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*An exploration of childhood obesity treatment interventions to enhance their long-term effectiveness.*

STANIFORD, Leanne J.

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**AN EXPLORATION OF CHILDHOOD OBESITY TREATMENT  
INTERVENTIONS TO ENHANCE THEIR LONG-TERM EFFECTIVENESS**

Leanne J Staniford

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

March 2012

## Abstract

Childhood obesity is a major public health concern. Recent data suggests although childhood obesity prevalence rates appear to be slowing, they are still unacceptably high (Health Survey for England, 2010). To establish a downward trend in childhood obesity rates, effective treatment options are vital. To date, multi-component treatment interventions (MCTIs) incorporating a physical activity, healthy eating and behavioural component and encouraging family involvement appear to be the most promising approach to treat childhood obesity. However, no firm conclusion can be made regarding the sustainability of treatment outcomes (i.e. behavioural & weight related outcomes) (Luutikhuis et al., 2009). This thesis contributed to the evidence base regarding the sustainability of treatment outcomes from MCTIs; considered stakeholder views in the intervention design process and provided an insight into treatment recipient's reasons for attrition from MCTIs.

To critically examine the evidence base, Study 1 provided a systematic review of childhood obesity treatment interventions. Results revealed gaps in the evidence in terms of how best to maintain treatment outcomes. Furthermore the study highlighted a need to better consider stakeholder views in intervention design and to fully report treatment fidelity (TF). In Study 2, a qualitative inquiry explored stakeholder perspectives towards childhood obesity treatment and the maintenance of treatment outcomes. Results revealed incongruence between treatment recipients (i.e. parents & children) and treatment deliverers (i.e. health professionals). Treatment recipients suggested they required ongoing support to maintain treatment outcomes. Conversely, treatment deliverers suggested ongoing support is unrealistic and MCTIs should create autonomous individuals who feel confident in their ability to maintain treatment outcomes. Implications included the need to consider maintenance strategies that promote autonomous motivations and perceived competence for behavioural changes in participants with the aim of improving weight maintenance following MCTIs.

In light of stakeholder views in Study 2, Study 3A detailed a pilot study to test the efficacy of a maintenance intervention underpinned by Self Determination Theory (Deci & Ryan, 1985; 2000) and that integrated Motivational Interviewing (Miller & Rollnick, 1991; 2002) and cognitive behavioural strategies to improve the sustainability of behavioural and weight related outcomes following a MCTI. A secondary aim of Study 3A was to evaluate TF. Findings supported the potential importance of autonomous motivation and perceived competence in enhancing the maintenance of behavioural and weight related changes. Furthermore this study highlighted a need to explore participants' reasons for attrition from MCTIs. Study 3B provided a qualitative exploration of parents and children's reasons for attrition from MCTIs. Findings underlined the complexity of attrition with several psychological and motivational reasons appearing as the driving source for attrition. Study implications included the need to consider individual families' needs within MCTIs, targeting parents and children's motivations for maintaining a healthy lifestyle and weight differently. The collective implications of the four studies included the need for stakeholders to be involved at all levels of design, implementation and evaluation of MCTIs, the need to assess and report all aspects of TF and the need for MCTIs to develop families' perceived competence and autonomous motivations for health behaviour changes in order to improve the sustainability of weight related outcomes.

## **Candidate's Statement**

I declare that the work in this thesis was carried out in accordance with the regulations of the Sheffield Hallam University and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in the thesis are those of the author and in no way represent those of the University.

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Leanne J Staniford

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## Published Material from this Thesis

Staniford, L. J., Breckon, J. D., & Copeland, R. J. & Hutchison, A. (2011). Key stakeholders' perspectives towards childhood obesity treatment: A qualitative study. *Sheffield Obesity Conference: Tackling Child and Adult Obesity in Sheffield*. Sheffield, 25<sup>th</sup> November 2008.

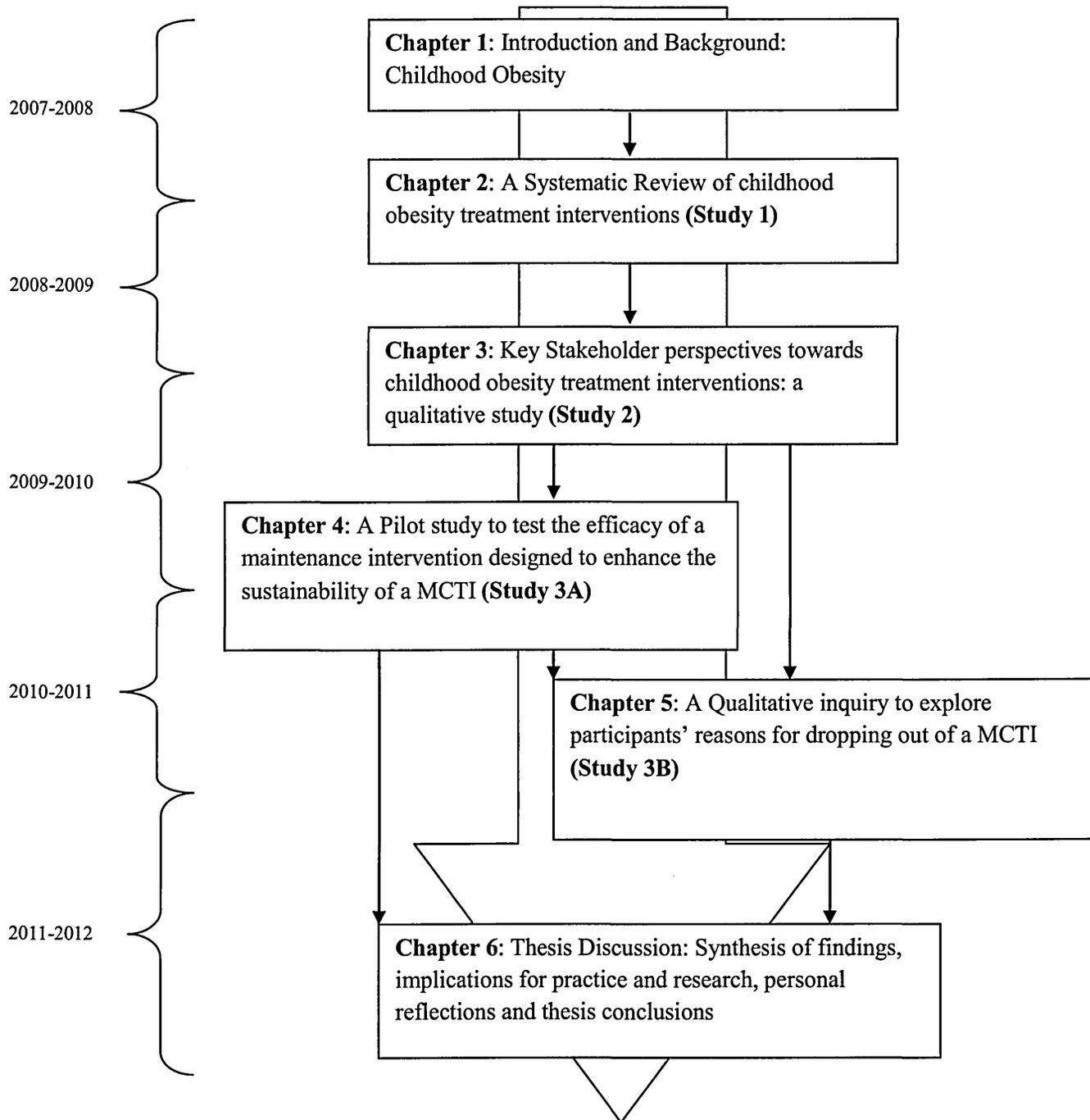
Staniford, L. J., Breckon, J. D., & Copeland, R. J. (2011). Treatment of Childhood Obesity: A Systematic Review. *Journal of Child and Family Studies*, 1-20, doi:10.1007/s10826-011-9507-7.

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, doi: 10.1177/1367493511404722.

## Structure of the Thesis

A structural diagram of this thesis is presented in Figure 1.1 which demonstrates how this thesis uniquely contributes to the evidence base regarding MCTIs. An iterative approach to the research was adopted with the findings of each study informing the development of the proceeding study (see Figure 1.1). In total, the thesis comprises four studies.

Study 1 (Chapter 2) contributes to the rationale for the thesis via a systematic review of MCTIs designed to treat childhood obesity (Staniford, Breckon & Copeland, 2011). Study 2 (Chapter 3) advances knowledge regarding stakeholder views of MCTIs through a qualitative inquiry focussed on the sustainability of childhood obesity treatment outcomes (i.e. weight related & lifestyle behaviour change outcomes) (Staniford, Breckon, Copeland & Hutchison, 2011). Findings from both Study 1 and 2 informed the development of a pilot study (Study 3A: Chapter 4) to test the efficacy of a maintenance intervention, underpinned by self determination theory (SDT, Deci & Ryan, 1985), integrating Motivational Interviewing (MI, Miller & Rollnick, 1991; 2002) and cognitive behavioural strategies to improve the sustainability of a MCTI. Findings from Study 3A highlighted a need to explore the reasons associated with participant attrition (i.e. drop-out) from MCTIs (Study 3B: Chapter 5). Chapter 6 provides a synthesis of the findings from the four studies, discusses the implications for practice, considers the emerging research questions from the thesis and provides an overall conclusion (see Figure 1.1).



**Figure 1.1** Structural Diagram of the Thesis.

## Content of the Thesis

To elaborate on the chapter headings presented in Figure 1.1, a brief summary of the content of each chapter is provided below:

### *Chapter one*

Chapter one provides an introduction and background to the childhood obesity literature. It describes the prevalence of childhood obesity and considers the physical, psycho-social and economic impact of the disease. The potential causes of obesity and risk factors associated with the disease are also discussed. A brief introduction is provided to MCTIs given that these are currently regarded as the most promising approach to treat childhood obesity (Luutikhuis et al., 2009). Finally, the limitations and gaps in the current literature related to MCTIs are identified which provides the rationale for the purpose, direction and structure of this thesis.

### *Chapter two*

To identify pertinent issues, limitations and gaps associated with current MCTIs, Chapter 2 details Study 1 of the thesis which provides a systematic review of contemporary treatment interventions. A semi quantitative approach was used in the systematic review (Sallis, Prochaska & Taylor, 2000) and the quality of each study was assessed to highlight the strength of conclusions that could be drawn from each study. Specific attention was given to whether interventions reported sustainable outcomes, whether issues related to the fidelity of treatment interventions were reported and the particular features that were associated with successful MCTIs. Chapter 2 describes in further detail the limitations and gaps that need to be addressed in the childhood obesity treatment literature.

### *Chapter three*

The systematic review described in Chapter 2 revealed limitations around the limited sustainability of treatment interventions, the under reporting of issues around treatment fidelity (TF), the poor retention rates and lack of consideration of stakeholder views in the design of treatment interventions. Therefore, Chapter 3 details Study 2 of the thesis and provides a qualitative inquiry to consider the perceptions of a range of stakeholders towards MCTIs. Particularly their views towards the sustainability of treatment outcomes (i.e. PA, healthy eating & weight related outcomes). Semi

structured interviews were used to elicit stakeholder views and a framework approach was taken to analyse the qualitative data (Ritchie & Spencer, 1994).

#### *Chapter four*

To address the implications uncovered in Chapters 2 and 3, Chapter 4 detailed Study 3A of the thesis, a pilot study that explored the efficacy of a maintenance intervention, underpinned by Self Determination Theory (SDT: Deci & Ryan, 1985) that integrated MI and cognitive behavioural strategies to improve the long-term outcomes (i.e. health behaviour changes & weight related outcomes) of a MCTI. The chapter details the rationale for the design of the maintenance intervention, justification for the SDT underpinnings (Deci & Ryan, 1985; 2000), justification for incorporating MI and cognitive behavioural strategies, the methods and a description of the intervention content, the results of the pilot study and a discussion of the findings including the implications for future research and practice. Chapter 4 highlighted the potential efficacy of using a maintenance intervention that promotes autonomous motivation, and enhances families' perceived competence to maintain behaviour changes and weight related outcomes. The chapter revealed difficulties in recruiting and retaining families in the maintenance intervention which supported findings from Chapter 2 relating to the difficulties associated with attrition of families from MCTIs.

#### *Chapter five*

In light of the attrition of families from MCTIs revealed in Chapters 2 and 4, Chapter 5 (Study 3B) provided a qualitative inquiry to explore participants' reasons for attrition from MCTIs. Particularly their views towards what would increase the likelihood of them remaining in treatment and adhering to lifestyle behaviour change over the long-term. Findings underlined the complexity of attrition with no parent or child expressing the same set of reasons for dropping out. Parents and children blamed each other for their lack of desire and motivation to make health behaviour changes and this dissonance was cited as a major reason for their attrition. The chapter concluded by providing implications for future research and practice.

#### *Chapter six*

Chapter 6 provided a synthesis of the main findings from the four studies detailed in Chapters 2, 3, 4 and 5. The chapter discusses the implications that can be used to inform applied practice and future research. The chapter then provided personal reflections of

the research experience and final conclusions of the thesis in relation to the original aims.

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## Abbreviations

<b>ANCOVA</b>	Analysis of Covariance
<b>BMI</b>	Body Mass Index
<b>BMI SDS</b>	Body Mass Index Standard Deviation Score
<b>BREQ</b>	Behavioural Regulation in Exercise Questionnaire
<b>CAQDAS</b>	Computer Assisted Qualitative Data Analysis Software
<b>CBT</b>	Cognitive Behavioural Strategies
<b>DOH</b>	Department of Health
<b>ES</b>	Effect Size
<b>GOALS</b>	Getting Our Active Lifestyles Started
<b>HCCQ</b>	Health Care Climate Questionnaire
<b>HSE</b>	Health Survey for England
<b>HP</b>	Health Professional
<b>IMD</b>	Indices of Multiple Deprivation
<b>MCTI</b>	Multi-Component Treatment Intervention
<b>MEND</b>	Mind, Exercise, Nutrition, Do it
<b>MI</b>	Motivational Interviewing
<b>MINT</b>	Motivational Interviewing Network of Trainers
<b>MITI</b>	Motivational Interviewing Treatment Integrity Scale
<b>NCMP</b>	National Child Measurement Programme
<b>NICE</b>	National Institute for Clinical Excellence
<b>NOO</b>	National Obesity Observatory
<b>PA</b>	Physical Activity
<b>PAQ-C</b>	Physical Activity Questionnaire for Children
<b>PASSES</b>	Perceived Autonomy Support Scale for Exercise Settings
<b>PCS</b>	Perceived Competence Scale
<b>QSR NVIVO</b>	Qualitative Solutions & Research NVIVO
<b>SD</b>	Standard Deviation
<b>SDT</b>	Self Determination Theory
<b>TSRQ</b>	Treatment Self Regulation Questionnaire

# **Chapter 1**

## **Thesis Introduction and Background: Childhood Obesity**

## **Chapter 1: Thesis Introduction and Background: Childhood Obesity**

### **1.1 Introduction**

The following chapter provides a review of the prevalence of childhood obesity, the impact and lifelong consequences of the disease in young people and its potential causes. The chapter then examines features of multi-component treatment interventions (MCTIs) designed to treat childhood obesity, given that they are currently regarded as the most promising treatment approach (Luutikhuis et al., 2009). Finally, the chapter highlights the design and methodological limitations associated with MCTIs which subsequently informed the purpose, direction and structure of this thesis.

#### ***1.1.1 Prevalence of Childhood Obesity in the UK***

Research articles and government reports have consistently highlighted the need to develop effective treatment interventions to tackle childhood obesity within the UK as part of a whole-systems strategy (Department of Health: DoH, 2008; Foresight, 2007). The need for such a strategy has been driven by the significant rise in childhood obesity observed over the past three decades. Data from the Health Survey for England (HSE, 2010) reported that the prevalence of obesity among boys aged 2 to 15 years old was 17%, and 15% among girls. HSE (2010) reported that 31% of boys and 29% of girls aged 2 to 15 years old are either overweight or obese and that children who are aged 11 to 15 are more likely to be obese than 2 to 10 year olds. The increasing prevalence in childhood obesity is mirrored in other countries worldwide (Han, Lawlor & Kimm, 2010). The Foresight report (2007) predicted that by 2050, 70% of girls and 55% of boys under the age of 20 will be overweight or obese without intervention. The prevalence of obesity is also disproportionately high among certain ethnic groups (particularly Bangladeshi, Black African & Black Caribbean), in areas with high levels of deprivation and for children living in urban areas (National Obesity Observatory: NOO, 2010; see section 1.4 for further details).

In the UK currently, over a fifth of children in reception year are classified as either overweight or obese (22.6%) and one in three (33.4%) children in year six are classified as either overweight or obese (National Child Measurement Programme: NCMP, 2010/2011). This most recent NCMP data has suggested a plateau in BMI has been observed in the UK at the national and local level (Boddy, Hackett & Stratton, 2009) and this plateau has been mirrored in other countries around the world (Ogden et

al., 2010). Research suggests the plateau might be due to the cumulative impact of national and local initiatives to promote healthy weight (Boddy et al., 2009). Despite this evidence to suggest a plateau might be occurring, the recent National Obesity Observatory (2012) report comparing NCMP data from 2006/2007 to 2010/2011 suggests that the prevalence of obesity in 10 to 11 year olds (i.e. year 6 children) has continued to show a significant year on year increase of 0.35% (NOO, 2012). The report brings into question to what extent this plateau has occurred both at the local and national level (NOO, 2012). Moreover, the prevalence of obesity is still unacceptably high among young people and it is crucial that tackling obesity remains a priority. To establish a downward trend in the prevalence of excess weight in children, and limit the considerable negative impact of obesity on the physical and psycho-social health of young people, treatment programmes that demonstrate sustained outcomes are required (DoH, 2011; National Institute for Health and Clinical Excellence: NICE, 2007).

## **1.2 Impact of Obesity**

### ***1.2.1 Impact of Obesity on Physical Health in Childhood***

Childhood obesity has been associated with a significant number of negative health complications in young people (Daniels et al., 2005; Reilly, 2006) and has been highlighted as an antecedent to a host of chronic health conditions in adulthood (Wabitsch, 2000; Wright, Parker, Lamont, Craft & Spence, 2001). Furthermore, it has been estimated that 60-85% of obese children will remain obese into adulthood and that obesity in childhood increases the risk of morbidity in later life, even if the child is no longer classified as obese as an adult (Kiess et al., 2001; Speiser et al., 2005).

Obese children are at a greater risk of developing type II diabetes and research has reported an increase in the number of children developing type II diabetes before puberty parallel to the increase in prevalence of childhood obesity (MacPhee, 2008). In the UK, research has revealed that the frequency of diagnosis for type II diabetes has increased and is strongly associated with a family history of the condition and increased adiposity (Haines, Wan, Lynn, Barrett & Shield, 2007).

Research has also reported an association between childhood obesity and cardiovascular disease risk factors. The major cardiovascular risk factors include high blood pressure (hypertension), dyslipidaemia, abnormalities in the left ventricular mass and/or function, hyperinsulinaemia and/or insulin resistance (Reilly et al., 2003). The

Bogalusa Heart Study identified 59% of children and adolescents with a BMI  $\geq$  99<sup>th</sup> percentile had at least two cardiovascular risk factors (Freedman, Mel, Srinivasan, Berenson & Dietz, 2007). Obese children are also at risk of developing metabolic syndrome (also known as syndrome X or the insulin resistance syndrome) which is the name given to a variety of clinical abnormalities known as risk factors for cardiovascular disease (Miranda, Defronzo, Califf & Guyton, 2005).

Sleep disorders are well recognised in obese children, especially in severe obesity including sleep apnoea, heavy snoring and resistance to airflow (Lobstein, Baur & Uauy, 2004). It has been reported that obese children are four to six times more likely to have obstructive sleep apnoea compared to lean peers of similar ages (Speiser et al., 2005). A number of studies have also shown a link between childhood obesity and asthma (Lobstein et al., 2004; Speiser et al., 2005). However, a causative biological link between asthma and excessive weight has yet to be determined (Lobstein et al., 2004; Speiser et al., 2005).

Obese children have been reported to be at a higher risk of developing certain orthopaedic problems such as Blount's disease, flat feet, ankle sprains, slipped epiphysis, osteoarthritis, and fractures (Lobstein et al., 2004; Speiser et al., 2005). Childhood obesity can decrease an individual's life expectancy by seven years by the time they reach 40 (Haslam & James, 2005). Other medical consequences associated with childhood obesity include non alcoholic fatty liver disease (NAFL; Patton et al., 2006), hypertension, dyslipidaemia, gallstones, arthritis and some types of cancers (Johnston et al, 2007). The implications for an obese child's physical health alone highlight why developing effective and sustainable treatment interventions is vital.

### ***1.2.2 Impact of Obesity on Psycho-social Health in Childhood***

In addition to the considerable negative impact on physical health, obesity in childhood and adolescence is also associated with a number of psycho-social problems. These include depression, low self-esteem and self efficacy, bullying and in some cases disordered eating (Claus, Braet & Decaluwé, 2006; Young-Hyman et al., 2006). Obese children's health related quality of life in physical, social and scholastic domains has shown to be significantly less than children of normal weight (Franklin, Denyer, Steinbeck, Caterson & Hill, 2006). Furthermore, Schwimmer, Burwinkle and Varni (2003) reported a reduced health related quality of life in a group of severely obese

children and adolescents (i.e. physical ability, social relations, psychological well-being & school achievement) similar to children who had been diagnosed with cancer and were receiving chemotherapy treatment.

Obese children are also reported to grow up in a climate of anti-fat attitudes and stigmatisation associated with obesity (Walker, Gately, Bewik & Hill, 2003) with studies showing obese children are stereotypically regarded as less desirable friends, unhealthy, ugly, weak, academically unsuccessful and socially incompetent by children and adults alike (Franklin et al., 2006). Obese children are the likely target of early discrimination and are more likely to suffer from prejudice and stereotyping associated with their weight (Puhl & Heuer, 2009). Maziak, Ward and Stockton (2007) suggested that children are not equipped to deal with this prejudice, which seems widespread amongst society and in some cases is even shared by the medical professionals. Therefore it is not surprising that the victimisation experienced by obese and overweight children can lead to poor self-esteem and consequential high probabilities of obesity in later life (Gray, Kahhan & Janicke, 2009).

### ***1.2.3 The Economic Impact of Obesity***

The negative impacts on physical and psycho-social health of being obese for an individual are substantial. However, obesity also has broader and extensive financial implications. The financial burden of overweight and obesity was estimated to cost the UK economy between £6.6 and £7.4 billion per year (Health Select Committee, 2004). In 2002, an estimated £49 million was spent on treating obesity and a further £1075 million was spent on treating the consequences of obesity (NHS Information Centre, 2006). The direct costs of obesity to the NHS are estimated to be £4.2 billion (Department of Health, 2011). Furthermore, the bill for treating obesity and weight related problems is forecast to rise to as much as £50 billion by 2050 without effective intervention (Foresight, 2007). To set these figures in context, it was estimated that the costs to health care providers of treating an individual with a BMI > 35 are at least 44% more than for a healthy weight individual (Speiser et al., 2005).

Taken together, data presented here confirms the physical, psycho-social and financial need for effective treatment strategies to tackle childhood obesity within the UK. That said, to ensure such interventions are indeed effective, the causes of obesity in young people need to be first understood.

### 1.3 Causes of Childhood Obesity

The causes of childhood obesity are frequently debated (Weiting, 2008) and there is little conformity over what is the major causal factor, with individual responsibility, parental responsibility and/or societal environment all commonly cited (Foresight, 2007; Weiting, 2008). What is clear is that the causes of obesity in children and adolescents are complex and multi-factorial. It is therefore important to consider the interplay of these factors rather than suggest one major factor is to blame. Although a detailed discussion of the aetiology of obesity would go beyond the scope of this thesis, a brief discussion of the potential causal factors of the disease is warranted.

At the simplest level weight gain is caused by a chronic energy imbalance (i.e. more energy is taken in from food than is being expended by physical activity: PA). As suggested in the recent Scottish Intercollegiate Guidelines Network (SIGN, 2010), this imbalance can be partially explained by environmental and behavioural changes related to diet and physical inactivity (SIGN, 2010). The term 'obesogenic environment' has been coined to describe the modern environment that promotes high energy intake and low energy expenditure. The 'obesogenic environment' includes the familial environment, the marketing culture of convenience and 'fast foods', increasing car usage, low PA and increased sedentary pursuits (i.e. computer games, TV watching). Promoters of the 'obesogenic environment' argument suggest that an individual would have to behave 'abnormally' to maintain a healthy weight and this failure to do so for most young people has led to a chronic positive energy imbalance and rising obesity prevalence (Lobstein et al., 2004).

Although the 'obesogenic environment' adds much to the debate concerning the causal factors of obesity in young people, obesity is perhaps better thought of as a "complex system" with an individual's energy balance influenced by a range of highly interconnected factors, including the 'obesogenic environment' (Foresight, 2007). These factors include the individual level (e.g. genetic predisposition to obesity, level of satiety, stress level & learned activity patterns) or at the broader environmental, societal and cultural level (e.g. how suitable an area is for walking, abundance & price of food, portion sizes, societal pressure to consume, socioeconomic status, mass medias marketing of junk food).

Foresight categorised these factors into seven thematic clusters; individual psychology, social psychology, individual PA, PA environment, physiology, food consumption and food production. The sum of all the relevant factors within these seven clusters and their inter-relationships (positive & negative) constitute the obesity system and perhaps represent the best available evidence for the causal factors of obesity to date (Foresight, 2007). Brief consideration of a number of these causal factors is presented in the following sections, beginning with physiological/genetic factors.

### ***1.3.1 Genetic Causes of Childhood Obesity***

It is important to acknowledge that there are genetic factors that predispose certain individuals to being overweight and obese. Seminal twin studies have reported that monozygotic twins had similar fat distributions while dizygotic twins were three times more likely to have different fat levels (Borjeson, 1976). Even when identical twins have grown up apart, their adult weight was closely correlated despite their childhood environment being different (Stunkard, Harris, Pederson & McClean, 1990). These studies demonstrate that genetics are a major causal factor in obesity. In other studies, Farooqi and O’Rahilly (2006; 2007) found that there are a number of genes or their variants that have been shown to influence the development of human obesity. Monogenetic causes of obesity tend to be rare but have also been found (Barsh, Farooqi, & O’Rahilly, 2000; Farooqi & O’Rahilly, 2006). A number of inheritable disorders including Down Syndrome, Prader Willi Syndrome, Duchenne’s Muscular Dystrophy and Fragile X include obesity as a clinical feature of the syndrome (Lobstein et al., 2004). Although interesting, further discussion on the genetic influences on the development of obesity is beyond the scope of this thesis.

### ***1.3.2 Endocrine Causes of Childhood Obesity***

The role of the endocrine glands is to produce hormones that regulate and maintain a stable body environment. In children they are important in regulating normal growth and timing of puberty (Malecka-Tendera & Molnar, 2002). A number of endocrine disorders can be caused by dysfunction in the production or utilisation of hormones that are associated with childhood obesity. These include hypothyroidism, growth hormone insufficiency, hypopituitarism, hypogonadotrophic hypogonadism, excessive corticosteroid administration, pseudohypoparathyroidism and craniopharyngioma (Malecka-Tendera & Molnar, 2002).

### ***1.3.3 Parental Influence on Childhood Obesity***

In the event of a child being genetically predisposed to increased weight gain, the role of their environment cannot be ignored. Indeed, the dramatic increase in childhood obesity prevalence throughout the world confirms obesity is not a product of genetics alone (Barsh et al., 2000; Commuzie, 2002). With this in mind, it is well documented that there is an increased risk of childhood obesity in children if one parent is obese and a four times greater risk if both parents are obese (Livingstone, McCaffery, Rennie & Wallace, 2006; Reilly et al., 2005). A child's weight seems to be influenced most by same sex parents (EarlyBird 43: Perez-Pastor et al., 2009) and even grandparents (Davis, McConagle, Schoeni & Stafford, 2008). Evidence indicates that parenting style, feeding practices, parental weight status and parental behaviours are all potential mechanisms through which parents can contribute to their child becoming obese (Golan & Weizman, 2001). For instance, research suggests that a parent's poor eating and health habits can be acquired by a child through imitation and modelling (Young, Fors & Hayes, 2004). Other research suggests that the authoritative parenting style (i.e. a parent who is demanding & responsive & assertive but not restrictive; Baumrind, 1991) has been linked to healthier eating habits (Bowne, 2009) and lower rates of obesity (Rhee, Lumeng, Appugliese, Kaciroti & Bradley, 2006). Based on this, it would seem appropriate for treatment interventions to consider the family unit as opposed to the child in isolation (NOO, 2009).

### ***1.3.4 Dietary Influence on Obesity***

Diet and dietary choices have contributed much to the rising rate of obesity in young people. The Food Standard Agency (FSA, 2001) advocates the Balance of Good Health for healthy eating in childhood. Dietary Reference Values (DRVs) are proposed for children and differ according to a child's age and sex (Department of Health, 1991). Reference values are based on average weights of children across the age range doing moderate amounts of activity (The Caroline Walker Trust, 2010).

Evidence suggests that the proportion of fat in the diet has increased over the last 50 years (French, Story & Jeffery, 2001; Prentice & Jebb, 1995). In particular, increases have been observed in foods high in fat and energy density including convenience foods used in the home and those from fast food outlets and take away meals (French et al., 2001). Foods high in fat contain more energy (calories) per gram and therefore more

readily influence overall energy intake. Furthermore, a diet high in fat can lead to an overriding of the body's satiety mechanisms which in turn encourages overeating (Blundell & MacDiarmid, 1997).

Over the past few decades a trend towards increasing portion sizes has been reported particularly in foods consumed outside of the home (e.g. in fast food restaurants) which is likely to have contributed to the increase in obesity (Nicklas, Barenowski, Cullen & Berenson, 2001). Another dietary factor implicated in the growing childhood obesity epidemic is the increased consumption of sugary soft drinks that are easily accessible to children in the modern day 'obesogenic' environment e.g. vending machines are in many leisure centres and community centres (French et al., 2001; Swinburn & Egger, 2002; Whitaker, 2003). It has been reported for every glass or can of sugary drink consumed by school aged children the ratio of becoming obese increases by 1.6 (Ludwig, Peterson & Gortmaker, 2001). It is clear that the increasing portion sizes, consumption of energy dense food and sugary soft drinks outside of the home environment have played a role in the development of obesity (SIGN, 2010).

### ***1.3.5 Physical Activity and Sedentary Behaviours Influence on Obesity***

There is research to suggest that it is the decrease in total energy expenditure that has played a more pivotal role in the development of obesity (Prentice & Jebb, 1995). The PA guidelines for children and young people (5-18 years old) state that children should aim to achieve at least 60 minutes and up to several hours a day of moderate to vigorous intense PA. The guidelines go on to suggest children should minimise the amount of time spent being sedentary (DoH, 2011). Lack of regular PA is associated with an increased risk of obesity and other metabolic and cardiovascular diseases (WHO, 2010). The HSE (2007) reported that among girls aged 2 to 15 years old, obesity prevalence rates were higher in the low PA group with 21% of girls classified as obese in the low PA group compared with 15% in the high PA group. There is a general consensus that the community environment, neighbourhood settings, town planning and modern life encourages a less physically active lifestyle (e.g. the increasing car usage & a corresponding decrease in walking & cycling) (Hill, King & Armstrong, 2007; Lobstein et al., 2004; Swinburn & Egger, 2002; 2004).

The increasing urbanisation and parental perceptions of the decreased safety of their neighbourhood settings means that parents are more likely to encourage their

children to partake in sedentary pursuits (Weir, Etelson & Brand, 2006). Thus, coupled with the decrease in PA has been an increase in sedentary pursuits. Research evidence has suggested that children who watched the most television in childhood had the greatest increase in body fat over time (Proctor et al., 2003). Viner and Cole (2005) reported that the TV viewing time at the age of five independently predicted BMI in adulthood even after adjustment for maternal attitude towards TV viewing, maternal education status in childhood, exercise levels in childhood, birth weight, BMI of both parents, and social class in adulthood. Research suggests that TV viewing contributes to obesity through increasing calorie intake (known as grazing) and decreasing time spent in PA (Cheng, 2005; Robinson, 2001). However, some evidence suggests there is only a small association between TV viewing and childhood overweight (Hancox & Poulton, 2005). Moreover, recent research findings have suggested that physical inactivity (i.e. sedentary behaviours) appears to be the result of fatness rather than its cause (EarlyBird 43: Metcalf et al., 2010). In light of this research and positive health implications of increasing PA, PA should be prioritised over reducing sedentary activity alongside encouraging dietary changes in interventions designed to treat childhood obesity (NOO, 2009). Research suggests it is not enough to focus on decreasing sedentary activities alone but rather to encourage increasing PA to increase energy expenditure which is key in weight management (NOO, 2009).

#### **1.4 High Risk Groups for Developing Obesity**

Within the UK, there are specific population groups that have been reported to have a higher risk of becoming obese. Children from ethnic groups specifically Asian (particularly Bangladeshi), Black African and Black Other ethnic groups (e.g. Afro-Caribbean) and lower socio-economic groups (i.e. working class) (HSE, 2010; NCMP 2010/2011) have been reported to be at a greater risk of developing obesity. The HSE (2010) reported that children were more likely to be obese if they were in the lowest income groups with 20% of boys and 17-18% of girls in the lowest income group classed as obese. The HSE (2007) found that the prevalence of overweight and obesity varied by parental BMI status with higher obesity prevalence rates in households where either natural parents (i.e. birth parents) or lone parents (single parent families) were classed as overweight or obese. Some evidence has revealed that children and adolescents with special needs, including autism and intellectual disabilities may have

significantly higher prevalence of obesity and severe obesity than the general population (Curtin, Anderson, Must & Bandini, 2010; Stewart et al., 2009).

## **1.5 Prevention of Childhood Obesity**

Recent reports have emphasised that in addition to the need for effective treatment strategies, there is a need for effective prevention strategies as part of a sustained strategy to achieve government targets of reducing the rising childhood obesity levels (DoH, 2008; Foresight, 2007; NOO, 2009). Summerbell et al. (2005) concluded that there are a limited number of well conducted prevention studies and recommended that future prevention interventions need to consider the sustainability and environmental changes alongside the promotion of individual and family lifestyle changes (Summerbell et al., 2005). As this thesis was interested in the treatment of childhood obesity further discussions on prevention are not warranted here. However, further information on interventions to prevent childhood obesity is available from the Cochrane review (2005) and evidence based guidelines (NICE, 2006; NOO, 2009; SIGN, 2010; Summerbell et al., 2005; Waters et al., 2011).

## **1.6 Introduction to the Treatment of Childhood Obesity**

The severe impact of obesity on young people's physical and mental health and wellbeing, as well as the financial burden to the economy confirms the urgent call for effective and sustainable treatment strategies. The most recent 'Healthy Lives, Healthy People: Call for Action' report (DoH, 2011) suggests that to establish a downward trend in excess weight in children and adults there is a continual need to develop the evidence base regarding the effectiveness and cost effectiveness with respect to many areas of obesity action (DoH, 2011). Therefore the effective treatment of childhood obesity is a key area that needs to be addressed in order to contribute to achieving the government's targets.

With this in mind, the following section provides a succinct overview of MCTIs that have focussed on lifestyle changes i.e. PA and dietary changes, briefly highlighting limitations and gaps in the current literature and thereby forming the rationale for the studies presented within this thesis. For the purpose of this thesis, effective interventions are defined, in accordance with SIGN guidelines (2010), as those that induce positive health behaviour change and/or parallel weight reduction or weight maintenance.

### ***1.6.1 Multi-Component Childhood Obesity Treatment Interventions***

There is a large body of evidence to suggest that MCTIs combining dietary modification, regular PA, and behavioural therapy, supported by family involvement are the best available option for treating childhood obesity (Barlow et al., 2007; Flynn et al., 2006; Luutikhuis et al., 2009; NOO, 2009; SIGN, 2010; Whitlock et al., 2010) (for a detailed systematic review see Chapter 2). That said review evidence has drawn attention to a number of limitations and gaps that remain regarding childhood obesity which need to be addressed to improve the effectiveness of future childhood obesity treatment (Luutikhuis et al., 2009; Whitlock et al., 2010).

### ***1.6.2 Limitations of Multi-Component Childhood Obesity Treatment Interventions***

Although current reviews advocate the use of MCTIs over other potential approaches to treat childhood obesity, a number of limitations have been highlighted. Limitations identified include the lack of well conducted studies providing adequate evaluation or detail regarding the content of interventions, lack of consideration of relevant theoretical underpinnings, limited long-term follow-up within studies (> 12 months), a lack of consideration for the development of adverse consequences (e.g. the development of eating disorders) and variation in the measurement tools for obesity and overweight (Luutikhuis et al., 2009; Summerbell et al., 2003; Whitlock et al., 2010).

The limited generalisability of findings was identified as a limitation due to the majority of studies only involving white, middle class participants and being conducted in specialised settings (Luutikhuis et al., 2009; Summerbell et al., 2003). The replicability of MCTIs is questionable due to inadequate evaluation of the fidelity of treatment interventions (i.e. was the intervention theoretically underpinned; was the intervention delivered & received as intended; was the interventionist adequately trained and competent to deliver the planned intervention content: Bellg et al., 2004) (Luutikhuis et al., 2009; Summerbell et al., 2003). The benefit of reporting TF is increasingly being recognised in the health context as it helps in the process of drawing firm conclusions regarding the effectiveness of interventions (Bellg et al., 2004; Johnston et al., 2009). Poor retention of participants in MCTIs was also recognised as a key limitation (Whitlock et al., 2010) given that this can pose a threat to the interpretation of findings and the external validity of the research (Coday et al., 2005).

Lastly, but possibly most importantly is the sustainability of treatment outcomes. Review evidence has consistently highlighted that it is difficult to draw firm conclusions recommending the use of MCTIs to produce sustainable outcomes due to the limited evidence available and the tendency for intervention participants to regain weight in the long-term (Barlow et al., 2007; Flynn et al., 2006; Luutikhuis et al., 2009; NICE, 2006; Whitlock et al., 2010). Improving the sustainability of treatment outcomes is clearly a priority for research.

### **1.7 Purpose of this Thesis**

In light of the increasing prevalence of childhood obesity, and the limitations and gaps identified in the current literature regarding childhood obesity treatment interventions, the primary aim of this thesis is to contribute to the evidence regarding MCTIs, recognising that these are currently recommended as the most promising approach to treatment (Luutikhuis et al., 2009; Whitlock et al., 2010). Specifically, this thesis was interested in advancing knowledge regarding; the sustainability of intervention outcomes (i.e. behavioural changes & weight related outcomes), the improvement of retention rates of MCTIs, and the involvement of stakeholders in the design of treatment interventions to facilitate more client-centered interventions (Whitlock et al., 2010). By developing a better understanding of these areas it is hoped, this thesis will provide important applied implications for the development of future MCTIs.

