Z. R., Ridgers, N. D., & Fairclough, S. J. (2011). Using formative research to develop *CHANGE!*: a curriculum-based physical activity promoting intervention. *BMC Public Health, 11*, 831.

Manning, K. (1997). Authenticity in constructivist inquiry: methodological considerations without prescription. *Qualitative Inquiry, 3*, 93-115.

Marx, R. D., & Neumark-Sztainer, D. (2005). Question: what can we do to help parents raise children with a healthy weight and a healthy body image? *Eating Disorders, 13*, 491-495.

Maziak, W., Ward, K. D., & Stockton, M. B. (2007). Childhood obesity: are we missing the big picture? *Obesity Reviews, 9*, 35-42.

McCarthy, H. D., & Ashwell, M. (2006). A study of central fatness using waist-to-height ratios in UK children and adolescents over two decades supports the simple message - "keep your waist circumference to less than half your height". *International Journal of Obesity, 30*, 988-992.

Medical Research Council. (2000). A framework for development and evaluation of RCTs for complex interventions to improve health. Discussion document drafted by members of the MRC Health Services and Public Health Research Board.

Medical Research Council. (2008). Developing and evaluating complex interventions: new guidance. Available to download at www.mrc.ac.uk/complexinterventionsguidance. Accessed 1 October 2009.

Michie, S., Abraham, C., Whittington, C., McAteer, J., & Gupta, S. (2009b). Effective Techniques in Healthy Eating and Physical Activity Interventions: A Meta-Regression. *Health Psychology, 28*(6), 690-701.

Michie, S., Ashford, S., Sniehotta, F. F., Dombrowski, S. U., Bishop, A., & French, D. P. (2011). A refined taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours: The CALO-RE taxonomy. *Psychology and Health, 26*(11), 1479-1498.

Michie, S., Fixsen, D., Grimshaw, J. M., & Eccles, M. P. (2009a). Specifying and reporting complex behaviour change interventions: the need for a scientific method. *Implementation Science, 4*, 40.

Moens, E., Braet, C., & Van Winckel, M. (2010). An 8-year follow-up of treated obese children: children's, process and parental predictors of successful outcome. *Behaviour Research and Therapy, 48*, 626-633.

Morse, J. M. (2000). Follow your nose. *Qualitative Health Research, 10*(5), 579-580.

Murdoch, N., Payne, N., Samani-Radia, D., Rosen-Webb, J., Walker, L., Howe, M., et al. (2011). Family-based behavioural management of childhood obesity: service evaluation of a group programme run in a community setting in the United Kingdom. *European Journal of Clinical Nutrition, 65* 764-767.

Murtagh, J., Dixey, R., & Rudolf, M. (2006). A qualitative investigation into the levers and barriers to weight loss in children: opinions of obese children. *Archives of Disease in Childhood, 91*, 920-923.

Narayan K M V, Gregg E W, Engelgau M M, Moore B, Thompson T J, Williamson D F, et al. (2000). Translational research for chronic disease: the case for diabetes. *Diabetes Care, 23*(12), 1794-1798.

National Institute for Health and Clinical Excellence. (2006). Obesity: guidance on the prevention, identification, assessment and management of overweight and obesity in adults and children. NICE clinical guideline 43. London: NICE.

National Institute for Health and Clinical Excellence. (2007). Behaviour Change at Population, Community and Individual Levels. NICE public health guidance PH6. London: NICE.

National Obesity Observatory. (2009). Standard Evaluation Framework for Weight Management Interventions. Available from www.noo.org.uk

National Obesity Observatory. (2012). *National Child Measurement Programme: changes in children's body mass index between 2006/07 and 2010/11*. Delivered by NOO on behalf of the Public Health Observatories in England: Available to download from www.noo.org.uk.

Nederkoorn, C., Jansen, E., Mulkens, S., & Jansen, A. (2006). Impulsivity predicts treatment outcome in obese children. *Behaviour Research and Therapy, 45*, 1071-1075.

O'Cathain, A., Murphy, E., & Nicholl, J. (2007). Why, and how, mixed methods research is undertaken in health services research in England: a mixed methods study. *BMC Health Services Research, 7*, 85.

O'Connell, J. K., Price, J. H., Roberts, S. M., Jurs, S. G., & McKinley, R. (1985). Utilizing the Health Belief Model to predict dieting and exercising behavior of obese and nonobese adolescents. *Health Education Quarterly, 12*(4), 343-351.

O'Dea, J. A. (2004). Evidence for a self-esteem approach in the prevention of body image and eating problems among children and adolescents. *Eating Disorders, 12*, 225-239.

Office for National Statistics. (2007). Indices of Deprivation 2007 for Super Output Areas. from http://www.neighbourhood.statistics.gov.uk/dissemination/

Ogilvie, D., Craig, P., Griffin, S., Macintyre, S., & Wareham, N. J. (2009). A translational framework for public health research. *BMC Public Health, 9*, 116.

Oude Luttikhuis, H., Baur, L., Jansen, H., Shrewsbury, V. A., O'Malley, C., Stolk, R. P., et al. (2009). *Interventions for treating obesity in children (Review)*: The Cochrane Collaboration: Wiley.

Oullette, J. A., & Wood, W. (1998). Habit and intention in everyday life: the multiple processes by which the past behavior predicts future behavior. *Psychological Bulletin, 124*, 54-74.

Partners IN Salford. Making every contact count in Salford. Retrieved 9 April 2012, from https://www.makingeverycontactcountinsalford.org.uk/Default.aspx

Patton, M. Q. (2002). *Qualitative Research and Evaluation Methods* (3rd ed.). London: Sage.

Pearson, N., & Biddle, S. J. H. (2011). Sedentary behavior and dietary intake in children, adolescents, and adults. *American Journal of Preventive Medicine, 41*(2), 178-188.

Pearson, N., Biddle, S. J. H., & Gorely, T. (2008). Family correlates of fruit and vegetable consumption in children and adolescents: a systematic review. *Public Health Nutrition, 12*(2), 267-283.

Perera, R., Heneghan, C., & Yudkin, P. (2007). A graphical method for depicting randomised trials of complex interventions. *British Medical Journal, 334*, 127-129.

Pittson, H., & Wallace, L. (2011). Using intervention mapping to develop a family-based childhood weight management programme. *Journal of Health Services Research & Policy, 16*, 2-7.

Pollestad Kolsgaard, M. L., Joner, G., Brunborg, C., Anderssen, S. A., Tonstad, S., & Frost Andersen, L. (2011). Reduction in BMI z-score and improvement in cardiometabolic risk factors in obese children and adolescents. The Oslo Adiposity Intervention Study - a hospital/public health nurse combined treatment. *BMC Pediatrics, 11*, 47.

Popay, J., & Williams, G. (Eds.). (1994). *Researching the People's Health*. London: Routledge.

Porcellato, L., Dugdill, L., & Springett, J. (2002). Using focus groups to explore children's perceptions of smoking: reflections on practice. *Health Education, 102*(6), 310-320.

Pott, W., Albayrak, O., Hebebrand, J., & Pauli-Pott, U. (2009). Treating childhood obesity: family background variables and the child's success in a weight-control intervention. *International Journal of Eating Disorders, 42*, 284-289.

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 20*, 368-375.

Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion, 12*(1), 38-48.

Prospective Studies Collaboration. (2009). Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies. *Lancet, 373*, 1083-1096.

Puhl, R. M., & Latner, J. D. (2007). Stigma, obesity, and the health of the nation's children. *Psychological Bulletin, 133*(4), 557-580.

Ray, C., & Roos, E. (2012). Family characteristics predicting favourable changes in 10 and 11-year-old children's lifestyle-related health behaviours during an 18-month follow-up. *Appetite, 58*, 326-332.

Reinehr, T., & Andler, W. (2004). Changes in the atherogenic risk factor profile according to degree of weight loss. *Archives of Disease in Childhood, 89*, 419-422.

Reinehr, T., de Sousa, G., Toschke, A. M., & Andler, W. (2006). Long-term follow-up of cardiovascular disease risk factors in children after an obesity intervention. *American Journal of Clinical Nutrition, 84*(3), 490-496.

Reinehr, T., Kleber, M., Lass, N., & Toschke, M. (2010). Body mass index patterns over 5 y in obese children motivated to participate in a 1-y lifestyle intervention: age as a predictor of long-term success. *American Journal of Clinical Nutrition, 91*(5), 1165-1171.

Reinehr, T., Schmidt, C., Toschke, A. M., & Andler, W. (2009). Lifestyle intervention in obese children with non-alcoholic fatty liver disease: 2-year follow up study. *Archives of Disease in Childhood, 94*, 437-442.

Reinehr, T., Temmesfeld, M., Kersting, M., de Sousa, G., & Toschke, A. M. (2007). Four-year follow-up of children and adolescents participating in an obesity intervention program. *International Journal of Obesity, 31*, 1074-1077.

Rhee, K. (2008). Childhood overweight and the relationship between parent behaviors, parenting style, and family functioning. *Annals of the American Academy of Political and Social Science, 615*, 12-37.

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

Robertson, W., Friede, T., Blissett, J., Rudolf, M. C. J., Wallis, M., & Stewart-Brown, S. (2008). Pilot of "Families for Health": community-based family intervention for obesity. *Archives of Disease in Childhood, 93*(11), 921-926.

Robinson, C. C., Mandleco, B., Olsen, S. F., & Hart, C. H. (1995). Authoritative, authoritarian, and permissive parenting practices: development of a new measure. *Psychological Reports, 77*, 819-830.

Rootman, I., Goodstadt, M., Hyndman, B., & et al (Eds.). (2001). *Evaluation in Health Promotion: Principles and Perspectives* (Vol. European Series No. 92): World Health Organisation/EURO.

Rudolf, M., Christie, D., McElhone, S., Sahota, P., Dixey, R., Walker, J., et al. (2006). WATCH IT: a community based programme for obese children and adolescents. *Archives of Disease in Childhood, 91*, 736-739.

Rudolf, M. C. J., Walker, J., & Cole, T. J. (2007). What is the best way to measure waist circumference? *International Journal of Pediatric Obesity, 2*(1), 58-61.

Sabin, M. A., Ford, A., Hunt, L., Jamal, R., Crowne, E. C., & Shield, J. P. H. (2007). Which factors are associated with a successful outcome in a weight management programme for obese children? *Journal of Evaluation in Clinical Practice, 13*(3), 364-368.