## **Chapter 2**

### **Study 1: Childhood Obesity**

### **Treatment Interventions: A**

### **Systematic Review**

## **Chapter 2: Study 1: Childhood Obesity Treatment Interventions: A Systematic Review**

### **2.1 Introduction**

This thesis aimed to gain a better understanding of, and contribute to the sustainability of multi-component treatment interventions (MCTIs) in the childhood obesity treatment context. Chapter 1 provided a brief overview of MCTIs, highlighting that although MCTIs (i.e. incorporate a dietary, PA & behavioural component) are effective in the short-term, no firm conclusions can be drawn regarding their long-term sustainability (Whitlock et al., 2010). To extend this overview the following chapter provides a detailed systematic review of contemporary MCTIs, identifying pertinent issues, limitations and gaps in the literature. The results and their implications (for research & practice) are discussed in detail in relation to previous literature particularly expert recommendations regarding childhood obesity treatment published by Barlow and the Expert committee (2007) (see Figure 2.1). Based on these findings, and previous research literature (see Section 1.6, Chapter 1), a rationale is presented for the proceeding qualitative study (see Chapter 3).

The chapter begins by offering a brief overview of more extreme approaches taken to treat childhood obesity and single component interventions that target either PA or dietary changes alone.

#### ***2.1.1 Extreme Approaches to Treat Childhood Obesity***

As mentioned above, only brief discussion is provided regarding extreme approaches to treating obesity in young people. This is because these approaches are usually reserved for the most severe cases of obesity in adolescents (SIGN, 2010), not the population of focus for this thesis. Extreme approaches or “radical treatments” for obesity encompass the use of drug therapy, liquid meal replacements/very low energy diets and/or bariatric surgery. These treatments are now more commonly being recommended for adolescents with extreme obesity (BMI >99<sup>th</sup> percentile for age & gender or, in young adults, BMI >40 kg/m<sup>2</sup>) yet are deemed inappropriate and extreme for use in primary school and pre-adolescent school age children (NICE, 2006; SIGN, 2010).

### *2.1.1.1 Very Low Energy Diets (VLEDs)*

VLEDs tend to use protein sparing modified fasts mainly based on foods but sometimes including liquid diets. VLEDs have been reported to use 1.5-2.0 grams of protein per kilogram body weight and have included additional vitamins and minerals. These diets induce rapid weight loss and guidelines from the National Health and Medical Research Council for Australia (2003) only recommend VLEDs in adolescents if the clinical circumstances require such rapid weight loss (National Health & Medical Research Council, 2003).

### *2.1.1.2 Drug Therapy*

Drug therapy has been recommended in combination with diet, lifestyle intervention and behavioural modifications in some cases of obesity in adolescents (NICE, 2006; Speiser et al., 2005). The most commonly prescribed drugs include orlistat, sibutramine and metformin. Orlistat is a drug that inhibits pancreatic lipase by inducing malabsorption of fat, particularly triglyceride, causing increased faecal fat (Speiser et al., 2005) and requires to be taken in combination with a low fat diet. A number of studies have shown that Orlistat can be effective in the treatment of adolescent obesity (Chanoine, Hampi, Jensen, Boldrin & Hauptman, 2005) and it is currently available in the US for children over 12 years of age (Speiser et al., 2005). However, adverse side effects are commonly reported including fatty/oily stool; increased defecation, and abdominal pain (Chanoine et al., 2005).

Sibutramine is an anorexic agent that inhibits the neural uptake of serotonin, norepinephrine and dopamine. Evidence suggests that when combined with a lifestyle intervention it can be more effective than lifestyle change alone (Berkowitz, Wadden, Tershakovec & Cronquist 2003; Berkowitz et al., 2006). However it has a number of serious side effects such as mild hypertension and tachycardia and to date has only been used for the treatment of obesity in adolescents and young adults aged 16 and above (Speiser et al., 2005).

Metformin (glucophage) has been used in the treatment of diabetes and to facilitate weight loss. Metformin reduces sugar release from the liver preventing sugar levels in the blood from rising too high. This means the body does not need to produce insulin, inhibiting the hunger response and inhibiting fat production from the liver (Davidson & Peters, 1997). Some evidence suggests that Metformin can be effective to

promote weight loss, but there are a number of potential adverse side effects such as abdominal pain and diarrhoea (Freemark & Burse, 2001).

### *2.1.1.3 Bariatric Surgery for Childhood Obesity*

Bariatric surgery has proven to be successful in the treatment of morbid obesity in adults. The two most commonly used surgical procedures are laproscopic gastric banding and the Roux-en-Y gastric bypass (Speiser et al., 2005). The SIGN (2010) report recommended that bariatric surgery can be considered for post pubertal adolescents with very severe to extreme obesity (BMI > 3.5 standard deviations above the mean on 1990 UK centile charts) and severe co-morbidities. However, a recent Cochrane review concluded that further investigation is needed into drug use and surgery in combination with lifestyle changes before it is considered as a potential treatment to be recommended for childhood obesity (Luutikhuis et al., 2009).

### *2.1.2 Single Component Childhood Obesity Treatment*

A brief discussion is provided below of interventions that have focussed solely on dietary changes or PA behaviour changes to treat childhood obesity.

#### *2.1.2.1 Dietary behaviour change based interventions*

As discussed in section 1.3.4, dietary factors play a role in the development of obesity and need to be addressed in treatment. Collins, Warren, Neve, McCoy and Stokes (2008) conducted a systematic review measuring the effectiveness of dietary-based interventions to treat childhood obesity. Authors concluded that dietary-based interventions can be effective although as dietary modifications were only a part of MCTIs in 30 of the 37 studies they were unable to evaluate the effectiveness of dietary treatment alone. Therefore it was impossible to draw firm conclusions considering the lack of adequate explanation of dietary interventions and the lack of high quality studies. The recent NOO report (2009) suggested that there is no clear evidence to recommend one dietary approach over another in the treatment of childhood obesity (NOO, 2009).

#### *2.1.2.2 Physical Activity based Treatment Interventions*

Like dietary interventions, the evidence pertaining to treatment interventions targeting PA alone show they are not effective in terms of weight loss. Studies comparing diet versus PA or a combination of the two suggest a combination of dietary

modification and increased PA is more effective in producing weight loss than diet or PA alone (Caprio, 2006; Foresight, 2007; Luutikhuis et al., 2009). Although PA alone might not produce the most significant weight reductions, it is considered a key facet of childhood obesity treatment recognising the associated benefits. Increased PA can improve the management of type II diabetes, reduce blood pressure, improve blood lipid profile, reduce lower back pain, reduce the risk of osteoporosis, reduce the risk of certain cancers, improve sleep, mood and self-esteem (Campbell & Haslam, 2005).

A recent systematic review of randomised controlled trials (RCTs) and controlled clinical trials designed to test the effect of school-based PA interventions reported that specific PA interventions did not result in additional improvements in BMI compared to standard PA curricula (Harris, Kuramoto, Schulzer & Retallack, 2009). However, the review suggested that poor adherence and insufficient doses of PA within the interventions could explain this lack of association. The recent NOO report (2009) concluded that there is no clear evidence on the effectiveness of PA alone. Despite this PA could still be regarded as a key facet of treatment when recognising that an increase in energy expenditure contributes to a negative energy balance thereby producing weight related benefits and associated health improvements (Harris et al., 2009).

Despite evidence regarding more extreme approaches to childhood obesity treatment and single component interventions the strength of evidence suggests MCTIs are currently the most effective approach to childhood obesity treatment, thus this thesis focuses on MCTIs from this point on.

## **2.2 Multi-Component Childhood Obesity Treatment Interventions**

As highlighted in the introduction (see Chapter 1), previous reviews consistently highlight that MCTIs that focus on dietary change, PA promotion, and include a behavioural component (e.g. stimulus control), targeting the whole family are the best available option for treatment (Caprio, 2006; Flynn et al., 2006; Jelalian, Wember, Bungeroth & 2007; Luutikhuis et al., 2009; Snethen, Broome & Cashin, 2006; Steinbeck, 2005; Summerbell et al., 2003). Expert recommendations suggest that MCTIs should be delivered by a multidisciplinary team with expert training in the relevant area of intervention (Barlow et al., 2007). They suggest that the intensity of treatment should be dependent on the degree of obesity and the child's age (Barlow et al., 2007; Luutikhuis et al., 2009). NICE (2007) behaviour change guidelines highlight

that behaviour change interventions should be tailored to individual needs, attitudes and beliefs and developed in collaboration with the target population (NICE, 2007).

### ***2.2.1 Multi-Component Treatment Interventions: Limitations***

In spite of MCTIs success, a number of limitations have been identified as ascertained to in Chapter 1 (see section 1.6.2). Review evidence has suggested that inconsistencies exist around study design, study quality and outcome measures; small sample sizes; and infrequent measurement of compliance/adherence to lifestyle advice (Snethen et al., 2006; Summerbell et al., 2003). Few interventions have been implemented outside of specialised settings i.e. clinical or university hospital settings with diverse study samples limiting the generalisability of findings (Flynn et al., 2006; Summerbell et al., 2003). Despite inclusion of a further 36 studies, the most recent Cochrane review drew similar conclusions, suggesting MCTIs appear to be effective yet many of the same limitations particularly the limited sustainability of MCTIs still exist (Luutikhuis et al., 2009). While noting the value of previous reviews, these have focussed on treatment effectiveness solely based on primary and/or secondary outcome measures (e.g. BMI, behaviour change & psycho-social measures) and ignored issues around TF (i.e. was the intervention delivered as intended & reported).

### ***2.2.2 Treatment Fidelity (TF)***

Treatment fidelity (TF) refers to the methodological strategies used to monitor and enhance the reliability and validity of behavioural interventions and is acknowledged as an integral part of the conduct and evaluation of all health behavioural intervention research (Abraham & Michie, 2008; Bellg et al., 2004). TF covers study design, provider training, treatment delivery, treatment receipt and enactment of treatment skills (Bellg et al., 2004; Breckon, Johnston & Hutchison, 2008) and is important for the interpretation and generalisation of research findings (Nigg, Allegrante & Ory, 2002). Some evidence suggests that for empirical based interventions, strong fidelity is essential to produce treatment effects in real world settings (Hogue et al., 2008). Despite its significance in drawing valid inferences, previous reviews have paid little attention to whether TF issues have been addressed by interventions. Therefore, this review considers whether studies have measured and/or reported TF practices. Adherence to intervention content and study design, particularly whether interventions have been designed in line with appropriate theoretical underpinnings,

competency of treatment deliverers (i.e. was their competency to deliver the intervention content assessed), treatment delivery (i.e. was the intervention delivered as intended & reported) and, the receipt of treatment (i.e. was the treatment evaluated from the perspectives of the recipients), and if so, was it received as intended are all considered.

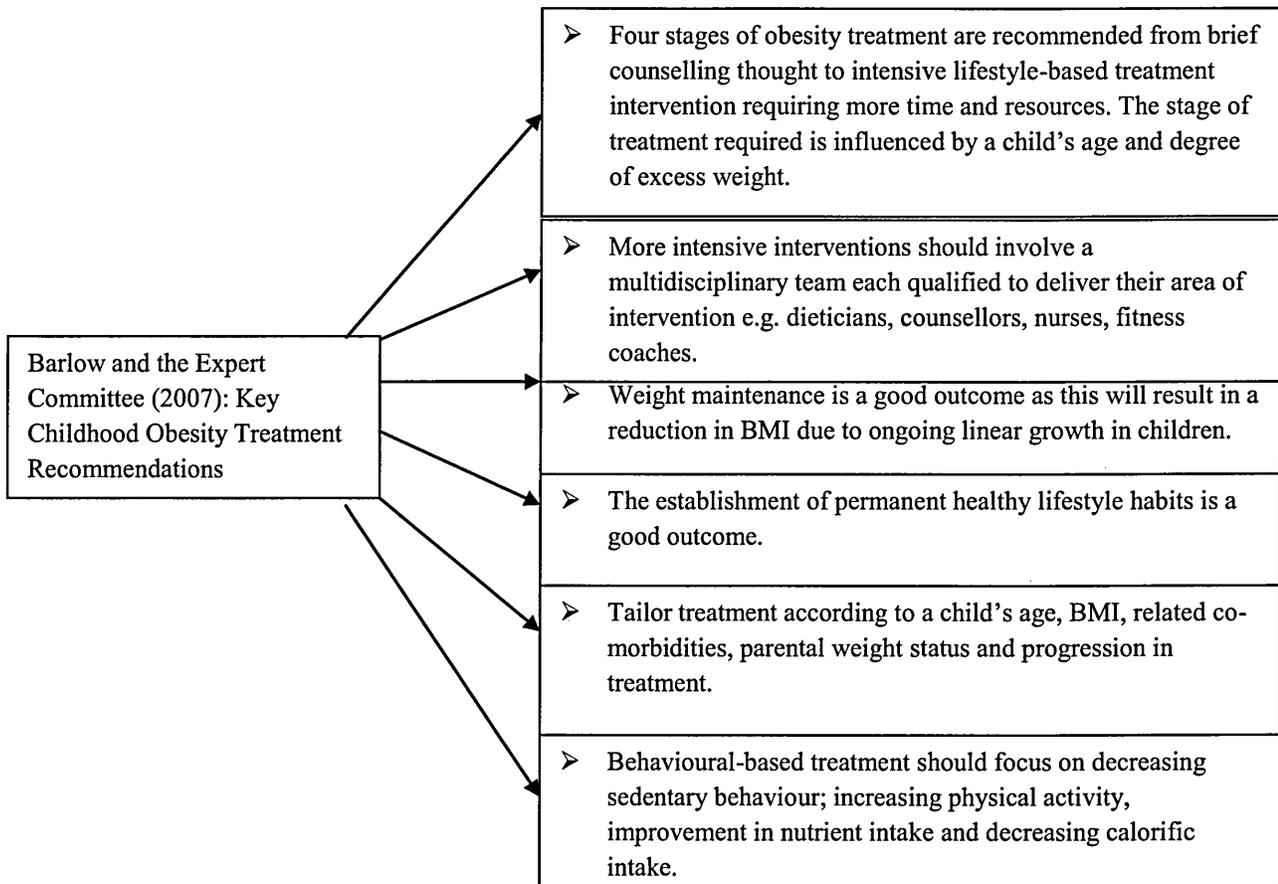
### **2.2.3 RCTs vs. non-RCTs**

Previous reviews have also largely ignored evidence from non-randomised controlled trials (Luutikhuis et al., 2009; Summerbell et al., 2003). While RCT designs are often recommended as the most reliable form of evidence there are a number of potential limitations of the RCT design. Limitations of RCTs include the potential that an RCT is impractical in terms of time and cost implications, the limited transferability of findings from RCTs back into the 'real world context', the potential unethical assignment of participants who require access to a service/ treatment to a control group, and a lack of appreciation of complex social phenomenon (Dugdill, Graham & McNair, 2005).

## **2.3 Study Aims**

Therefore, the aim of this study was to provide a systematic review to consider the efficacy of MCTIs. The review specifically addresses whether childhood obesity treatment interventions have considered and/or assessed TF issues (i.e. process evaluation). This could enhance the generalisability and replicability of successful interventions (Resnick et al., 2005) and uncover key facets of sustainable MCTIs.

The review considers whether treatment interventions have reported long-term follow-up, and if so, whether the treatment intervention was effective in the long-term. The Effect size (ES) was calculated for each study to allow for the consideration of how effective the treatment intervention was versus the control condition, and whether this related to the fidelity of the treatment condition. The review includes non-RCTs as well as RCTs considering the emergence of an increasing number of childhood obesity treatment interventions post 2000, such as camp-based studies that have not been implemented as large scale RCTs.



**Figure 2.1** Barlow and the Expert committees' recommendations for the treatment of childhood obesity (Barlow et al., 2007)

## **2.4 Method**

### **2.4.1 Sources**

The search strategy employed two main sources to locate published studies of child and adolescent overweight and obesity treatments: 1) Electronic searches of computerised databases (SPORTdiscus, PsychINFO, Medline, Scopus, Highwire Press & PubMed); 2) Citations in papers identified by the electronic searches. Keyword combinations for the electronic database searches included: Childhood and adolescent, obesity and overweight, treatment intervention, weight loss/reduction programme, weight management, weight maintenance, weight control programme, and healthy lifestyle programme. Figure 2.2 illustrates the study selection procedure and the results of the filtering process.

### **2.4.2 Selection of Studies for Inclusion/ Exclusion**

#### *2.4.2.1 Inclusion Criteria for this review were:*

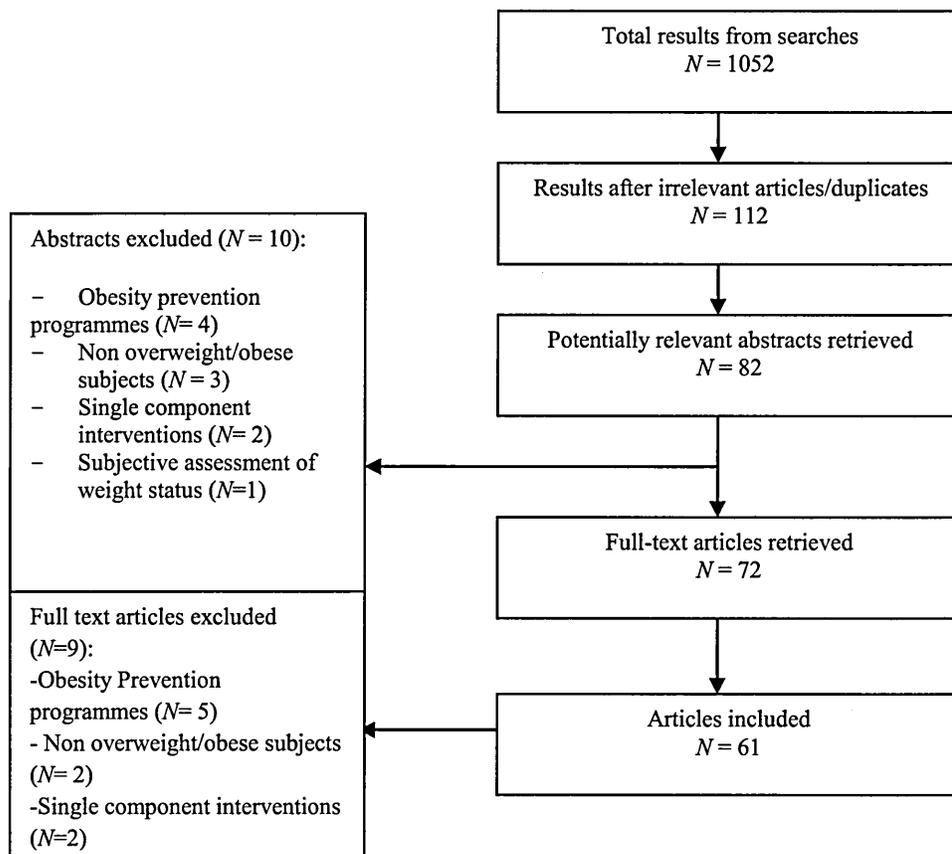
1. Data from randomised controlled trials (RCTs) and non-RCTs (including observational studies, pre-post trials, cohort studies: retrospective & prospective, longitudinal studies, case control or time series).
2. Lifestyle Interventions designed to treat childhood obesity that involved any combination of dietary, physical activity and behavioural therapy.
3. Interventions with both short (less than 6 months), medium (6-12 months) and long-term follow-up (greater than 12 months) were included.
4. Participants in the age range 5-18 years old.
5. Interventions that included at least one objective measure of participant's weight status/ adiposity (including BMI, BMI-SDS, waist circumference, skinfold thickness & percent overweight) prior to, and post treatment.
6. Publications from January 2000 to January 2009.

Treatment interventions were defined as those that involved a primary or secondary goal of weight loss or weight control/ weight maintenance/ weight management. Family involvement was defined as having a minimum of one parent or guardian involved in at least one aspect of the treatment.

Treatment interventions were defined as those that involved a primary or secondary goal of weight loss or weight control/ weight maintenance/ weight management. Family involvement was defined as having a minimum of one parent or guardian involved in at least one aspect of the treatment.

#### *2.4.2.2 Exclusion criteria*

Articles were excluded if they were not available in the English Language; unpublished studies and dissertations/theses.



**Figure 2.2** Summary of outcomes of all retrieved papers.

### **2.4.3 Procedures**

Hard copies of all relevant publications were obtained, according to this review's inclusion and exclusion criteria. To analyse included publications, a descriptive review protocol outlined in Sallis, Prochaska and Taylor (2000) and adopted by Goodger, Gorely and Johnston (2007) and Hutchison, Breckon and Johnston (2009) was followed. Each treatment intervention was initially coded with a bibliography number allocated chronologically (see Table 2.1). Tables 2.2 and 2.3 were then created for the selected sample and study characteristics and Table 2.4 reports the effect sizes of studies. Bibliography numbers were used to identify relevant characteristics of included studies. The TF of each study was assessed in terms of study design in terms of whether the intervention was theoretically underpinned, training and competencies of treatment deliverers, treatment delivery, treatment receipt and enactment of treatment skills (see Table 2.3).

In order to clarify study details, and assess the potential role of TF in each study, an email was sent to the first author of each study. Corresponding authors were asked the following three questions:

- 1) If not reported here, or elsewhere, was there an underlying theoretical underpinning that influenced the development of the intervention design?
- 2) If not reported here, or elsewhere, was there any intention to conduct further follow-up assessments of the outcome measures and if so, how long will this follow-up period be?
- 3) If not reported here, was there a rationale behind the age group included in the intervention? If so, what was this?

Emails were sent to the first author of each study (N=47), and responses were received from 20 authors (42.6%). Where multiple papers reported interventions conducted by the same author only one email was sent to the first author. Nine out of the 61 studies did not receive an email as no up to date email addresses were available.

### **2.4.4 Data Extraction and Quality assessment**

Data (sample & study characteristics, intervention design, outcomes, effectiveness & quality) were independently extracted and reviewed. Where

discrepancies occurred the researcher consulted the supervisory team and a consensus was reached. Study quality was assessed using the American Dietetic Association evidence analysis manual, Fifth Edition (ADA: IV Edition 2005). Following ADA guidelines, studies were rated according to class, which was assessed via study design. Secondly study quality was assessed according to study relevance i.e. the applicability of the research to the childhood obesity treatment context and study validity (i.e. the design & execution of the study). Thirdly, studies were rated according to the strength of conclusion which was determined by the strength of evidence supporting the conclusion. The strength of evidence was assessed according to the quality (i.e. the validity of the study according to the design & execution); the consistency; and the sample size (quantity); the clinical impact (i.e. the importance of the outcome(s) studied & the generalisability of findings to similar populations). Table 2.2 details quality ratings for each included study. For a detailed explanation of how quality assessment was carried out see the ADA: Evidence analysis manual Fifth Edition (ADA: IV Edition 2005).

#### ***2.4.5 Treatment Effect Size***

The ES was calculated to measure how large the treatment effect was. The measure of effect is the magnitude of the distance between two groups' means in number of standard deviations. Cohen's *d* (Cohen, 1988) was used to calculate the size of the treatment effect as it is a recognised measure of ES and allows the consideration of whether the treatment intervention resulted in a small ( $\leq 0.2$ ), medium ( $\leq 0.5$ ), or large effect ( $\leq 0.8$ ) (Coe, 2002). Table 2.4 presents the ES for the 21 studies that reported sufficient detail to allow the calculation of the ES. The ES was calculated immediately post intervention and for the follow-up period of those studies that reported it.

## **2.5 Results**

### ***2.5.1 Sample and Study Design Characteristics***

Searches identified 61 relevant articles reported from January 2000 to January 2009 that met the inclusion/exclusion criteria. Table 2.1 presents the bibliography number assigned to each study retrieved. Table 2.2 reports the study design and sample characteristics. Non-RCTs were the dominant design with 40 non-RCTs (65.6%) and 21

RCTs (34.4%). Only three studies reported samples of less than 20 participants (4.9%). A number of studies did include a comparison condition (18%) and studies with a control group ranged from an advice in one session (1.6%), to typical/standard care (13%), wait list control (4.9%) or a medium intensity intervention (8.2%). There were 17 studies (27.8%) that reported sample sizes of over 100, 13 interventions involved a sample of 60 to 80 participants (21.3%) and 12 interventions reported a sample of 40 to 60 participants (19.6%). There were 19 interventions (31.1%) conducted with children (5-12 years old); 16 interventions (26.2%) involved adolescents (12-18 years old), and 26 (42.6%) interventions were aimed at children and adolescents. A large number of studies did not identify the ethnicity (49.2%) or the socio-economic status (67.2%) of the participants and in studies that identified these demographics, samples with a majority of white participants (36.1%), from middle to upper class backgrounds (21.3%), were the most common (i.e. according to criteria defined by each study). In general, the majority of samples included a mixture of male and female participants (96.7%). A small number of studies specifically targeted females (3.3%), African Americans (4.9%) or lower working class samples (4.9%). The percentage of the sample completing the interventions ranged from 50-100%.

Out of the 61 studies, 31 (50.8%) used multiple measures to determine treatment effect on the participant's weight status including Body Mass Index (BMI); BMI standard deviation score (BMI SDS: z-score); percent BMI; body composition; waist circumference and percent overweight. A large proportion of the interventions were conducted in the USA (39.3%). A number of studies were UK based (13.1%) and interventions in other European countries including Belgium (4.9%), Germany (9.8%), Italy (4.9%) and France (3.3%) were reported. Globally, interventions have been conducted in China (3.3%), Israel (4.9%) and Australia (4.9%).

**Table 2.1** Bibliography Details, Intervention/Study names

<b>Biblio. No.</b>	<b>Name of Study/Intervention (Year)</b>	<b>Journal</b>
1	Braet & Van Winckel (2000)	Behavioural Therapy
2	Gately et al (2000)	International Journal of Obesity
3	Sothorn et al (2000)	Acta Paediatrica
4*	Epstein et al (2001)	Obesity Research
5	Levine et al (2001)	International Journal of Eating Disorders
6*	Nova et al (2001)	Ambulatory Child Health
7*	Warschburger et al (2001b)	International Journal of Obesity
8	Jelalian & Mehlenbeck (2002)	Journal of Clinical Psychology in Medical Settings
9	Saelens et al (2002)	Obesity Research
10	Sothorn et al (2002)	Journal of American Dietetic Association
11*	Sung et al (2002)	Archives of Disease in Children
12	Braet et al (2004)	Journal of Pediatric Psychology
13	Dao et al (2004)	International Journal of Obesity
14	Dietrich & Widhalm (2004)	International Pediatrics
15	Epstein et al (2004)	Health Psychology
16	Golan & Crow (2004)	Obesity Research
17	Gately et al (2005)	Pediatrics
18*	Jiang et al (2005)	Archives of Disease in Children
19	Kirk et al (2005)	Obesity Research
20	Kirschenbaum et al (2005)	Obesity Research
21	Korsten Reck et al (2005)	International Journal of Obesity
22	Lazzer et al (2005)	International Journal of Obesity
23*	Nemet et al (2005)	Pediatrics
24*	Resnicow et al (2005)	Obesity Research
25	Sacher et al (2005) MEND	Journal of Human Nutrition and Dietetics
26	Savoie et al (2005)	Journal of American Dietetic Association
27*	Wrotniak et al (2005)	Obesity Research
28*	Daley et al (2006)	Pediatrics
29	Edwards et al (2006)	European Journal of Clinical Nutrition
30	Fennig & Fennig (2006)	European Eating Disorders Review
31	Jelalian et al (2006)	International Journal of Obesity
32	Rudolf et al (2006) WATCH IT	Archives of Diseases in Children
33*	Williamson et al (2006)	Diabetes Research & Clinical Practice
34	Dreimane et al (2007)	Journal of Pediatric Endocrinology Metabolism
35	Gillis et al (2007)	Pediatrics
36*	Golley et al (2007)	Pediatrics
37*	Johnston et al (2007)	International Journal of Obesity
38*	Kalavainen et al (2007)	International Journal of Pediatric Obesity

<b>Biblio. No.</b>	<b>Name of Study/Intervention (Year)</b>	<b>Journal</b>
39	Nowicka et al (2007)	International Journal of Obesity
40	Reinehr et al (2007)	Journal of Evaluative Clinical Practice
41	Sabin et al (2007)	Journal of American Medical Association
42*	Savoye et al (2007) †	Journal of Paediatrics and Child Health
43*	Shelton et al (2007)	BMC Pediatrics
44	Tanas et al (2007)	BMC Pediatrics
45	van den Akker et al (2007)	The Journal of Pediatrics
46	Vignolo et al (2007)	International Journal of Clinical Nutrition
47	Archenti & Pasqualinotto (2008)	Obesity Surgery
48	Craeynest et al (2008)	Eating Behaviours
49*	Hughes et al (2008)	Pediatrics
50*	Janicke et al (2008)	Archives of Pediatrics and Adolescent Medicine
51	Knopfli et al (2008)	Journal of Adolescent Health
52	McCormick et al (2008)	Clinical Pediatrics
53	Miller et al (2008)	Vascular Disease Prevention
54*	Munsch et al (2008)	Psychotherapy and psychosomatics
55	Nowicka et al (2008)	International Journal of Pediatric Obesity
56	Rice et al (2008)	Clinical Pediatrics
57	Robertson et al (2008)	Archives of Disease in Children
58	Schiel et al (2008)	Journal of Telemedicine Telecare
59	Speroni et al (2008)	American Journal of Preventive Medicine
60*	Tsiros et al (2008)	American Journal of Clinical Nutrition
61*	Weigel et al (2008)	Journal of Nutrition and Education

\* Bibliography numbers marked with an asterix (\*) represent those studies that were randomised controlled trials

† Savoye et al., (2007) represents the same intervention as Savoye et al. (2005). It was considered relevant for inclusion as it was a larger scale RCT so provided different design characteristics than the earlier study.

**Table 2.2** Sample and Study Characteristics

Characteristic	Biblio. No.	No. of Studies (%)
<i>Age</i>		
Mixed ( 5-18 yrs)	1*, 2, 3, 7*, 12, 14, 17, 19, 23*, 32, 33*, 34, 37*, 40, 41, 43*, 44, 45, 47, 48, 49, 50, 52, 53, 56, 61*	26 (42.6)
Children (5-12 yrs)	4*, 5, 6*, 11, 15, 16, 18*, 21, 25, 27*, 29, 36*, 38*, 39, 42, 49*, 54*, 57, 59	19 (31.1)
Adolescents (12-18 yrs)	8, 9*, 10, 13, 20, 22, 24*, 26, 28*, 30, 31, 35, 51, 55, 58, 60*	16 (26.2)
<i>Gender</i>		
Mixed	1, 2, 3, 4*, 5, 6*, 7*, 8, 9*, 10, 11*, 12, 13, 14, 15, 16, 17, 18*, 19, 20, 21, 22, 23*, 25, 26, 27*, 28*, 29, 30, 31, 32, 34, 35, 36*, 37*, 38*, 39, 40, 41, 42*, 43*, 44, 45, 46, 47, 48, 49*, 50*, 51, 52, 53, 54*, 55, 56, 57, 58, 59, 60*, 61*	59 (96.7)
Females	24*, 33*	2 (3.3)
<i>Ethnicity</i>		
Not identified	2, 6*, 7*, 14, 16, 21, 22, 23*, 25, 26, 30, 32, 35, 39, 40, 41, 43*, 45, 46, 47, 48, 49*, 51, 53, 54*, 55, 56, 58, 60*, 61*	30 (49.2)
White	1, 3, 4*, 5, 8, 9*, 10, 12, 13, 15, 17, 19, 27*, 28*, 29, 31, 36*, 38*, 44, 50*, 57, 59	22 (36.1)
African American	20, 24*, 33*	3 (4.9)
Diverse sample	42*, 52	2(3.3)
Chinese	11*, 18*	2 (3.3)
Hispanic	34	1(1.6)
Mexican American	37*	1 (1.6)
<i>Socio Economic Status</i>		
Not identified	6*, 7*, 10, 11*, 13, 14, 16, 17, 18*, 19, 21, 22, 23*, 25, 30, 32, 33*, 34, 35, 36*, 37*, 39, 40, 41, 42*, 43*, 45, 46, 47, 48, 50*, 51, 52, 53, 54*, 55, 56, 58, 59, 60*, 61*	41 (67.2)
Upper/Middle Class	2, 3, 4*, 8, 9*, 12, 15, 24, 26, 27*, 29, 31, 38*	13 (21.3)
Diverse sample	1, 44, 49*, 57	4(6.6)
Lower/working class	5, 20, 28*	3 (4.9)
<i>Main Measure(s) used to assess treatment effect on weight status</i>		
Multiple Measures (any combination of weight change, BMI, BMI SDS, fat mass, waist circumference, skinfold thickness)	3, 5, 10, 11*, 12, 13, 17, 19, 20, 21, 22, 23*, 24*, 25, 26, 32, 33*, 36*, 37*, 38*, 42*, 43*, 44, 45, 46, 51, 52, 54*, 58, 59, 60*	31 (50.8)
BMI Standard Deviation Score (BMI SDS/ z score)	2, 9*, 15, 35, 39, 40, 41, 49*, 50*, 53, 55, 57, 61*	13(21.3)
Body Mass Index (BMI)	14, 18*, 28*, 29, 34, 47, 48, 56	8(13.1)
Percent overweight	1, 4*, 6*, 7*, 16, 27*	6 (9.8)
Weight change/loss	8, 30, 31	3(4.9)

Characteristic	Biblio. No.	No. of Studies (%)
<i>Country</i>		
USA	2, 3, 4*, 5, 8, 9*, 10, 15, 16, 19, 20, 24*, 26, 27*, 31, 33*, 34, 37*, 42*, 50*, 52, 53, 56	24 (39.3)
UK	17, 25, 28*, 29, 32, 41, 49*, 57	8 (13.1)
Germany	7*, 21, 40, 54*, 58, 61*	6(9.8)
Belgium	1, 12, 48	3(4.9)
Israel	23*, 30, 35	3(4.9)
Italy	6*, 44, 47	3(4.9)
Finland	38*, 39, 55	3(4.9)
Australia	36*, 43*, 60*	3(4.9)
France	13, 22	2(3.3)
China	11*, 18*	2(3.3)
Switzerland	51	1 (1.6)
Netherlands	45	1(1.6)
Austria	14	1 (1.6)
<i>Percentage of Sample Completing Intervention</i>		
90-100%	11*, 13, 15, 17, 18*, 21, 22, 25, 37*, 38*, 43*, 44, 55, 56, 61*	15 (24.6)
70-80%	6*, 9*, 14, 20, 26, 27*, 30, 32, 33*, 49*, 50*, 52, 58	13 (21.3)
80-90%	1, 4*, 8, 23*, 24*, 28*, 29, 36, 39, 40	10 (16.1)
60-70%	3, 5, 10, 12, 45, 46, 57	7 (11.5)
50-60%	2, 34, 42*, 48, 53, 59	6 (9.8)
Not identified	7*, 16, 31, 35, 41, 51	6 (9.8)
<50%	19, 54*, 60*	2(3.3)
<i>Sample Size</i>		
>100	1, 2,6*,7*,12,19,21,24*,27*,36*,40,41,42*,48,49*, 51,58	17 (27.8)
60-80	3,4*,18*,31,28*,38*,45,50*, 52,53,55,56,61*	13 (21.3)
40-60	10,13,14,15,16,23*,33*,37*,39,43*,54*,60*	12 (19.6)
20-40	5,9*,22,26,29,34,35,46,47,57,59	11 (18)
80-100	11*,17,20, 32,44	5 (8.2)
< 20	8,25, 30	3(4.9)
<i>Design</i>		
Non-randomised controlled trials	1, 2, 3, 5, 8, 10, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 25, 26, 29, 30, 31, 32, 34, 35, 39, 40, 41, 44, 45, 46, 47, 48, 51, 52, 53, 55, 56, 57, 58, 59	40 (65.6)
Randomised controlled trials	4*, 6*, 7*, 9*, 11*, 18*, 23*, 24*, 27*, 28*, 33*, 36*, 37*, 38*, 42*, 43*, 49*, 50*, 54*, 60*, 61*	21 (34.4)

Characteristic		Biblio. No.	No. of Studies (%)
<i>Study quality ratings</i>			
<i>Class Rating**</i>	Class D	2,3,5,8,10,12,13,14,19,20,22,25,29,30,32,34,39,40,41,44,45, 46,47,49,51,52,53,56, 57, 58,59	31 (50.8)
	Class A	1, 4*, 6*,9*,11*,15,16,24*, 27*,28*,31,33*,36*,38*,42*,43*,48, 50*,54*,60*,61*	20 (31.1)
	Class C	17,18*,21,23*,26,35,37, 55	8 (13.1)
	Class B	7	1 (1.6)
<i>Quality Rating</i>	Neutral Ø	2,3,5,6*,7,8,10,12,13,14,15,17,18*,19,20,22,24,25,26,29,31, 32,35,37,39, 40,41,44,45,46,52,55,56, 57, 58	35 (57.4)
	Positive +	1,4*,9*,11*,16,21,23*,27*,28*,33*,36*,38*,42*,43*,48,50*, 54*,60*, 61*	19(31.1)
	Negative -	30,34,47,49*,51,53,59	7 (11.5)
<i>Strength of Conclusion</i>	III (limited/weak)	2, 3, 5, 6*, 7*, 8,10,13,14,15, 17,18*,19,20,22,25,26,29,30, 31,32,33*,34,35,37*,39,41,43*,44,45,46,47,52,53, 55, 57, 58,59	38 (62.3)
	II (fair)	1, 4*, 9*,11*,12,16,21,23*,24*,27*,28*,36*,38*,40,42*,48,49*,51, 56, 60*,61*	21(34.4)
	I (Good/strong)	50*,54*	2 (3.3)
	III (expert opinion only)	0	
	IV (grade not assignable)	0	

\* Bibliography numbers marked with an asterisk (\*) represent those studies that were randomised controlled trials

\*\* Class rating assessed according to the study design (from Class A randomised controlled trials to Class D before and after study design with absence of a control group).

## ***2.5.2 Treatment Programme/Intervention Characteristics and Outcomes***

### ***2.5.2.1 Multiple Components of Treatment Interventions***

The majority of studies (72.1%) targeted multiple health behaviours including nutrition, PA and/or sedentary behaviours coupled with behaviour change/modification strategies and incorporated family involvement (70.5%) (see Table 2.3). No consistent protocol appeared to have been followed by interventions to guide how these multiple components (i.e. PA, diet, family involvement & behavioural components) should be applied. The dietary components generally focussed on the prescription of a healthy balanced diet (e.g. Craeynest, Crombez, Deforche, Tanghe & De Bourdeaudhuij, 2008; Fennig & Fennig, 2006; Lazzar et al., 2005), and/or education on healthy eating/nutrition (e.g. Reinehr, Temmesfeld, Kersting, de Sousa & Toshke, 2007; Rice, Thombs, Leach & Rehm, 2008; Sacher et al. 2005; Tanas, Marcolongo, Pedretti & Giuseppe, 2007) with the traffic light diet representing the most commonly prescribed diet featured in studies (e.g. Epstein, Paluch & Raynor, 2001; Epstein, Paluch, Kilanowski & Raynor, 2004; Jiang, Xia, Greiner, Lian & Rosenqvist, 2005; Levine, Ringham, Kalarchian, Wisniewski & Marcus, 2001). The traffic light diet involves nutritional education, teaching the participants to increase their intake and availability of foods that are low in fat and high in nutrient density (i.e., "green" foods) and to decrease their intake and availability of foods that are high in fat/sugar and low in nutrient density (i.e. "red" foods). Only one study involved an 'extreme approach' using a very low energy diet (VLEDs: Sothorn, Udall, Suskind, Vargus & Blecker, 2000).