Sabin, M. A., Ford, A. L., Holly, J. M. P., Hunt, L. P., Crowne, E. C., & Shield, J. P. H. (2006). Characterisation of morbidity in a UK, hospital based, obesity clinic. *Archives of Disease in Childhood, 91*, 126-130.

Sabin, M. A., & Shield, J. P. H. (2006). Clinical significance vs statistical significance in childhood obesity weight management programmes: Letter to the editor. [Letter to the editor]. *Archives of Disease in Childhood.*

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

Sacher, P. M., Chadwick, P., Wells, J. C. K., Williams, J. E., Cole, T. J., & Lawson, M. S. (2005). Assessing the acceptability and feasibility of the MEND programme in a small group of obese 7-11-year-old children. *Journal of Human Nutrition & Dietetics, 18*, 3-5.

Sacher, P. M., Kolotourou, M., Chadwick, P., Cole, T. J., Lawson, M., Lucas, A., et al. (2010). Randomized controlled trial of the MEND program: a family-based community intervention for childhood obesity. *Obesity, 18*(Supplement 1), S62-S68.

Sahota, P., Rudolf, M. C. J., Dixey, R., Hill, A. J., Barth, J. H., & Cade, J. (2001). Randomised controlled trial of primary school based intervention to reduce risk factors for obesity. *British Medical Journal, 323*, 1029-1032.

Sahota, P., Wordley, J., & Woodward, J. (2010). *Health behaviour change models and approaches for families and young people to support HEAT 3: child healthy weight programmes.* Edinburgh: NHS Health Scotland.

Savva, S., Tornaritis, M., Savva, M. E., Kourides, Y., Panagi, A., Silikiotou, N., et al. (2000). Waist circumference and waist-to-height ratio are better predictors of cardiovascular

disease risk factors in children than body mass index. *International Journal of Obesity, 24*, 1453-1458.

Schwandt, T. A. (2000). Three epistemological stances for qualitative inquiry: interpretivism, hermeneutics and social constructionism. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research: second edition*. USA: Sage Publications, Inc.

Scottish Intercollegiate Guidelines Network. (2003). *Management of Obesity in Children and Young People: A national clinical guideline*. Edinburgh: SIGN.

Scottish Intercollegiate Guidelines Network. (2010). Management of obesity: a national clinical guideline 115: NHS Scotland.

Shultz, S. P., Anner, J., & Hills, A. P. (2009). Paediatric obesity, physical activity and the musculoskeletal system. *Obesity Reviews, 10*, 576-582.

Singh, A. S., Mulder, C., Twisk, J. W. R., van Mechelen, W., & Chinapaw, M. J. M. (2008). Tracking of childhood overweight into adulthood: a systematic review of the literature. *Obesity Reviews, 9*, 474-488.

Skelton, J. A., & Beech, B. M. (2010). Attrition in paediatric weight management: a review of the literature and new directions. *Obesity Reviews, 12*(5), e273-e281.

Sleddens, E. F. C., Gerards, S. M. P. L., Thijs, C., de Vries, N. K., & Kremers, S. P. J. (2011). General parenting, childhood overweight and obesity-inducing behaviors: a review. *International Journal of Pediatric Obesity, 2011*(6), e12-e27.

Sparkes, A. C. (1998). Validity in qualitative inquiry and the problem of criteria: implications for sport psychology. *The Sport Psychologist, 12*, 363-386.

Speiser, P. W., Rudolf, M. C. J., Anhalt, H., Camacho-Hubner, C., Chiarelli, F., Eliakim, A., et al. (2005). CONSENSUS STATEMENT: Childhood Obesity. *Journal of Clinical Endocrinology and Metabolism, 90*, 1871-1887.

Stamatakis, E., Wardle, J., & Cole, T. J. (2010). Childhood obesity and overweight prevalence trends in England: evidence for growing socioeconomic disparities. *International Journal of Obesity, 34*, 41-47.

Staniford, L. J., Breckon, J. D., Copeland, R. J., & Hutchison, A. (2011). Key stakeholders' perspectives towards childhood obesity treatment: a qualitative study. *Journal of Child Health Care, 15*(3), 230-244.

Steele, M. M., Steele, R. G., & Hunter, H. L. (2009). Family adherence as a predictor of child outcome in an intervention for pediatric obesity: different outcomes for self-report and objective measures. *Children's Health Care, 38*, 64-75.

Stein, R. I., Epstein, L.H., Raynor, H.A., Kilanowski, C.K., & Paluch, R.A. (2005). The influence of parenting change on pediatric weight control. *Obesity Research, 13*(10), 1749-1755.

Steinberger, J., Jacobs Jr, D. R., Raatz, S., Moran, A., Hong, C.-P., & Sinaiko, A. R. (2005). Comparison of body fatness measurements by BMI and skinfolds vs dual energy X-ray absorptiometry and their relation to cardiovascular risk factors in adolescents. *International Journal of Obesity, 29*, 1346-1352.

Stewart, L., Chapple, J., Hughes, A. R., Poustie, V., & Reilly, J. J. (2008a). Parents' journey through treatment for their child's obesity: a qualitative study. *Archives of Disease in Childhood, 93*, 35-39.