The PA component of interventions varied considerably. Several studies adopted structured, supervised exercise interventions (e.g. Gately, Cooke, Butterly, Knight & Carroll, 2000; Korsten-Reck, Kromeyer-Hauschild, Wolfarth, Dickhurth & Freiburg, 2005; Sacher et al., 2005; Savoye et al., 2005; 2007), while others merely encouraged the participants to set goals to increase their PA (e.g. Resnicow, Taylor & McCarty 2005). Behavioural modification techniques such as self-monitoring, rewards and goal-setting were common (e.g. Kirk et al., 2005; Korsten-Reck et al., 2005). A number of interventions adopted structured, cognitive behavioural approaches to promote behaviour change (e.g. Braet & Van Winckel, 2000; Braet, Tanghe, Decaluwe, Moens & Rosseel, 2004; Craeynest et al., 2008). Cognitive behavioural approaches typically incorporated goal-setting, problem solving, self-monitoring of PA and nutrition, and

stimulus control strategies to try and change the participants thinking and thus encourage behaviour change.

Interventions also employed multiple strategies (67.2%) to deliver intervention content and support participant behaviour change. For example, delivery of the behavioural component varied from individually-based treatment (e.g. Craeynest et al., 2008; Fennig & Fennig 2006; Hughes et al., 2008; Reinehr et al. 2007), to group-based sessions (e.g. Gately et al., 2005; van der Akker et al. 2007), or a combination of group and individual sessions (e.g. Rice et al., 2008; Rudolf et al., 2006) and telephone counselling/support (e.g. Resnicow et al., 2005). Only two studies (3.3%) adopted computer/internet mediated or computer supported interventions (Saelens et al., 2002; Williamson et al., 2006). The intensity of professional contact time throughout interventions varied from weekly treatment sessions (e.g. Dietrich & Widhalm, 2004) to phased treatment that progressively decreased the intensity of professional support (e.g. Reinehr et al., 2007).

A number of studies identified ways in which interventions tailored and/or individualised treatment. Interventions were tailored according to the participants' weight status (e.g. Sothorn et al., 2000) or the participants' cognitive developmental age (e.g. Fennig & Fennig, 2006; Golley et al., 2007; Kalavainen, Korppi & Nuutinen, 2007; Saelens et al., 2002). Individualised approaches included personal goal-setting regarding target behaviours (e.g. Jiang et al., 2005; Kirk et al., 2005), individual contracts (e.g. Williamson et al., 2006), personalised diet and PA plans (e.g. Fennig & Fennig, 2006; Hughes et al., 2008; Lazzer et al., 2005; Rice et al., 2008) and motivational interviewing (e.g. Resnicow et al., 2005).

Over a third of interventions (39.3%) were categorised as long-term (> 6 months duration), while 21 studies (34.4%) were categorised as medium-term duration (3-6 months duration), and 16 studies (26.2%) were categorised as brief duration (< 3 months duration). A number of interventions were delivered from specialised or supervised settings that ranged from controlled/supervised residential settings (13.1%), to specialised hospital inpatient (11.5%), or outpatient settings (41.0%).

#### *2.5.2.2 Treatment Fidelity*

The findings revealed that the majority of studies (70.5%) did not explicitly identify theoretical underpinnings in the development of the intervention. Only seven

studies (11.5%) explicitly detailed the development of the intervention with reference to underlying theory (e.g. Daley, Copeland, Wright, Roalfe & Wales, 2006; Epstein et al., 2001; Epstein et al., 2004; Golley, Magarey, Baur & Steinbeck, 2007; Levine, Ringham, Kalarchian, Wisniewski & Marcus, 2001; Nowicka, Pietrobelli & Flodmark, 2007 & Wrotniak, Epstein, Paluch & Roemmich, 2004). However, author responses established a further seven studies that used underlying theory to develop component(s) of the intervention which had not been originally reported. For example, Braet, Tanghe, Decaluwe, Moens and Rosseel, (2004) used cognitive behavioural theory to develop their intervention and Nowicka et al. (2007) used family therapy and solution focussed therapy as a theoretical framework.

Measures of TF practices, particularly in terms of adherence to theoretical underpinnings, (i.e. if the intervention was theoretically underpinned) intended intervention content, competence of treatment deliverers (i.e. their training & skills relevant to delivering the intervention) and whether treatment was delivered as intended were rarely acknowledged and/or measured (3.3%). Of the 61 interventions, 56 (91.8%) were delivered by ‘trained professionals’ (e.g. exercise specialists, nutritionists & psychologists) yet details of the training or specific skills that professionals had (& their subsequent competence) to deliver the intervention content was largely unreported. In terms of receipt of treatment, less than a quarter of studies assessed participant satisfaction (23%).

#### *2.5.2.3 Treatment Outcomes*

Aside from weight related measures, treatment effect was also reflected through measures of physiological outcomes (31.1%), measures of behaviour change (26.2%) and psycho-social measures (26.2%). Other outcome measures included unintended effects (9.8%) and adherence to treatment (11.5%). From pre-post treatment, effectiveness was concluded in terms of weight loss or maintenance, as reflected in the anthropometric measure that each study used to report weight change (i.e. percent overweight, BMI &/or BMI SDS), and a high proportion of the treatment interventions were reported as effective immediately post intervention (85.2%) and almost a third reported medium-term effectiveness (6-12 months). However, long-term effectiveness (> 12 months) was reported by only nine out of the 61 interventions (14.8%).

**Table 2.3** Intervention outcome(s) and design characteristics

Characteristic	Biblio. No.	No. of Studies (%) ‡
<i>Treatment Fidelity</i>		
Measures of treatment fidelity unreported/unidentified	1,2,3,4,5,6*,7*,8, 9*,10,11*,12,13,14,15,16,17,18*,19,20, 21,22,23*,24*,25,26,27*,28*,29,30,31,32,33*,34,35,36*, 37*,38*,39,40,41,42*,43*,44,45,46,47,48*,49*,50*,51,52,53, 54*,55,56, 57, 58, 59, 61*	59(96.7)
Measures of treatment fidelity reported/identified	54*, 60*	2 (3.3)
<i>Theoretical Underpinning guiding intervention (does not extend to include evidence based programmes e.g. programmes based on professional guidelines or government guidelines)</i>		
No theoretical underpinning identified	2, 3, 6*, 7*, 8, 9*, 10, 11*, 13, 14, 17, 18*, 19, 20, 21, 22, 23, 24*, 25, 26, 30, 31, 34, 35, 37*, 40, 41, 42*, 43*, 44, 47, 48, 49*, 50*, 51, 52, 53, 55, 56, 57, 58, 59, 61*	43 (70.5)
Other	16, 32, 33, 29, 36*, 38, 39	7(11.5)
Cognitive Behavioural Theory	1, 12, 45, 54*, 60*	5 (8.2)
Social Cognitive Model/ Theory	4*, 5, 15, 27*	4(6.6)
Transtheoretical Model	28*, 46	2 (3.3)
<i>Interventionists</i>		
Health professionals (i.e. paediatricians, counsellor, nutritionists, physical activity coaching etc.)	1, 2, 3, 4*, 6*, 7*, 8, 9*, 10, 11*, 12, 14, 15, 16, 17, 18*, 19, 20, 21, 22, 23*, 24*, 25, 26, 29, 30, 31, 33*, 34, 35, 36*, 37*, 38*, 39, 40, 41, 42*, 43*, 44, 45, 46,47, 48, 49*, 50*, 51, 52, 53, 54*, 55, 56, 57, 58, 59, 60*, 61*	56 (91.8)
Students with limited training to deliver intervention	5, 28*, 32	3 (4.9)
Not identified	13, 27*	2 (3.3)
<i>Interventionist Competence in delivering treatment</i>		
Competence in delivery not assessed/ unidentified	1,2,3,4*,5,6*,7*,8,9*,10,11*, 12,13,14,15,16,17,18*,19,20, 21,22,23*,24*,25,26,27*,28*,29,30,31,32,33*,34,35,36*, 37*,38*,39,40,41,42*,43*,44,45,46,47,48,49*,50*,51,52,53, 55,56,57,58,59,61*	59(96.7)
Competence assessed/identified	54*, 60*	2 (3.3)
<i>Receipt of treatment</i>		
Participant satisfaction not assessed/not identified	1,2,3,4*,5,6*,11*,12,13,14,15,16,17,18*,19,20,21,22,23*,24*, 25,26,27*,28,30,31,34,35,37*,39,40,41,42*,44,45,47,48,49*, 50*,51,52,53,55,56, 61*	45(73.8)
Participant satisfaction assessed/ identified	7*, 8, 9*, 10, 29, 32, 33*, 36*, 38*, 43*, 46, 54*, 57, 58, 59, 60*	16(26.2)
<i>Delivery mode/ setting of Intervention</i>		
Specialised/hospital outpatient treatment	1, 3, 6*, 10, 14, 19, 20, 21, 23*, 26, 29, 34, 36*, 39, 40, 41, 42*, 44, 45, 46, 47, 49*, 53, 54*, 57	25 (41.0)

Characteristic	Biblio. No.	No. of Studies (%)
Community setting	8, 24*, 25, 31, 32, 35, 43*, 50*, 52, 56	10 (16.4)
Specialised/hospital in patient treatment	7*, 12, 22, 30, 48, 51, 58	7 (11.5)
Residential Controlled setting	2, 4*, 13, 15, 17, 27, 37*, 55	8 (13.1)
Not identified	5, 11*, 16, 38*	4 (6.6)
Combination/ Mixed Modes of delivery (e.g. primary care & computer support /telephone counselling)	9*, 28*, 50*, 60*, 61*	5(8.2)
Computer-based	33*	1(1.6)
Home-based	18 *	1 (1.6)
<i>Duration of Intervention</i>		
Long-term (>6 months)	1, 3, 4*, 6*, 10, 12, 13, 14, 15, 18*, 21, 22, 26, 27*, 33*, 39, 40, 41, 42*, 44, 48, 56, 58, 61*	24 (39.3)
Medium-term (3-6months)	8, 9*, 16, 19, 20, 23*, 24*, 25, 29, 31, 32, 34, 36*, 37*, 38*, 49*, 50*, 53, 54*, 59, 60*	21 (34.4)
Brief (< 12weeks)	2, 5, 7*, 11*, 17, 28*, 30, 35, 43*, 45, 46, 47, 51, 53, 55, 57	16 (26.2)
<i>Components of the obesity treatment intervention</i>		
Nutrition, exercise and/ or sedentary behaviours plus behaviour change/ modification (e.g. goal-setting, self-monitoring, stimulus control)	2, 3, 4*, 5, 9*, 14, 15, 16, 17, 18*, 19, 21, 23*, 24*, 25, 26, 27*, 29, 32, 33*, 34, 35, 36*, 37*, 38*, 39, 40, 41, 42*, 43*, 44, 46, 47, 49*, 50*, 51, 52, 53, 54*, 55, 56, 57, 58, 61*	44(72.1)
Nutrition, exercise and cognitive behavioural treatment (CBT)	1, 7*, 12, 20, 30, 45, 48, 60*	8(13.1)
Nutrition and Exercise	6*, 11, 59	3 (4.9)
Nutrition, exercise, psychological and /or medical support	10, 13, 22	3(4.9)
Nutrition, exercise, CBM and Peer-based skill training	8, 31	2 (3.3)
Exercise and behavioural change	28*	1(1.6)
<i>Delivery strategies employed by the intervention</i>		
Multiple/ Combination of strategies employed	1, 2, 3, 4*, 6*, 7*, 8, 9*, 10, 12, 14, 15, 17, 21, 22, 24*, 26, 29, 30, 31, 36*, 37*, 38*, 41, 42*, 43*, 44, 46,47, 48, 49*, 50*, 51, 52, 54*, 55, 56, 57, 58, 59, 60*	41 (67.2)
Group-based treatment	5, 16, 20, 23*, 25, 34, 40, 45, 61*	9 (14.8)
Individually tailored support/ face to face counselling	13, 18*, 19, 28*, 33*, 39, 53	7 (11.5)
Written material/educational support material	11*, 27*, 35	3 (4.9)
Computer/internet-based support material	32	1 (1.6)

Characteristic	Biblio. No.	No. of Studies (%)
<i>Target individuals of the Intervention</i>		
Family	1, 3, 4*, 5, 6*, 8, 9*, 10, 11*, 13, 14, 15, 18*, 19, 20, 21, 23*, 24*, 25, 26, 27*, 29, 31, 32, 33*, 34, 35, 37*, 38*, 39, 40, 41, 42*, 44, 45, 46, 47, 48, 50*, 53, 55, 56, 57	43 (70.5)
Child/ Adolescent alone	2, 7*, 12, 17, 22, 28*, 30, 51, 58, 59, 60*, 61*	12(19.7)
Parent only	16, 36, 43*, 50*, 54*	5 (8.2)
<i>Control Condition</i>		
No control group	2, 3, 5, 8, 10, 12, 13, 14, 16, 19, 20, 22, 25, 26, 29, 30, 31, 32, 39, 41, 45, 46, 47, 48, 51, 53, 54*, 56, 58, 59	30(49.2)
No intervention comparison group	17, 18, 21, 23*, 33*, 34, 35, 36*, 40, 43, 52	11 (18.0)
Medium Intensity Intervention	4*, 7*, 24*, 37*, 42*, 54*	6 (9.8)
Typical care	6*, 9*, 15, 27*, 28*, 38*, 44, 49*	8 (13.1)
Wait list control group	50*, 55, 60 *	3 (4.9)
Educational material	11* , 61*	2 (3.3)
Advice in one session	1	1(1.6)
<i>Outcome Measures (excluding measures of adiposity)</i>		
Physiological measures	14, 18, 19, 21, 24*, 25, 30, 34, 36*, 37*, 40, 42*, 44, 45, 46, 50*, 51, 56	19 (31.1)
Behavioural measures	4*, 6*, 7*, 9*, 11*, 15, 20, 23*, 27, 43, 44, 48, 50*, 53, 57, 58, 59, 60*	18(29.5)
Psychosocial Measures	1, 4*, 5, 7*, 8, 25, 26, 28*, 29, 39, 46, 44 , 51, 54*, 57, 58	16 (26.2)
Evaluation/Participant satisfaction	7*, 8, 9*, 10, 29, 32, 33*, 36*, 38*, 43*, 46, 57, 58, 59	14(23.0)
Other measure (s)	2, 4*, 8, 21, 22, 23*, 25, 28*, 35, 46	10 (16.4)
Adherence Measure	6*, 27* , 50*, 52, 54*, 57, 58, 59	7 (11.5)
Eating Disorder Measure/measure of unintended effects	1, 5, 12, 29, 33, 54*	6 (9.8)
No other outcomes reported	16, 17, 47, 55	4 (6.6)
<i>Follow-Up†</i>		
6 to 12 months	2, 4*, 5, 6, 7*, 8, 13, 15, 21, 23*, 24*, 31, 33*, 36*, 38*, 45, 48, 49*, 50*, 54*, 55, 57, 58	23 (37.7)
No follow-up post intervention	3, 10, 11*, 14, 17, 18*, 19, 20, 32, 34, 37*, 39, 41, 42*, 47, 51, 52, 53, 56, 60*	20(32.7)
> 12 months	1, 12, 16, 26, 27*, 30, 40, 44, 46	9 (14.8)
<6 months	9*, 22, 25, 28*, 29, 35, 43*, 59, 61*	9(14.8)

Characteristic	Biblio. No.	No. of Studies (%)
<i>Significantly Effective</i> ** (Pre-Post treatment on at least one measure of adiposity)		
Significantly effective	2, 3, 4*, 5, 6*, 7*, 8, 9*, 10, 12, 13, 14, 15, 16, 17, 18*, 19, 21, 22, 23*, 25, 26, 27*, 29, 30, 31, 32, 33*, 34, 36*, 37*, 38*, 39, 40, 41, 42*, 43*, 44, 45, 46, 48, 50*, 51, 53, 54*, 55, 56, 57, 58, 59, 60*, 61*	52 (85.2)
Not significantly effective	1, 11*, 20, 24*, 28*, 35, 47, 49*, 52	9(14.8)
<i>Significantly Effective</i> ** (At follow-up reflected by at least one measure of adiposity)		
No follow-up post intervention reported	3, 10, 11*, 17, 18*, 19, 20, 32, 34, 37*, 39, 41, 42*, 47, 51, 52, 53, 56, 60*, 61*	20(31.1)
Medium-Term (6-12 months)	4*, 6*, 7*, 8, 13, 14, 15, 22, 23*, 26, 31, 36*, 45, 48, 50*, 54*, 57, 58	18(29.5)
Non significant at follow-up	2, 5, 9*, 21, 24*, 25, 28*, 33*, 35, 38*, 49*	11(18.0)
Long-Term (12 months +)	1, 12, 16, 26, 27*, 30, 40, 44, 46	9 (14.8)
Short-Term (<6 month follow-up)	29, 43*, 59	3 (4.9)

\* Bibliography numbers marked with an asterisk (\*) represent those studies that were randomised controlled trials

† Primary Goal as defined by authors

‡ Follow-up was measured from treatment intervention termination to last follow-up measurement recorded.

\*\* Effective refers to whether the primary treatment intervention arm was concluded to be effective by authors in terms of its ability to induce weight loss/ weight maintenance in the short-term, medium and long-term.

#### *2.5.2.4 Treatment Effect Size*

Table 2.4 details the ES for 21 studies. Of the 21 studies that ES was calculated for, immediately post intervention, only five studies (23.8%) reported a large ES (e.g. Gately et al., 2005; Janicke et al., 2008; Johnston et al., 2007; Nemet et al., 2004; Weigel et al., 2008), seven studies (33.3%) reported a small ES (e.g. McCormick, Ramirez, Caldwell, Ripley & Wilkley, 2008; Resnicow et al., 2005; Tsiros et al., 2008; Warschburger, Fromme, Petermann, Wojtalla & Oepen, 2001b) and nine studies (42.8%) reported a medium ES (e.g. Kalavainen et al., 2007; Munsch et al., 2008; Shelton et al. 2007).

Of the 21 studies that the ES was calculated for the length of intervention and the length of follow-up was variable and of the five studies that reported a large ES, none of them reported follow-up beyond six months. Only one of the 21 studies that the ES was calculated for included follow-up beyond 12 months (Williamson et al., 2006) which was a two year trial and only reported a small ES. Of the five studies that reported a large ES, they were all MCTIs delivered by health professionals, that where of medium to long-term duration. Yet none assessed the fidelity of the treatment interventions and none reported long-term follow-up (> 6 months). Munsch et al. (2008) and Tsiros et al. (2008) were the only studies that reported the fidelity of the treatment interventions and both had a medium ES (i.e. 0.32 & 0.3 respectively).

Table 2.4 Treatment effect sizes for RCTs and controlled trials

Study & Bibliography Number	Study Design	Primary Outcome Variable (s)*	Length of Intervention	Effect Size (ES) Immediately Post Intervention †	Length of Follow-up	Effect Size at Follow-up
6. Nova et al (2001)	RCT	BMI	6 months	0.5	12 months	0.5
		Percent overweight		0.5		0.4
7. Warschburger et al (2001b)	RCT	Percent overweight	6 weeks	0.12	12 months	NA
9. Saelens et al (2002)	RCT	BMI	4 months	0.4	12 months	0.3
		Percent overweight		0.3		0.3
11. Sung et al (2002)	RCT	BMI	6 weeks	0.24	0	NA
17. Gately et al (2005)	Controlled trial	BMI	6 weeks	0.5	0	NA
		BMI SDS		0.6		
18. Jiang et al (2005)	RCT	BMI	2 years	1.8	0	NA
21. Korsten Reck et al (2005)	Nonrandomized clinical observation study	BMI	8.5 months	0.3	0	NA
		BMI SDS		0.3		
23. Nemet et al (2005)	RCT	BMI	3 months	1.4	12 months	0.4
		BMI SDS (only available at 12 mth follow-up)				2.1
24. Resnicow et al (2005)	RCT	BMI	6 months	0.07	12 months	0.01
28. Daley et al (2006) ‡	RCT	BMI SDS	14 weeks (intervention gp)	0	28 weeks	0.2
			14 weeks (placebo gp)	0.7	28 weeks	1
33. Williamson et al (2006)	RCT	BMI	24 months	0.1	0	NA
		BMI SDS		0.0004		

Study & Bibliography Number	Study Design	Primary Outcome Variable (s)*	Length of Intervention	Effect Size (ES) Immediately Post Intervention †	Length of Follow-up	Effect Size at Follow-up
36. Golley et al (2007)‡	RCT	BMI SDS (parenting plus lifestyle programme)	12 months	0.3	0	NA
37. Johnston et al (2007)	RCT	BMI SDS (parenting alone)	3 months	0.04	6 months	1.5
		BMI		1.42		0.9
38. Kalavainen et al (2007)	RCT	BMI SDS	6 months	0.8	6 months	0.6
		BMI		0.3		0.3
42. Savoye et al (2007)	RCT	BMI	6 months	0.47	12 months	0.47
43. Shelton et al (2007)	RCT	BMI	3 months	0.5	0	NA
50. Janicke et al (2008)‡	RCT	BMI SDS (family-based)	4 months	0.4	10 months	0.7
		BMI SDS (parent-only)		0.7		0.6
52. McCormick et al (2008)	Controlled trial	Weight change per month	6 months	0.2	0	NA
54. Munsch et al (2008)	RCT	Percent overweight (mother only CBT group)	6 months	0.29	6 months	0.32
60. Tsiros et al (2008)	RCT	BMI	10 weeks (initial phase)	0.2	20 weeks (maintenance phase)	0.3
61. Weigel et al (2008)	RCT	BMI	6 months	0.1	12 months	1.2

NA = Not applicable: were studies did not report a follow-up period an ES could not be calculated.

\*The ES was calculated for the primary outcome variable used by studies to reflect weight change. BMI and BMI SDS where the most consistent measure used to report weight change across studies therefore the ES was calculated for BMI and BMI SDS. Were BMI and BMI SDS data was not available, the ES was calculated using the primary outcome variable used to report weight change (i.e. percent weight change) in that specific study.

† Effect Sizes (ESs) were calculated using data for completers of the intervention. ‡ Were two intervention arms were reported, ESs were calculated for each intervention arm. Were standard errors were reported the following equation was used to calculate SD = SE  $\sqrt{n}$  (were SE= standard error and n= number of subjects)

## 2.6 Discussion

The aim of this chapter was to consider the efficacy of MCTIs to treat childhood obesity over the past decade. The review was particularly interested in the sustainability of interventions and whether they assessed and/or addressed TF. The review reiterates the need for treatment interventions that are family-based, taking a holistic approach to incorporate PA, diet and behavioural components and tailoring treatment to the target population, in line with expert recommendations (Barlow et al., 2007). The sustainability of MCTIs still appears to be questionable and the evidence base needs to be developed if a downward trend in excess weight in children is to be achieved and sustained (DoH, 2011).

### 2.6.1 Sustainability of MCTIs

In line with previous review findings only a limited number of studies reported sustained weight related outcomes (i.e. >12 months) and only nine studies reported follow-up beyond 12 months (Luutikhuis et al., 2009; Whitlock et al., 2010). There appeared to be a number of common features associated with MCTIs reporting sustainable outcomes including being delivered by trained professionals within specialised settings (e.g. Fennig & Fennig, 2006; Tanas, Marcolongo, Pedretti & Giuseppe, 2006; Vignolo et al., 2008). The behavioural component of sustainable interventions tended to employ a number of similar cognitive behavioural strategies including self-monitoring, goal-setting, encouraging participants to develop problem solving skills and strategies to encourage children to make their own choices regarding eating healthily and being active (e.g. Braet et al., 2004; Savoye et al., 2005; 2007; Tanas et al., 2006; Vignolo et al., 2008).

MCTIs should consider incorporating cognitive behavioural strategies as research suggests interventions that have employed cognitive behavioural strategies (e.g. goal-setting, self monitoring & problem solving) report sustainable outcomes in up to five year follow-up periods (e.g. Braet et al., 2004; Vignolo et al., 2008). A number of interventions reporting sustainable outcomes incorporated an individualised element. For example Fennig and Fennig (2006) devised personalised PA and dietary plans for participants, or Reinehr et al. (2007) provided individual psychological care for the child and their family. In light of these findings and expert recommendations, MCTIs

should include an individualised element to allow treatment to be tailored to individual family needs (Barlow et al., 2007)

In line with expert recommendations (Barlow et al., 2007), a number of interventions that reported sustainable outcomes appeared to take a phased approach to treatment i.e. a more intensive initial phase followed by a less intensive support phase(s) to facilitate families in the maintenance of their behaviour and weight related changes (e.g. Braet et al., 2004; Fennig & Fennig, 2006; Reineher et al., 2007; Savoye et al., 2005). Further research is still necessary to establish the efficacy of a phased approach to treatment, having a more intensive treatment phase followed by less intensive support phases to facilitate families to sustain behaviour and weight related changes. Due to the lack of reporting of TF in interventions it was difficult to identify the specific features of phased treatment that were most strongly associated with sustainable outcomes. Therefore research is needed to uncover the specific components necessary in each phase of treatment interventions to encourage sustainable outcomes?

As highlighted previously, MCTIs that reported sustainable outcomes in this review were associated with interventions in specialised settings therefore these findings cannot be generalised to MCTIs in other contexts. Further research is required to assess the sustainability of interventions outside of specialised settings e.g. community settings (Luutikhuis et al., 2009). For example, findings here revealed that a number of community-based interventions have begun to emerge, particularly within the UK context (e.g. Rudolf et al., 2006; Sacher et al., 2005). Research is needed to evaluate the sustainability of these interventions particularly as community-based MCTIs could offer a cost effective alternative to more traditional intensive treatment approaches within specialised settings. Overall, given the limited number of studies reporting long-term treatment outcomes, it is still not possible to draw firm conclusions regarding the sustainability of MCTIs. Findings here reiterate the need for interventions to report treatment outcomes beyond 12 months to allow the long-term effectiveness of interventions to be assessed (Luutikhuis et al., 2009).

### **2.6.2 RCTS vs. non-RCTs**

There was a clear trend moving away from traditional RCT approaches towards adopting non-RCT approaches. Clearly the dominance of non-RCTs (65.6%) affirms that reviews in real world settings, such as childhood obesity treatment, need to adopt

broad inclusion criteria, including evidence from non-RCTs that are likely to have been limited by practical or ethical concerns associated with the RCT design and thus not been able to include a control group (Dugdill et al., 2005; Sibbald & Rolland, 1998).

Findings from RCTs have limited transferability to real world settings and can lack appreciation of complex social phenomenon (Dugdill et al., 2005). For example, in the childhood obesity treatment context the RCT fails to appreciate that there are many factors outside of the control of the intervention that could influence a child's weight throughout the intervention period e.g. a change in family circumstances (i.e. the child goes to live with another parent or relative) or a family holiday. Furthermore, the Medical Research Council guidelines to develop complex interventions (i.e. interventions with several interacting components: MRC, 2000; 2008) highlight the importance of carrying out new intervention designs in smaller scale studies initially to allow preliminary evaluation of whether the intervention could have a worthwhile effect. This will allow identification of whether it is justified to implement the intervention in a larger scale RCT (MRC, 2000; 2008). Recognising the demand for funders within the public health domain to establish treatment services on the back of research interventions there is a need to generate and consider evidence where RCTs or the inclusion of a control group is difficult. This is particularly important in light of the emerging number of community-based childhood obesity interventions in real world settings where the inclusion of a control group is difficult (Sibbald & Rolland, 1998). Therefore potentially effective treatment strategies should be evaluated on a smaller scale first to consider their value or when it is not feasible to include a control group (Flynn et al., 2006).

### ***2.6.3 Treatment Settings***

It was encouraging to see community-based and brief interventions emerging that reported positive outcomes (e.g. McCormick et al., 2008; Sacher et al., 2005; Shelton et al., 2007). Promising community-based and/or brief treatment interventions could offer cost-effective treatment options compared with the more traditional and expensive approach of offering intensive interventions delivered from specialised settings (Summerbell et al., 2003). Although only two studies employed computer and internet mediated approaches, these also offer a feasible and economical platform to

support and deliver weight loss/weight maintenance treatment interventions (Harvey-Berino, Pintauro, Buzzell & Casey-Gold, 2004; Womble et al., 2004).

#### *2.6.4 Treatment Fidelity*

The need for TF in terms of a sound study design in line with relevant theoretical underpinnings; assurance on the competence and reliability of the intervention and interventionist; and ensuring the intervention is received as intended is clear (Bellg et al., 2004; Breckon et al., 2008). However while this approach seems widely appropriate, the reporting of such facets in research is scant (Bellg et al., 2004).

Munsch et al. (2008) and Tsiros et al. (2008) were the only two studies that explicitly detailed all aspects of TF. Munsch et al. (2008) used independent, outside evaluators to assess adherence to treatment protocol; interventionist competency to deliver the intervention and; the suitability of treatment from the participants' perspectives. There were no differences in the participants' satisfaction, the quality and competency of the therapists' delivery and adherence to intervention content in both of the cognitive behavioural based treatment conditions (parent only group vs. parent & child group). Authors concluded that overweight reduction was not as pronounced as in other similar CBT based treatment interventions. However, the replicability, and the strength of conclusions of this study is greater given the explicit reporting of TF thus enhancing the study quality (Resnick et al., 2005).

In the absence of TF data it is impossible to determine whether poor child weight related outcomes resulted from an ineffective intervention or an effective intervention that was poorly implemented (Hogue et al., 2008). Therefore studies within this review that concluded treatment effectiveness without demonstrating the key facets of TF (e.g. Dietrich & Widhalm, 2004; Knopfli et al., 2008) are not replicable and raise questions regarding what were the specific features of these interventions that made them effective (i.e. was it the quality of care from the deliverers, the intensity of the PA component or the dietary prescription, etc). Some studies did report aspects of TF more frequently than others (e.g. Edwards et al., 2006 van der Akker et al., 2007), these studies identified the theoretical underpinnings and the receipt of treatment, measuring participant satisfaction. A logical step to strengthen treatment interventions would be to report all facets of TF to ensure that reliable, competent and theoretically sound interventions which are successful can be replicated. It would also be advantageous if

treatment interventions were reported in a standardised manner making direct comparison of interventions easier.

The Medical Research Council (2000; 2008) suggests that complex interventions in the public health domain, such as MCTIs should clearly report the intervention protocol. The MRC have suggested eight characteristics that are essential descriptors to include when reporting interventions in the public health domain. The eight characteristics include: the content or elements of the intervention (including the relevant theoretical underpinnings & associated techniques), characteristics of those delivering the intervention, characteristics of the recipients, characteristics of the setting (e.g., worksite), the mode of delivery (e.g., face-to-face), the intensity (e.g. dose of treatment; contact time), the duration (e.g., number sessions over a given period), and adherence to delivery protocols (Davidson et al., 2003).

Future interventions should aim to fully report intervention protocols taking heed of these guidelines. MCTIs should fully evaluate and report TF to ensure that effective interventions can be replicated accurately. To ensure standardised reporting of RCTs, researchers should consider using the CONSORT (Consolidated Standards Of Reporting Trials) guidelines which provide a checklist of information to include when reporting RCTs (Schulz, Altman, & Moher, 2010). Equally, researchers reporting non-RCTs should consider the TREND (Transparent Reporting of Evaluations with Non-randomised Designs) checklist which provides information on what to include when reporting non-randomised designs. Consideration of these guidelines could improve the quality of reporting in peer reviewed publications, improve the transparency and replicability of research and allow the valid comparison of findings across studies reporting MCTIs in the childhood obesity treatment context (Des Jarlais et al., 2004).

### ***2.6.5 Treatment Effect Size***

There was clearly variation in the size of effect reported by treatment interventions. Five studies reported a large ES, yet the majority of the studies reported a small to medium ES. Interestingly four of the five studies reporting large effect sizes were RCTs and involved samples of over 40 participants. This highlights the importance of recruiting a large sample size to increase the power and ability to detect an effect size in the study. All of the five studies that reported a large ES included a PA, dietary and behavioural component, and incorporated the whole family. However these

interventions were of different intensities, involved variability in the intervention components and length of treatment intervention, thus there is not enough evidence to support one intervention format over another (Snethen et al., 2006).

Out of the 21 studies that the ES was calculated for, only Munsch et al. (2008) and Tsiros et al. (2008) assessed the fidelity of treatment and both only reported a small to medium ES. Given that they both reported TF this gives greater potential to explain why a smaller ES was reported and contribute to modifying the intervention in order to enhance the effectiveness in the future (Resnick et al., 2005). For example Munsch et al. (2008) highlighted that participants consistently, positively rated the suitability of the treatment condition in the mother only CBT and in the mother and child CBT group. Munsch et al. (2008) could firmly conclude that the results were down to the intervention rather than any extraneous variables. This highlights the effect size and the fidelity of the treatment intervention should be reported fully in order to draw firm conclusions, and allow for the valid comparison of treatment effects and identification of the specific features of effective MCTIs, (Michie, Fixsen, Grimshaw & Eccles, 2009; Moncher & Prinz, 1991).

#### ***2.6.6 Tailoring Treatment Interventions***

Expert recommendations emphasise treatment interventions need to be tailored to the participants' needs (Barlow et al., 2007). A child's age was highlighted as a key factor to recognise when considering the intensity of the intervention yet, almost half of the interventions were not age tailored (i.e. targeted a large age range from 5-18 years old). Only four studies tailored interventions according to the age of the child (Fennig & Fennig, 2006; Golley et al., 2007; Kalavainen et al., 2007; Saelens et al., 2002), all of which produced significant weight reductions. Given that children differ metabolically, developmentally, emotionally and nutritionally across the three childhood phases (i.e. infancy, childhood & adolescence), further RCT's are needed to compare the effectiveness of age tailored treatment versus standardised treatment options (Summerbell et al., 2003). Furthermore it must be considered how tailoring can be accommodated within an RCT design and whether this is possible.

Limited research has addressed recommendations to actively recruit and tailor treatment interventions to ethnically diverse and immigrant populations (Flynn et al., 2006; Summerbell et al., 2003). When reported, studies generally involved white,

middle/upper class samples. Future research targeting diverse populations, specifically groups with the highest prevalence of obesity are still required to avoid taking a "one size fits all" approach. In the UK, for example Asian communities, lower social class groupings and Black African populations have been identified as having a higher prevalence of obesity than their middle class/white counterparts (Jebb, Rennie & Cole, 2003; NOO, 2010). Therefore it is important to be aware of the need to develop treatment interventions that tailor behavioural recommendations in line with families' specific cultural values (Barlow et al., 2007).

### ***2.6.7 Implications for Practice***

Practitioners should design obesity treatment interventions based on appropriate theoretical principles as those underpinned by relevant theory have been associated with the most promising outcomes (e.g. Braet et al., 2004, Resnicow et al., 2005). Practitioners should also explicitly detail their philosophy of practice, theoretical underpinnings, treatment protocol and ensure objective measurement of all facets of TF. This should ensure interventions are delivered and received as intended to allow future replication of effective interventions. Practitioners would benefit from recruiting independent professionals to evaluate such issues around TF.

Commissioners should adopt empirically based interventions, taking a holistic approach to treatment that targets the whole family, encouraging PA and dietary behaviour change through behavioural modification techniques (e.g. goal-setting, self-monitoring & positive reinforcement). Evidence suggests that family-based multi-component interventions are effective in producing weight loss in children (e.g. Epstein et al., 2001; Epstein et al., 2004; Levine et al., 2001; Nova et al., 2001; Sacher et al., 2005). Cognitive behavioural strategies appear to be a feature of MCTIs reporting positive effects on weight related outcomes and should be considered by practitioners as part of MCTIs. Interventions should consider the suitability of treatment, varying the intensity of the treatment according to participant's motivation, age, degree of obesity, health risks and their response to treatment (Barlow et al., 2007). Practitioners should consider maintenance strategies to provide low intensity ongoing support to facilitate adherence to lifestyle change in the long-term, post treatment. A potential strategy to reduce attrition rates would be to assess potential participants regarding their readiness

to change prior to intervention thereby screening out individuals not ready to commit to treatment.

Computer mediated treatment interventions (e.g. Williamson et al., 2006) may offer a cost-effective alternative to traditional and expensive face-to-face methods and should be considered, particularly in light of the growing computer usage among children. Qualitative methodologies should be included to allow stakeholder involvement in the designing of future interventions (Flynn et al., 2006) and to assess the impact of interventions beyond the programme outcome measures from both the deliverers and the participant's perspective (e.g. Rudolf et al., 2005).

### ***2.6.8 Implications for Research***

Treatment interventions need to identify and objectively assess all facets of TF. These include; adherence to theoretical underpinnings and treatment content; practitioner competence in delivery of the intervention and participant satisfaction to evaluate whether the programme was delivered and received as intended and enhance the reproducibility of successful treatment in the future (Resnick et al., 2005). This approach is fundamental and has been applied successfully in health psychology (e.g. Bellg et al., 2004). To ensure standardised reporting of RCTs researchers should consider adhering to the CONSORT guidelines (Schulz et al., 2010). Equally researchers reporting non-randomised designs should consider using the TREND guidelines (Des Jarlais et al., 2004). To improve study quality and strengthen conclusions drawn from treatment interventions large scale RCTs are needed to test interventions that have been effective in smaller scale studies.

Given that retention of participants within MCTIs is still an issue in line with previous review findings (Luutikhuis et al., 2009; Whitlock et al., 2010), interventions need to include an intention to treat analysis to ensure results portray an accurate picture of the success of the intervention (Luutikhuis et al., 2009; Whitlock et al., 2010). Further qualitative research would be useful to gain a greater insight into why families drop-out from treatment interventions so that future interventions could address attrition related issues. A priority that needs to be addressed is the design and validation of appropriate measurement tools to assess specific behavioural and psycho-social outcomes (Luutikhuis et al., 2009).

It is vital for future studies to report follow-up data beyond one year to assess the sustainability of treatment outcomes (e.g. Golan & Crow, 2004; Reinehr et al., 2007). Further research is needed to establish the efficacy and sustainability of brief and/or community-based interventions in comparison to more traditional intensive interventions delivered in specialised settings. RCTs are necessary, both in wider contexts (e.g. UK) and in adolescent populations if we are to draw valid conclusions on the effective treatment of childhood obesity. Qualitative work is necessary to consider the perspectives of key stakeholders particularly treatment recipients regarding current obesity treatment options. This could contribute to the development of effective, sustainable treatment interventions that meet user's needs. Continued generation of quality reviews is necessary to provide recommendations that interventions can use to enhance the design of future treatment interventions.

Research with diverse sub-groups e.g. ethnic minority groups, immigrant populations, socioeconomic groups and religious groups are still required, specifically in those groups identified with higher prevalence rates of overweight/obesity (e.g. Asian & low socioeconomic status groups: see Chapter 1 section 1.4). This might help to identify specific strategies for treatment in these sub-groups. Limited data still exists on the potential unintended effects (i.e. eating disorders) that could result from obesity treatment as only six studies assessed the potential for this. Accurate reporting of treatment ES and the fidelity of treatment will contribute to allowing valid comparisons of similar treatment interventions, ensuring effective replication of treatment interventions that report a larger ES and could contribute to the development of standardised MCTIs which are necessary (Moncher & Prinz, 1991; Snethen et al., 2006).

## **2.7 Limitations of the Review**

Although a large number of interventions fulfilled the inclusion and exclusion criteria, these were tailored to the specific aims of the review. As we included both random and non-randomised trials, the quality of data was limited in some studies due to no control group; non-random assignment to the treatment, unreliable outcome measures, small sample sizes and relatively high drop-out rates, thus limiting confidence to draw firm conclusions. The ES could only be calculated for 21 studies, therefore it was recognised that it was not possible to directly compare ES for the other 40 studies that were included in the review.