Stewart, L., Chapple, J., Hughes, A. R., Poustie, V., & Reilly, J. J. (2008b). The use of behavioural change techniques in the treatment of paediatric obesity: qualitative evaluation of parental perspectives on treatment. *Journal of Human Nutrition & Dietetics, 21*(5), 464-473.

Stewart, L., Houghton, J., Hughes, A. R., Pearson, D., & Reilly, J. J. (2005). Dietetic management of pediatric overweight: development and description of a practical and evidence-based behavioral approach. *Journal of the American Dietetic Association, 105*(11), 1810-1815.

Stratton, G. S., Canoy, D., Boddy, L. M., Taylor, S. R., Hackett, A. F., & Buchan, I. E. (2007). Cardiorespiratory fitness and body mass index of 9-11-year-old English children: a serial cross-sectional study from 1998 to 2004. *International Journal of Obesity, 31*, 1172-1178.

Stratton, G. S., & Watson, P. M. (2009). Young people and physical activity. In L. Dugdill, D. Crone & R. Murphy (Eds.), *Physical Activity and Health Promotion: Evidence-based Approaches to Practice* (pp. 150-169). Oxford: Wiley-Blackwell.

Stuckey, H. L., Kraschnewski, J. L., Miller-Day, M., Lehman, E. B., & Sciamanna, C. N. (2011). Using positive deviance for determining successful weight-control practices. *Qualitative Health Research, 21*(4), 563-579.

Stunkard, A. J., & Messick, S. (1985). The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research, 29*(1), 71-83.

Summerbell, C. D., Ashton, V., Campbell, K. J., Edmunds, L., Kelly, S., & Waters, E. (2003). Interventions for treating obesity in children. *Cochrane Database of Systematic Reviews*, DOI: 10.1002/14651858.CD14001872.

Taylor, R. W., Jones, I. E., Williams, S. M., & Goulding, A. (2002). Body fat percentages measured by dual-energy X-ray absorptiometry corresponding to recently recommended body mass index cutoffs for overweight and obesity in children and adolescents aged 3-18 y. *American Journal of Clinical Nutrition, 76*, 1416-1421.

Taylor, W. C., Baranowski, T., & Sallis, J. F. (1994). Family determinants of childhood physical activity: A social-cognitive model. In R. K. Dishman (Ed.), *Advances in Exercise Adherence* (pp. 319-342). Champaign, Il: Human Kinetics.

Te Velde, S. J., van Nassau, F., Uijtdewilligen, L., van Stralen, M. M., Cardon, G., De Craemer, M., et al. (2012). Energy balance-related behaviours associated with overweight and obesity in preschool children: a systematic review of prospective studies. *Obesity Reviews, 13*(Suppl 1), 56-74.

The Information Centre for Health and Social Care. (2007). National Child Measurement Programme: 2006/2007 school year, headline results: Available to download from http://www.ic.nhs.uk/ncmp.

The NHS Information Centre. (2011). National Child Measurement Programme: England, 2010/11 school year: Available to download from www.ic.nhs.uk/ncmp.

The Sedentary Behaviour and Obesity Expert Working Group. (2010). *Sedentary behaviour and obesity: review of the current scientific evidence*. Department of Health and Department for Children, Schools and Families.

Togashi, K., Masuda, H., Rankinen, T., Tanaka, S., Bouchard, C., & Kamiya, H. (2002). A 12-year follow-up study of treated obese children in Japan. *International Journal of Obesity, 26*, 770-777.

Tremblay, M., LeBlanc, A. G., Kho, M. E., Saunders, T. J., Larouche, R., Colley, R. C., et al. (2011). Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity, 8*, 98.

Trigwell, J., Watson, P. M., Murphy, R., Cable, N. T., & Stratton, G. (2011). *Addressing childhood obesity in black and racial minority (BRM) populations in Liverpool*: Liverpool Health Inequalities Research Institute.

Tyers, M. (2005). Healthy lifestyle project for overweight and obese children: a pilot study. *Nutrition and Food Science, 35*(5), 298-302.

van der Horst, K., Kremers, S., Ferreira, I., Singh, A., Oenema, A. & Brug, J. (2007). Perceived parenting style and practices and the consumption of sugar-sweetened beverages by adolescents. *Health Education Research, 22* (2), 295-304.

Verplanken, B., & Orbell, S. (2003). Reflections on past behavior: a self-report index of habit strength. *Journal of Applied Social Psychology, 33*(6), 1313-1330.

Vignolo, M., Rossi, F., Bardazza, G., Pistorio, A., Parodi, A., Spigno, S., et al. (2008). Five-year follow-up of a cognitive-behavioural lifestyle multidisciplinary programme for childhood obesity outpatient treatment. *European Journal of Clinical Nutrition, 62*, 1047-1057.

Wadden, T. A., Stunkard, A. J., Rich, L., Rubin, C. J., Sweidel, G., & Mckinney, S. (1990). Obesity in black adolescent girls: a controlled clinical trial of treatment by diet, behavior modification, and parental support. *Pediatrics, 85*(3), 345-352.

Walker, L. L. M., Gately, P. J., Bewick, B. M., & Hill, A. J. (2003). Children's weight-loss camps: psychological benefit or jeopardy? *International Journal of Obesity, 27*, 748-754.

Walker Lowry, K., Sallinen, B. J., & Janicke, D. M. (2007). The effects of weight management programs on self-esteem in pediatric overweight populations. *Journal of Pediatric Psychology, 32*(10), 1179-1195.

Walker, O., Strong, M., Athcinson, R., Saunders, J., & Abbott, J. (2007). A qualitative study of primary care clinician's views of treating childhood obesity. *BMC Family Practice, 8*, 50.

Watts, K., Naylor, L. H., Davis, E. A., Jones, T. W., Beeson, B., Bettenay, F., et al. (2006). Do skinfolds accurately assess changes in body fat in obese children and adolescents? *Medicine and Science in Sports and Exercise, 38*(3), 439-444.

Webb, T. L., & Sheeran, P. (2006). Does changing behavioural intentions engender behaviour change? A meta-analysis of the experimental evidence. *Psychological Bulletin, 132*, 249-268.

Welk, G. J., Wood, K., & Morss, G. (2003). Parental influences on physical activity in children: an exploration of potential mechanisms. *Pediatric Exercise Science, 15*, 19-33.

Wells, J. C. K., Coward, W. A., Cole, T. J., & Davies, P. S. W. (2002). The contribution of fat and fat-free tissue to body mass index in contemporary children and the reference child. *International Journal of Obesity, 26*(1323-1328).

Williams, S. L., & French, D. P. (2011). What are the most effective intervention techniques for changing physical activity self-efficacy and physical activity behaviour - and are they the same? *Health Education Research, 26*(2), 308-322.

Wolfe, I., Cass, H., Thompson, M. J., Craft, A., Peile, E., Wiegersma, P. A., et al. (2011). Improving child health services in the UK: insights from Europe and their implications for the NHS reforms. *British Medical Journal, 342*, doi:10.1136/bmj.d1277.

Wood, W., Quinn, J. M., & Kashy, D. A. (2002). Habits in everyday life: thought, emotion and action. *Journal of Personality and Social Psychology, 83*(6), 1281-1297.

Wood, W., Tam, L. & Witt, M.G. (2005). Changing circumstances, disrupting habits. *Journal of Personality and Social Psychology, 88*(6), 918-933.

World Health Organisation. (March 2011). Obesity and overweight: fact sheet No. 311. *http://www.who.int/mediacentre/factsheets/fs311/en/index.html* Retrieved 5 April 2012

Wrotniak, B. H., Epstein, L. H., Paluch, R. A., & Roemmich, J. N. (2004). Parent weight change as a predictor of child weight change in family-based behavioral obesity treatment. *Archives of Pediatrics & Adolescent Medicine, 158*, 342-347.

Appendices

1 – Watson PM, Dugdill L, Pickering K, Bostock S, Hargreaves J, Staniford L & Cable NT. A whole family approach to childhood obesity management (GOALS): relationship between adult and child BMI change. *Annals of Human Biology* 2011;38:445-452.

2 - Watson PM, Dugdill L, Murphy R, Knowles Z & Cable N T. Moving forward in childhood obesity treatment: a call for translational research. *Health Education Journal.* Published online 3 April 2012. DOI: 10.1177/0017896912438313

3 – Dugdill, L., Stratton, G. S., & Watson, P. M. (2009a). Developing the evidence base for physical activity interventions. In L. Dugdill, D. Crone & R. Murphy (Eds.), *Physical Activity and Health Promotion: Evidence-based Approaches to Practice* (pp. 60-81). Oxford: Wiley-Blackwell.

4 – Stratton, G. S., & Watson, P. M. (2009). Young people and physical activity. In L. Dugdill, D. Crone & R. Murphy (Eds.), *Physical Activity and Health Promotion: Evidence-based Approaches to Practice* (pp. 150-169). Oxford: Wiley-Blackwell.

5 – Adapted version of the Self-Perception Profile for Children

6 – Instructions for the Self-Perception Profile for Children

7 – Breakdown of stage 2 coding from the parent questionnaire in study 1

Appendix 5 – Adapted version of the Self-Perception Profile for Children

What I am like

	Really true for me	Sort of true for me				Sort of true for me	Really true for me
Example	☐	☐	*Some kids would rather play outdoors in their spare time*	**BUT**	*Other kids would rather watch TV*	☐	☐
1.	☐	☐	Some kids find it *hard* to make friends	**BUT**	Other kids find it's pretty *easy* to make friends	☐	☐
2.	☐	☐	Some kids do very *well* at all kinds of sports	**BUT**	Other kids *don't* feel that they are very good when it comes to sports	☐	☐
3.	☐	☐	Some kids are *happy* with the way they look	**BUT**	Other kids are *not* happy with the way they look	☐	☐
4.	☐	☐	Some kids are often *unhappy* with themselves	**BUT**	Other kids are pretty *pleased* with themselves	☐	☐
5.	☐	☐	Some kids have *alot* of friends	**BUT**	Other kids *don't* have very many friends	☐	☐
6.	☐	☐	Some kids wish they could be a lot better at sports	**BUT**	Other kids feel they are good enough at sports	☐	☐
7.	☐	☐	Some kids are *happy* with their height and weight	**BUT**	Other kids wish their height or weight were *different*	☐	☐
8.	☐	☐	Some kids *don't* like the way they are leading their life	**BUT**	Other kids *do* like the way they are leading their life	☐	☐
9.	☐	☐	Some kids would like to have a lot more friends	**BUT**	Other kids have as many friends as they want	☐	☐