No hand searches of journals were conducted and inclusion criteria did not extend to include unpublished studies and PhD theses, thus the potential for file drawer bias was acknowledged. However, studies that were internationally comparable and available were included as this was considered important. The search strategy employed here, and adopted in previous reviews (Goodger et al., 2007; Hutchinson et al., 2008; Sallis et al., 2000) generated all relevant studies. Author contact resulted in a moderate 42.6% response rate, which could limit the accuracy of details reported from interventions. Although this systematic review did not include single component interventions (e.g. low glycaemic index diet), or extreme approaches to treatment (e.g. drug treatment or surgery) that could offer effective treatment options, a brief overview of these approaches was provided (see Sections 2.1.1 to 2.1.7) and these have been subject to review elsewhere (Flynn et al., 2006; Gibson, Peto, Warren & dos Santos Silva, 2007; Luutikhuis et al., 2009; van Sluijs, McMinn & Griffin, 2008).

## **2.8 Chapter Summary**

Overall this chapter confirms that health professionals should adopt multi-faceted approaches to treating childhood and adolescent obesity. Treatment should encourage a whole family approach to target PA and dietary behaviour change, adopting behavioural change strategies including goal-setting, self-monitoring and stimulus control. This chapter highlights that the majority of interventions do not adequately assess and/or report aspects of TF, and this has implications for the conclusions that can be drawn regarding the effectiveness of the interventions (Bellg et al., 2004). The consideration of data from non-RCTs suggests where it is not feasible to conduct large scale RCTs, non-RCTs should be considered to test the efficacy of new treatment approaches given that in the real world context conducting RCTs is not always feasible.

The most significant general limitation associated with MCTIs is still the concerns over the sustainability of treatment outcomes with treatment effects rarely being reported beyond 12 months. Moreover there appears to be a tendency for intervention effects to decrease over time and children to regain weight they had lost during treatment (Whitlock et al., 2010). Consequently, there is a need to develop the evidence base regarding the specific features of MCTIs that produce sustainable treatment outcomes.

A clear implication from this chapter is that the views of stakeholders have rarely been considered in the childhood obesity field. There is a clear lack of consideration of qualitative data, particularly in terms of process evaluation and the consideration of stakeholder views (i.e. treatment deliverers & treatment recipients) in the evaluation process of MCTIs (Staniford et al., 2011). The MRC guidelines suggest the need for appropriate users to be involved at all stages of the development, process and outcome analysis of a complex intervention as this is more likely to produce implementable data. The MRC guidelines go on to suggest that qualitative research is a good way to involve users and consider a wider range of views that can be incorporated into the design and evaluation of interventions (MRC, 2008; NICE, 2007; Yardley, Donovan-Hall, Francis & Todd, 2006). With this in mind, Chapter 3 provides a qualitative inquiry into stakeholders' views towards MCTIs, particularly the sustainability of outcomes recognising that the primary aim of this thesis is to improve the sustainability of MCTIs.

# **Chapter 3**

## **Study 2: Key Stakeholders Perspectives towards Childhood Obesity Treatment: A Qualitative Study**

## **Chapter 3: Study 2: Key Stakeholders Perspectives towards Childhood Obesity**

### **Treatment: A Qualitative Study**

#### **3.1 Introduction**

The purpose of Chapter 2 was to provide a systematic review of multi-component childhood obesity treatment interventions (MCTIs). Ultimately the review highlighted that the long-term efficacy of MCTIs is still questionable. Moreover, there is a need to better understand stakeholder perspectives on treatment, particularly in terms of the design, development and analysis of interventions (Bartholomew, Parcel & Kok, 1998; Flynn et al., 2006; Luutikhuis et al., 2009; MRC, 2000; 2008). The potential for qualitative research methods to be used as an approach to explore stakeholder's views was also recognised. Therefore the purpose of this chapter was to provide a qualitative inquiry into stakeholder perspectives towards MCTIs. Specifically, to explore their views regarding treatment design, receipt of treatment and uncover potential strategies to promote long-term weight reduction and health behaviour change. This research is much needed given the sustainability of treatment outcomes and high attrition from MCTIs emerged as significant limitations of current interventions from the systematic review (see Chapter 2).

#### **3.2 Background**

The potential contribution of stakeholders' views to inform intervention and strategy development is often overlooked (Hesketh, Waters, Green, Salmon & Williams, 2005). This might explain why previous studies in the field commonly report high attrition rates and outcomes that only last in the short-term (Flynn et al., 2006; Luutikhuis et al., 2009). Furthermore, there is a growing body of international health promotion literature that advocates patient involvement in the development of community-based complex interventions (MRC, 2008; NICE 2007). It seems necessary to develop a better understanding of stakeholder perspectives so to provide a positive adjunct to existing epidemiological and behavioural evidence and enhance and inform the development of complex interventions with obese young people.

##### ***3.2.1 Qualitative Research in the Childhood Obesity Context***

Despite recommendations to consider qualitative methods in the design of interventions there is only limited qualitative evidence within the childhood obesity

treatment context. Although existing studies provide brief insight into: perceived barriers to treatment, reasons to change, attitudes towards weight, exercise and health among children (Murtagh, Dixey & Rudolf, 2006; Snethen & Broome, 2007), parents and children's experiences/journey through treatment (Daley et al., 2008; Stewart, Chapple, Hughes, Poustie & Reilly, 2008), and practitioner/health professionals' attitudes towards managing childhood obesity (Walker, Strong, Atchinson, Saunders & Abbott, 2007), more research is required. Murtagh et al. (2006) investigated children's perceptions of the levers and barriers to attending childhood obesity treatment interventions. Levers to attending treatment included social torment and being excluded from friendship groups due to their weight, whilst delayed parental recognition, previous negative experiences of weight loss and the perceived behavioural sacrifice of making changes were perceived as the main barriers to attending treatment. This does not tell us about children's and/or parents' views towards the barriers to the maintenance of PA, healthy eating and weight related outcomes upon exiting treatment.

Limited research has provided an insight towards parents' perspectives concerning the maintenance of behavioural and weight related changes post participation in treatment interventions. Stewart et al. (2008) explored parents' journeys in a childhood obesity treatment intervention and found that parents perceived extended family members undermined their attempts to make behavioural changes (particularly grandparents). Stewart and colleagues also suggested parents reported extended support should be provided beyond the six month intervention period to maintain behavioural and weight related changes. Psycho-social difficulties i.e. their child's low self-esteem was often the main reason given for parents attending and then adhering to treatment. Implications from this study included the need to consider providing ongoing/extended support to help families develop their confidence to maintain weight reductions and health behaviour changes in the long-term and the need to include extended family members in treatment interventions (Stewart et al., 2008). Despite providing parents' views, this does not provide an insight into children's or health professionals' views regarding the maintenance of health behaviour changes and weight related outcomes.

Qualitative research with health professionals has provided some insight into their views towards childhood obesity treatment. One qualitative study revealed that practitioners are largely unaware of the NICE (2006) guidelines regarding childhood obesity treatment; suggesting primary care is not an effective treatment setting for

childhood obesity. Practitioners went on to suggest they do not have the time, expertise or resources to deliver childhood obesity treatment (Turner, Shield & Salisbury, 2009). A study with general practitioners (GPs) uncovered that GPs primarily believed obesity was the responsibility of their patients yet patients handed the responsibility to their doctors (Epstein & Ogden, 2005). This evidence suggests the views of treatment recipients (i.e. children & parents), and treatment deliverers (i.e. health professionals), are incongruent regarding the treatment of childhood obesity. Despite this evidence few qualitative studies have evaluated treatment strategies [within childhood obesity] from the perspectives of all stakeholders (i.e. treatment recipients & treatment deliverers).

### ***3.2.2 Qualitative Research in the Adult Healthcare Context***

Qualitative research within other healthcare contexts (e.g. mental health & spinal cord injury) has similarly identified incongruence between treatment deliverers (i.e. nurses, doctors & therapists) and treatment recipients' views towards treatment (Lester, 2005; Pellatt, 2007; Pryor & O'Connell, 2008). For example, Pryor and O'Connell (2008) identified that nurses perceived a marked incongruence between their own, and their patients' perspectives on the purpose and nature of mental health rehabilitation. Nurses emphasised their role was to facilitate patients to take responsibility for their own mental health rehabilitation, yet patients expected and were reliant upon health professional support, and did not recognise self care as a goal of their mental health rehabilitation (Pryor & O'Connell, 2008). Authors concluded that establishing congruence between patients and nurses, ensuring patients were educated on the nature and purpose of mental health rehabilitation could enhance treatment (Pryor & O'Connell, 2008).

Pellatt (2007) suggested that congruence between patients and health professionals is crucial to encourage effective, equal relationships in developing treatment and realistic expectations of treatment. Furthermore, the "Expert Patient" white paper (Department of Health, 2001) suggested congruence between the perspectives' of health professionals, patients and families is needed so that families can take greater responsibility over the management of their child's chronic illness. Recognising this, it will be important that the potential existence and impact of incongruence across different stakeholders with regards to the efficacy and the sustainability of current obesity treatment interventions is explored.

### **3.3 Study Aims**

Recent review evidence calls for qualitative research with providers and recipients of obesity treatment interventions to identify why interventions were more or less successful (Luutikhuis et al., 2009). Moreover evidence suggests that patient/ client involvement is important in the development of childhood obesity treatment (MRC 2000; 2008). It is therefore, the aim of this study to explore key stakeholders' perspectives towards childhood obesity treatment and intervention design. In particular this qualitative study was interested in stakeholder's views towards the sustainability of treatment outcomes following participation in a MCTI.

### **3.4 Method**

#### ***3.4.1 Sampling Strategy***

The study sample size was determined by the original aim(s) and purpose of the research (Patton, 2002). Given that this study aimed to consider a range of stakeholders' perspectives towards childhood obesity treatment and the sustainability of treatment outcomes, a purposive sampling method was used. This was to ensure the inclusion of individuals who had key characteristics relevant to fulfil the aim(s) of the study i.e. health professionals involved in the design and delivery of treatment interventions and families participating in MCTIs. Considering this, there was no set or predetermined sample size and rather this was determined by whether 'saturation' of the subject matter was achieved (Glaser & Straus, 1967). 'Saturation' is reached when different participants repeat the same subject matter, the same themes emerge and further interviews do not reveal further information (Glaser & Straus, 1967). Therefore the depth, range and the richness of data collected was considered more important than the actual number of participants (Patton, 2002).

#### ***3.4.2 Procedures***

With institutional ethics approval, 26 participants were recruited using a purposive sampling strategy. Participants included nine health professionals with experience in obesity treatment design or delivery; 10 children aged 7-13 years old participating in a community-based childhood obesity treatment intervention called

'MEND'<sup>1</sup> (Sacher et al., 2005) and; seven parents of children attending MEND/ or (if not MEND) a MCTI designed to treat childhood obesity other than MEND. Interviews with children and parents were conducted from March 2008 - June 2008, during participation in the intervention. Interviews with health professionals were conducted in a setting and at a time that was convenient for them which was typically within their work place during working hours.

Upon reading the participant information sheets (see Appendix A) informed and parental consent (where appropriate) were provided (see Appendix B), each stakeholder took part in a semi-structured interview, that was digitally recorded and that lasted between 25-35 minutes. Each child was given the option of having a parent or guardian present during the interview, yet no child requested this. Due to the potentially sensitive nature of the issues being discussed a risk assessment was carried out to ensure the safety of the researcher and participants (see Appendix C).

Semi-structured interviews were developed using a flexible interview guide. This provided a deductive framework, whereby topics were identified from previous reviews of childhood obesity treatment interventions (Flynn et al., 2006; Luutikhuis et al., 2009; Mathers, Fox & Hunn, 2000). According with previous review evidence key areas outlined in the topic guide included the features of successful interventions (i.e. the dietary component, the PA component & the behavioural component) the intensity of support; what type of support is needed in the long-term to sustain behavioural changes. This approach allowed the interviewer to guide the line of questioning in order to address questions of immediate importance to the original aims of the study, to collect data about the research topic in a systematic manner yet, the open ended nature of the questions was flexible enough to allow for the exploration of specific pertinent issues that arose (Britten, 1995). The interview topic guide was the same for all stakeholders.

### **3.4.3 Data Analysis**

Interviews were transcribed verbatim into Microsoft Word® and names were removed from transcripts to ensure anonymity. Participants were referred to as 'parent', 'child', or 'health professional', along with a unique identifier number and labelled pre

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<sup>1</sup> MEND (Mind, Exercise, Nutrition, Do it!) is a community-based behavioural childhood obesity treatment programme that uses behavioural modification to encourage changes in nutrition and exercise in families with overweight and obese children.

or post to identify those who were interviewed at the beginning or at the end of the treatment intervention. To aid the qualitative data analysis process a Computer Assisted Qualitative Data Analysis Software (CAQDAS) was used. QSR NVivo 7 (Qualitative Solutions & Research International, 2007) is one such package, and has been used to facilitate the qualitative data analysis process in similar studies (Hutchison, Johnston & Breckon, 2009; Snethen & Broome, 2007; Stewart et al., 2008).

Transcribed data was transferred into QSR NVivo 7 and was used to code interviews, store, sort and retrieve the coded data. In NVivo 'themes' are known as 'nodes' and sub themes as 'trees' and 'child'. The researcher read through the transcripts on the computer screen, the text was coded by highlighting a section of text and then clicking on the appropriate node, tree or child. The text was colour coded according to the themes and sub themes that emerged (i.e. node, tree & child). The modelling tool aided the interpretation and explanation of the themes and sub themes that emerged in terms of the patterns, similarities and differences that occurred within and between sub-groups of stakeholders. The memo tool allowed the researcher to attach reflective notes to the transcripts which aided the analysis process. The researcher had attended a two day NVivo training course to ensure they were competent in the use of the software before undertaking the data analysis.

The framework analysis technique was developed by the National Centre for Social Research (Ritchie & Spencer, 1994) and was used to analyse the qualitative data in the present study as it was deemed this provided a systematic process to fit the original purpose of this research. Due to the systematic nature of the framework approach it is regarded as an appropriate strategy when analysing a large quantity of qualitative data (Murtagh et al., 2006), is well accepted among qualitative researchers and has been adopted in a number of qualitative studies (e.g. Stewart et al., 2008). Details of the 5 distinct, yet interconnected, phases of the systematic framework approach are detailed in Table 3.1 (Ritchie & Spencer, 1994).

The first stage involved reading the interview transcripts (raw data) and identifying broad themes and concepts e.g. stakeholders talking about family difficulties to maintain behavioural changes and weight reductions in the long-term. Related themes were then grouped together as themes and related sub themes and a thematic framework was constructed (a list of the groupings of themes & sub themes: see Table 3.2). The thematic framework was then applied to the interview transcripts and due to the open

ended nature of the questions asked, one sentence or paragraph can contain one or more themes so could be labelled under multiple themes. Charts were then laid out on a thematic basis which allowed identification of patterns, differences and similarities between and within sub-groups of stakeholders, across key themes and sub themes. Finally, diagrams were used to aid the final interpretation phase of the analysis. To counter bias and ensure the trustworthiness of the data, peer consultation took place with two other post doctorate researchers on the development of the thematic framework, charting and mapping data and final interpretations (Pope, Ziebland & Mayes, 2000). Member checks were also conducted to allow participants to verify the analysis represented an accurate account of their views (Parahoo, 1997).

**Table 3.1** Stages of the Framework analysis technique (Ritchie & Spencer, 1994)

<b>Stage of Analysis</b>	<b>Features of this Phase</b>
1. Familiarisation	Familiarisation with the data reading and re reading the transcripts.
2. Identify thematic framework	Key themes placed within a thematic framework and sorted hierarchically into main and sub themes.
3. Indexing/coding	Thematic framework is systematically applied to interview transcripts.
4. Charting	Chart displays laid out on thematic basis.
5. Mapping and Interpretation	Can now look for patterns and associations to search for explanation and meaning.

**Table 3.2** Thematic Framework displaying key themes and sub themes across stakeholders

<p><b>Motivational Issues:</b></p> <ul style="list-style-type: none"> <li>- Readiness to change</li> <li>- Motivational tools and behaviour change techniques</li> <li>- Motivational factors</li> <li>- Importance of motivation for change</li> </ul>	<p><b>Psychological issues:</b></p> <ul style="list-style-type: none"> <li>- Psycho-social impacts of obesity</li> <li>- Emotional impact of obesity</li> </ul>
<p><b>Barriers to treatment:</b></p> <ul style="list-style-type: none"> <li>- Lack of support from health professionals</li> <li>- Genetic reasons for obesity</li> <li>- Challenges to maintenance</li> <li>- Barriers to exercise and healthy eating</li> </ul>	<p><b>Treatment Goal:</b></p> <ul style="list-style-type: none"> <li>- Weight management and maintenance goal</li> <li>- Weight loss goal</li> <li>- Healthy lifestyle behaviour change goal</li> </ul>
<p><b>Context and design features of treatment interventions:</b></p> <ul style="list-style-type: none"> <li>- Program location</li> <li>- One to one counselling</li> <li>- Non-medicalised treatment</li> <li>- Non-judgemental atmosphere</li> <li>- Monitored weight</li> <li>- Individual sessions <u>and</u> group work</li> <li>- Duration of intervention</li> <li>- Coordinate with school efforts</li> <li>- Child group discussion sessions</li> <li>- Against school involvement</li> </ul>	<p><b>Specific Treatment Recommendations:</b></p> <ul style="list-style-type: none"> <li>- Parenting issues</li> <li>- Increase available treatment programmes</li> <li>- Healthy role models</li> <li>- Family therapy</li> <li>- Empowering child to make healthy choices</li> <li>- Deliverers qualities</li> <li>- Child education on health consequences</li> <li>- Change family habits</li> </ul>
<p><b>Social support channels:</b></p> <ul style="list-style-type: none"> <li>- Professional Support</li> <li>- Post programme support</li> <li>- Perceived importance of group support</li> <li>- Perceived Group support of similar others</li> <li>- Peer support</li> <li>- Importance of family involvement and support</li> </ul>	<p><b>Overall views regarding treatment:</b></p> <ul style="list-style-type: none"> <li>- Tackle wider society issues</li> <li>- Prevention in early years over treatment</li> <li>- Positive attitude to treatment</li> <li>- New more imaginative approach to treatment</li> <li>- Negative attitude to UK obesity treatment</li> <li>- Learn from European treatment approaches</li> <li>- Importance of structure and routine</li> <li>- Importance of fun and enjoyment</li> </ul>
<p><b>Tailoring treatment:</b></p> <ul style="list-style-type: none"> <li>- Tailor treatment to individual or specific groups</li> <li>- Appropriate level for education</li> <li>- Age considerations designing interventions</li> </ul>	<p><b>Treatment intervention expectations and achieved outcomes :</b></p> <ul style="list-style-type: none"> <li>- Positive physical and psycho-social outcomes not just weight loss</li> <li>- Positive outcomes of physical activity</li> <li>- Parental weight loss goal</li> <li>- Health improvement</li> </ul>

### 3.5 Results

Results are displayed according to key themes and sub themes that arose, in line with the framework analysis technique (Ritchie & Spencer, 1994). Similar themes emerged across children and parents irrespective of whether they were at the beginning or end of the intervention, thus all children and parents' results are presented collectively. Stakeholders' were ten children aged 7-13 years old (three males & seven females; four pre-treatment & six post treatment); seven parents (six mothers & one father; three pre-treatment & four post treatment); and nine health professionals (three nutritionists, two health promotion experts, one paediatric endocrinologist, one paediatrician, one paediatric dietician & one exercise professional).

#### 3.5.1 Key Treatment Intervention Components

Stakeholders concurred that treatment should incorporate a physical activity (PA), nutrition and behavioural component (n=25),

*“I think the aim of something like this programme should be like I said ... a more holistic approach and not just your coming to lose weight but it's to become healthier and it's not just about eating less it's about everything ... so the end goal should be about having a healthier lifestyle by doing x, y, z, by eating healthier ... exercising more.”* (Parent 1 post).

Stakeholders felt that a concerted effort should be made to move away from a medical model for obesity treatment and that interventions should be conducted in recipients' familiar and comfortable environments rather than in medical settings (n=19),

*“Programmes should definitely be in community settings and we need to get away from medicalising obesity treatment, except of course in cases where there are medical complications and then more intense medically supervised treatment is necessary.”* (Health Professional 6).

Health professionals emphasised that to move forward, future interventions should involve innovative strategies to tailor treatment according to participant's age, ethnicity, degree of obesity and their readiness or confidence to change (n=8),

*“You know ... really tailor... make it to the needs of different groups and you can do that nowadays really with you know the internet.”* (Health Professional 6).

Health professionals recognised a number of key issues that treatment interventions need to address to be effective. Health professionals concurred that interventions needed to focus on facilitating families to break their unhealthy habits and that it is not just about the overweight child changing; the whole family needs to be engaged in this process of change (n=6),

*“All the family needs to be involved in that and need to take ownership or responsibility for changing behaviours”* (Health Professional 3).

Health professionals suggested that parents have the primary responsibility for leading the attempts to make behaviour changes and therefore interventions need to address underlying parenting issues, so parents take charge of making changes (n= 7),

*“Reinforcing the positive element of their parenting and simply helping to modify less effective strategies that they're kind of using in the house that might be getting in the way and hinder them making changes.”* (Health Professional 3).

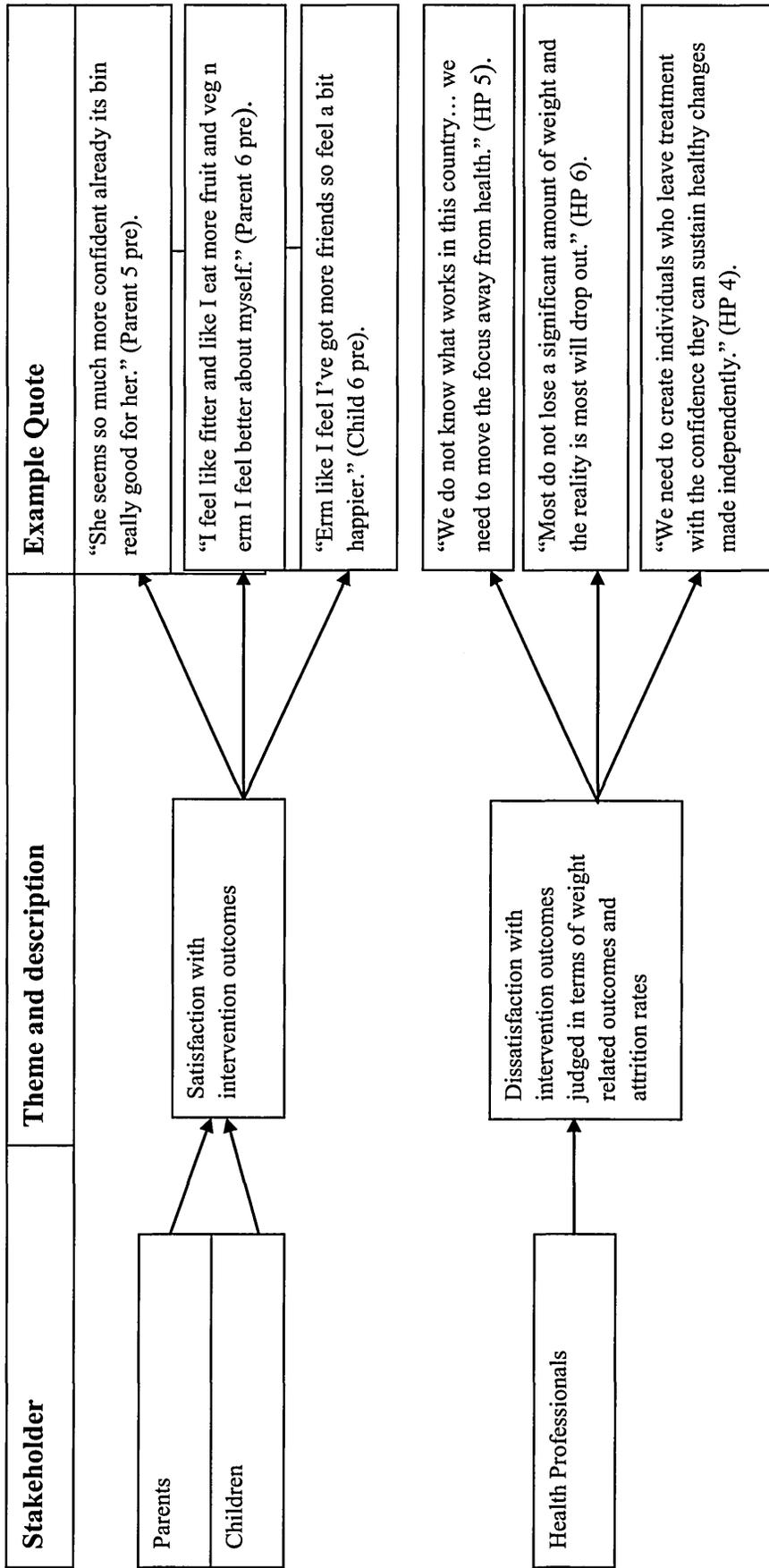
Innovative strategies such as the computer/internet were acknowledged as helpful to sustain contact with the treatment support network (n= 14), yet some stakeholders highlighted that treatment interventions should not solely be computer-based, recognising the importance of support and interaction with similar others (n=6),

*“Setting up some erm ... setting up some type of external support network (right) erm ... you know something that was accessible to the group involved ... even if it was like a website or exchanging phone numbers .”* (Health Professional 1).

### **3.5.2 Treatment Intervention Outcomes**

Discrepancies existed between children and parents versus health professionals' perceptions towards the effectiveness of current treatment interventions (see Figure 3.1). The importance of, “being satisfied” with achieved outcomes from treatment interventions was expressed by all children and parents, and was associated with their motivation to maintain change after the intervention has finished. Conversely, health

professionals were largely dissatisfied with intervention effectiveness, largely expressing concerns over participants commitment to treatment, attrition rates and poor weight related outcomes, particularly in the long-term (n= 7). Health professionals were especially negative towards treatment approaches in the UK, implying they still do not know what works.



**Figure 3.1** Stakeholders perceptions towards intervention outcomes

### 3.5.3 Importance of Social Support

Social support emerged as a major theme across all stakeholders in relation to initiating and maintaining a healthy lifestyle. Stakeholders agreed a consistent support network, incorporating the core family unit, 'similar others' (i.e. other overweight children & their parents), and health professionals is key,

*"I were looking forward to child 3 getting interaction with children that are ... that look the same as child 3."* (Parent 3 post).

Parents conveyed that they felt isolated and abnormal in society, and that support offered from similar others in the treatment context was comforting and integral for themselves and their child. Health professionals emphasised family support is critical to empower children to initiate and maintain health behaviour change (n=25),

*"All the family needs to be involved in that and need to take ownership or responsibility for changing behaviours"* (Health Professional 3).

Stakeholders conveyed different perceptions towards the responsibilities of parents to effectively support their child in treatment interventions. Children and health professionals felt parents had a responsibility to be a healthy role model. However, parents largely felt it was simply about bringing their child along to the intervention and providing the emotional support to empower their child to make their own independent behaviour changes (n=4),

*"I see it as being my role to carry on facilitating this ... so with the food and that cause child 6 is young and needs to learn herself... I wouldn't see it as appropriate to take that over."* (Parent 6 post).

Stakeholders agreed on the importance of treatment interventions providing group support from similar others for parents, from other parents of overweight children, and for the children from other overweight children,

*"I think erm ... coming here with other children similar to himself and getting to speak to other parents dealing with like the same issues is really helpful for us and you don't feel like your bein looked at funny and child 2 actually looks forward to coming."* (Parent 2 pre).

### ***3.5.4 Maintaining Behaviour Change (post intervention)***

Stakeholders perceived a number of challenges to maintaining health behaviour changes when treatment interventions cease (see Figure 3.2). Children and parents emphasised that to sustain behaviour change and weight regulating behaviours, they need ongoing support from health professionals and ‘similar others’. However, health professionals suggested ongoing support is unrealistic due to cost. Furthermore there was agreement that in reality the majority of families would not take up or commit to extended support leading to poor attendance and high drop-out.

Health professionals suggested it might be more realistic to develop treatment interventions that enhance parents and children’s confidence to independently maintain health behaviour change, encouraging habitual behaviour change,

*“Treatment needs to create individuals who can go away and independently maintain health behaviour change.”* (Health Professional 6).

Health professionals commented that treatment needs to enhance autonomous and self regulated motivation so families feel confident they can go away and independently maintain changes in behaviour (n=4). Children and parents reported that using behavioural techniques, established during treatment, post intervention such as goal-setting would help maintain behaviour change (see Figure 3.2).

### ***3.5.5 Barriers to the Maintenance of Behaviour and Weight related Changes post treatment***

Stakeholders identified a number of barriers to the maintenance of behaviour change post treatment (see Figure 3.3). Children and parents reiterated that the loss of the support network offered from ‘similar others’ and health professionals in the intervention context, would inhibit their ability to sustain newly adopted behaviours in the long-term (n=12). Parents perceived a lack of support from health professionals in general, outside of the intervention context, negatively impacted their motivation to sustain healthy lifestyles. Parents perceived that a lack of support from other family members i.e. grandparents, fathers, siblings and mothers, would be a significant barrier to maintaining health behaviour change through creating an unsupportive environment for a healthy lifestyle (n= 6). Children perceived, “being bullied” as their major barrier to maintaining a healthy lifestyle (n=6). However both children and parents had little

confidence to overcome their perceived barriers to maintaining a healthy lifestyle without sustained support.

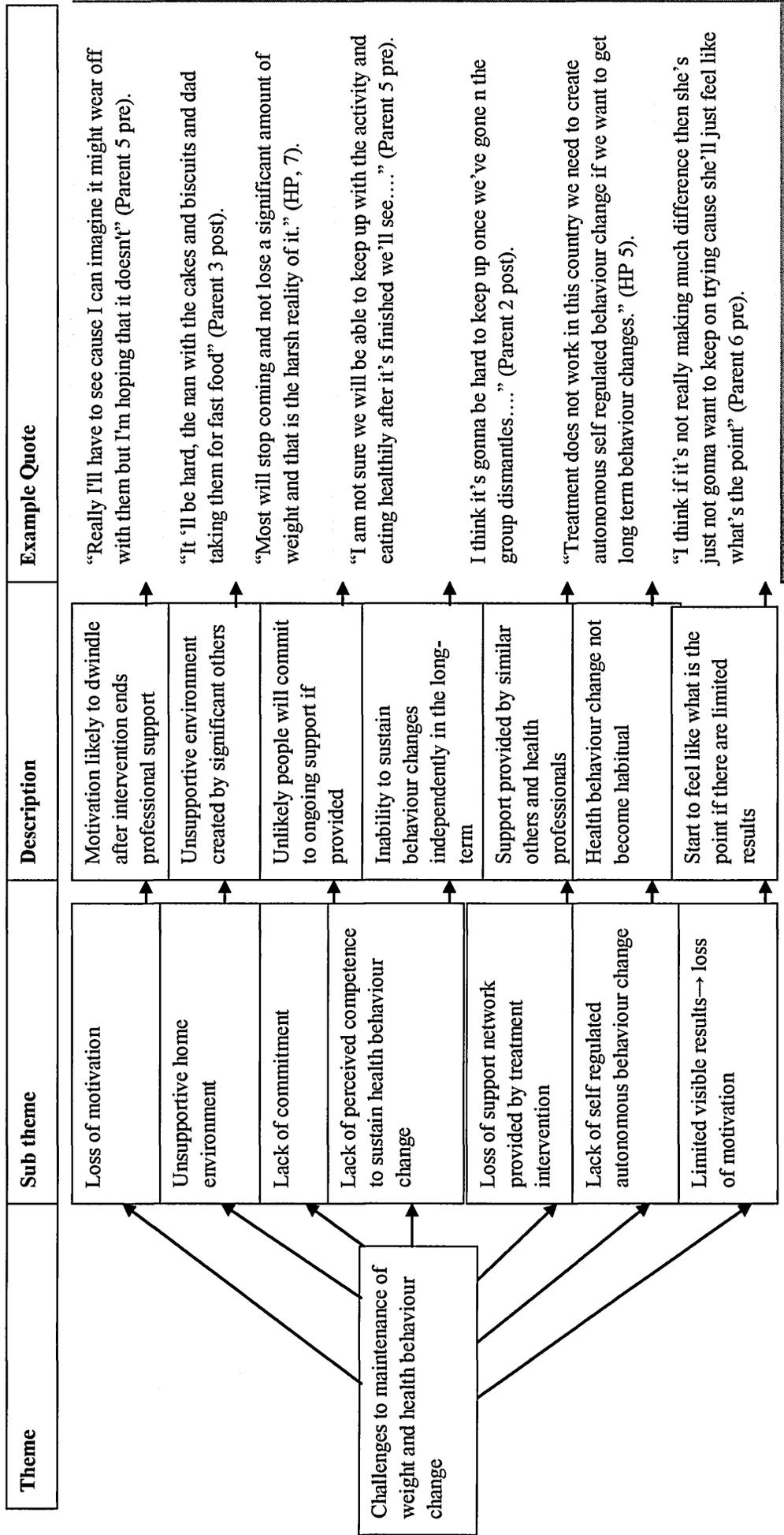
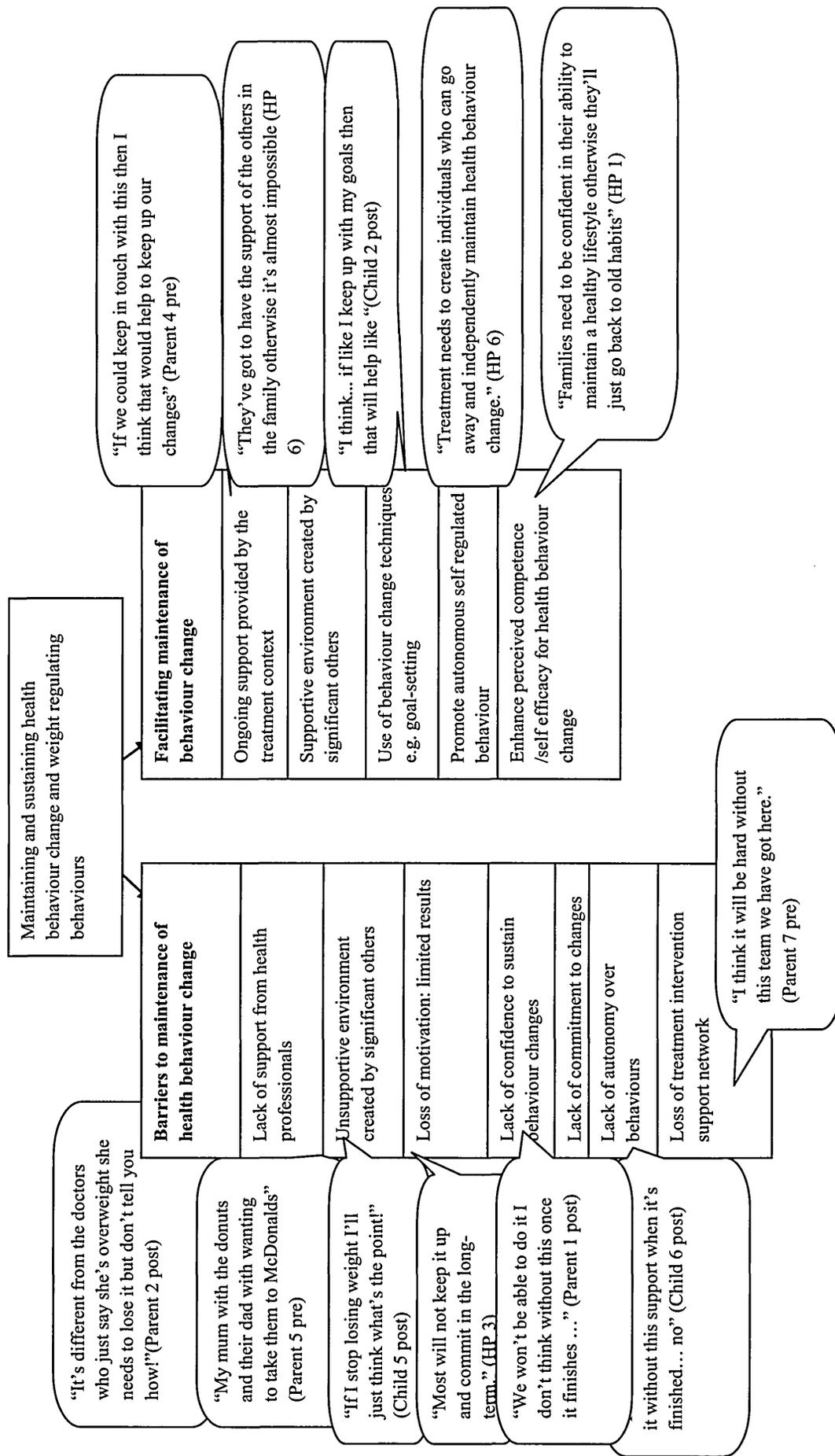


Figure 3.2 Stakeholders perceptions of the challenges to maintaining health behaviour change in the long-term



**Figure 3.3:** Barriers and facilitating factors to the maintenance of health behaviour change

### **3.6 Discussion**

There is a call for the development of knowledge regarding stakeholder's views towards childhood obesity treatment (Luutikhuis et al., 2009). This is especially prominent given expert guidelines suggest the need to consider stakeholder views (particularly patients & clients) in the process of designing complex interventions such as MCTIs (MRC, 2000; 2008). The qualitative study detailed in this chapter aimed to explore stakeholders' perceptions towards the content and design of childhood obesity treatment interventions, particularly their views towards the sustainability of treatment outcomes i.e. PA and healthy eating behaviour and weight reductions, to facilitate effective intervention design in the future. Similar to Pryor and O'Connell (2008), incongruence was found between treatment deliverers (health professionals), who felt treatment should create autonomous individuals, and treatment recipients (children & parents'), who reported a need for support to maintain health promoting and weight regulating behaviours post treatment. As Pellatt (2007) suggested, to enhance treatment outcomes the gap between recipients and deliverers expectations of treatment needs to be closed to ensure equal relationships in developing future interventions.

Despite differing perceptions emerging from the current study, all stakeholders agreed that treatment interventions should focus on lifestyle behaviour change, within a socially supportive context in which recipients are comfortable. In line with expert recommendations, stakeholders also agreed that treatment interventions should incorporate behavioural modification strategies to encourage PA and nutrition related behaviour change (Barlow et al., 2007). Stakeholders suggested that interventions should be run in familiar, non-medical settings, such as community or leisure centres. This is promising considering the emergence of contemporary interventions in community settings that have reported positive outcomes (e.g. Rudolf et al., 2006; Sacher et al., 2010: see Chapter 2). As highlighted in previous recommendations (e.g. Luutikhuis et al., 2009; Summerbell et al., 2003), stakeholders reported parental support to be a key feature of effective treatment.

#### **3.6.1 Tailored Interventions**

Stakeholders agreed that treatment interventions should be tailored to effectively target age differences, readiness and confidence to change, degree of obesity, socioeconomic status and gender. Consequently, findings here reject a 'one size fits all'

approach (Barlow et al., 2007). Instead, tailoring interventions based on the families and child's readiness and confidence to change, might strengthen treatment recognising that children and parents in this study displayed differing motivation for treatment (i.e. some children had no desire or felt no need to be there).