	Really true for me	Sort of true for me			Sort of true for me	Really true for me
10.	☐	☐	Some kids think they could do well at just about any new sports activity they haven't tried before	**BUT**	Other kids are afraid they might *not* do well at sports they haven't ever tried	☐	☐
11.	☐	☐	Some kids wish their body was *different*	**BUT**	Other kids *like* their body the way it is	☐	☐
12.	☐	☐	Some kids are *happy* with themselves as a person	**BUT**	Other kids are often *not* happy with themselves	☐	☐
13.	☐	☐	Some kids are always doing things with *a lot* of kids	**BUT**	Other kids usually do things by *themselves*	☐	☐
14.	☐	☐	Some kids feel that they are *better* than others their age at sport	**BUT**	Other kids *don't* feel they can play aswell	☐	☐
15.	☐	☐	Some kids wish their physical appearance (how they look) was *different*	**BUT**	Other kids *like* their physical appearance the way it is	☐	☐
16.	☐	☐	Some kids *like* the kind of person they are	**BUT**	Other kids often wish they were someone else	☐	☐
17.	☐	☐	Some kids wish that more people their age liked them	**BUT**	Other kids feel that more people their age *do* like them	☐	☐
18.	☐	☐	In games and sports some kids usually *watch* instead of play	**BUT**	Other kids usually *play* rather than just watch	☐	☐
19.	☐	☐	Some kids wish something about their face or hair looked *different*	**BUT**	Other kids *like* their face and hair the way they are	☐	☐
20.	☐	☐	Some kids are very *happy* being the way they are	**BUT**	Other kids wish they were *different*	☐	☐

	Really true for me	Sort of true for me				Sort of true for me	Really true for me
21.	☐	☐	Some kids are *popular* with others their age	**BUT**	Other kids are *not* very popular	☐	☐
22.	☐	☐	Some kids *don't* do well at outdoor games	**BUT**	Other kids are *good* at new games right away	☐	☐
23.	☐	☐	Some kids think that they are good looking	**BUT**	Other kids think that they are not very good looking	☐	☐
24.	☐	☐	Some kids are *not* very happy with the way they do a lot of things	**BUT**	Other kids think the way they do things is fine	☐	☐

Thank you for your completing this survey

Appendix 6 – instructions for the Self-Perception Profile for Children

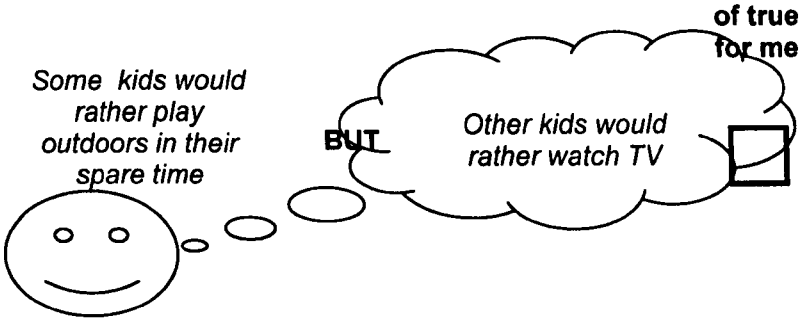
It is important you try and do this without your mum's help, as this is about what *you* think.

Look at the example. This tells you about 2 different types of children.

	Really true for me	Sort of true for me				Sort of true for me	Really true for me
(a)	☐	☐	*Some kids would rather play outdoors in their spare time*	**BUT**	*Other kids would rather watch TV*	☐	☐

Step 1: decide (in your head) which type of children you are most like.

	Really true for me	Sort of true for me				Sort of true for me	Really true for me
(a)	☐	☐	*Some kids would rather play outdoors in their spare time*	**BUT**	*Other kids would rather watch TV*	☐	☐



Step 2: Decide if that is *really true* for you or just *sort of* true.

Step 3: Tick the box that is most like you.

	Really true for me	Sort of true for me				Sort of true for me	Really true for me
(a)	☐	☐	*Some kids would rather play outdoors in their spare time*	**BUT**	*Other kids would rather watch TV*	☑	☐

Important rule! Only tick one box in each row.

Appendix 7 - Breakdown of stage 2 coding from the parent questionnaire in study 1

General notes on stage 2 coding of response components

- *Different components* of the *same response* can be coded in different categories. i.e. the same participant can give information relevant to more than one objective.
- However, the *same response component* cannot be coded in more than one category.
- A response can only be coded once within a category, even if there are several components that relate to it. The frequency count refers to how many different participants provided information relevant to that objective.
- If a response contains components belonging to several categories, but doesn't make sense if broken up, it is left intact and the relevant component (within each category) underlined.