### ***3.6.2 Treatment Intervention Outcomes***

Parents and children suggested the psycho-social outcomes from treatment made it worthwhile, despite limited weight related changes. However, health professionals conveyed psycho-social outcomes were not sufficient justification for intervention effectiveness and expressed dissatisfaction towards weight related treatment outcomes. This suggests that health professionals and parents/children judge intervention effectiveness by different measures which could exert an influence on the outcomes from treatment interventions. For example, if families perceive psycho-social benefits are achieved from treatment they may not be concerned with making sustained behaviour change to lose weight as this is not important to them. This could explain the tendency for children to regain weight post intervention (Whitlock et al., 2010). Furthermore, health professionals' expectations of typical behavioural-based treatment interventions in the community context, that last only 8-12 weeks, might be unrealistic given the complexity of childhood obesity (Department of Health, 2008). To improve weight related outcomes, health professionals might consider designing bespoke, innovative and flexible treatment interventions to match the complexity of the condition.

### ***3.6.3 Importance of Social Support***

Positive social support during treatment emerged as key to achieving and maintaining weight management efforts. This is in accord with previous qualitative studies that reported continual, positive social support from significant others is important to making and sustaining behaviour changes (Borra, Kelly, Shirreffs, Neville & Geiger, 2003; Murtagh et al., 2006; Stewart et al., 2008). Despite this clear emphasis on social support, rarely has it been defined or assessed in the majority of lifestyle focussed childhood obesity treatment interventions (Elfhag & Rossner, 2005; Verheijden, Bakz, van Weel, Koelen & van Staveren, 2005). Future interventions should therefore seek to identify the optimal function of social support in the treatment intervention context to enhance long-term effectiveness and cost-effectiveness.

Parents and children expressed a clear lack of confidence in their ability to independently sustain health promoting and weight related changes made as a result of treatment, without ongoing support. Review evidence supports this finding, suggesting that behavioural-based treatment interventions have limited effectiveness at producing sustained weight loss (Whitlock et al., 2010). This suggests families need some mechanism of sustained support to maintain treatment outcomes. However, health professionals suggested the provision of ongoing support to families was unrealistic due to cost and concerns about families developing a dependency on support. This incongruence might be due to treatment deliverers failing to understand what families can realistically be expected to achieve as a result of treatment. Alternatively, families might have unrealistic expectations due to not being accurately informed as to the intended purpose and nature of the intervention. Such incongruence between treatment deliverers and recipients has been visible in various health contexts, including mental health and other chronic health conditions (Lester, 2005; Pryor & O'Connell, 2008). Addressing incongruence appears important in improving the maintenance of treatment intervention outcomes.

#### ***3.6.4 Maintaining Behaviour Change (post intervention)***

Children and parents expressed concerns that the loss of the supportive environment offered by the treatment intervention would make it difficult to transfer and maintain their new weight regulating behaviours in their 'real life' (i.e. in their home environment). Existing interventions rarely incorporate the home environment into the treatment protocol (Luutikhuis et al., 2009). By teaching behaviour change/weight control techniques in a contextual vacuum (i.e. the treatment setting), participants are highly likely to remain vulnerable to the same environmental influences/ barriers associated with their unhealthy eating and PA habits when they return to their home environments. The weight rebound effect that is commonly visible post intervention posits that families find it difficult to maintain behaviour changes independently (Sallis & Glanz, 2009). Therefore, a critical issue facing practitioners is how to design treatment interventions to effectively support families to translate the skills learned in treatment into their home lives.

The Ecological Model of childhood obesity treatment recognises the importance of a child's environment in influencing their health behaviours (Davison & Birch, 2001).

This model recognises that factors at multiple levels influence a child's PA and healthy eating behaviours including the family, school and community context. Research within other healthcare contexts has highlighted that when interventions are implemented at multiple levels they are more likely to result in sustainable outcomes (Sallis & Glanz, 2009). For example, action at all levels of the ecological model within the US setting targetted at smoking cessation, contributed to marked reductions in smoking rates among adults from 42% in 1965 to 21% in 2005 (Centres for Disease Control & Prevention, 2006). Considering this, to produce sustained outcomes in the childhood obesity treatment context it is likely that MCTIs at the individual level need to be supported by action at the family level, school and community level and then the government policies at a national level (Davison & Birch, 2001).

### ***3.6.5 Implications for Practice***

Ultimately the findings of this study suggest that treatment interventions need to account for the perspectives of the recipient and the deliverer. Specifically, it is important to establish congruence between stakeholders' perceptions of the nature and purpose of treatment thus ensuring that providers and recipients work together to enhance treatment success (Pellatt, 2007). Interventions should also account for differences in age, degree of obesity and ethnicity in light of the current findings and previous expert recommendations (Barlow et al., 2007). A key consideration in the development of future interventions will be addressing how to effectively tailor treatment to individual's needs. Innovative treatment strategies (e.g. internet or computer mediated treatment) could provide an effective and cost effective means to facilitate tailoring and targeting of treatment and maintaining support post treatment over traditional, expensive face to face approaches (Whiteley, Bailey & McInnis, 2008).

Considering that the majority of eating and exercise habits are home-based, a logical step in strengthening behavioural-based treatment interventions would be to move towards an "ecological model" of behaviour change. Practitioners should be encouraged to conduct interventions in community settings and attempt to incorporate the home environment into treatment to facilitate the transfer of weight regulating behaviours into people's 'real lives'. Clinical-based interventions should attempt to dovetail treatment with home-based activities to ensure the home environment is modified to support health behaviour changes. Given stakeholders' lack of confidence

towards maintaining behaviour change post treatment, interventions should also include maintenance strategies that promote autonomous motivation as a means of enhancing participants' confidence for independent maintenance of weight regulating behaviours.

Strategies to enhance autonomous and self regulated motivation should include goal-setting and self-monitoring, given that these techniques can facilitate participants in sustaining weight regulating behaviours (Levesque et al., 2006; Wilson, Blanchard, Nehl & Baker, 2006). Treatment interventions need to emphasise parents' responsibilities to provide a supportive context for health behaviour change, acting as a healthy role model, given that parents' avoidance or unwillingness to alter their own health behaviours could be a hindrance to their children's successful behaviour change (Slawta, Bentley, Smith, Kelly & Syman-Dieger, 2006). Therefore, interventions should engage the whole family unit in some aspect of treatment, as positive social support appears to enhance the maintenance of weight management efforts.

### ***3.6.6 Implications for Research***

Given that little is known about stakeholders' views towards treatment, qualitative research is needed to uncover quality and fidelity issues (i.e. was treatment delivered & received as intended). Qualitative research with children/parents who have dropped out of treatment or have attended treatment in specialised contexts, could also offer a unique insight to enhance the development of future treatment interventions. Recognising the perceived importance of social support across stakeholders, treatment interventions should include a clear description of the intended mechanism of action for social support as well as including perceived social support as an outcome variable to assess how, and in what ways, it can affect obesity treatment interventions (Verheijden et al., 2005).

Children and parents conveyed a need for support to maintain behaviour change beyond treatment. However, treatment deliverers suggested ongoing support to be unrealistic and expensive. To resolve the incongruence identified here, studies should explore feasible and cost-effective strategies to support families in maintaining behavioural changes (e.g. mentoring systems, continued peer support, self support groups & telephone/ home-based support) and at the same time reduce participants' perceived need for ongoing support (Harris, Oelbaum & Flomo, 2007). With this in mind, future research should consider the efficacy of incorporating maintenance and

relapse prevention strategies into treatment interventions as a means of enhancing self regulated and autonomous motivation in families, to develop their confidence to independently maintain weight.

### **3.7 Limitations**

The framework technique offered the flexibility to allow emergent ideas to be reformed as the analytical process progressed. However, due to the open-ended nature of this approach, it is possible that the researcher's own views, conflicts and prejudices might have influenced the themes that were subsequently identified. An attempt was made to minimise this by involving two post-doctoral researchers in the review process. This meant that where discrepancy occurred, a consensus could be reached. Although a purposeful sample was gathered, it was acknowledged the actual make up of the sample in terms of the ratio of different groups of stakeholders was partly determined by convenience. The researcher could not be certain that 'saturation' was achieved yet given that no new themes appeared to emerge in the final interviews, the range of stakeholders that were interviewed and in light of the time and resource constraints 26 stakeholders was deemed an appropriate sample size to achieve the original aims of the study (Patton, 2002). If the research was conducted again it would have been beneficial to pilot the interview topic guide prior to the study to ensure it elicited the relevant information in line with the original research aim(s). There was no access to participants who had dropped out of the intervention or participants of treatment interventions in more specialised settings (e.g. hospital-based). Therefore, results displayed in this chapter might not generalise across groups, but could be transferred to similar groups and settings (Fern, 2001). Resource limitations and access to stakeholders did not allow the researcher to interview more stakeholders, or to further explore the findings with other groups (i.e. children & parents who dropped out of treatment).

### **3.8 Chapter Summary**

This chapter provided a qualitative inquiry into stakeholders' views towards childhood obesity treatment interventions. As a result, there were a number of implications highlighted for further research, particularly to address the sustainability of MCTIs. Specifically parents and children felt that they did not have the confidence to maintain their health behaviour changes in their "real life" home environments and consequently stated a need for ongoing professional support. However, health

professionals' views were incongruent with this and believed that in reality it was not feasible to offer ongoing support and that the majority of participants would drop-out. To enhance the long-term efficacy of MCTIs it appears necessary to test the efficacy of strategies to enhance the autonomous motivation and confidence of families to maintain behaviour changes independently. In accordance with the findings here the next chapter details a pilot study to investigate the efficacy of a maintenance intervention that has considered the views of stakeholders here to enhance the long-term efficacy of a MCTI.

## **Chapter 4**

# **Study 3A: A Pilot Study to test the Efficacy of a Maintenance Intervention to Improve the Sustainability of a Multi-component Lifestyle-based Childhood Obesity Treatment Intervention**

## **Chapter 4: Study 3A: A Pilot Study to test the Efficacy of a Maintenance Intervention to Improve the Sustainability of a Multi-component Lifestyle-based Childhood Obesity Treatment Intervention**

### **4.1 Introduction**

The sustainability of weight related and behavioural outcomes from multi-component treatment interventions (MCTIs) for overweight and obese children are questionable (see Chapter 2). Furthermore, qualitative inquiry into stakeholders' views towards childhood obesity treatment (see Chapter 3) suggests children and parents have limited confidence in their ability to sustain newly adopted lifestyle behaviours once they return to their 'real life' environments (i.e. away from the intervention setting). Stakeholders suggested ongoing support would facilitate a transfer of these behaviours from the treatment context into the home environment. However, there is concern from some health professionals that such an approach would require unrealistic resource and ultimately prove not to be cost-effective due to families dropping out (Staniford et al., 2011). Therefore, a maintenance intervention designed to enhance the autonomous motivation and confidence of participants to independently sustain lifestyle/weight reducing behaviour in their home environment, limiting the need for ongoing support, appears warranted.

Despite guidelines for the design of complex interventions suggesting the importance of being informed by relevant theoretical underpinnings and taking into consideration stakeholders' views, the systematic review in Chapter 2 revealed that MCTIs rarely reported these features (Medical Research Council; MRC, 2000; 2008). A theoretical approach that has accounted for how individuals maintain behavioural changes and appears to be congruent with stakeholders' views expressed in Chapter 3 is Self Determination Theory (SDT; Deci & Ryan 1985). SDT posits that humans behave and are motivated to behave in a certain way in order to satisfy their innate needs to feel competence, autonomy and relatedness. There is limited research available in the childhood obesity context regarding the maintenance of weight related and behavioural changes following MCTIs (Luutikhuis et al., 2009). Research in the adult health context has supported the use of SDT (i.e. perceived competence & autonomy) to enhance the maintenance of behavioural changes and weight management (e.g. Edmunds, Ntoumanis & Duda, 2008; Fortier, Sweet, O'Sullivan & Williams, 2007; West et al.,

2010; Williams et al., 1996). Cognitive behavioural strategies (e.g. self-monitoring, problem solving, setting action plans & setting realistic goals) have been common features of SDT based interventions reporting sustained outcomes in the adult health behaviour change contexts (e.g. Fortier et al., 2007; Williams et al., 1996; 2002). Research in the adult weight management context also suggests that Motivational Interviewing (MI: Miller & Rollnick, 1991; 2002) offers a practical approach that is fully coherent, and can promote the key facets of SDT (i.e. through supporting autonomy & enhancing perceived competence for behavioural changes) (Markland, Ryan, Tobin & Rollnick, 2005). Findings in the adult weight management context have shown an SDT based intervention incorporating MI improved participants' weight maintenance at 18 month follow-up (West et al., 2010).

In light of stakeholder views the purpose of the current chapter was to assess the efficacy of a maintenance intervention underpinned by SDT, integrating Motivational Interviewing (MI: Miller & Rollnick, 1991; 2002) and cognitive behavioural strategies to improve obese children's maintenance of behavioural and weight related changes. This chapter also considers the fidelity of the maintenance intervention recognising that the findings in Chapter 2 revealed that MCTIs rarely report treatment fidelity (TF) despite its importance in drawing firm conclusions (Bellg et al., 2004). Moreover the assessment of TF is particularly important in the pilot phase to allow strengths and weaknesses of the intervention design, and treatment delivery to be identified and in turn inform the basis of modifications if the intervention is implemented in a large scale RCT (Bruckenthal & Broderick, 2007).

## **4.2 Background**

### ***4.2.1 Maintenance of Behaviour Change and Weight Related Outcomes: Childhood Obesity Context***

In the childhood obesity treatment context only a small number of studies have reported sustainable weight related outcomes (Braet & Van Winckel, 2001; Braet et al., 2004; Epstein et al., 1990; 1994; Savoye et al., 2005; Vignolo et al., 2008). Furthermore, these outcomes have resulted from studies that provided high intensity professional support in specialised settings e.g. hospital inpatient or outpatient settings (e.g. Braet et al., 2004; Epstein et al., 1990; 1994), outside of the UK. Despite this, a number of cognitive behavioural strategies were common to studies that appeared to elicit positive

and sustained treatment effects (Braet et al., 2004; Savoye et al., 2005; Vignolo et al., 2008). These strategies included; stimulus control, self-monitoring, emotional education, child involvement in decision making processes, creating an awareness of costs and benefits of having a healthy lifestyle, assertiveness training, problem solving and coping skills (Vignolo et al., 2008). Vignolo et al. (2008) concluded that the cognitive behavioural MCTI produced sustained weight related outcomes consistent with five year and ten year follow-ups of Epstein et al. (1990; 1994), the five year follow-up of Braet and Van Winckel, (Braet et al., 2004) and seven year follow-up effects reported by Golan and Crow (2004). The targeting of nutrition education, promotion of PA, the development of self control and the active involvement of parents and family members to change their lifestyles to support the child also appear to be key features of MCTIs displaying sustainable outcomes (Braet et al., 2004; Golan & Crow, 2004; Vignolo et al., 2008).

There is a small amount of evidence that supports the inclusion of relapse prevention training as a strategy to improve weight maintenance following participation in MCTIs (Savoye et al., 2005; 2007). Relapse prevention training focuses on the identification of high risk situations i.e. when it might be difficult to adhere to PA and healthy eating goals. Relapse prevention aims to help children and their families develop coping strategies to deal with high risk situations. Despite recommendations for the inclusion of relapse prevention strategies within MCTIs (Stewart et al., 2009) there is still limited evidence to conclude their effectiveness in the childhood obesity treatment context.

To date only one childhood obesity treatment intervention has specifically considered the efficacy of including active maintenance strategies (i.e. incorporated a maintenance intervention period after the main treatment intervention that includes strategies designed to specifically target the maintenance of behavioural & weight related changes) to enhance the sustainability of weight related and behavioural outcomes. Wilfley et al. (2007) considered the efficacy of two different maintenance support conditions. The first condition was the social facilitation maintenance (SFM) strategy that used a social ecological approach and employed empirically supported techniques (Frankell, Myatt & Cantwell, 1996) to help parents facilitate child peer support networks that support healthy lifestyles. The second condition was a behavioural skills maintenance (BSM) strategy that took a cognitive behavioural

approach adapted from weight maintenance, (Perri et al., 2001; Wing, Tate, Gorin, Raynor & Fava, 2006) and other evidence based interventions for children with anxiety (Hudson, Krain & Kendal, 2001; Kendal & Southam-Gerow, 1996) and substance use disorders (Stewart et al., 2005). Both conditions significantly enhanced the maintenance of treatment outcomes in the four month treatment period compared to families randomly allocated to receive no maintenance support (post participation in the standard treatment intervention). However, findings revealed that at a two year follow-up there was no significant effect for either active weight maintenance groups (BSM & SFM) over families who received standard treatment alone (Wilfley et al., 2007). Further research evidence is required to identify effective approaches that provide sustainable behavioural change and weight related outcomes in children.

#### ***4.2.2 Maintenance of Behaviour Change and Weight Related Outcomes: Adult***

##### ***Health Context***

In adult weight management settings, a greater depth of research has been carried out regarding sustainable treatment options. Frequently applied maintenance strategies that have been adopted in adult weight loss interventions include extended (i.e. a lengthened intervention period) professional contact, extended behavioural skills training, provision of peer support networks and extended PA sessions (Jeffery et al., 2000; Perri et al., 2001; Wing et al., 2006). Research within the adult weight loss context supports the inclusion of relapse prevention strategies within MCTIs to improve long-term weight reductions (Perri et al., 2001; Wing et al., 2006). Evidence suggests a delayed benefit can occur where despite no intervention effects being reported at program completion, at six and twelve month follow-ups participants who had received relapse prevention training produced significantly greater weight reductions than participants who had not (Perri et al., 1987).

Another common facet of successful interventions is a theoretical underpinning. A growing body of research has provided evidence supporting SDT (see section 4.2.3) as an appropriate theoretical underpinning to promote sustained behavioural change outcomes in a number of adult health contexts including exercise adherence (Edmunds et al., 2008; Fortier et al., 2007; Ingledew, Markland & Ferguson, 2009), smoking cessation (Williams et al., 2006) and weight management (Teixeira et al., 2010; West et al., 2010; Williams et al., 1996). Research suggests that when an individual's focus

shifts from extrinsic to intrinsic (e.g. an individual participates in exercise for personal enjoyment rather than external rewards) this has positive long lasting effects on behavioural outcomes (Teixeira et al., 2010; West et al., 2010). Given the limited evidence in children regarding maintenance interventions, successful strategies employed in the adult health context to promote the maintenance of health related outcomes should be considered. Therefore SDT was considered an appropriate theory to underpin the maintenance intervention in the present study. The next section provides justification for adopting SDT to underpin the design of the maintenance intervention.

#### ***4.2.3 Theoretical Rationale: SDT***

One theoretical perspective that appears to be useful in understanding motivation for sustained health behaviour changes is SDT (Deci & Ryan, 1985). Motivation can be defined as the direction and intensity that drives an individual towards a specific goal and has been viewed as one dimensional, varying only in terms of its quantity (Sage, 1977). However, according to SDT (Deci & Ryan 1985; 2000) motivation can also vary in terms of the quality of the motivational drive. The basic tenets of SDT posit that human motivation varies in the extent to which it is either autonomous (self-determined) or controlled, and that to promote long-term behaviour change there is a need to understand the means by which motivation becomes internalised (i.e. the human tendency to integrate externally regulated activities).

SDT explains the quality of motivation that regulates behaviours can be considered on a continuum from the lower to the higher autonomously motivated behaviours: the least autonomous is identified as externally regulated and occurs when a person performs activities either to obtain external rewards, or to avoid punishment or sanctions; introjected regulation involves internalising the behaviour's regulation, but not fully accepting it as one's own (behaviours are performed to avoid negative emotions such as anxiety & guilt, supporting conditional self-worth); identified regulation reflects participation in an activity because an individual values the outcomes of the behaviour to be personally significant, important (although one may not enjoy the activity itself) and intrinsic, a highly autonomous form of motivation, is present when an activity is engaged in because of its inherent satisfaction such as for the fun, interest, or the challenge it offers. SDT accounts not only for the quality of motivation but the processes by which more controlled motivation is converted to autonomous motivation

if supportive conditions are in place i.e. a context that satisfies an individual's basic needs for autonomy, competence and relatedness (Deci & Ryan, 2000).

#### *4.2.3.1 SDT as a Theory to Underpin a Maintenance Intervention*

According to SDT, successful maintenance of weight related outcomes would occur when children choose eating healthily and regular PA because they personally value weight maintenance and health behaviour change outcomes (Deci & Ryan, 2000). Indeed, the provision of an autonomy supportive treatment context and internalisation of treatment goals have been associated with greater reductions in BMI in the adult weight management context (West et al., 2010; Williams et al., 1996). This finding also holds true in the adult exercise behaviour change context where research suggests long-term PA behaviour change was associated with higher forms of autonomous motivation (Fortier et al., 2007). Evidence from these studies suggests that interventions guided by SDT can facilitate the internalisation of autonomous self regulation and feelings of competence and thus improve the maintenance of treatment outcomes (Ryan, Patrick, Deci & Williams, 2008). Furthermore, these studies clearly demonstrate that autonomous motivation is a crucial predictor of maintained behaviour change. Despite this, no research within the childhood obesity context has considered SDT underpinnings to inform intervention design. Therefore SDT was selected as the theoretical basis for this study as firstly, it is coherent with stakeholder views towards the maintenance of behavioural and weight related changes voiced in Chapter 3 (Staniford et al., 2011). Secondly, it is the only motivational theory that posits perceived autonomy and perceived competence is essential for the maintenance of behaviour changes. Lastly, from an intervention standpoint SDT highlights that the environment can be modified to support autonomy and competence.

#### *4.2.3.2 Fostering High Quality Self-Determined Motivation: Intervention Strategies*

A strength of SDT from an intervention standpoint is that it suggests autonomous motivation is predictive of maintained health behaviour changes, and the environment can be modified to support more autonomous motivations for health behaviours. A number of studies have supported the effectiveness of manipulating the socio-contextual variables to support higher quality self determined motivations in the context of smoking cessation (Williams et al., 2006), PA promotion in school settings (Chatzisarantis & Hagger, 2009), adult weight management (West et al., 2010) and in

healthcare services (Fortier et al., 2007). Therefore, it is important for interventions to include strategies that can create an autonomy supportive treatment context thus supporting an individual's autonomy over their health behaviours.

One practical approach that is compatible with the SDT perspective (Markland et al., 2005) and enhancing an individual's autonomy and confidence in taking responsibility for their own behaviour changes is MI (Miller & Rollnick, 1991; 2002). MI is a client centered counselling method aimed at promoting behaviour change and has been successfully applied to a wide range of health behaviours (Resnicow et al., 2002). MI is fully coherent with the key facets of SDT and provides practical strategies to create an autonomy supportive treatment environment and to satisfy the three needs of SDT (competency, autonomy & relatedness) (Markland et al., 2005).

Despite scarce research regarding the usefulness of MI within the childhood obesity treatment context (Resnicow, Davis & Rollnick, 2006) promising findings have been reported using MI in office-based settings to prevent and treat obese children and adolescents (Pollak et al., 2009; Schwartz et al., 2007). Research suggests that MI can be successfully adapted as a feasible method to promote health behaviour changes with adolescents and young people (Naar King & Suarez, 2011). MI has successfully been employed to address behaviours such as smoking, dental care avoidance and healthy eating adherence in adolescent populations (Flaherty, 2006). MI has also shown promising results in the education setting, reducing truancy (Enea & Dafinoiu, 2009). Evidence related to MI with child and adolescent populations suggests MI can be effective in brief intervention settings (i.e. one to four sessions) on a one to one basis (e.g. Baer, Garrett, Beadnell, Wells & Peterson, 2007; D'Amico, Miles, Stern & Meredith, 2008). This might be particularly important in light of review recommendations, and health professionals perceptions of the need for cost effective maintenance strategies (Luutikhuis et al., 2009; Staniford et al., 2011). Recognising the positive findings in other health contexts, Resnicow et al. (2006) concluded that practitioners should incorporate MI strategies into pediatric obesity treatment.

Research in the adult behaviour change context has also supported the use of MI to promote PA, healthy eating behaviours and weight management (e.g. Carels et al., 2007; Perry, Rosenfeld, Bennett & Potempa, 2007; West et al., 2010). Findings from a motivational focussed adult weight maintenance intervention underpinned by SDT suggest MI was successfully incorporated into treatment to elicit and sustain more

autonomous motivations for health behaviour changes and produced weight maintenance in up to an 18 month follow-up (West et al., 2010). In light of research supporting the use of MI in adult and child health-related contexts, MI was adopted in the current maintenance intervention. MI was coherent with the SDT underpinnings and can promote an individual's autonomy and perceived competence which appear to be crucial for maintained behavioural changes (Deci & Ryan, 2000).

As highlighted in section 4.2.1 cognitive behavioural strategies are often features of MCTIs in the childhood obesity context that have reported sustainable outcomes (Braet et al., 2004; Savoye et al., 2005; Vignolo et al., 2008). Moreover, SDT based interventions within adult health contexts have successfully employed cognitive behavioural strategies (e.g. self-monitoring, problem solving, self directed goal-setting) to promote sustained behavioural and weight related changes (e.g. Fortier et al., 2007; Teixeira et al., 2009; Williams et al., 1996; 2002). Therefore cognitive behavioural strategies were incorporated alongside MI given that they are coherent with the SDT underpinnings (Dwyer, Hornsey, Smith, Oei & Dingle, 2011) and appear to be an important feature of interventions reporting sustained behavioural changes and weight related outcomes (Staniford et al., 2011).

#### *4.2.3.3 Incorporating the Home Setting into the Maintenance Intervention*

As discussed above, from an SDT perspective, sustained behaviour changes will only occur when the environment is supportive of an individual's autonomy and competence for behaviour changes. This means families need to create a home environment that supports their health behaviour changes to enable the transfer and maintenance of these behaviours in the long-term. Ecological models of childhood obesity suggest the home environment is a key context influencing a child's diet and PA and the subsequent development of obesity (Davison & Birch, 2001; Golan & Weizman, 2001). Stakeholders' views in the previous chapter concur with the ecological viewpoint, suggesting when their home environment is unsupportive of PA and healthy eating this limits their feelings of control and confidence to sustain behaviour changes and weight related outcomes (Staniford et al., 2011).

Golan and Weizman (2001) reported that when the obesogenic load at home decreased an associated decrease in parental and child weight status was seen and this was sustained at the seven year follow-up (Golan, 2006). Furthermore, evidence from

childhood obesity prevention programmes have highlighted the importance of modifying and targeting physical attributes of the home environment and parental behaviours as part of childhood obesity prevention and treatment strategies (Fulkerson et al., 2010; Spurrier, Magarey, Golley, Curnow & Sawyer, 2008). Despite this evidence suggesting the influence of home environmental factors on childhood obesity, no studies to date have attempted to incorporate the home setting into childhood obesity treatment interventions. With this in mind, the present study recognised the importance of incorporating the home context into the maintenance intervention in aim to create an autonomy supportive home environment.

#### *4.2.3.4 Importance of Assessing TF*

As highlighted in Chapter 2, reporting TF is essential for the translation of research into practice (Radziewicz et al., 2009). Assessing TF ensures that ineffective treatments are not implemented prematurely, can aid the dissemination and transfer of research findings into practical settings and can ensure accurate replication of effective interventions (Nigg et al., 2002). Therefore the assessment of TF was acknowledged as an important part of the evaluation, particularly as this was a pilot of a maintenance intervention that had not been trialed before (MRC 2000; 2008).

The treatment fidelity workgroup proposed that treatment was evaluated in terms of the following five areas: (a) study design, (b) training of interventionist(s), (c) intervention delivery, (d) intervention receipt, and (e) enactment of the intervention in real life settings (Bellg et al., 2004). Hence, TF of the maintenance intervention was considered in relation to these five areas.

### **4.3 Study Aims**

This pilot study aimed to consider the efficacy of a maintenance intervention underpinned by SDT (Deci & Ryan, 1985; 2000), and incorporating MI and cognitive behavioural strategies (in light of stakeholder views: see Chapter 3) as an adjunct to a MCTI to improve the sustainability of weight related outcomes (i.e. BMI & BMI SDS) and behaviour changes (i.e. PA & healthy eating). The maintenance intervention specifically aimed to enhance autonomous motivation and perceived competence to maintain PA and healthy eating through integrating MI and cognitive behavioural strategies to promote an autonomy supportive treatment context. A secondary aim was to consider the fidelity of the maintenance intervention to ensure the intervention was

delivered as intended and ensure greater strength in conclusions regarding the efficacy of the maintenance intervention.

#### **4.4 Hypotheses**

It was hypothesised that children receiving the maintenance intervention would sustain weight and behavioural changes significantly better than children receiving standard care. It was anticipated that the maintenance of weight and lifestyle behaviour change would be associated with increases in autonomous motivation, perceived competence and positive perceptions of an autonomy supportive treatment climate.

#### **4.5 Method**

##### ***4.5.1 Research Design***

Conducting a pilot study allows researchers to assess whether the intervention can be successful? Is the intervention protocol realistic? (i.e. the recruitment strategies, the intervention content, duration & setting) Is the treatment deliverer skilled enough to deliver the intervention? And, it provides the opportunity to assess TF (i.e. can the intervention be delivered & received as intended in line with the theoretical underpinnings?). Ultimately it allows the researcher to identify whether it would be feasible or efficacious to conduct the intervention on a larger scale (Thabane et al., 2010). With this in mind a pilot study was deemed the most appropriate approach to explore the efficacy of the maintenance intervention.

##### ***4.5.2 Participants and Recruitment***

In total, 15 overweight/obese children aged 7-13 years old and their families (i.e. at least one parent/carer) were recruited from a community-based MCTI called GOALS<sup>2</sup> (Getting Our Active Lifestyles Started: Watson et al., 2011). The inclusion and exclusion criteria are detailed below.

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<sup>2</sup> The GOALS intervention is a community-based MCTI focussed on changing the whole family's changes to their PA and eating behaviours. Families with children aged 4-16 years who were overweight or obese (BMI > 91st percentile according to the UK 1990 BMI reference charts [Cole et al., 1995]) were eligible for the GOALS intervention. Further details of the GOALS MCTI are available from Watson et al. (2011). My involvement in the GOALS intervention was the delivery of behavioural-based sessions.

#### *4.5.2.1 Inclusion and Exclusion Criteria*

For a child to be considered for the maintenance intervention they had to fulfil all of the inclusion criteria: (i) families that had attended over 75% of the core GOALS sessions; (ii) families that remained in the treatment intervention until the end (i.e. completed intervention endpoint assessment of outcome measures); (iii) families who were willing to take part in a six week maintenance intervention (i.e. one session per week) after completing the 18 week standard GOALS intervention; (iv) children who lost or maintained their BMI during the treatment intervention. Children were excluded if: (i) families failed to adhere to the core GOALS treatment plan i.e. attendance at the weekly sessions; (iii) families who were not willing to and/or could not commit to attend a further six weeks of treatment (one session per week).

#### *4.5.2.2 Recruitment Characteristics*

A total of 34 families were identified as eligible and subsequently informed of the purpose of the study via verbal communication and a participant information sheet (see Appendix D). Of these, 20 families provided written informed consent to participate. Subsequently, five dropped out prior to baseline assessment, eight families were allocated to the maintenance intervention group and seven families were allocated to the standard care control group. Families were allocated to either the maintenance intervention or standard care control group based on a self referral process i.e. families who were willing to complete the six week maintenance intervention were allocated to the intervention group whilst families unable to attend were allocated to the standard care control group (see Figure 4.1).

#### *4.5.2.3 Completion of Assessments*

Demographic data was collected at baseline by questionnaire (sex, age, ethnicity & socioeconomic status). Outcome measures were taken at four assessment points: baseline (i.e. endpoint of the standard GOALS 18 week intervention), end point of the maintenance intervention, three and six month follow-up points (i.e. from the maintenance intervention endpoint) (see Figure 4.1). At the final follow-up participants were thanked for their ongoing commitment to the intervention and assessments and were presented with a GOALS cookbook as a gesture of thanks.

#### *4.5.2.4 Attendance*

Attendance at the maintenance intervention was 100% for the individual home-based sessions and the mean attendance at group-based sessions was 57% (i.e. on average four families attended each group-based session). In the standard care control group five of the families did not attend any of the weekly ongoing support sessions and two families attended two sessions (i.e. two out of six sessions) (33.3%) throughout the six week intervention period.

#### *4.5.3 Ethics Approval*

Adult participants joining the intervention were asked to sign informed consent a) for their family to participate in the intervention and b) for their family's data to be used for the research (see Appendix E). Children over the age of eight years old were asked to provide written assent for the use of their own data (see Appendix E). Ethics approval was obtained from Liverpool Paediatric Research Ethics Committee (July, 2009) and Sheffield Hallam University Ethics Committee (May 2009) (see Appendix F).

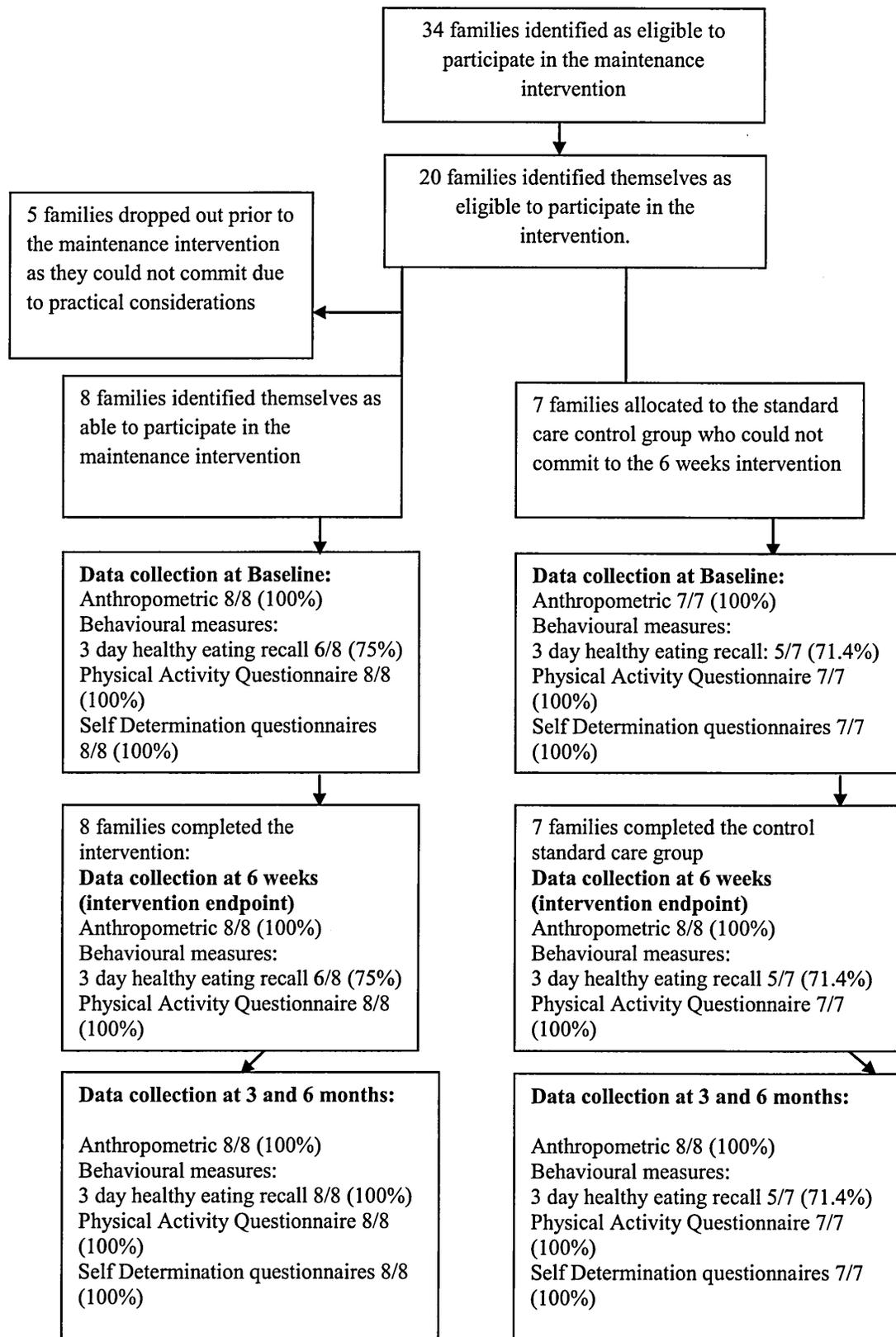


Figure 4.1 Flowchart of participants through the study

#### **4.5.4 Maintenance Intervention Content**

##### **4.5.4.1 General Format of the Maintenance Intervention**

The maintenance intervention ran over a six week period and incorporated six intervention sessions (one session per week) composed of two individual home-based sessions and four group-based sessions. Each session aimed to provide an autonomy supportive climate for PA and healthy eating and intervention strategies were designed to target either improvement in autonomous motivation and/or perceived competence to maintain PA and healthy eating independently. The two individual home-based sessions for children incorporated MI as a strategy to promote autonomous motivation and perceived competence for PA and healthy eating. The cognitive behavioural strategies employed in the individual sessions aimed at addressing barriers to the maintenance of behaviour changes specific to each child and their family context (see Section 4.5.4.2).

The four group-based sessions incorporated cognitive behavioural strategies (e.g. action plans, self directed goals, self-monitoring & setting action plans) aimed at promoting either perceived competence, or autonomous motivation for PA and healthy eating (see Section 4.5.6.3). Table 4.1 details the session type (i.e. group or individual based), the session aims; the intervention strategies employed and the targetted SDT component that each session was focussed on. A session plan was used to ensure the researcher delivered each session consistently (see Appendix G). Participants in the maintenance intervention group also had access to the weekly ongoing PA sessions (one hour weekly PA sessions offered to GOALs participants upon completion of the core programme) that were held at the same venue as the group-based sessions (i.e. the Belve community centre). Since the aim of this study was to pilot an intervention underpinned by SDT and stakeholders' views, the brief length of the intervention was determined by pragmatic reasons to allow key sessions to be piloted and evaluated (i.e. acceptability of the sessions) and was not intended as a blueprint for replication (Knight, 2001).

**Table 4.1** Content of the maintenance intervention sessions

<b>Session Type</b>	<b>Session Topic</b>	<b>Targeted SDT concept</b>	<b>Session aim(s)</b>	<b>Duration</b>
1. Group-based	Applying goal-setting and monitoring independently in their home environment (without professional support)	Perceived competence	Encourage children to set their own goals. Encourage children to plan their actions and monitor their progress using action plans (i.e. wall charts.) Encourage parents to support children's health behaviour changes including modifying the home environment to support a healthy lifestyle.	90 minutes
2. Individual	Setting individual healthy lifestyle action plan	Perceived competence  Autonomy supportive home environment	Using goal-setting/self-monitoring skills (developed in GOALS) to create individual healthy lifestyle action plan with support of parent (family). Use the spirit of MI to support children's autonomy for PA and healthy eating i.e. open ended questions; positive affirmations; reflective listening and providing summaries (OARS) Use of motivational interviewing techniques to promote autonomy in the participant and encourage them to make decisions about their health behaviours and how they can maintain PA and healthy eating in the long-term. Encouraging parents and children to create a supportive home environment for PA and healthy eating.	90 minutes
3. Group-based	Group problem solving session	Autonomy support	Encourage families to identify barriers in their home environment and help them come up with solutions to overcome these barriers. Encourage the group to help each other solve their problems (peer support). Enhancing families peer support network to provide a larger support network supportive of autonomous motivation.	90 minutes
4. Group-based	Self regulation and awareness	Self regulated/ autonomous motivation  Perceived competence	Encourage children to identify ways to keep up their health behaviours. Identify ways to cope with lapses. Identify strategies to stay on track using group to help each other. Create plans to help maintain what they feel are their key changes they need to keep up.	90 minutes

Session Type	Session Topic	Targeted SDT concept	Session aim(s)	Duration
5. Group-based	Decision making and choice making session	Self regulated/autonomous motivation	To facilitate families in making healthy choices and decisions that will support their attempts to maintain/adhere to healthy lifestyles.	90 minutes
6. Individual	Overcoming barriers and enhancing higher quality autonomous motivation	Self regulated/ autonomous motivation Autonomy supportive home environment	Helping families to modify their environment to support healthy lifestyles, tackle perceived barriers trying to solve problems and emphasise parent's role as healthy role models. Use the spirit of MI to support children's autonomy for PA and healthy eating i.e. open ended questions; positive affirmations; reflective listening and providing summaries. Highlight the families' role to enhance autonomy supportive atmosphere at home and promote autonomous motivation.	90 minutes

#### *4.5.4.2 Description of Individual Home-based Sessions*

In recognition of children and parents' perceptions of their difficulties in transferring and maintaining health behaviour change from the treatment setting into their home environment (see Chapter 3), home-based sessions were employed. This provided the opportunity to work with the child at an individual level and identify more specific family needs and problems that they felt would inhibit their ability to maintain health behaviour changes. One individual home-based session was at the beginning (week one) and one session was at the end (week six) of the six week intervention and sessions were arranged at a time convenient for each family. Table 4.1 details the specific focus of each home-based session. To ensure the safety of the researcher and participants a risk assessment was carried out and is provided in the appendix (see Appendix H).

An MI approach was employed to create an autonomy supportive treatment climate and facilitate families to make their home context supportive of health behaviour changes (e.g. removing unhealthy snacks from the home environment). Miller and Rollnick (2002) emphasise that it is important to see MI as an interpersonal style and that the spirit of MI is adhered to rather than proposing a set of techniques you must deliver. The researcher aimed to deliver the individual sessions in the spirit of MI to create a treatment context supportive of autonomy. Four communication components that engendered the spirit of MI include asking open end questions, using affirmations, reflective listening and providing summary statements (OARS). Then underlying these four components is the need to express empathy to ensure the child does not feel like they are being judged and feels open to express what their concerns are regarding making and sustaining PA, healthy eating and weight related outcomes. In keeping with the spirit of MI, the researcher incorporated these strategies consistently throughout the individual sessions. Table 4.2 summarises the key features of MI that were employed to promote an autonomy supportive treatment environment and satisfy the three needs of SDT (competency, autonomy & relatedness). Gently reflecting positive change to support children's autonomy and affirming prior successes of changing and/or maintaining behaviour changes to enhance children's perceived competence were particularly important to encourage the maintenance of behavioural and weight related changes (Levy & Knight, 2008). Details of the researcher's training, ongoing

supervision and how their competence in MI was assessed are provided in section 4.5.5.4

#### *4.5.4.3 Description of the Group-based Sessions*

The four group-based sessions were held in a community centre in Liverpool where the standard GOALS intervention was held and lasted approximately 90 minutes each. Sessions aimed to incorporate cognitive behavioural strategies to help families' identify and overcome barriers to maintaining PA, healthy eating and weight related changes, and encourage families to use the group setting to come up with solutions together to overcome common barriers to the maintenance of behavioural changes and weight reductions. Each session incorporated cognitive behavioural strategies designed to target a specific construct of SDT (see Table 4.3). Parallels can be drawn between a number of the cognitive behavioural strategies employed here and those described in the taxonomy of behaviour change techniques proposed by Abraham and Michie (2008; Michie et al., 2011). Table 4.3 identifies the cognitive behavioural strategies employed in the maintenance intervention, the definition according to Abraham and Michie's taxonomy (2008), and a summary of how each strategy was employed within the intervention. Cognitive behavioural strategies were delivered in line with the definition provided in the taxonomy (Abraham & Michie, 2008).

Session plans were used to ensure the proposed session components were delivered consistently (see Appendix F). The researcher's role in delivering sessions was to use the proposed cognitive behavioural strategies to work towards helping participants establish more autonomous motivations and greater competence in their ability to maintain PA and healthy eating behaviours independent of the treatment intervention, help build the rapport between the group members and help families to establish support networks. Cognitive behavioural strategies that were used included personal goal-setting, goal attainment skills, problem solving skills, action plans and self-monitoring given that these skills have shown promise in SDT based adult weight loss interventions (Williams et al., 1996), childhood obesity treatment interventions (Braet et al., 2004; Vignolo et al., 2008) and interventions designed to improve children and adolescent's self determination and thus academic performance in the education setting (Palmer & Wehmeyer, 2003) (see Table 4.3).

**Table 4.2** Features of MI used

<b>Features of MI</b>
Minimisation of controls i.e. working alongside children to make their own decisions regarding PA and healthy eating so they feel in control.
Agenda setting- encourage participant to set the focus of the sessions
Direction- The deliverer encourages the direction of the session to be determined by the participant
Providing meaningful rationale for the maintenance of behaviour change/weight reduction
Offering choice
Encouraging individuals to initiate actions for their own reasons and in line with their personal goals and values
Active listening
Expressing empathy
Develop discrepancy (i.e. between their health/weight related goals and their current health behaviours)
Roll with resistance (i.e. do not confront their resistance to making health behavior changes, work with this until they are ready to make the changes )
Support self efficacy (i.e. positive reinforcement of positive health behavior changes)
Honour and respect clients autonomy
Developing clear expectations
Encouraging competence and using positive feedback
Explaining behaviour outcome contingencies
Involvement, which concerns understanding other peoples perspectives
Providing consistent non-judgemental positive regard
Demonstrating genuine concern for an individual's well being

**Table 4.3** Behavioural strategies employed in the maintenance intervention

Behavioural Strategy	Description of behavioural strategy and how it was used to encourage the maintenance of PA and healthy eating	Justification for the use of this behavioural strategy	Technique and definition (as defined in the Taxonomy of behaviour change techniques (Abraham & Michie, 2008; Michie et al., 2011))
<b>Problem solving skills</b>	Helping children and families to develop solutions to overcome the problems and barriers they have in relation to maintaining PA and healthy eating.	MCTIs incorporating problem solving have proven to be effective in up to five year follow-ups (Epstein et al., 1990; Vignolo et al. 2008).	<b>Technique:</b> Prompt barrier identification/problem solving <b>Definition:</b> Identify barriers to performing a behaviour and plan ways of overcoming them.
<b>Creating action plans</b>	Helping children to develop a set plan to organise their PA and healthy eating to try and make it part of their daily routine.	SDT based interventions provide support for the use of action plans to maintain behaviour changes (e.g. Palmer & Wehmeyer, 2003; Williams et al., 1996).	<b>Technique:</b> Action Planning <b>Definition:</b> Interventions describe details of how, when and where to act e.g. a specific exercise prescription.
<b>Developing independent choice and decision making skills</b>	Encourage children to make their own healthy choices regarding PA and healthy eating. Increase children's confidence in their own ability to make healthy choices.	MCTIs incorporating decision and choice making skills in children have proven to be effective in up to a five year follow-up (Vignolo et al. 2008).	Not included in the taxonomy.
<b>Developing self directed goals</b>	Helping children to develop their own goals regarding PA and healthy eating.	MCTIs incorporating goal-setting strategies have been associated with sustainable outcomes (Braet et al., 2004; Vignolo et al., 2008). Evidence from SDT based interventions in the child education setting (Palmer & Wehmeyer, 2003) and adult behaviour change context (Williams et al., 1996) support the use of self directed goals as a strategy to promote behaviour change maintenance.	<b>Technique:</b> Prompt specific goal-setting <b>Definition:</b> Involves detailed planning of what a person will do i.e. specifying frequency, intensity, or duration, who with, how, where and when.
<b>Self regulation skills</b>	Encourage children to take charge of their own health behaviour changes and weight reductions. Children were given wall planner to monitor their PA and healthy eating.	Evidence from the adult weight management context suggest that individuals who can self regulate (i.e. take charge of their own behaviours) are more likely to maintain them in the long-term (Wing et al., 2006).	<b>Technique:</b> Prompt self-monitoring of behaviours <b>Definition:</b> The person is asked to keep a record of the specified behaviour.

Behavioural Strategy	Description of behavioural strategy and how it was used to encourage the maintenance of PA and healthy eating	Justification for the use of this behavioural strategy	Technique and definition (as defined in the Taxonomy of behaviour change techniques (Abraham & Michie, 2008; Michie et al., 2011))
<b>Developing peer support networks</b>	Encourage children and parents to use the support of other parents and children in the group.	Evidence in the adult and child behaviour change contexts have supported the use of peer support networks to promote maintained behaviour change and weight reductions (e.g. Perri et al., 2001; Vignolo et al., 2008; Wing et al., 2006)	<b>Technique:</b> Plan social support <b>Definition:</b> Prompting consideration of how others could change their behaviour in order to help the child change their behaviours e.g. buddy system.
<b>Self-monitoring</b>	Each child had a wall planner to plan their week including their PA and healthy eating goals and could monitor their PA and healthy eating behaviours on the wall chart.	Evidence from the child obesity treatment context supports the use of self monitoring to improve the maintenance of behavioural changes and weight reductions (e.g. Braet and Van Winckel, 2001; Epstein et al., 1994; Savoye et al., 2006; Vignolo et al., 2008). Evidence from the adult weight management context concur with these findings (Wing et al., 2006)	<b>Technique:</b> Prompt self monitoring of behaviours <b>Definition:</b> The person is asked to keep a record of the specified behaviour.
<b>Stimulus control</b>	Sessions within the home environment offered the opportunity for children to identify stimuli(s) in the home environment which where unsupportive of PA and healthy eating and help families to directly address these issues.	MCTIs incorporating stimulus control strategies have been associated with sustainable outcomes (Braet & Van Winckel, 2001; Epstein et al., 1994; Vignolo et al., 2008).	<b>Technique:</b> Teach to use prompt or cues <b>Definition:</b> Teach the person to identify environmental cues that can be used as reminders to perform a certain behaviour e.g. times of day or elements of the context.
<b>Parental role modelling</b>	Parents will be encouraged to become healthier themselves i.e. being physically active and eating healthy diet and providing a home context that is supportive of this.	Evidence from MCTIs targeting parental behaviour change has been associated with sustained behavioural and weight related outcomes (Golan & Crow, 2004).	<b>Technique:</b> Prompt identification as a role model. <b>Definition:</b> Indicate how a person might be a role model or provide an opportunity for the person to set a good example.
<b>Motivational Interviewing</b>	Children and parents need to recognise for themselves the value of behaviour change and the need to take charge and motivate themselves.	Evidence from the adult weight maintenance context support the use of MI to promote sustained behavioural changes and weight related outcomes in up to an 18 month follow-up (West et al., 2010)	<b>Technique:</b> Motivational Interviewing <b>Definition:</b> Promote the person to provide self motivating statements and evaluations of their own behaviour and minimise resistance.

#### *4.5.4.4 Standard Care Control group*

Those who agreed to participate in the standard care control group had access to a weekly group-based session composed of a PA session delivered by a PA instructor and a baking/cookery session involving cooking healthy recipes delivered by a nutritionist. No further behavioural support (i.e. goal-setting) was provided. Participants were encouraged to attend the ongoing support sessions yet attendance at the sessions was optional and was monitored throughout the maintenance intervention period.

#### *4.5.5 Outcome Measures*

##### *4.5.5.1 Primary Outcome Measure: Anthropometry*

###### *4.5.5.1.1 Body Mass Index (BMI) and BMI SDS*

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. Height and weight were converted to BMI using the formula weight (kg)/height (m<sup>2</sup>). Children's measures were then converted to BMI Standard Deviation Scores (BMI SDS) based on the 1990 Growth Reference data (Cole et al., 1995), as recommended by the National Obesity Observatory Standard Evaluation Framework (NOO, 2009). A BMI SDS (also referred to as BMI z-score) represents how many units of the standard deviation a child's BMI is from the mean for their age and sex, and thus accounts for changes in age from baseline.

##### *4.5.5.2 Secondary Outcome Measures: Behavioural Measures*

Questionnaires were compiled into booklet form (Appendix I) to assess behavioural measures and SDT related measures. The vocabulary used and the design and layout of the questionnaire was carefully considered to try and ensure all participants understood the questions and reduce the risk of errors in participants' responses. Adaptations made included replacing 'exercise' with 'physical activity' as this was familiar to the children as it had been adopted throughout the GOALS intervention. Also in the HCCQ 'health practitioner' was replaced with 'GOALS deliverer' to ensure children understood the questions referred to the researcher delivering the maintenance intervention. All participants received verbal and visual instruction regarding completion of the questionnaire booklet. The researcher was

present while all participants filled in their questionnaire. Participants were told to ask the researcher if they had any queries during the completion of the questionnaire.

#### *4.5.5.2.1 Physical Activity*

PA was assessed using the self-report Physical Activity Questionnaire for Children (PAQ-C; Kowalski, Crocker & Faulkner, 1997). The PAQ-C is a seven-day recall instrument developed to assess general levels of PA during the school year, based on nine items. These nine items relate to i) frequency of participation in specific spare time activities; ii) activity level in Physical Education (PE); iii) activity level at break-time; iv) activity level at lunchtime; v) frequency of participation in PA right after school; vi) frequency of participation in PA in the evening; vii) frequency of participation in PA at the weekend; viii) activity level during free time; and ix) level of activity on each day of the previous week. A summary PA score is derived from the nine items, each scored on a five-point Likert scale where a score of one indicates little or no PA and a score of five indicates very high levels of PA. The PAQ-C has previously demonstrated acceptable validity and reliability in an early adolescent population (Welk & Eklund, 2005).

#### *4.5.5.2.2 Nutritional Assessment*

All participants were instructed on how to complete a three day dietary recall and had completed three day dietary recalls as part of the standard GOALS intervention. Participant's food diaries from the initial intervention period were checked to ensure understanding and accuracy. The data from the three day dietary recall was checked for omissions (for example, what type of milk was used on the participants cereal), and errors (for example incorrect portion sizes). This approach has been validated by Crawford Obarzanek, Morrison & Sabry, (1994) for children and adolescents. All children completed the three day dietary recall at baseline, at six weeks (i.e. endpoint of intervention), three month and six month follow-up.

#### 4.5.5.3 Self Determination Theory based instruments

##### 4.5.5.3.1 *The Treatment Self-Regulation Questionnaire (TSRQ; Ryan & Connell 1989; Williams et al., 2002a; 2002b)*

The Treatment Self Regulation Questionnaire (Ryan and Connell 1989; Williams et al., 2002) was used to assess self-determined motivation for healthy eating and PA behaviour. The TSRQ has 15 items. The participant is given the stem: “the reason I would eat a healthy diet is...” (to assess autonomous regulation for healthy eating behaviours) and ‘the reason I would be physically active is....’ (to assess autonomous regulation for PA), followed by several reasons that vary in the extent to which they represent autonomous regulation. Examples of more controlled reasons are: “I want others to see that I can eat healthily” and “I feel like a failure if I don’t”. Examples of more autonomous reasons are: “It’s important to me personally to succeed in eating a healthy diet” and “I believe it’s the best way to help myself.” Each reason was rated on a 7-point scale ranging from not true at all to very true. Typically, the responses on the autonomous items are summed and divided by the number of items that assessed that aspect of motivation to form the autonomous regulation score for the target behaviour. The same approach is used to calculate the controlled regulation score (range 6-42) and the amotivation score (range 3-7). These three subscale scores are used separately to score each aspect of motivation (i.e. autonomous motivation, controlled motivation & amotivation), for healthy eating & PA.

The researcher considered other measures of self determination for PA and healthy eating including the Behavioural Regulation for Exercise Questionnaire (BREQ-version 1; Mullan, Markland & Ingledew, 1997), the BREQ-version 2 (Markland & Tobin, 2004), the Exercise Motivation Scale (Li, 1999) and the Perceived Locus of Causality Scale (Goudas, Biddle & Fox, 1994). However, as the intervention was targeting autonomous motivation for the maintenance of PA and healthy eating behaviours in children, the Treatment Self Regulation Questionnaire was deemed most appropriate. Data here from the TSRQ demonstrated high internal reliability for measures of autonomous motivation (at baseline,  $\alpha = 0.89$  & at follow-up  $\alpha = 0.95$ ), controlled motivation (at baseline,  $\alpha = 0.84$  & at follow-up  $\alpha = 0.75$ ), and amotivation (at baseline,  $\alpha = 0.82$  & at follow-up  $\alpha = 0.80$ ) concerning PA. Data for the TSRQ concerning healthy eating also demonstrated high internal reliability for measures of

autonomous motivation (at baseline,  $\alpha = 0.95$  & at follow-up  $\alpha = 0.90$ ), controlled motivation (at baseline,  $\alpha = 0.86$  & at follow-up  $\alpha = 0.82$ ), and amotivation (at baseline,  $\alpha = 0.88$  & at follow-up  $\alpha = 0.83$ ).

#### 4.5.5.3.2 *The Health Care Climate Questionnaire (HCCQ; Williams et al., 1996)*

The HCCQ assessed participants' perceived need for support, measuring perceptions of the degree to which their care provider(s) was autonomy supportive versus controlling. The six item short form of the questionnaire was used and the scale included items reflecting autonomy support (e.g., 'I feel that the GOALS deliverer has provided me choices and options'), involvement (e.g., 'The GOALS deliverer handles peoples' emotions very well'), and structure (e.g., 'the GOALS deliverer has made sure I really understand my condition and what I need to do'), three dimensions considered essential for an optimally supportive health-care context. Answers to the six items for healthy eating and then PA were rated on a seven point Likert scale ranging from one = strongly disagree to seven = strongly agree and a total score was calculated (range 1-42).

The perceived autonomy support scale for exercise settings (PASSES) has commonly been adopted as a valid and reliable measure of perceived autonomy support in exercise settings with young people (e.g. Hagger et al., 2007). However data for the HCCQ demonstrated high internal reliabilities (at baseline,  $\alpha = 0.82$  & at follow-up  $\alpha = 0.92$ ), concerning PA and similarly high internal reliabilities for healthy eating (at baseline,  $\alpha = 0.71$  & at follow-up  $\alpha = 0.81$ ). These values are equivocal to similar studies employing the HCCQ in adult samples (e.g. Williams et al., 1996) and consistent with those using PASSES (e.g. Hagger et al., 2007). The HCCQ was only completed by participants at the baseline and intervention endpoint (six weeks) as the questions relate specifically to the climate created by the researcher during the intervention period.

#### 4.5.5.3.3 *The Perceived Competence Scale (PCS; Williams et al., 1996; Williams, Freedman & Deci, 1998)*

PCS is a short, 4-item questionnaire to assess an individual's perceived competence to maintain healthy eating and PA behaviours. Within the questionnaire, four items assess perceived competence for maintained PA and four items assess perceived competence for maintaining healthy eating. The responses to the four items

ranged on a seven point Likert scale from one (not at all true) to seven (very true). An individual's score is the average of the four responses therefore a low score represents a participant low in confidence in their ability to maintain a healthy diet or PA behaviours and a high score represents a participant high in confidence. Data for the PCS demonstrated high internal reliabilities for maintaining PA (at baseline,  $\alpha = 0.93$  & at follow-up  $\alpha = 0.98$ ), and maintaining healthy eating (at baseline,  $\alpha = 0.81$  & at follow-up  $\alpha = 0.95$ ). These values are similar to studies in adult health behaviour change contexts such as smoking cessation (Williams et al., 1996; Williams et al., 1998; Williams et al., 2009).

#### *4.5.5.4 Assessment of Treatment Fidelity*

To ensure the fidelity of the treatment, in line with the guidance provided by the Behaviour Change Consortium a TF plan was drawn up to assess the five aspects of TF (Bellg et al., 2004). Table 4.4 provides a TF plan with a brief description of each aspect of TF and how it was addressed.

##### *4.5.5.4.1 Researcher's Training and Assessment of Competence to deliver MI*

The researcher attended the introductory workshop and the intermediate MI training course, including ongoing clinical supervision. Ongoing supervision included completion of an audio recorded session (i.e. an individual, home-based maintenance intervention session where consent had been provided) which was coded and evaluated by a member of the Motivational Interviewing Network of Trainers (MINT) in order to provide corrective feedback. Feedback was provided with regards to the global dimensions of MI (i.e. collaboration, evocation, autonomy/support, direction & empathy), behavioural counts (i.e. MI adherent vs. MI non-adherent), use of questions (i.e. open ended vs. closed ended) and their use of reflections (simple vs. complex). Corrective feedback regarding these dimensions of MI was used to ensure the fidelity and to contribute to the researcher's ongoing training and development in MI. The researcher delivered the two individual home-based sessions in line with session plans to try and ensure consistency across the individual sessions while still allowing flexibility to respond to individual needs (Miller & Rollnick, 2002).

**Table 4.4** Treatment fidelity plan for the maintenance intervention

Type of Fidelity	Recommendations to Ensure Fidelity	How was Fidelity Assessed in this study?
<b>Fidelity to Theory</b> (did the intervention include the relevant “active ingredients” based on theory?)	Ensure equivalent dose of treatment across participants in the intervention condition	Documentation of session plans. Each session plan identified what facets of SDT the session targeted Evidence was provided to ensure there was no difference in the number, frequency, length of contact.
<b>Provider Training</b> (were the treatment providers capable of delivering the intervention as designed?)	Initial training of the interventionist Test of Provider skills Ongoing evaluation of interventionist	The researcher attended the introductory MI training course and the two day training course which incorporated ongoing supervision and corrective feedback (i.e. a MINT member coded an audio recorded session). Participant evaluation forms were used to document sessions.
<b>Treatment Implementation</b> (did the interventionist actually implement the intervention as it was designed?)	Standardised intervention protocol Provider monitoring (e.g. audio, video, in-person) Participant rating of treatments’ credibility Minimise treatment contamination	Treatment session plans and standardised material (e.g. participant action plans). Behavioural strategies delivered in line with definitions provided by the taxonomy of behaviour change techniques (Abraham & Michie, 2008). Participant evaluation sheets (to allow participants to communicate their views towards treatment) Audio recorded session independently coded by MINT member as part of ongoing supervision and in order to provide corrective feedback to ensure fidelity of MI.
<b>Treatment Receipt</b> (did the participant receive the relevant “active ingredients” as intended?)	Check of participants understanding Measure of change in participants knowledge Review of homework/weekly task completion at the start of each session Self report or diary to measure use of new skills	Results from participant measures were used to assess participant satisfaction and acceptance of the maintenance intervention sessions (i.e. review of participants’ action plans each week & participant evaluation forms to assess satisfaction with the maintenance intervention).
<b>Treatment Enactment</b> (did participants put new skills or behaviours into practice? Were all necessary steps completed?)	Success in implementing new behaviours Level of skill in performing new behaviours	Children’s action plans provided self report guides of their use of behavioural skills Participant evaluation forms to reveal where participants have continued to use the behavioural skills they used during the maintenance intervention.

Adapted from Bellg et al. (2004)

#### 4.5.5.5 Statistical Analysis

Cronbach's alpha coefficients were calculated for each of the subscales of the SDT measures employed to ensure reliability given that the SDT measures employed had not been used with pediatric samples. Anthropometric data (i.e. BMI & BMI SDS), behavioural and SDT variables were compared between the maintenance intervention group and standard care control group at each assessment point using repeated measures analysis of covariance (repeated measures ANCOVAs) with baseline values as the covariate. Data are presented as mean and standard deviation (SD) scores at each time point and as between group differences in change scores between time points (mean difference  $\Delta$ ; adjusted for baseline scores). Statistical significance was set at  $p < 0.05$  throughout, with 95% confidence intervals (CI) used to express the uncertainty in the estimates. Pearson's correlation coefficients ( $r$ ) were calculated to measure the strength of association between anthropometric, behavioural and SDT variables. Healthy eating analysis included analysis of energy intake (kcalories) and percentage macronutrient intake (i.e. fat, carbohydrate & protein) using microdiet (University of Salford, 1993).

#### 4.5.5.6 Qualitative Data Analysis

To assess aspects of TF, participant evaluation forms were analysed using qualitative content analysis (Graneheim & Lundman, 2004; Krippendorf, 2004). Qualitative content analysis has been defined as,

*“A research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns”* (Hsieh & Shannon, 2005, p.1278)

Krippendorf (2004) suggests that a text never has one meaning but rather a probable meaning from a particular perspective. Therefore evaluation forms in this study reflect children and parents' perspectives towards each session of the maintenance intervention and their overall views of the maintenance intervention. The participant evaluation forms were read through by the researcher (myself) and units of analysis were identified. The evaluations were read through again and the meaning units were identified and coded to allow grouping of similar themes. This condensing of the text allows the removal of unimportant words and making the text shorter so that the core meaning is preserved (Krippendorf, 2004). The condensed text was then arranged into core categories with regards to participants' views towards the maintenance intervention.

The codes were arranged into themes and sub themes and then validated in the original text (Hsieh & Shannon, 2005). To achieve trustworthiness, member checks were completed whereby the participants were consulted and asked whether the key themes and sub themes identified from their session evaluations accurately reflected their perceptions. Results for the qualitative data analysis are presented in section 4.6.6.

## **4.6 Results**

### **4.6.1 Participant Demographics**

The baseline participant characteristics are identified in Table 4.5. A total of 15 children took part in the study. Children were aged between 9-13 years old (mean age = 12.2 years old; SD=2.2). The mean age of children was 11.5 years old (SD=1.5) in the maintenance intervention group (n=8) and 12.2 years old (SD= 2.2) in the standard care control group (n=7). The maintenance intervention group was composed of five females and three males and the standard care control group was composed of four females and three males. The majority of the sample was White and British (n= 13, 86.7%) with one family of White and Chinese ethnicity (n=1, 6.7%) and one family of White and Asian ethnicity (n= 1, 6.7%). IMD (IMD 2010) rank scores indicated that over half of the participants were living in rank one (most deprived) (n= 9, 60%), three families were living in rank 6 (n= 3, 20%), one family was living in rank 2 (n= 1, 6.7%), one family was living in rank 5 (n=1, 6.7%) and one family was living in rank 7 (n= 1, 6.7%).

### **4.6.2 Participant Baseline Outcome Measures**

Baseline measures of anthropometric, behavioural and SDT variables are presented in Table 4.5.

#### **4.6.2.1 Baseline Anthropometric Measures**

No significant differences were recorded between groups for BMI and BMI SDS scores at baseline. Baseline scores for BMI revealed that all participants recorded BMI scores above the 98<sup>th</sup> percentile used to define obesity (Cole et al., 1995) (see Table 4.5).

#### *4.6.2.2 Baseline Behavioural Measures*

No significant differences were revealed between groups in baseline PA scores, mean energy intake and mean percentage energy intake from fat, carbohydrate and protein (see Table 4.5).

#### *4.6.2.3 Baseline SDT Measures*

No significant differences were revealed between groups in baseline data for autonomous motivation, controlled motivation, amotivation, perceived competence and perceptions of an autonomy supportive treatment climate for PA and healthy eating behaviours (see Table 4.5).

**Table 4.5** Baseline Demographics of the study sample according to group

<b>Characteristic</b>	<b>Intervention Group (n= 8)</b>	<b>Control Group (n=7)</b>	<b>Overall sample (n= 15)</b>
Age Mean (SD)	11.5 (1.5)	12.2 (0.9)	
Gender			
Male	3 (37.5%)	3 (42.9%)	6 (40%)
Female	5 (62.5%)	4 (57.1%)	9 (60%)
Ethnicity:			
White British	7 (87.5%)	6 (85.7%)	13 (86.7%)
White Asian	1 (12.5%)		1 (6.7%)
White Chinese		1 (14.3%)	1 (6.7%)
Socioeconomic status:			
Rank 1 (most deprived)	5 (62.5%)	4 (57.1%)	9 (60%)
Rank 2		1 (14.3%)	1 (6.7%)
Rank 5		1 (14.3%)	1 (6.7%)
Rank 6	2 (25%)		3 (20%)
Rank 7	1 (12.5%)	1 (14.3%)	1 (6.7%)
<b>Baseline Anthropometric Data</b>			
Height (cm) Mean (SD)	144.7 (5.8)	148.7 (7.4)	146.5(6.7)
Weight Mean (SD)	58.6 (8.1)	64.1 (8.9)	61.2(8.0)
Body Mass Index Mean (SD)	27.9 (2.6)	28.9 (3.7)	28.4(3.1)
BMI SDS Mean (SD)	2.7(0.4)	2.7(0.6)	2.7(0.5)
<b>Baseline Healthy eating/ Physical Activity (PA) Variables</b>			
Physical Activity Score Mean (SD)	2.9 (1.0)	2.4 (0.4)	2.7 (0.8)
Energy Intake (Kcalories)	1853(367)	1979 (204)	1916 (285)
% energy intake fat	29.4	35.7	32.6
% energy intake carbohydrate	54.4	49.7	52.1
% energy intake protein	16.3	14.6	15.5

Characteristic	Intervention Group (n= 8)	Control Group (n=7)	Overall sample (n= 15)
	Baseline Self Determination Variables		
Autonomous Motivation for diet Mean (SD)	4.5 (1.5)	2.9(1.4)	3.7(1.6)
Controlled Motivation for diet Mean (SD)	3.8(1.1)	4.0(1.5)	3.9(1.3)
Amotivation for diet Mean (SD)	2.4 (0.5)	4.9(1.0)	3.6(1.5)
Autonomous Motivation for PA Mean (SD)	4.4 (1.2)	2.9(1.1)	3.7 (1.3)
Controlled Motivation for PA Mean (SD)	4.0 (0.9)	3.8(1.2)	3.8 (1.0)
Amotivation for PA Mean (SD)	2.2 (0.3)	4.5(1.4)	3.3 (1.5)
Perceived Competence for Diet Mean (SD)	2.9 (1.2)	2.7(0.5)	2.8(0.9)
Perceived Competence for PA Mean (SD)	2.9 (1.5)	3.5(0.9)	3.2 (1.2)
HCCQ (Diet) Mean (SD)	4.4 (0.6)	4.7(0.5)	4.6 (0.6)
HCCQ (PA) Mean (SD)	4.8 (0.8)	4.8(0.4)	4.8 (0.6)

### 4.6.3 Anthropometric Outcomes (BMI & BMI SDS)

Table 4.6 displays adjusted for baseline mean scores for the maintenance intervention group and standard care control group, group mean difference and results of repeated measures ANCOVAs for weight, height, BMI and BMI SDS across all time points. Repeated measures ANCOVAs adjusting for baseline mean score revealed no significant differences between groups for BMI at the end of the intervention (adjusted mean difference  $\Delta = -0.029$ ;  $p=0.861$ ) and at three month follow-up (adjusted mean difference  $\Delta = -0.328$ ;  $p=0.152$ ). However, between group difference for BMI was significant at the six month follow-up (adjusted mean difference  $\Delta = -0.603$ ;  $p=0.042$ ). Repeated measures ANCOVAs, adjusting for baseline mean score revealed no significant difference in BMI SDS at the end of the intervention (adjusted mean difference  $\Delta = -0.039$ ;  $p=0.299$ ) or at three month follow-up (adjusted mean difference  $\Delta = -0.087$ ;  $p=0.067$ ). However, differences for BMI SDS were significant at six month follow-up (adjusted mean difference  $\Delta = -0.125$ ;  $p=0.034$ ).

#### 4.6.3.1 Pearson's Correlation Coefficients

Pearson's correlation coefficients revealed that at the end of the intervention, BMI had a positive relationship with controlled motivation for PA ( $r = 0.731$ ,  $p < 0.05$ ) and perceptions of an autonomy supportive climate for PA behaviour ( $r = -0.711$ ,  $p < 0.05$ ) with BMI decreasing in line with decreases in controlled motivation for PA and perceptions of an autonomy supportive environment for PA in the maintenance intervention group. BMI SDS was not significantly correlated with any self determination or behavioural variables at the end of the intervention. In the control group, BMI at the end of the intervention was positively correlated with PA behaviour ( $r = -0.867$   $p < 0.05$ ). BMI SDS was also positively correlated with PA behaviour post intervention ( $r = -0.903$   $p < 0.01$ ).

At three months, Pearson's correlations revealed that BMI and BMI SDS were both inversely correlated with controlled motivation for healthy eating behaviours ( $r = 0.732$  &  $r = 0.815$   $p < 0.05$ ) respectively. However, in the control group BMI and BMI SDS were not correlated with any SDT variables or behavioural variables at three months. At six months, Pearson's correlations revealed that there was an inverse correlation between BMI and autonomous motivation for PA ( $r = -0.847$   $p < 0.01$ ) as BMI had decreased and autonomous motivation for PA had increased. There was also a

positive relationship between BMI and controlled motivation for PA ( $r= 0.859$   $p<0.01$ ) as both decreased at six months. BMI SDS was also positively correlated with controlled motivation for PA ( $r= 0.748$   $p<0.05$ ) and controlled motivation for healthy eating behaviours ( $r= 0.748$   $p<0.01$ ). In the control group, BMI and BMI SDS were positively correlated with PA behaviour ( $r= -0.816$   $p<0.05$ ) ( $r= -0.756$   $p<0.05$ ) respectively.

#### **4.6.4 Behavioural Outcomes**

Table 4.7 details the group mean differences and repeated measures ANCOVAs adjusted for baseline scores between the maintenance intervention and standard care control group. Repeated measures ANCOVAs adjusted for baseline scores revealed significant differences in PA scores between the maintenance intervention and control group at the end of the intervention (adjusted mean difference  $\Delta= 0.058$ ;  $p=0.026$ ), three month follow-up (adjusted mean difference  $\Delta= 0.282$ ;  $p=0.047$ ) and six month follow-up (adjusted mean difference  $\Delta= 0.378$ ;  $p=0.017$ ).

Repeated measures ANCOVAs adjusted for baseline scores revealed that there was a significant effect for the maintenance intervention over the control condition on energy intake at the end of the intervention (adjusted mean difference  $\Delta= -9.3$  kcal;  $p= 0.037$ ), at three month follow-up (adjusted mean difference  $\Delta= -43.2$ ;  $p<0.001$ ) and at the six month follow-up (adjusted mean difference  $\Delta= -329.1$ ;  $p<0.001$ ) respectively.

#### **4.6.5 SDT Related Outcomes**

##### **4.6.5.1 Autonomous and Controlled motivation outcomes**

Table 4.8 displays adjusted for baselines scores for the maintenance intervention and standard care control group, group mean difference and repeated measures ANCOVAs results for autonomous motivation, controlled motivation and amotivation for diet and PA. Repeated measures ANCOVAs revealed that the group\*time interaction on autonomous motivation for healthy eating was not significant at the end of the intervention (adjusted mean difference  $\Delta= 0.617$ ;  $p=0.091$ ), yet was significant at three month follow-up (adjusted mean difference  $\Delta= 0.668$ ;  $p=0.012$ ) and six month follow-up (adjusted mean difference  $\Delta= 0.658$ ;  $p=0.017$ ). Repeated measures ANCOVAs revealed that although autonomous motivation for PA behaviour was higher in the maintenance intervention group at all three time points, the between group

difference was not significant at the end of the intervention (adjusted mean difference  $\Delta = 0.413$ ;  $p = 0.110$ ), at three month follow-up (adjusted mean difference  $\Delta = 0.409$ ;  $p = 0.205$ ) and at the six month follow-up (adjusted mean difference  $\Delta = 0.613$ ;  $p = 0.082$ ).

Repeated measures ANCOVAs adjusted for baseline scores revealed that controlled motivation scores for healthy eating behaviours were lower in the maintenance intervention group than the standard care control group. These differences were not significant at the end of the intervention (adjusted mean difference  $\Delta = -0.484$ ;  $p = 0.091$ ), three month follow-up (adjusted mean difference  $\Delta = -0.408$ ;  $p = 0.097$ ) and six month follow-up (adjusted mean difference  $\Delta = -0.400$ ;  $p = 0.116$ ). Repeated measures ANCOVAs adjusted for baseline scores revealed that differences in PA behaviour, although higher in the maintenance intervention group than the standard care control group, these differences were not significant at the end of the intervention (adjusted mean difference  $\Delta = -0.169$ ;  $p = 0.393$ ), three month follow-up (adjusted mean difference  $\Delta = 0.409$ ;  $p = 0.339$ ) and six month follow-up (adjusted mean difference  $\Delta = -0.304$ ;  $p = 0.396$ ). Similarly, repeated measures ANCOVAs adjusted for baseline scores revealed that there were no significant difference in amotivation for healthy eating and PA behaviours (see Table 4.8).

#### 4.6.5.2 Perceived Competence Outcomes

Table 4.9 details group mean differences and results of repeated measures ANCOVAs adjusted for baseline scores for perceived competence to maintain PA and healthy eating behaviours between the maintenance intervention and standard care control group across all time points. Repeated measures ANCOVAs revealed that differences in perceived competence for healthy eating behaviour was significant at the end of the intervention (adjusted mean difference  $\Delta = 0.850$ ;  $p = 0.005$ ), three month follow-up (adjusted mean difference  $\Delta = 1.199$ ;  $p < 0.001$ ) and six month follow-up (adjusted mean difference  $\Delta = 1.285$ ;  $p < 0.001$ ). Repeated measures ANCOVAs adjusted for baseline scores revealed that the difference in perceived competence for PA behaviour was significant at the end of the intervention (adjusted mean difference  $\Delta = 1.004$ ;  $p = 0.004$ ), three month follow-up (adjusted mean difference  $\Delta = 1.468$ ;  $p < 0.001$ ) and six month follow-up (mean difference  $\Delta = 1.683$ ;  $p < 0.001$ ).

#### *4.6.5.3 Autonomy Support Outcomes*

Repeated measures ANCOVAs adjusted for baseline scores revealed that there was a significant difference in perceptions of an autonomy supportive treatment climate between the maintenance intervention and standard care control group at the end of the intervention (adjusted mean difference  $\Delta = 0.402$ ;  $p < 0.001$ ).