Q1. "How do your activity levels now compare to your activity levels before you came to GOALS? Please describe anything that is different"

Objective	Response component	No. of responses
Physical activity feelings	1. I just don't seem to sit down now till about 8.30-9pm of a night. From 7:30 am I have lots more energy 2. Feel that I have more energy because of what I'm eating 3. I feel more energetic 4. More willing to [participate] in activities 5. I have more energy, less tired/bored 6. I have more energy, I think it due to diet change 7. I can do more exercise, more walking, eat healthily 8. Feel more energetic, and enjoy the exercise	**8**
Physical activity levels	1. Much increased, from once or twice a week to three or four times 2. More 3. My activity level has increased greatly but the last two weeks I have not been as active due to being too busy 4. My activity level has gone up 5. Doing more activities 6. More activity now	**6**
Tentative	1. Slightly improved 2. Improved slightly 3. Things are much better, but I am trying to make things better 4. I feel activity levels are increasing, I think maybe its because the nights are lighter	**4**
Walking (active transport or leisure)	1. Go for walks 2. I do a lot more walking 3. Walking more 4. Increased because we go on walks at weekend 5. More walking 6. More active, more walking, lifting and stretching 7. Walk more when possible 8. We have recently got a dog and walk it twice daily 9. I am lot more active I always walk instead of getting a taxi 10. Walk more frequently 11. I walk more	**11**
Other active transport		**0**
Other lifestyle activity	1. Use stairs rather than lift	**1**
Active play	2. Play more physical games	**1**
Structured exercise	1. Now regularly attend the gym	**12**

	2. I do more exercise during week 3. Exercising 4. I try to exercise more 5. And we try and go the baths more. 6. Exercise bike 7. More active, more walking, lifting and stretching 8. Use my cross trainer at least twice a week 9. I now go swimming with kids 10. Go to the gym 11. Using DVD motivation at home 12. Very different, I never did any exercise after work. As now at least three times a week at least, if not more	
Sport participation		**0**

Specific coding notes for Q1:

- If the participant talked about "activity" but didn't mention a specific type of activity, the whole response was coded as general "physical activity levels". This category included whole responses only.
- A separate category of "tentative" responses was created where participants said little and used words such as "slightly", or implied activity levels were improving but still were not where they would like them to be.
- It is acknowledged that walking can be either a lifestyle activity or active transport. As it was not always possible to tell from participants' responses which they were referring to (or both), a separate category named "walking" was added.

Q2. "How do you feel your child's activity levels compare to their activity levels before GOALS?"

Objective	**Response component**	**No. of responses**
Tries harder / gets involved	1. My son tries much harder now without giving up too soon when tired of struggling 2. I feel that [my daughter's] fitness levels have increased a lot since coming to GOALS 3. Join in more school activities 4. Both children are more active and more confident as they will join more clubs 5. Again much less tired 6. He is more determined to do activity 7. He does seem keen to do more activity 8. My grandchild appears to be more interested in doing sports and taking part in activities	**8**
Awareness	1. He is now more aware of importance of exercise 2. Increased, she is more aware of the balance between what she eats and her activity levels 3. Not much difference in actual activity but it is talked about more/has a higher profile	**3**
Physical activity levels	1. Better 2. Improved a lot 3. They have improved 4. A lot more activity 5. They have increased 6. A lot better 7. Doing more activities 8. Have definitely increased 9. The activity levels have increased 10. [My son] does more activity now	**10**
Tentative	1. Have gone up slightly 2. Slightly improved	**7**

	3. A bit more 4. Some increase, does more at weekends 5. They have increased, but it was difficult finding an exercise he enjoyed and was motivated to do 6. Has increased but still takes a lot of effort to motivate at this age - 5 7. Has increased to some degree, but have found it difficult to fit in around school/homework	
Active transport	1. They have improved - does more walking and plays out more 2. [My sons'] improved - walks to school and walks the dog 3. Doing well, boxing more, walking, more PE 4. Walk home from school most nights 5. Walks more 6. A lot more walking	**6**
Lifestyle activity	1. [My sister] is involved with more activities after school with her friends 2. His activity is great, he now goes to football and rides his bike frequently. He also plays badminton and goes swimming. 3. More intensity-swimming and cycling 4. Does a lot more sports. Only used to do football. Now does swimming, running, exercises, riding bike	**4**
Active play	1. She plays on the Wii which is good exercise 2. They have improved - does more walking and plays out more 3. [My daughter] does more physical activities and plays more physical games	**3**
Structured exercise	1. More intensity-swimming and cycling 2. Does a lot more sports. Only used to do football. Now does swimming, running, exercises, riding bike* 3. more active, swimming has improved, little more running 4. Doing well, boxing more, walking, more PE 5. his activity is great, he now goes to football and rides his bike frequently. He also plays badminton and goes swimming	**5**
Sport participation	1. [My daughter] has now been doing football 4 times a week 2. Get more involved in sports 3. He now goes to football, cricket 4. Excellent - [my daughter] has increased her sports activities and maintained her levels of fitness 5. Doing well, boxing more, walking, more PE 6. His activity is great, he now goes to football and rides his bike frequently. He also plays badminton and goes swimming	**6**

Specific coding notes for Q2:

- If the participant talked about "activity" but didn't mention a specific type of activity, the whole response was coded as general "physical activity levels". This category included whole responses only.
- A separate category of "tentative" responses was created where participants said little and used words such as "slightly", or implied activity levels were improving but still were not where they would like them to be.
- *although this participant refers to "sports", the examples given refer to exercise therefore it is coded under exercise

- All references to walking coded under "active transport" (unless specifically stated that it is for leisure purposes), as walking is most commonly associated with transport for children.
- All references to cycling coded under "lifestyle activity" (unless specifically stated that it is for transport purposes), as bike-riding is more commonly associated with lifestyle activity than transport for children.