**Table 4.6** Weight related outcomes for each group across follow-ups

		<b>Height (cm)</b>	<b>Weight (kg)</b>	<b>BMI</b>	<b>BMI SDS</b>
Baseline	Control Mean (SD)	148.7(7.4)	64.1(8.4)	28.9(3.6)	2.7(0.6)
	Intervention Mean (SD)	144.7(5.8)	58.6(7.1)	27.9 (2.6)	2.7(0.4)
Endpoint	Control Mean (SD)	149.8(7.1)	65.1(8.3)	29 (3.4)	2.7(0.5)
	Intervention Mean (SD)	146.3(6.0)	60.0(8.0)	27.9(3.2)	2.6(0.5)
	Group mean difference in $\Delta^*$ (95%CI)	0.169(-0.628,0.967)	0.256(-1.241,1.753)	-0.029 (-0.524, 0.465)	-0.039 (-0.118, 0.039)
	<i>Adjusted P#</i> value	0.652	0.72	0.861	0.299
3 month post intervention	Control Mean (SD)	151.4(7.5)	67.8(9.4)	29.6(3.2)	2.8(0.5)
	Intervention Mean (SD)	147.2(6.3)	60.2(8.1)	27.8(3.1)	2.6(0.5)
	Group mean difference in $\Delta^*$ (95%CI)	0.072(-0.949)	-0.401(-2.357,1.555)	-0.328 (-1.068, 0.412)	-0.087 (-0.199,0.024)
	<i>Adjusted P†</i> value	0.772	0.264	0.152	0.067
6 month post intervention	Control Mean (SD)	152.5(7.4)	69.7(9.4)	29.9(3.2)	2.8(0.5)
	Intervention Mean (SD)	147.6(6.0)	60.1(7.7)	27.5(3.1)	2.6(0.5)
	Group mean difference in $\Delta^*$ (95%CI)	0.196(-1.340,0.949)	-1.281(-3.669,1.106)	-0.603(-1.516, 0.310)	-0.125(-0.262, 0.013)
	<i>Adjusted P‡</i> value	0.211	0.036	0.042	0.034

$\Delta$  (delta) from baseline in maintenance intervention group minus baseline in standard care control group. A negative score indicates a greater decrease in the maintenance intervention group and a positive score a greater increase.

# ANCOVA of endpoint score adjusting for baseline score, effect of group.

† ANCOVA of endpoint and three month follow-up scores adjusting for baseline score, effect of group.

‡ ANCOVA of end point and six month follow-up scores adjusting for baseline score, effect of group.

NOTE: since the 95% CI in the previous column is calculated on unadjusted data, the P-value, which is adjusted for baseline score, will not necessarily be consistent with the CI.

**Table 4.7** Behavioural outcomes for each group across follow-ups

		<b>Energy Intake</b>	<b>Fat (% kcal)</b>	<b>Carbohydrate (% kcal)</b>	<b>Protein (%kcal)</b>	<b>Physical Activity Score</b>
Baseline	Control Mean (SD)	1979(204)	35.7(4.9)	49.7(5.3)	14.6(2.3)	2.4(0.4)
	Intervention Mean (SD)	1853(367)	29.4(9)	54.4(8.1)	16.3(2.1)	2.9(1.0)
Endpoint	Control Mean (SD)	2161(304)	34.1(5.7)	51.7(3.5)	14.1(3.5)	2.4(0.2)
	Intervention Mean (SD)	1631(114)	21.6(7.1)	59.3(6.2)	19(2.5)	2.2(0.4)
	Group mean difference in $\Delta^*$ (95%CI)	-9.3(-149.188, 167.781)	-5.0(-8.685, 1.239)	3.2(0.174, 6.183)	2.8(0.947, 4.612)	0.1(-0.081, 0.196)
	<i>Adjusted P#</i> value	0.037	0.013	0.040	0.006	0.026
3 month post intervention	Control Mean (SD)	2131(262)	37.1(5.2)	47.2(6.1)	15.7(1.8)	2.2(0.4)
	Intervention Mean (SD)	1608(81)	21.6(3.1)	58.9(4.2)	18.3(2.9)	2.8(0.5)
	Group mean difference in $\Delta^*$ (95%CI)	-43.2(-163.026, 76.645)	-8.0(-11.498, -4.548)	5.5(2.924, 8.017)	2.5(0.845, 4.119)	0.3(0.049, 0.515)
	<i>Adjusted P†</i> value	<0.001	<0.001	0.030	0.017	0.047
6 month post intervention	Control Mean (SD)	2204(255)	36.6(4.6)	46.6(6.2)	15.4(3.5)	2.1(0.4)
	Intervention Mean (SD)	1571(81)	21.5(4)	60(4.1)	18.5(2.4)	2.9(0.5)
	Group mean difference in $\Delta^*$ (95%CI)	-329.1(-507.264, -276.999)	-9.7(-13.360, -6.066)	7.5(4.360, 10.687)	2.7 (0.726, 4.611)	0.378(0.104, 0.651)
	<i>Adjusted P‡</i> value	<0.001	<0.001	0.006	0.031	0.017

$\Delta$  (delta) from baseline in maintenance intervention group minus baseline in standard care control group. A negative score indicates a greater decrease in the maintenance intervention group and a positive score a greater increase.

# ANCOVA of endpoint score adjusting for baseline score, effect of group.

† ANCOVA of endpoint and three month follow-up scores adjusting for baseline score, effect of group.

‡ ANCOVA of end point and six month follow-up scores adjusting for baseline score, effect of group.

NOTE: since the 95% CI in the previous column is calculated on unadjusted data, the P-value, which is adjusted for baseline score, will not necessarily be consistent with the CI

**Table 4.8** TSRQ outcomes for each group across follow-ups

	Diet				Physical Activity			
	TSRQ Autonomous Motivation	TSRQ Controlled Motivation	TSRQ Amotivation	TSRQ Autonomous Motivation	TSRQ Controlled Motivation	TSRQ Amotivation	TSRQ Autonomous Motivation	TSRQ Controlled Motivation
Baseline	2.9(1.4)	4.0 (1.5)	4.9(1.0)	2.9(1.1)	3.8(1.2)	4.5(1.4)		
Mean (SD)								
Intervention	4.5(1.5)	3.8(1.1)	2.4(0.5)	4.4(1.2)	4.0(0.9)	2.2(0.3)		
Mean (SD)								
Control Mean (SD)	3.4(1.1)	4.3(1.1)	4.2(1.4)	3.4(1.4)	4.1(1.1)	4.6(1.3)		
Intervention Mean (SD)	5.3(0.6)	3.3(1.0)	2.5(0.8)	5.4(1.0)	3.9(0.7)	2.5(0.6)		
Group mean difference in $\Delta^*$ (95%CI)	0.617(0.208,1.025)	-0.484(-1.058,0.089)	0.510(-0.430,1.450)	0.413(-0.108,0.933)	-0.169(-0.585,0.247)	-0.110(-0.615,0.396)		
<i>Adjusted P† value</i>	0.091	0.091	0.260	0.110	0.393	0.645		
Control Mean (SD)	3.5(1.0)	3.9(1.0)	4.0(1.2)	3.6(1.1)	4.1(1.1)	4.2(1.0)		
Intervention Mean (SD)	5.0(0.8)	3.6(0.7)	2.8(0.6)	4.8(0.8)	3.7(0.8)	2.4(0.6)		
Group mean difference in $\Delta^*$ (95%CI)	0.668(0.125,1.211)	-0.408(-1.055,0.239)	0.398(-0.782,1.578)	0.409(-0.207,1.026)	-0.288(-0.879,0.304)	-0.335(-0.999,0.328)		
<i>Adjusted P† value</i>	0.012	0.097	0.395	0.205	0.339	0.341		
Control Mean (SD)	3.6(1.1)	3.8(1.0)	4.0(1.0)	3.7(1.1)	4.0(1.0)	4.1(0.9)		
Intervention Mean (SD)	4.9(0.7)	3.4(0.5)	2.5(0.5)	5.2(0.7)	3.7(0.6)	2.3(0.5)		
Group mean difference in $\Delta^*$ (95%CI)	0.658(0.049,1.267)	-0.400(-1.093,0.294)	0.343(-0.880,1.565)	0.613(-0.094,1.320)	-0.304(-0.959,0.351)	-0.465(-1.208,0.279)		
<i>Adjusted P† value</i>	0.017	0.116	0.424	0.082	0.396	0.254		

$\Delta$  (delta) from baseline in maintenance intervention group minus baseline in standard care control group. A negative score indicates a greater decrease in the maintenance intervention group and a positive score a greater increase.

# ANCOVA of endpoint score adjusting for baseline score, effect of group.

† ANCOVA of endpoint and three month follow-up scores adjusting for baseline score, effect of group.

‡ ANCOVA of endpoint and six month follow-up scores adjusting for baseline score, effect of group.

NOTE: since the 95% CI in the previous column is calculated on unadjusted data, the P-value, which is adjusted for baseline score, will not necessarily be consistent with the CI

**Table 4.9** PCS and HCCQ outcomes for each group across follow-ups

	Perceived Competence Diet	Perceived Competence Physical Activity	HCCQ Diet	HCCQ PA
Baseline	2.7(0.5)	3.5(0.9)	4.7(0.5)	4.8(0.4)
Mean (SD)				
Intervention	2.9(1.2)	2.9(0.5)	4.4(0.6)	4.8(0.8)
Mean (SD)				
Control Mean (SD)	2.6(0.9)	3.2(1.2)	4.7(0.3)	4.9(0.3)
Intervention Mean (SD)	4.3(1.1)	5.1(0.9)	5.5(0.6)	5.7(0.4)
Group mean difference in $\Delta^*$ (95%CI)	0.850(0.303,1.393)	1.004(0.395,1.613)	0.491(0.251,0.730)	0.402(0.173,0.631)
†				
Adjusted P‡ value	0.005	0.004	<0.001	0.002
3 month post intervention				
Control Mean (SD)	2.2(0.5)	2.3(0.8)		
Intervention Mean (SD)	4.2(0.8)	4.6(0.6)		
Group mean difference in $\Delta^*$ (95%CI)	1.199(0.668,1.730)	1.468(0.864,2.073)		
Adjusted P‡ value	0.001	0.001		
6 month post intervention				
Control Mean (SD)	2.3(0.5)	2.2(0.7)		
Intervention Mean (SD)	3.9(0.9)	4.4(0.7)		
Group mean difference in $\Delta^*$ (95%CI)	1.285(0.718,1.851)	1.683(1.069,2.298)		
Adjusted P‡ value	<0.001	<0.001		

$\Delta$  (delta) from baseline in maintenance intervention group minus baseline in standard care control group. A negative score indicates a greater decrease in the maintenance intervention group and a positive score a greater increase.

# ANCOVA of endpoint score adjusting for baseline score, effect of group.

† ANCOVA of endpoint and three month follow-up scores adjusting for baseline score, effect of group.

‡ ANCOVA of end point and six month follow-up scores adjusting for baseline score, effect of group.

NOTE: since the 95% CI in the previous column is calculated on unadjusted data, the P-value, which is adjusted for baseline score, will not necessarily be consistent with the CI.

#### **4.6.6 Treatment Fidelity Related Outcomes**

##### **4.6.6.1 Qualitative Content Analysis**

Results from the qualitative content analysis of the participant evaluation forms revealed a number of issues regarding the fidelity and design of the maintenance intervention. Table 4.10 details the key themes and sub themes that emerged, example quotes are provided to illustrate key themes and sub themes.

##### **4.6.6.2 Participant Satisfaction with the Maintenance Intervention**

All eight children and their parents (n=8) reported being satisfied to very satisfied with the individual home-based sessions. Satisfaction with group-based sessions was lower with 75% of children and parents rating they were satisfied to very satisfied with the group-based sessions and 25% of children and parents suggesting that they were dissatisfied with group-based sessions. Overall all children and parents reported being either satisfied or very satisfied with the six week maintenance intervention.

##### **4.6.6.3 Strengths of the Maintenance Intervention: Home-based Individual Sessions**

Overall parents and children expressed a number of strengths associated with the maintenance intervention. Parents and children suggested that the home-based sessions offered the opportunity to modify the home environment to support health behaviour changes,

*“ I think it was good in your house cause you could try and change things that stop you from being healthy like lots of chocolate in the fridge just tempting you.” (Child 1).*

Children and parents suggested that individual home-based sessions provided the opportunity to address personal and family barriers to maintaining health behaviours,

*“Cause we were on our own we could talk more about things that I find hard with my eating and trying to get more active...I think that helped a lot.” (Child 3).*

Parents suggested physically having someone in your home pointing out the barriers to a healthy lifestyle motivated them to change the home environment to support their child’s PA and healthy eating. For example, one family reported buying

smaller dinner plates and breakfast bowls to help with portion control, buying less unhealthy snacks and buying and preparing healthier snacks so they are easily available in the house e.g. fruit salad,

*“I think physically pointing out barriers like the large plate sizes in our house or the fridge drawer full of chocolate made us see we were not helping (child’s name) and we need to change things to support him.”* (Parent 4).

Parents and children highlighted having the individual sessions in their own home at a convenient time was a key strength in that it allowed them to commit to the sessions,

*“It’s a great idea having home sessions it’s so much easier to do them this way and get the whole family in one place.”* (Parent 2).

Children also suggested that having the sessions at home enhanced their feelings of comfort to be open as they deemed their home as a ‘safe’ environment,

*“I liked being at home it made me feel safe to talk about things I wouldn’t have said in our GOALS group.”* (Child 5).

Parents and children expressed the researcher’s communication style as another positive. Parents and children perceived that the researcher listened and responded to what they said. They suggested this made them feel understood so they could be open and honest to confront issues they felt would interfere with their healthy eating and PA,

*“I think I was honest about things I was finding difficult like still wanting to eat lots of chocolate because (researcher’s name) listened and tried to understand why I was finding it hard. She didn’t just tell me don’t do it. That helped.”* (Child 5).

Children and parents also highlighted that having already worked with the researcher in the standard GOALS intervention meant they had built up a rapport and helped them to open up about their barriers to maintaining a healthy lifestyle,

*“I already knew (researcher’s name) so it felt comfortable for her to come to our house and discuss things about what I was still being naughty with.”* (Child 7).

With regards to the behavioural strategies employed, the majority of children suggested that making action plans facilitated their motivation. They suggested they

offered the ability to plan health behaviours and monitor progress towards them through having a visual reminder of their goals,

*“I liked my action planner, it was on my wall so I could just follow it and tick it off when it was done. It made me feel good seeing the ticks.”* (Child 8).

Children suggested talking about making healthy choices increased their confidence to make healthier food choices in their house and when going out to eat,

*“I choose the healthy option ... even at my friend’s house or when I go to a restaurant.”* (Child 4).

#### 4.6.6.4 Weaknesses of the Home-based Individual Sessions

The main weakness that children and parents perceived in relation to the individual home-based sessions was that they would have preferred more individual sessions over having group-based sessions,

*“I think more home sessions would have helped and I know (child’s name) would have preferred these over the group ones.”* (Parent 4).

Children also suggested that having practical sessions would have been useful where they were given ideas of ways to be active at home. They highlighted this would have provided a good opportunity to try different ways of being healthy and active within their home environment e.g. doing a family activity session within the home environment or cooking a healthy meal together as a family. Children perceived that this would have increased their confidence to try this again if they completed it successfully whilst the researcher was present,

*“It would have been good to do some activity with (researcher’s name) in the house or to cook a healthy meal together and then we could have kept this up as a family.”* (Child 4).

Also, children and parents felt there should have been some mechanism to contact the researcher when a difficult situation arose in the long-term,

*“It shouldn’t have just stopped but you could have had text message or phone calls to make sure you were still being healthy.”* (Child 2).

#### 4.6.6.5 Strengths of the Group-based Sessions

A key strength of the group-based sessions according to parents and children was the opportunity this provided for similar others in the group to help solve common problems related to maintaining a healthy lifestyle. They suggested they could work together to identify potential solutions and help each other determine healthier choices regarding their eating and activity habits,

*“We worked together to come up with some ideas of how we could be more active.”* (Parent 7).

Parents and children suggested this extended contact time with the researcher and the group allowed them time to discuss their concerns regarding maintaining PA and healthy eating that they had not had the opportunity to address in the standard GOALS treatment phase,

*“The extra group sessions meant we had more time to talk about our concerns about keeping up healthy eating and PA which was important cause we did not talk about this much in the main GOALS phase.”* (Parent 1).

#### 4.6.6.6 Weaknesses of the Group-based Sessions

The inability to form a strong bond with the group due to the small group size and the differences between families was recognised by children and parents as the main weakness of the group-based sessions. They suggested that lack of similarities between the group in terms of the varied ages of children and different family circumstances meant the group did not form a bond,

*“The group would have been better if the children were the same age and if we had more in common.”* (Parent 6).

The difficulties and inconvenience of getting to the location of the group-based sessions was acknowledged as another weakness,

*“We couldn’t go sometimes cause it was too hard to get there cause of traffic at that time.”* (Child 7).

Children and parents perceived that the lack of differences between the group-based sessions of the maintenance intervention and the group-based sessions in the standard

GOALS treatment phase meant they did not value these as much as the individual home-based sessions,

*“I think we had already done group work so it would have just been better to have all home sessions.” (Child 3).*

#### *4.6.6.7 Assessment of the Researcher’s Competence in MI*

Corrective feedback from the independent evaluation of the audio recorded maintenance intervention session highlighted that the researcher scored higher on the global MI dimensions of collaboration, autonomy/support and empathy. While the researcher scored lower on the global dimensions of evocation and direction. The researcher employed a greater number of open ended questions over closed ended questions and used both simple and complex reflections. In terms of MI adherent vs. non adherent behaviours, the researcher displayed a greater number of MI adherent behaviours. Feedback was used as part of the researcher’s ongoing training/supervision in MI.

**Table 4.10 Strengths and weaknesses of the Maintenance Intervention**

Theme	Sub theme	Example Quote
<b>Strengths of individual home-based sessions</b>	Opportunity to alter home environment	‘Cause we were in our home the goals person could help get my mum and dad to move bad food so you’re not tempted to eat it and then feel guilty because that is when you want to give up’ (Child 3).
	Parents realisation of their role to provide supportive home context	Having the one on one session made us realise that we have to be strong for our (child’s name) so that we are healthier and make the house healthy to support him.’ (Parent 2).
	Allows for individualised tailored support	‘Cause we were on our own I felt comfortable to talk about the things that I really found difficult and could try and (researcher’s name) helped us to think of ways to deal with it and it encouraged my mum and dad helped me.’ (Child 4).
	Familiarity and rapport allowed openness	“I felt comfortable because I knew (treatment deliverer’s name) and I was in my house I was not embarrassed to tell the truth about things I was worried about.” (Child 8).
	Empathy lead children to feel understood	“I think she listened to us so understood our situation and worked with me and my mum and dad and helped us to think of ways to make it easier to eat healthy and keep up our activity which was what we were worried about.” (Child 1).
	More individual home-based sessions needed	“I think I would have liked more home sessions so I could work through the things I was finding hard with my eating and activity instead of the group sessions because we had done them before.” (Child 5).
	Gained confidence to make healthy choices	‘We talked about making healthy choices so when I finished I felt that I could make healthy choices like choosing a healthier option off the menu when you go out to eat.’ (Child 1).
<b>Weaknesses of individual home-based sessions</b>	Need more home-based sessions during maintenance phase	“If you had more sessions at your house then you could have tried to come up with more ideas to make it healthier like thinking of ways so you could do activities in your house.” (Child 1).

Theme	Sub theme	Example Quote
	Need for practical home-based sessions e.g. making healthy recipes, removing unhealthy foods, doing an activity session in the home	"I think we should have done cooking or family games to show us how to be healthy in the house like how we can do activities in the house together." (Child 8).
<b>Strengths of group-based sessions</b>	Similar others helped with problem solving	"If someone had the same problem they could like help and tell you how they dealt with it so I think this was good." (Parent 1).
	Learn from other members of the group	"I learnt how to cook healthy pizza from someone else in the group." (Parent 3).
	Similar others can provide motivation	"Because the other families are also doing it they can spur each other on to keep going and not give up." (Child 7).
	Group problem solving was helpful	"It is good to talk about what you find hard because your in same situation they can help you think of something that you might not." (Parent 7)
<b>Weaknesses of group-based sessions</b>	Needed larger group network	"I think the group sessions would have been good if you had a big group and you knew each other anyway because I was embarrassed to speak cause I did not know some people." (Child 2).
	No different from the main intervention period	"I didn't think it was any different from the main bit of GOALS so think it should have just been family sessions in your house." (Child 1).
	Need to be grouped with 'similar others'	"I think it would have been good in a group with other kids my age who lived in my area so we could have maybe done some activities together because we would have got on better and been able to help each other more." (Child 6).

## 4.7 Discussion

The primary aim of this study was to test the efficacy of a maintenance intervention underpinned by SDT and that incorporated MI and cognitive behavioural strategies in light of stakeholders' views (see Chapter 3) to improve the sustainability of a MCTI, in terms of weight related outcomes (BMI & BMI SDS). Cognitive (self-determined motivation) and behavioural measures (PA & diet) were also assessed. A secondary aim was to assess the TF of the maintenance intervention as this has often been overlooked in previous childhood obesity treatment studies.

### 4.7.1 *Effects of the Maintenance intervention on BMI and BMI SDS*

In line with the first hypothesis, a maintenance intervention administered after a MCTI resulted in a significant improvement in the maintenance of weight related outcomes at six month follow-up compared with no maintenance treatment (i.e. standard care). Despite lacking significance, the mean decrease of 0.03 for BMI and 0.04 for BMI SDS at the intervention endpoint, and the mean decrease of 0.3 for BMI and 0.09 for BMI SDS at the three month follow-up, were comparative to weight reductions reported in the maintenance conditions of Wilfley et al. (2007) (i.e. one year follow-up mean pooled BMI SDS decrease = 0.07).

In contrast to the declining treatment effects commonly reported in the childhood obesity context (Lutikhuis et al., 2009), adult weight loss context (Wadden & Phelan, 2002), and the maintenance conditions reported by Wilfley and colleagues (2007), the intervention effects here for BMI and BMI SDS were maintained. Indeed at the six month follow-up a mean decrease of 0.6 for BMI and 0.13 for BMI SDS was observed in the intervention arm of the study. This is particularly encouraging when compared to marginal increases in BMI and BMI SDS in the control group over time. The difference in BMI and BMI SDS between the intervention and control group at the six month follow-up was significant ( $p < 0.05$ ). A potential explanation for this could be that the maintenance intervention empowered children to maintain change through the creation of a supportive environment that facilitated development in self-efficacy via appropriate cognitive behavioural strategies. The data supports this view given the improvement in weight related outcomes over time were associated with improvements in children's autonomous motivation and perceived competence for PA and healthy eating. Empowerment is considered a vital characteristic for sustained behaviour

changes and weight reductions in adult populations (Jeffery et al., 2000) and data here provides some efficacy for this in young people. Indeed, findings here indicate that SDT based strategies (specifically MI & cognitive behavioural strategies) employed in the maintenance intervention enhanced children's feelings of empowerment leading to the maintenance of health behaviour changes.

Although the weight reductions reported from the present study were minimal, weight maintenance is recognised as a successful outcome in MCTIs in this age group given that children are still growing (NOO, 2009). Furthermore, the observed reduction of 0.13 for BMI SDS was over two times the average decrease of 0.06 observed for lifestyle interventions in the most recent Cochrane review (Luutikhuis et al., 2009). It is possible a longer follow-up period might have revealed further improvements in weight reductions given the increasing weight reductions over the six month follow-up. This reiterates the importance of having long-term follow-up (i.e. > 12 months) to establish the sustainability of weight related outcomes from MCTIs (Luutikhuis et al., 2009). Overall, the findings support the efficacy of the maintenance intervention underpinned by SDT to promote sustained weight related outcomes in the childhood obesity context. However, as this was a pilot study, future research is needed to test the effectiveness of the maintenance intervention in a larger scale RCT.

#### ***4.7.2 Effects of the Maintenance Intervention on SDT Related Outcomes***

##### ***4.7.2.1 Effects of the Maintenance Intervention on Autonomous Motivation***

The maintenance intervention enhanced children's autonomous motivation for healthy eating with intervention effects increasing over time in line with weight related outcomes. Findings concur with those in adult health contexts where improvements in autonomous motivation for behavioural changes have been associated with sustained weight related outcomes (West et al., 2010; Williams et al., 1996), smoking cessation (Williams et al., 2002) and exercise adherence (Fortier et al., 2007). Improvements in children's autonomous motivation for healthy eating could be explained by their positive attitudes towards the usefulness of cognitive behavioural strategies acquired in the maintenance intervention. For example, cognitive behavioural strategies such as the use of action plans, goal-setting, independent decision making and self-monitoring were positively accepted by children. Children highlighted these strategies gave them a sense of control and enhanced their motivation to achieve and maintain their health

behaviours. Cognitive behavioural strategies such as goal-setting, decision making, problem solving and self-monitoring have all been features of sustainable interventions in both the adult behaviour change context (e.g. Williams et al., 2002) and childhood obesity context (e.g. Braet et al., 2004; Vignolo et al., 2008). Findings here support the use of cognitive behavioural strategies in MCTIs to enhance autonomous motivation for PA and healthy eating and promote the maintenance of treatment outcomes.

In the intervention group, although improvements were visible in children's autonomous motivation for PA, they were not significant at any of the assessment time points compared to controls. A potential explanation for this could be that children expressed the main changes in their home environment supported healthful eating e.g. the use of smaller plates to encourage smaller portion sizes, availability of healthier snacking options and reduction in the number of unhealthy snacking options rather than PA. It appears that families have difficulties in overcoming barriers to being active at home (Troost et al., 2003). Children suggested their parents needed to be an active role model in order for them to become more active, particularly in the home environment. Troost et al. (2003) suggest parental support is an important correlate of PA and interventions targeting PA need to consider individual-level and community-level strategies to increase parents' capacities to provide instrumental and motivational support for children's PA. For example, interventions should teach parents strategies to provide opportunities and equipment for PA in the home environment as these are considered key factors contributing to children's PA (Kumanyika, 2008; Spurrier et al., 2008). Alternatively, recognising the small sample size (n=15), this might not have represented a large enough sample to detect a significant change in autonomous motivation for PA and has been acknowledged as a limitation of the pilot study (see Section 4.7.7).

#### *4.7.2.2 Effects of the Maintenance Intervention on Perceived Competence*

The maintenance intervention reported a significant effect on perceived competence to maintain PA and healthy eating across all time points (i.e.  $p < 0.05$ : intervention endpoint, three month & six month follow-up). Findings are congruent with stakeholders' views that children's confidence in their ability to maintain health behaviour changes is central to sustain weight related outcomes (see Chapter 3). However the mechanisms by which the maintenance intervention enhanced children's

perceived competence for PA and healthy eating are not clear. A possible explanation from an SDT perspective is that the improvements in autonomous motivation lead children to feel in greater control over their health behaviours and feel more confident over their ability to maintain these behaviours i.e. PA and healthy eating (Deci & Ryan, 2000). Findings here concur with research in the smoking cessation context that have reported increases in autonomous motivation parallel to improvements in perceived competence for smoking cessation (Williams et al., 2009). These findings reiterate SDTs argument that perceived competence and autonomous motivation are important in sustaining behaviour changes (Deci & Ryan, 2000).

#### *4.7.2.3 Effects of the Maintenance Intervention on Perceptions of Autonomy Support*

Aligned with the theoretical tenets of SDT, children's perceptions of an autonomy supportive treatment deliverer were positively associated with increases in perceived competence and autonomous motivation for PA and healthy eating (Deci & Ryan, 1985; 2002). Findings here are congruent with evidence in the physical education setting suggesting that children who perceived their teacher, parents and/or coach to support their autonomy reported greater autonomous motivation and perceived competence for PA (Hagger & Chatzirantis, 2007; Hagger et al., 2009). It is not clear what specific features of the intervention or by what mechanisms the maintenance intervention acted to create this autonomy supportive treatment climate. Future research exploring the creation of autonomy supportive environments for treatment is warranted.

Recognising the parallels that have been drawn between SDT and MI (Markland et al., 2005) one potential explanation for children's positive perceptions of an autonomy supportive treatment climate could be that the use of MI created an autonomy supportive treatment context, thus supporting children's autonomy. Findings in adolescent and adult populations support the use of MI to facilitate the maintenance of behavioural changes (e.g. Daugherty, 2008; Flaherty, 2006) and weight maintenance (West et al., 2010). In light of previous research and findings here, MCTIs should consider adopting MI as a strategy to promote an autonomy supportive treatment climate. However, more robust research i.e. a large scale RCT is needed to test the effectiveness of adopting MI to promote autonomous motivation and perceived competence for PA and healthy eating within the childhood obesity treatment context. Overall the findings support the second hypothesis (the maintenance of weight &

lifestyle related behaviour change would be associated with increases in autonomous motivation, perceived competence & positive perceptions of an autonomy supportive treatment climate) and highlight the value of using SDT to underpin the design and development of interventions within the childhood obesity treatment context.

#### *4.7.2.4 Effects of the Maintenance Intervention on the Home Environment*

As highlighted in section 4.2.3.2, a strength argued by SDT is that autonomous motivation, from an intervention standpoint is modifiable i.e. social environments can be modified to support autonomous motivation for health behaviour changes (Deci & Ryan, 2000). Children's positive perceptions of an autonomy supportive treatment climate suggest the maintenance intervention was successful in the attempts to promote an autonomy supportive treatment atmosphere. Children suggested that having sessions at home made their home environment more supportive of health behaviours as their parents became more proactive in modifying the home to support their health behaviour changes e.g. offering healthier food choices and opportunities for family PA.

The physical home environment, parental role modelling and parental education and feeding practices have been implicated as key factors contributing to a child's weight (Golan & Weizman, 2001). Furthermore ecological models identify the home environment as a key context contributing to childhood obesity (Davison & Birch, 2001) yet MCTIs have not attempted to incorporate the home setting into treatment. Findings here support the ecological viewpoint and previous research findings that have suggested the home context is a key context particularly influencing children's healthy eating and thus should be considered as a setting for delivering treatment (Fulkerson et al., 2010; Spurrier et al., 2008). Results from a childhood obesity prevention programme provide preliminary support for using home-based sessions to encourage behaviour changes, reporting increased consumption of fruit and vegetables in children following the intervention (Fulkerson et al., 2010). It seems home-based sessions offer the opportunity to address both physical barriers to a healthy lifestyle within the home environment and parental factors related to health behaviour changes encouraging parents to be more proactive in tackling these barriers which is considered key for maintaining health behaviour changes (Golan & Weizman, 2001; Spurrier et al., 2008).

Findings here support SDTs argument that socio-contextual variables are amenable to manipulation and play an important role in facilitating the internalisation

process of motivation and enhancing autonomous motivation and behaviour changes in the long-term (Deci & Ryan, 2000). The home environment should be incorporated into MCTIs to directly address barriers to children's maintenance of PA and healthy eating behaviours, helping families to develop autonomy supportive home environments and improve the sustainability of treatment outcomes.

#### ***4.7.3 Effects of the Maintenance Intervention on Behavioural Outcomes***

##### ***4.7.3.1 Effects of the Maintenance Intervention on Healthy eating outcomes***

Children in the maintenance intervention group significantly decreased their energy intake and their percentage energy intake from fat at all assessment points and these were associated with an increase in children's autonomous motivation, perceived competence and perceptions of an autonomy supportive treatment climate for healthy eating. Previous research revealed that children consume more unhealthy foods if they are available in their home (Blanchette & Brug, 2005; Utter, Scragg, Schaff & Mhurchu, 2008). Findings here are congruent with this research as children perceived there was a reduction in the availability and access to unhealthy foods in their home. This could explain the reductions in energy intake and percentage energy intake from fat. Therefore interventions need to encourage parents to make healthy foods accessible to their children by having items within reach and prepared for easy consumption whilst reducing the availability of unhealthy foods (Utter et al., 2008).

Another potential explanation for the decrease in energy intake is the influence of parental energy intake and feeding habits, as children suggested having their parents as a healthy role model helped them to maintain healthy eating. Parental role modelling is also highlighted as a key factor contributing to a child's weight in Golan and Weizman's (2001) social ecological model to guide childhood obesity treatment. Furthermore, there is evidence to suggest that interventions targeting parents exclusively, addressing their eating habits and practices have been successful in producing maintained weight loss in children in up to a seven year follow-up period (Golan, 2006). This reiterates the importance of encouraging parental behaviour changes to support children's efforts to make and sustain healthy eating behaviour changes (Spurrier et al., 2008).

Lastly, children suggested they decreased their portion size as a result of the maintenance intervention which could provide another potential explanation for the

reduced energy intake. Evidence suggests that larger portion sizes have been positively associated with increased energy intake in children (Fisher, Rolls & Birch, 2003) and that increased portion sizes have played a role in the increasing obesity levels (Ello-Martin, Ledikwe & Rolls, 2005). Further research is required to uncover whether reducing portion sizes is key to address in MCTIs to reduce children's energy intake.

#### *4.7.3.2 Effects of the Maintenance Intervention on PA outcomes*

Children in the maintenance intervention group significantly increased their PA at all assessment points in comparison to the standard care control group. PA improvements were in line with improvements in autonomous motivation and perceived competence for PA. These findings are consistent with those in the adult behaviour change context suggesting that exercise adherence improves in line with autonomous motivation and perceived competence for PA (Fortier et al., 2007). Children again emphasised that home-based sessions encouraged their parents to take a central role in becoming more active as a family, yet suggested it was more difficult to overcome barriers, and find opportunities for increasing PA within their home environment than it was for healthy eating. Research supports that the home environment is critical to provide access to opportunities for PA (Kumanyika, 2008; Kumanyika, Parker & Sims, 2010; Spurrier et al., 2008), and that children participate in more PA when the equipment is available in the home environment (Timperio et al., 2008). Research is needed to identify effective strategies to help families modify the home environment to support PA given the role this could play in sustained PA behaviour.

#### *4.7.4 Treatment Fidelity*

A secondary aim of the present study was to consider the fidelity of the maintenance intervention. It was deemed that this would allow consideration of whether the maintenance intervention was feasible and/or acceptable. Chapter 2 revealed that MCTIs rarely report the researcher's training and/or competence in delivering the proposed intervention content. The findings displayed the importance of ongoing supervision and the provision of adequate training to ensure treatment deliverers are competent in their use of MI (Miller, Yahne, Moyers, Martinez & Pirritano, 2004). For example, feedback provided from the audio recorded session highlighted that the researcher scored higher on the global dimensions of collaboration, autonomy/support and empathy yet scored lower on the global dimensions of evocation and direction thus

suggesting the researcher still required ongoing training to further develop these skills (Miller et al., 2004).

Although TF related to the researcher's training and competence in their use of MI was considered, time and cost considerations meant independent evaluation of all intervention sessions using a validated measure of MI was not possible (Carroll et al., 2000). Thus, this has been acknowledged as a limitation of the maintenance intervention (see section 4.7.7). If the maintenance intervention was conducted on a larger scale (i.e. RCT), to allow greater strength in conclusions regarding TF, MI based sessions should be evaluated using the Motivational Interviewing Treatment Integrity (MITI) code, which is regarded as a valid and reliable measure of MI (Madson & Campbell, 2006; Moyers, Martin, Manuel, Hendrickson & Miller, 2005).

Participant evaluations revealed that the researcher's delivery style was positively evaluated by participants with children suggesting they felt that the researcher was not judging them but was empathic and attempted to understand their difficulties with regards to maintaining their behavioural changes and weight reductions. Despite only having two individual sessions that incorporated MI, the positive receipt of these sessions supported by positive outcomes (i.e. improved autonomy & competence for behavioural changes alongside enhance weight related outcomes & behavioural changes) supports previous findings suggesting that MI can be efficacious in brief intervention settings as short as single sessions of 5-15 minutes (Pollak et al., 2009). This reiterates the importance of recognising MI as a potentially cost effective option to enhance the sustainability of treatment outcomes from MCTIs in the childhood obesity context (Lutikhuis et al., 2009; Staniford et al., 2011).

Evaluation of TF data identified a number of strengths and weaknesses of the maintenance intervention design and delivery from the perspectives of the treatment recipients. Without assessing the fidelity of the maintenance intervention, it would have been difficult to conclude whether the weight reductions and behavioural changes were a result of the SDT targeted intervention content, intervention delivery (i.e. using MI interpersonal delivery style) or other mediating factors that had not been controlled for (Bellg et al., 2004). Therefore the evaluation of TF in the present study yielded information that helped to explain and understand the research findings (Resnick et al., 2005). For example, the participant evaluation forms revealed that individual home-based sessions were better received and deemed favourably over group-based sessions.

Parents and children perceived that having one to one sessions provided the opportunity to address personal barriers to PA and healthy eating behaviours. Barlow and the expert committees (2007) recommendations concur with these findings suggesting the need to tailor intervention strategies to individual families' needs.

Cognitive behavioural skills including problem solving skills, self-monitoring, independent healthy choice and decision making, setting action plans and goal-setting skills employed in line with the SDT underpinnings were well received by children and parents. MCTIs in the childhood obesity context that have reported sustainable weight related outcomes have also employed common cognitive behavioural strategies (Braet et al., 2004; Epstein et al., 1990). Thus treatment deliverers might want to consider incorporating such cognitive behavioural strategies into interventions and delivering strategies in line with definitions provided by the taxonomy of behaviour change techniques (Abraham & Michie, 2008; Michie et al., 2011). In particular, this might be useful where there are multiple treatment deliverers to ensure behaviour change techniques are delivered in a standardised manner (Michie et al., 2011). Furthermore reporting of the behaviour change techniques employed in line with the taxonomy of behavioural change techniques could contribute towards enhancing the replication, implementation and synthesis of evidence in the childhood obesity treatment context (Michie et al., 2011).

Taken together the TF data provides confidence in concluding that the maintenance intervention was delivered and received as intended in line with SDT underpinnings and offers a promising approach to improve the maintenance of health behaviour and weight related outcomes from MCTIs. TF data highlights the importance of ongoing supervision to help treatment deliverers reach competence in MI. It suggests that attending brief MI training workshops might not be enough to achieve competence, thus emphasising the need for ongoing training/supervision (Miller et al., 2004). This study confirms the value of assessing TF in the pilot phase of designing complex interventions (MRC 2000, 2008). Overall, TF data improves the strength in concluding the efficacy of the maintenance intervention and the use of MI and cognitive behavioural skills as practical intervention strategies to promote SDT theoretical underpinnings (Bruckenthal & Broderick, 2007).

#### ***4.7.5 Implications for Practice***

Practitioners in the childhood obesity context should consider training in MI (including ongoing supervision & feedback to reach competency in delivering MI) and incorporating this into their interaction with overweight/obese children. This could help to create an autonomy supportive climate and support children's autonomy and perceived competence for PA and healthy eating. Practitioners should encourage parents to create a home environment that supports PA and healthy eating including making healthy foods available and accessible at home, providing a positive role model for healthy eating and PA and providing the equipment and opportunities for PA. Practitioner's delivery should be evaluated by independent evaluators where possible, to ensure competency in the delivery of the proposed intervention. Home visits should be considered where appropriate recognising the opportunity this offers to directly address barriers in the physical home environment and make appropriate modifications to support health behaviours which appears to be crucial in changing children's PA and dietary habits (Spurrier et al., 2008).

#### ***4.7.6 Implications for Research***

A large scale RCT is needed to assess the effectiveness of a maintenance intervention underpinned by SDT to improve the sustainability of weight related and behavioural outcomes following MCTIs. MCTIs should incorporate a longer follow-up period (i.e.> 12 months) to ensure interventions can assess the sustainability of treatment outcomes. Further research is needed to compare a standard MCTI to a MCTI that incorporates home-based sessions to consider whether this can enhance the sustainability of intervention outcomes. Further research is required to assess the value of using MI skills to increase children's autonomy and perceived competence to maintain weight reductions, PA and healthy eating given the limited evidence regarding the use of MI in the childhood obesity context (Resnicow et al., 2005).

All aspects of TF should be evaluated and reported with studies setting out a TF plan and planning for the costs of independent evaluation (Bellg et al., 2004) particularly in the pilot phase of intervention development (MRC 2000, 2008). Researchers might want to encourage that cognitive behaviour change techniques are employed and reported in line with the definitions provided in the taxonomy of behaviour change techniques (Abraham & Michie, 2008; Michie et al., 2011). This

could enhance the standardisation, replication and implementation of MCTIs (Michie et al., 2011).