Q3. "Have you noticed any changes in your child's confidence and attitude to physical activity since coming to GOALS (either positive or negative)?"

Objective	Response component	No. of responses
General improvement in confidence	1. Yes, lot more positive 2. Positive, she is getting extremely fit 3. Definitely, due to understanding the importance of exercising 4. Yes, she is more positive 5. Positive 6. Much more self-confident 7. More confident 8. She is more confident and positive towards exercise 9. It has a positive impact 10. Yes, he is more confident than before 11. It has positive confidence and he is more confident 12. Yes, positive 13. Positive 14. Yes more confidence 15. Yes (especially [referred child]) 16. Positive 17. Yes as above [meaning child PA question which was a positive answer] 18. Positive 19. He appears to be more positive and has more self-confidence 20. Yes she is more aware of healthy lifestyle	**20**
Tentative	1. Slightly more positive 2. Slightly more confident 3. Possibly more positive	**3**
Willingness to get involved	1. She is more positive and prepared to have a go at new things 2. He wants to get more involved. Not as shy, esteem has increased. Looks forward to getting involved. 3. Yes he is willing to join in with activities as before he wouldn't 4. More willing to take part in activity. Slight increase confidence 5. Make conscious effort to partake in activities 6. Not saying no anymore, more willing to walk the dog 7. Yes, [my daughter] takes part in sports and other activities by herself - confidence has grown 8. More eager 9. He has become more involved and will try most things 10. She's become more positive about trying more exercise 11. Yes they are more willing to try new sports and activities 12. Happy to walk from school 13. She enjoys physical activities more and asks to do them	**13**
Healthy body image	1. He doesn't seem to worry so much now about his weight and looks more confident	**1**

Q4. "How do your family's eating habits now compare to your eating habits before you came to GOALS? Please describe anything that is different."

Objective	Response component	No. of responses
Reduce portion sizes	1. Smaller portion sizes 2. More aware of portion size, increasing vegetables and trying new foods 3. We have also reduced our food portion	**3**
Consume fewer processed foods	1. I am cooking more meals from scratch instead of processed foods 2. We are eating less processed foods	**2**
Cook more meals from fresh	1. We used to have frozen food, now we have fresh for about same cost 2. I cook different meals 3. Cooking more fresh food instead of frozen foods 4. Trying more recipes 5. I am cooking more meals from scratch instead of processed foods 6. Yes I cook more fresh foods eg. Make my own curries, pasta sauces etc. 7. We eat food from fresh	**7**
Increase fruit & vegetable intake	1. More fruit is eaten 2. As a family we eat more healthy and we eat a lot more vegetables 3. Eat more fruit on regular basis, trying more vegetables 4. More salads, have found [my daughter] doesn't ask for sweets, will eat cucumber instead 5. We have made quite a lot of changes - increased fruit and veg, changed bread, breakfast cereals and swapped diet drinks (fizzy) to cordials (no added sugar) 6. Better, more veg either raw or stir fried 7. Fruit and veg 8. More veg, more fruit, more healthy foods 9. More aware of portion size, increasing vegetables and trying new foods 10. Eat far more fruit and veg 11. Eat more fruit and veg	**11**
Replace snacks	1. We have stopped eating as many crisps and biscuits 2. Fewer crisps are bought 3. [My daughter] tries to change her snacks 4. A big improvement - snack more healthily, carrots, pitta, homemade	**4**
Reduce added salt & sugar		**0**
Reduce takeaways	1. Much better stopped fast foods	**1**
Increase water consumption	1. More water 2. And drink more water 3. Drinking water 4. Drink more water	**4**
Regular meals, esp. breakfast	1. A lot more healthier, planning of meals 2. Eating breakfast 3. Breakfast club, eat all time never did before	**3**
Food labels and awareness	1. [My daughter] is very aware of the foods she eats and is conscious of trying to get the balance right 2. We look at food more about fat content, sugar, calories 3. We do think twice when eating something 4. We are more conscious of what we eat	**7**

	5. ALWAYS buy low fat/salt options, ALWAYS buy and look for healthy options 6. More healthier and paying attention to all the labels 7. Tend to think about things family are going to have, because I want to keep eating healthily	
Trying new foods	1. Kids more adventurous with trying new foods 2. More aware of portion size, increasing vegetables and trying new foods 3. The children are more prepared to try different foods	**3**
Healthy balanced diet	1. Switched to skimmed milk 2. Things like sausage rolls or pies are now definite "no no" and high in sugar cereals are something that we tend not to buy anymore 3. Lot more fish, brown bread, semi-skimmed milk, low fat butter, not as much fizzy drinks 4. We have made quite a lot of changes - increased fruit and veg, changed bread, breakfast cereals and swapped diet drinks (fizzy) to cordials (no added sugar) 5. We have changed our eating bread to wholemeal bread 6. 100% improved all healthy foods 7. Reduced salt content and fat foods 8. Completely different a lot more healthier choices at the same cost as before 9. We are eating much more healthily 10. Eating healthy food and regular 11. We have stopped eating at night	**11**