Qualitative research with families who have maintained weight related, and behavioural changes would be useful to gain an understanding of how families maintain changes in the long-term. Given the difficulties recruiting families to the maintenance intervention and the poor adherence to the ongoing support sessions provided from the GOALS intervention, qualitative research would also be useful to explore families' reasons for attrition. Research is needed to identify effective recruitment strategies to ongoing maintenance support interventions given the difficulties in recruiting families to the maintenance intervention here. Stakeholders' views should be considered in the design of interventions (MRC, 2000; 2008) given that their views (see Chapter 3) informed the decision to employ SDT underpinnings in the maintenance intervention which was positively accepted by families in the current study.

#### **4.7.7 Limitations**

Given the small sample size it was not possible to carry out sub-group analyses (e.g. gender or SES), thus the study could not identify whether the maintenance intervention was more or less successful in certain sub-groups. However, it was not the aim of the present study to identify group differences in response to the maintenance intervention but to test the efficacy of the maintenance intervention. The small sample size also limited the ability to detect where the maintenance intervention had resulted in a significant effect on the study variables (i.e. weight related, behavioural & self determination variables) and significant associations between variables. This limits the strength of conclusions that could be drawn from the intervention. Difficulty with recruitment and limited uptake of the ongoing support highlights the problems associated with long-term commitment and attrition from MCTIs in the childhood obesity treatment context (Whitlock et al., 2010).

Given the problems with recruitment families could not be randomly allocated to groups and families who were in the maintenance intervention group were self referred. Therefore results of the present study cannot be generalised as the maintenance intervention groups motivation might not be representative of the general population. It was acknowledged that the SDT measures employed here had not been validated with a child sample yet displayed good internal reliabilities (i.e.  $\alpha > 0.7$ ). Due to practical

considerations (i.e. time constraints) the current study did not measure children's general motivational orientations, the perceived parental motivational climate and parental motivational variables which could have influenced the success of the intervention. However, the current study was primarily concerned with children's autonomous motivations and perceived competence given that these behaviours were the target of the intervention strategies employed.

The reliance on self report methods for healthy eating changes (i.e. three day food diaries) was recognised as a limitation considering the tendency for overweight children to underreport energy intake. However, the energy intakes reported here were similar to energy intakes reported in other studies that have used self report methods to assess children's dietary intake (Gibson & Neate, 2007). PA was also measured using a self report measure which might be subject to bias yet for pragmatic reasons it was not possible to employ a more objective assessment of PA (e.g. accelerometers: Trost, 2001). If conducted on a larger scale it would be recommended to use accelerometers as a more objective method to assess PA behaviour change (Trost, 2001).

Given time and cost considerations each intervention session was not independently evaluated and coded using a validated MI measurement tool (i.e. MITI). If implemented as an RCT, it would be ideal to directly or indirectly observe (i.e. audio taped) every session or random sessions to ensure competency, and consistency in the delivery of the intervention components (i.e. assessment of MI using MITI: Moyers et al., 2005) throughout, and independent evaluators should be employed to avoid bias. Although the researcher had attended two MI training workshops, feedback provided from the audio recorded intervention session, suggest this might not be sufficient to allow intervention deliverers to reach competence in MI. This reiterates the need for adequate training and ongoing supervision to ensure the fidelity of MI (Miller et al., 2004).

#### **4.8 Chapter Summary**

This chapter presented data which supports the efficacy of a maintenance intervention (underpinned by SDT & stakeholders' views) and that incorporated MI and cognitive behavioural strategies to sustain weight related outcomes following participation in a MCTI. The maintenance intervention increased children's autonomous motivation and perceived competence for the maintenance of PA and healthy eating.

Changes in perceived competence were associated with enhanced maintenance of PA and healthy eating behaviours, weight reductions and perceptions of an autonomy supportive treatment deliverer. Findings presented within this chapter also highlighted the value of evaluating the fidelity of MCTIs in the pilot phase of interventions in an attempt to understand the mechanisms by which an intervention has been successful or unsuccessful.

## **Chapter 5**

# **Study 3B Reasons for Attrition from a Multi-component Childhood Obesity Treatment Interventions: A Qualitative Inquiry**

## **Chapter 5: Study 3B Reasons for Attrition from a Multi-component Childhood Obesity Treatment Interventions: A Qualitative Inquiry**

### **5.1 Introduction**

In Chapter 3, data suggested that parents and children needed ongoing support to facilitate the maintenance of their health behaviour and weight related changes post intervention. However, when a maintenance intervention was provided many families either did not take up the offer of support or dropped out (see Chapter 4). Therefore questions still remain about how to appropriately support some families post participation in a multi-component childhood obesity treatment intervention (MCTI). Attrition (i.e. drop-out) is commonly reported as a limitation in the childhood obesity treatment context both in the initial phases of treatment and the follow-up phases (Luutikhuis et al., 2009; Whitlock et al., 2010; Wilfley et al., 2007) (see Chapter 2). For example, Luutikhuis et al. (2009) in their review of childhood obesity treatment interventions reported that only 31 studies out of the 64 included could report follow-up measures of over 80% of the baseline participants. Despite this, there is little exploration of why families drop-out and moreover what factors would encourage families to remain in treatment interventions over the long-term. Minimising attrition is crucial for individual success within treatment interventions and patient retention is critical to demonstrate the long-term efficacy of treatment interventions (Hampl, Paves, Lamscher & Eneli, 2011). With this in mind, this chapter provides a qualitative exploration of parents' and children's reasons for attrition from a MCTI with a view to providing implications for research and practice that could inform strategies to reduce attrition rates in future interventions.

### **5.2 Background**

Attrition is a complex process and a product of the interaction between the pre-treatment characteristics of the individual and treatment variables (Dalle Grave et al., 2005). In the childhood obesity treatment context, attrition is perhaps further complicated by a need to consider not only the pre-treatment characteristics of the overweight/obese child but also the pre-treatment characteristics of the child's support system (i.e. parents, siblings & extended family members or significant others who have a role in caring for the child, all of whom interact with the child on a regular basis) as

well as the interaction with treatment variables. Perhaps as a result, research is scarce as regards to attrition in the childhood weight management context (Skelton & Beech, 2011).

### ***5.2.1 Attrition from Childhood Obesity Treatment Interventions***

Only a small number of studies have explored the reasons for attrition from MCTIs in the childhood obesity context (Cote, Byczkowski, Kotagal, Kirk & Zeller, 2004; Grimes-Robison & Evans, 2008; Zeller et al., 2004). Zeller et al. (2004) examined families' reasons for attrition from a MCTI in a specialised weight management clinic that reported only a 45% completion rate. Factors related to attrition included lack of motivation, significant time commitments, cost and lack of insurance cover, educational content, unsupportive families, a child's lack of desire to lose weight and the educational content of treatment interventions. Grimes-Robison and Evans (2008) identified similar factors to that of Zeller et al. (2004) reporting that a lack of support, lack of motivation or desire to lose weight and/or change their dietary or PA behaviour, baseline degree of overweight and initial weight loss as key factors associated with attrition in a medically supervised child weight management programme. Cote and colleagues' (2004) research comparing participants who remained in treatment versus those who dropped out from a MCTI in a children's hospital suggested poor perceived quality of care was negatively associated with higher attrition rates. Quality of care was also reported as the predominant factor that influenced families' retention in a child weight management clinic (Reinehr, Brylak, Alexy, Dersting & Andler, 2002). Other possible predictors of attrition have been ambivalence to engage in weight management programmes, fear of weight bias and stigmatisation and length of visits (Hampl et al., 2011).

### ***5.2.2 Attrition in the Adult Weight Management Context***

In the adult weight management context, Dalle Grave et al. (2005) found that higher weight loss expectations, binge eating, significant life stress (including financial stress) and initial small weight losses were all important predictors of attrition. Teixeira et al. (2010) found psycho-social variables and behavioural variables (e.g. dietary history, outcome evaluations & exercise self efficacy) may be useful predictors of attrition in a sample of adult women attending a MCTI. Qualitative research in the adult weight management context has also provided some insight into potential reasons

associated with attrition. A qualitative study revealed that participants suggested factors that would enable them to remain in a weight management programme included programme knowledge and attainment of a set goal. Inhibiting factors included the perceived need to come along to classes, the group setting of treatment, concerns about keeping/ remaining in control of weight and health behaviour changes and the recognition of a lapse can lead to participant attrition (Cioffi, 2002). Given that there is not a great depth of research regarding attrition in the child or adult weight management context evidence related to participant drop-out from other health contexts was considered.

### **5.2.3 *Attrition in other Health Contexts***

Research within other health contexts has provided an insight into potential factors that are associated with attrition. For example, factors associated with attrition from child and adolescent mental health services have included family problems, negative life events, promptness of time between follow-up appointments and anxiety or depressive disorders (Johnson, Meller & Brann, 2008). Within the adult context of lifestyle-based treatment interventions for adults with diabetes, factors related to attrition were grouped into categories of predisposing, enabling and need factors (Gucciardi, DeMelo, Offenheim & Stewart 2008). Predisposing factors included low perceived confidence to adhere to medication and lifestyle changes, low level of self efficacy and the inability to adhere to management recommendations can cause embarrassment or weight gain. Other predisposing factors included unrealistic weight goals, apathy, low priority attitude towards diabetes management, lack of time and inconsequential attitudes towards diabetes undermining individual's motivations leading to attrition (Gucciardi et al., 2008). Enabling factors included those related to how the services are structured and delivered (e.g. conflict between work schedules & centre's hours of operation) and suggestions were made for less intensive treatment at convenient times. Need factors included the low perceived seriousness or severity of their diabetes as the reasons for not returning (Gucciardi et al., 2008).

Gucciardi and colleagues (2008) suggested that interventions need to be flexible to participants' needs and provide more patient centered communication in a non-judgemental environment. This should empower individuals to take charge of their own behavioural changes. They also suggested that a range of delivery methods should be

offered for treatment (e.g. telephone contact, home visits & internet contact) and this may retain more participants in the long-term (Gucciardi et al., 2008).

Barrett et al.'s (2008) review of the literature on attrition within the psychotherapy treatment context highlighted that a number of factors interacted to influence attrition. Factors included patient characteristics (e.g. age, gender, ethnicity, beliefs & expectations), enabling factors (e.g. degree of family involvement, cost of service & income level), need factors (e.g. diagnosis, prognosis, co-morbidities & length of treatment) and environmental factors (e.g. accessibility, type of provider, treatment options & setting). The review went on to suggest potential strategies that could reduce attrition rates including having a pre-therapy stage incorporating aspects of MI to ensure a client centered focus and to ensure the client is motivated to change their behaviours. They suggested the importance of managing expectations of clients, involving the client in decisions about their treatment plan, increasing client motivation and increasing client knowledge about the client and therapist's role. Other strategies included assessing the client's progress throughout the treatment and adapting the treatment plan where necessary, and reducing waiting list times by providing a brief phone call to discuss the client's treatment with them (Barrett et al., 2008). It is unknown whether similar factors apply to MCTIs in the childhood obesity context. Therefore gaining a greater understanding of attrition could inform strategies to develop MCTIs and improve retention rates within the childhood obesity treatment context.

### **5.3 Study Aims**

Although there is evidence regarding attrition from MCTIs in the childhood obesity context, the research has largely been in specialised settings i.e. pediatric tertiary care institutions and has tended to employ cross-sectional survey methods with limited use of qualitative methods. To date there is limited evidence regarding families' reasons for attrition from MCTIs within community settings where a number of contemporary interventions are run from (see Chapter 2). A more complete understanding of families' reasons for attrition is needed to improve the retention rates of future interventions (Cote et al., 2004). Hampl et al. (2011) recommended that qualitative work with children and parents of childhood obesity interventions is needed to elicit barriers and promote more acceptable treatment interventions. With this in mind this study adopted a qualitative approach to explore participant attrition from MCTIs

with a view to understanding how best to reduce the likelihood of participants dropping out of treatment.

## **5.4 Method**

### **5.4.1 *Sampling Strategy***

The study sample size was determined by the original aim(s) and purpose of the research (Patton, 2002). Given that this study aimed to explore children's and parents views towards drop out, a purposive sampling method was used to ensure the inclusion of individuals who had key characteristics relevant to the study i.e. children and parents who had dropped out from a childhood obesity treatment intervention. Considering this, there was no set, predetermined sample size and rather this was determined by whether 'saturation' of the subject matter was achieved (Glaser & Strauss, 1967). 'Saturation' is reached when different participants repeat the same subject matter, the same themes emerge and further interviews do not reveal further information (Glaser & Strauss, 1967). Therefore as in Study 2 (see Chapter 3) the depth, range and the richness of data collected was considered more important than the actual number of participants (Patton, 2002).

### **5.4.2 *Procedures***

Ethics approval was attained from Sheffield Hallam University and Liverpool NHS Primary Care Trust (see Appendix J). Potential participants were identified as those who had dropped out from the GOALS MCTI (Watson et al., 2011) in the past 12 months. Participants were contacted by telephone by the researcher (myself), informed of the purpose of the study and were sent an information sheet to support this (see Appendix K). Parents and children who were willing to take part signed informed consent and assent forms (i.e. children > 8 years old) (see Appendix L). Participants included ten parents and ten children of the same parents (dyads) (aged 7-13 years old) who had dropped out from the GOALS intervention either during the standard 18 week intervention, or the follow-up period (i.e. families were required to attend a three month & six month follow-up to monitor their weight maintenance: Watson et al., 2011).

Upon informed consent/assent (where appropriate), a time and date was arranged to interview parents and children that was convenient for them. To increase engagement, all interviews were conducted in the participant's home environment. Each

child was given the option of having a parent or guardian present during the interview, yet no child requested this. Interviews were conducted from June 2010-August 2010. Each parent and child took part in a semi-structured interview that lasted between 20-30 minutes and was digitally recorded. Parents and children were asked about their experience at GOALS, why they had decided to drop-out from the intervention and what factors they perceived might have enabled or impeded them from remaining involved in the treatment intervention.

Semi-structured interviews were developed using a flexible interview guide. The interview guide provided a deductive framework, informed by the attrition literature (see Section 5.2) and taking into account topics identified in the Foresight systems map of determinants of childhood obesity as discussed in the Chapter 1 (Foresight, 2007). The interview topic guide contained potential interview questions and prompts designed to elicit as much information as possible regarding participant reasons for attrition (see Appendix M). This was similar to the qualitative approach taken in Study 2 (see Chapter 3) allowing the researcher to guide the line of questioning, collecting data about the research topic in a systematic manner yet allowing the flexibility to explore specific pertinent issues that arose (Britten, 1995). Given that interviews were conducted in participants' homes, a risk assessment was carried out (see Appendix N) to ensure the safety of the researcher and participant.

### **5.4.3 Data Analysis**

Interviews were transcribed verbatim into Microsoft Word® and names were removed from transcripts to ensure anonymity. Participants were referred to as 'parent' or 'child', along with a unique identifier number. Transcribed data was imported into QSR NVivo 8 (Qualitative Solutions & Research International, 2008), which is the later version of NVivo that was used to facilitate the qualitative data analysis in Study 2 (see Chapter 3). QSR NVivo has also been used to facilitate the analysis of large quantities of qualitative data in previous studies (Hutchison et al., 2009; Snethen & Broome, 2007; Stewart et al., 2008).

The framework method was used to analyse data. Framework analysis is deemed an appropriate approach to analyse a large quantity of qualitative data due to the systematic nature of the approach (Murtagh et al., 2006; see Chapter 3). Details of the five distinct, yet interconnected, phases of the systematic framework approach can be

found in Chapter 3 (see Table 3.1; Chapter 3; Ritchie & Spencer, 1994). Briefly here; first the researcher identified appropriate themes and associated sub themes that emerged from the data and placed these within the framework applied (see Table 5.1). Charts were then laid out on a thematic basis which allowed identification of patterns, differences and similarities between and within sub-groups of parents and children, across key themes and sub themes. Finally, diagrams were used to aid the final interpretation phase of the analysis. To counter bias and ensure the trustworthiness of the data, peer consultation took place between the researcher and two other doctorally prepared colleagues on the development of the thematic framework, charting and mapping data, and final interpretations (Mays & Pope, 1995). Member checks were also conducted to allow participants to verify the analysis represented an accurate account of their views (Parahoo, 1997).

## **5.5 Results**

Participants were ten children aged 7-14 years old (mean age=11.8; SD=1.8) (three males & seven females; three who dropped out in the core treatment phase & seven who dropped out in the follow-up phase) and ten parents (eight mothers & two fathers; three who dropped out in the core treatment phase & seven who dropped out in the follow-up phase). All participants identified themselves as White British ethnicity. Parents and children reported a combination of common reasons for attrition yet the extent to which each variable influenced each child or parent's decision to leave the treatment intervention varied.

The thematic framework revealed five core categories of variables that parents and children identified had influenced their attrition from the treatment intervention. These were; attitudinal, psychological/motivational, interpersonal, environmental and treatment-related variables (see Table 5.1). Similar themes and sub themes emerged across children and parents irrespective of whether they had dropped out in the initial phase or the follow-up phase of the GOALS intervention thus results are displayed collectively. The treatment-related variables were further sub categorised to differentiate variables that parents and/or children perceived would have enabled their continuation in the intervention, and variables that inhibited their continuation in the treatment intervention. The key themes/categories and sub themes/categories that emerged are detailed in Table 5.1.

**Table 5.1** Thematic Framework displaying the key themes/sub themes related to attrition

<p><b>Psychological/Motivational Factors:</b>          Treatment outcomes did not match initial expectations          Lack of readiness/desire to make health behaviour changes          Perceived costs of changing to a healthy lifestyle outweigh the benefits          Fearful of making changes to their lifestyle          Guilt due to not making any changes</p>	<p><b>Attitudinal Factors:</b>          Blame each other for a lack of desire/motivation to change          Not ready for the commitment involved in making health behaviour changes          Parents do not recognise the seriousness of their child's overweight          Negative perceptions towards having a healthy lifestyle (i.e. boring, restrictive, unenjoyable)          Overemphasis on health messages → children resist making health behaviour changes</p>
<p><b>Interpersonal Factors:</b>          Lack of active parental involvement          Lack of family support          Limited peer support          Lack of group bond          Professional support needed at an individual level</p>	<p><b>Environmental Factors:</b>          Media pressures          Unsupportive school environment          Unsupportive home environment</p>
<p><b>Treatment Variables: Enabling Factors:</b>          Professional support at a family level          Hard hitting approach to highlight the seriousness of child overweight/obesity          Phased treatment: reducing intensity of support progressively          Flexible treatment interventions to specific family needs (i.e. length of treatment, mode of delivery, intensity of the support)          School active involvement in promoting a healthy lifestyle for all          Need for community-based support groups          Separate groups according to small age bands</p>	<p><b>Treatment Variables: Inhibiting Factors:</b>          Initial small weight losses          Educational aspect of treatment perceived as boring          Provision of health education not enough to sustain involvement in interventions          Discrepancy over the usefulness of behavioural techniques (i.e. goal-setting &amp; self-monitoring)          Practical difficulties travelling to the treatment venue</p>

### ***5.5.1 Psychological and Motivational Factors and their Influence on Attrition***

Psychological and motivational variables emerged as the major driving factors that had interacted with other variables and led to families' attrition from the treatment intervention. A number of children and parents revealed that they did not realise the commitment involved in taking part in the treatment intervention. They suggested it was not until after attending the intervention that it 'hit them' they did not feel ready to make changes to their lifestyle. Parents emphasised they felt guilty and embarrassed due to having only made limited or no efforts to change their lifestyle. They suggested this made them feel responsible for their child's limited weight loss during the course of treatment and was a major reason for their attrition,

*"I think I felt a bit guilty as well cause I had let it slip and I had no excuse cause I knew what I should be doing so there was no reason why I shouldn't be doing it but I suppose sometimes it's easier to just stick to what you know."* (Parent 10).

Parents and children suggested they feared making health behaviour changes. This fear stemmed from not knowing the impact making lifestyle changes would have on their life,

*"I was a bit scared cause I like the things I eat and didn't want to change, cause if I did change I wouldn't be able to like do the things I do now like going for McDonalds with my friends and that."* (Child 6).

Parents' concerns also seemed to stem from a fear of failure to successfully make, and sustain health behaviour changes and lose weight. Parents felt they would rather not try at all than to have tried and failed,

*"I think like I felt a bit guilty anyway for being in this situation and I was really scared that if I did try to change and then failed I would have felt even worse like I had failed (child's name)."* (Parent 3).

Parents and children highlighted that only achieving small amounts of weight loss in the first stage of treatment was disheartening and did not match their expectations. Parents and children perceived this limited weight loss as a failure and this negatively impacted their confidence to change and contributed to their reasons for attrition,

*“Erm well for me if in the first bit I actually seen our (child’s name) losing weight then yes this would have made me want to stay. I think it would have made me more motivated definitely and it would have made a difference for her I think which was what she needed really.”*(Parent 5)

*“I thought I would lose loads of weight but like I didn’t even feel like I’d lost anything.”* (Child 10).

For one parent and child, they were highly motivated to make lifestyle changes due to being aware of the immediate danger to their own (i.e. child’s perspective), or their child’s health (i.e. parent’s perspective),

*“I think we got what we needed from it but the rest was up to me to make the changes to be healthier so she could lose weight.”* (Parent 2).

*“I knew I needed to lose weight cause the doctor said so I was scared so really wanted to try to be healthier.”* (Child 2).

This parent and child’s reasons for attrition differed a lot from other parents and children as their situation meant making lifestyle changes and losing weight had to be a priority for the sake of the child’s health.

### **5.5.2 Blame Culture**

A blame culture emerged between parents and children with both sides failing to acknowledge their role and taking responsibility for making health behaviour changes. Instead, parents and children blamed each other for their eventual attrition from the treatment intervention,

*“I think there was nothing I could do cause (child’s name) was just not prepared to try and change so in the end I just thought it was pointless us being there.”* (Parent 7).

*“I did want to try like but it’s too hard cause like my mum wasn’t being healthy and there was loads of unhealthy things in the house so I just give up.”* (Child 9).

For parents, they blamed their child’s lack of desire to make changes as a major reason for attrition,

*“I give up trying I couldn’t get through to him ... he just didn’t want to know. So I just thought there is no point in coming anymore.”* (Parent 10).

Conversely, children blamed their parents' lack of desire and willingness to make changes to their own health behaviours in order to support them as the major factor influencing their attrition,

*"I wasn't gonna try anymore cause why should I like if my mum and dad weren't trying."* (Child 10).

### ***5.5.3 Attitudinal Variables and their Influence on Attrition***

Parents revealed that they did not perceive their child's overweight/obesity as a serious issue given that their child was still young. The majority of parents perceived their child's extra weight as puppy fat and they would grow out of this. Therefore parents did not see their participation in the treatment intervention as a priority and this influenced their decision to leave the intervention,

*"I didn't really think we needed to be there cause there was lots of kids bigger than our (child's name) and so I thought it's not really a big thing and I wasn't that worried and had other more important things to be doing to be honest."* (Parent 6).

Parents and children expressed a number of concerns over the negative impact changing to a healthier lifestyle would have on their life. Parents and children perceived eating healthily would mean they would be 'starving' all the time,

*"I just wasn't sure I wanted to eat healthy, I don't want to be starving all the time."* (Parent 6).

Children perceived a healthy lifestyle to be boring, and that it would restrict them from living their life how they wanted to,

*"Being healthy was like too hard and it's no fun you just feel like it stops you living your life like you want to like going to the chippy with your mates."* (Parent 8).

*"It was kind of boring cause they just did exercise and stuff and it was the same thing every week and it is just kind of boring being healthy and you feel the odd one out cause you can't do the same as your friends"* (Child 1).

Parents and children perceived the costs of changing to a healthy lifestyle would outweigh the benefits and that this contributed to their attrition from the treatment intervention,

*“I think there are too many sacrifices and we weren’t getting that much out of it.” (Parent 7).*

*“I think I enjoy being unhealthy better... what’s the point of being healthy when I like my life the way it is anyway.” (Child 10).*

A common issue children raised was that the over emphasis of health messages (e.g. ‘5 a day’ fruit & vegetables) made them want to resist making health changes. Children perceived their health should be their personal choice and they would not make changes because some external force has dictated to them that they should do it now,

*“When they go on like about being healthy it just makes me wanna do it less cause like I think I’ll do it when I want to do it and not cause you tell me.” (Child 5).*

#### ***5.5.4 Interpersonal Variables and their Influence on Attrition***

A number of parents and children revealed that due to the lack of bond with other group members, group-based sessions had not provided a support network,

*“I didn’t really feel like I could open up in the group cause I wasn’t really sure about the people in the group and didn’t really feel confident in front of them.” (Parent 3).*

Children emphasised the lack of active involvement and willingness of their parents and/or their family unit to change their health behaviours as one of the major variables that impeded their continuation in the treatment intervention. Children suggested if their family did not make any efforts to be healthy, this created an unsupportive home climate making it impossible to maintain health behaviour changes,

*“I think like cause like my mum does the shopping if she buys junk food then I will eat it and if she says we are gonna go to the chippy then I will just go cause I like it. I think if my mum made like more effort then I maybe would try harder.” (Child 8).*

Parents suggested the lack of peer support had a major role in their child's lack of desire to be involved in the treatment intervention,

*"I think cause his friends were not involved and don't eat healthily this just made him more uninterested so eventually I give up trying to get him to go."*  
(Parent 5).

Children and parents agreed that group level professional support was not enough and did not allow time for personalised, one to one family support. Parents and children suggested personalised support is necessary to address their families' personal needs and barriers to making health behaviour changes. Parents and children highlighted that if professional support was offered at an individual level it would have increased the likelihood of them remaining involved in the treatment intervention,

*"I didn't really feel like I could open up in the group cause I wasn't really sure about the people in the group and didn't really feel confident in front of them I think it should have been more one on one so you could speak about more personal stuff."* (Parent 3).

#### ***5.5.5 Environmental Constraints and their Influence on Attrition***

Parents and children concurred that there were a number of environmental constraints that interacted with psychological factors and reduced their motivation to remain in the treatment intervention. Children perceived that an unsupportive home environment negatively influenced their motivation to sustain a healthy lifestyle and made them think "what is the point". Parents and children agreed that the school environment was unsupportive in their approach to dealing with overweight /obese children and that this added to the stigma created around being overweight. Parents suggested this stigma created at school led children to fear being ridiculed about 'being different' and this contributed to their negative attitudes towards being involved in treatment interventions and influenced their decision to leave,

*"Because our (child's name) was singled out and sent a letter home it made him very defensive from the start so it was like fighting a losing battle."* (Parent 1).

There were differences in the way children and parents perceived the media influenced their attitudes towards making health behaviour changes. For children, the media added to a perceived 'nagging' culture where there was an overemphasis on

health messages (i.e. ‘5 a day’ message for fruit & vegetables) and this increased their resistance to making health behaviour changes,

*“When the adverts just keep telling you about having five a day and not eating fatty foods it just makes me think I want to even more cause you should just be able to eat what you want.”* (Child 3).

For parents, they perceived that the constant media pressure in terms of the marketing of unhealthy food choices and sedentary leisure pursuits placed pressure on families to engage in unhealthy practices,

*“But too much of it is the unhealthy stuff in your face is not good I think it just needs to cut down.”* (Parent 1).

### **5.5.6 Treatment Variables and their Influence on Attrition**

Treatment variables have been categorised into factors that parents and/or children perceived would have enabled or inhibited them from remaining involved in the treatment intervention (see Figure 5.1).

### **5.5.7 Enabling Factors**

Parents and children perceived that professional support should have been provided at an individual level. They suggested this would have decreased their likelihood of attrition through allowing the treatment deliverer to help families address personal barriers to making and sustaining behaviour changes,

*“I think we really needed one to one family support to allow us to open up about the issues that were getting in the way of making health behaviour changes.”* (Child 8).

Parents perceived that treatment deliverers should have adopted a strict and directive delivery approach, highlighting the potentially serious consequences of child overweight/obesity. They suggested this would have made it ‘hit home’ about the seriousness of their child’s overweight /obesity and the need for them to take a leading role in tackling it,

*“I think they need to be really straight with you as parents when you go to these programmes and say how bad it could be if you don’t make change. I think then I*

*would have sit up and listened and thought right I need to get a grip of this right now!” (Parent 9).*

Parents felt that the treatment intervention should have been structured into phases. They believed this would allow variation in the intensity of the support so it could be reduced gradually until families no longer required professional support. The belief was that this phased approach would also allow the flexibility for families to exit treatment when they felt ready to independently sustain behaviour changes rather than adhering to prescriptive timescales of treatment,

*“I think no one family is going to have the same problems when they are tryna become healthier so if you had like different phases where you could opt out once you felt ready to go this would have been much better.” (Parent 3).*

Parents and children emphasised that schools need to be actively involved in childhood obesity treatment, suggesting healthy lifestyle interventions should be run within schools so that a healthy lifestyle is encouraged for all children irrespective of their weight. Parents felt that the school was a key vehicle to try and work towards normalising rather than stigmatising obese children and their families, to avoid children developing negative attitudes towards taking part in treatment interventions,

*“I think the schools need to take more responsibility and promote healthy living for all kids rather than singling out the overweight ones who then feel different cause kids are cruel so this makes them easy targets.” (Parent 1).*

Parents and children believed if the treatment group were separated into children and parents; boys and girls; and children were grouped with others of the same age this would have increased the likelihood of the group bonding. It was believed this would have reduced the likelihood of attrition,

*“I think the group would have bonded if the children would have been the same age and then (child’s name) wouldn’t have wanted to leave.” (Parent 8).*

Parents and children highlighted that had the treatment intervention of been in a local community centre it would have been more accessible and thus they would have been more likely to keep attending,

*“Even though it wasn’t miles away, the time it was at meant it took a while to get there and it was just a bit awkward sometimes. Like if they could have put it in*

*like a local community centre it could have been something we kept up, it's a shame really.*" (Parent 6).

### **5.5.8 Inhibiting Factors**

Parents and children suggested the limited weight loss in the initial six weeks of treatment had inhibited their motivation to remain in the intervention,

*"I thought I was trying really hard to like be healthy but then only lost like a pound so I just thought what's the point!"* (Child 9).

Parents and children suggested the intervention provided nothing beyond health education. Therefore, they suggested once they had learnt what they needed to, they stopped coming,

*"I think I learnt a little bit more about things like reading food labels and having the right portion sizes but after that nothing much else so I didn't see the point in us coming anymore."* (Parent 4).

Parents suggested they had not found the behavioural techniques within the treatment intervention useful, although they did recognise that goal-setting was helpful in motivating children to make changes (i.e. goal-setting & self-monitoring),

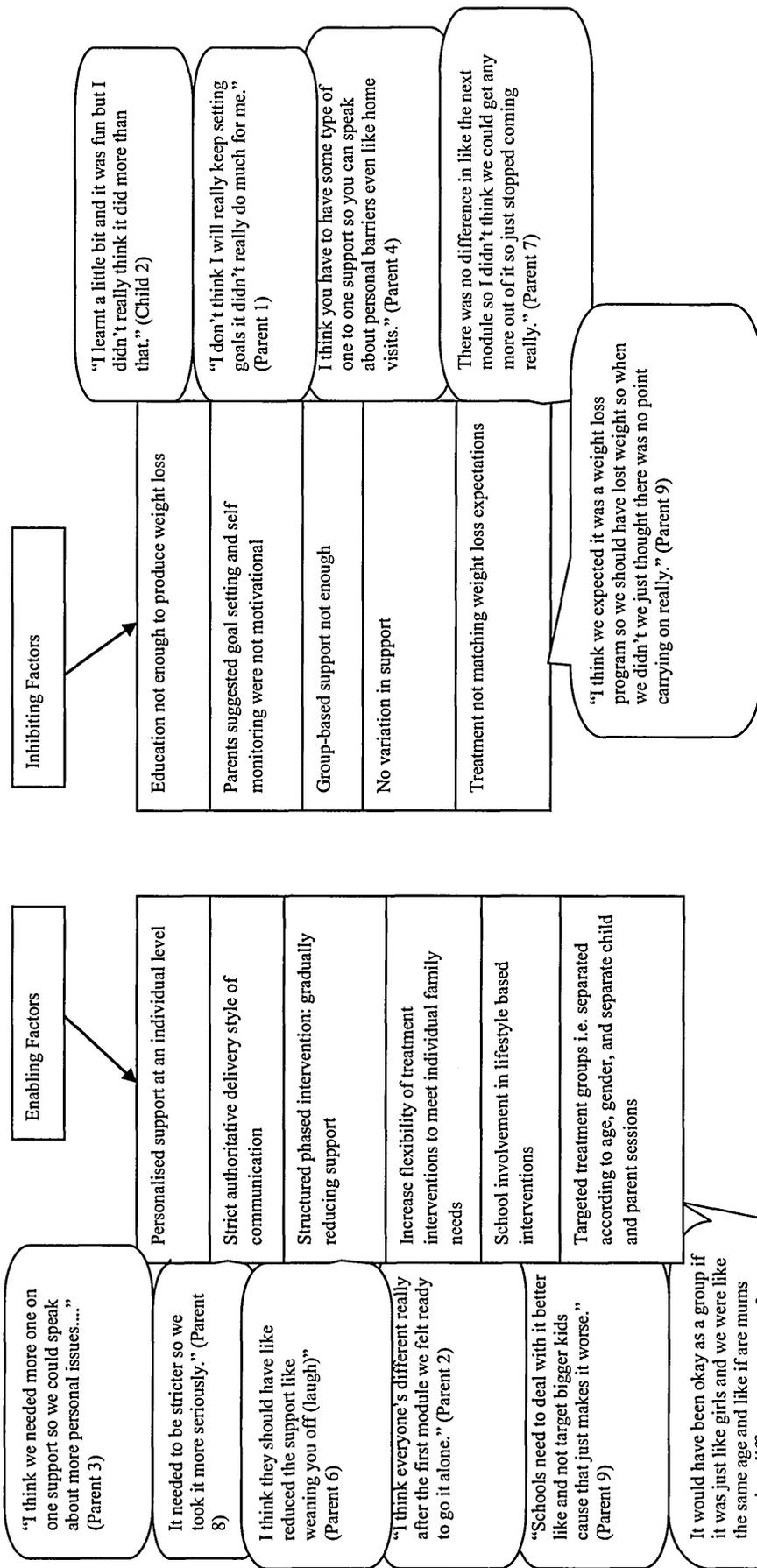
*"I didn't really find it helpful to set goals really it didn't motivate me but I think it was good for the kids cause they really wanted to achieve whatever goal they had set."* (Parent 8).

Conversely, children felt goal-setting was useful to help them focus on what it was they were going to change that week,

*"When like I set myself a goal I really wanted to achieve it so I use to like make sure I wrote down every day whether I had done it in my goals book."* (Child 7).

Children perceived that the treatment was educational and was boring which heightened their negative attitudes towards having a healthy lifestyle. Instead children suggested practical, fun-based learning sessions (so that it felt less like school) would have increased their likelihood of remaining involved in the intervention,

*"If it was more fun it would have made me want to be healthy more but it just felt like school really."* (Child 1).



**Figure 5.1** Enabling and Inhibiting Variables to attending treatment

## 5.6 Discussion

The retention of participants is often recognised as a major challenge for childhood obesity treatment interventions (Luutikhuis et al., 2009). Surprisingly then, attrition in lifestyle-based childhood obesity interventions has rarely been explored in the literature (see Chapter 1). To better understand the determinants of attrition this chapter explored the experiences of parents and children who had dropped-out of a MCTI. It was hoped that such an approach, with an often ignored population, would provide insight as to how best to reduce attrition in future interventions.

The qualitative findings here confirmed the complexity of families' reasons for attrition (Dalle Grave et al., 2005). Congruent with previous findings in the child and adult weight management context, parents and children identified a combination of interacting variables that had led to their attrition from the treatment intervention (Barrett et al., 2008; Cote et al., 2004; Dalle Grave et al., 2005; Grimes-Robison & Evans, 2008; Grossi et al., 2006; Gucciardi et al., 2008; Zeller et al., 2004). The findings are discussed in relation to the major reasons parents and children perceived for their attrition. The chapter concludes providing implications for future research and practice.

### *5.6.1 Psychological and Motivational Variables and their Influence on Attrition*

Psychological and motivational factors including higher weight loss expectations, disappointment with initial small weight losses and a lack, or a reduction in motivation were highlighted as key variables associated with attrition. Findings are congruent with previous research reported in the child and adult weight management context (Cote et al., 2004; Dalle Grave et al., 2005; Grossi et al., 2006; Gucciardi et al., 2008). Although previous studies have emphasised the central role of demographics in predicting attrition (Zeller et al., 2004) (e.g. higher BMI, co-morbidities & ethnicity), findings here suggest psychological variables may play a greater role within attrition. This view is supported by findings taken from the adult weight management context (Honas, Early, Frederickson & O'Brien, 2003).

In line with findings in the adult weight management context, dissatisfaction with small weight losses in the initial phase of the intervention was reported as a major reason for leaving treatment interventions prematurely (Dalle Grave et al., 2005). A possible explanation for families' dissatisfaction with the treatment intervention could

be that families often enter MCTIs with the primary goal of weight loss (Murtagh et al., 2006). However, these expectations are unlikely to be met and are unrealistic given that MCTIs are typically associated with small weight reductions (Luutikhuis et al., 2009). Therefore it is essential that interventions consider how best to ensure families enter interventions with realistic expectations of what is possible within the timescales of treatment. One option could be a pre-treatment phase which helps families manage their expectations and establish realistic treatment goals. Indeed, this approach has shown efficacy in the adult psychotherapy context, in terms of reduced drop-out (Barrett et al., 2008).

Congruent with findings in the adult weight management context (Grossi et al., 2006), parents and children perceived that the costs outweighed the benefits of being involved in the treatment. In turn, this reduced their motivation and influenced their decision to leave the intervention. In line with expert recommendations, this finding highlights the need for interventions to sustain families' motivation throughout treatment interventions (Barlow et al., 2007). Treatment deliverers need to ensure that families continue to believe that the benefits of changing to a healthier lifestyle outweigh the costs. One potential strategy to promote and renew motivation, and has shown promise in the adult weight management context is Motivational Interviewing (MI; Miller & Rollnick, 1991; 2002) (Grossi et al., 2006). Further research is required to assess the usefulness of applying MI in the childhood obesity treatment context (Resnicow et al., 2006). Furthermore, research is needed to assess how interventions can effectively target different families' motivations to be responsive to treatment recipients' needs and try to ensure families do not leave treatment prematurely (Barlow et al., 2007). Lastly, research suggests that careful evaluation of complex interventions could ensure that the benefits outweigh the costs for treatment recipients thus increase the likelihood of them remaining involved in interventions (Mitchell & Selmes, 2007).

Parents and children suggested their attrition was associated with fears over their ability to make, and sustain health behaviour and weight related changes, parallel to findings in the adult weight management context (Cioffi, 2002). A potential explanation for this is that parents and children had a fear of failure i.e. that they would not be able to make and/or adhere to lifestyle changes. Research suggests that MI could also provide an effective strategy to overcome parents and childrens' fears surrounding making behaviour changes (Gance Cleveland & Oetzel, 2010). Further research is

needed to assess how MCTIs can reduce families' fears of making health behaviour changes given that this appears to influence attrition.

### **5.6.2 *Blame Culture***

Parents and children ultimately blamed each other for their attrition from the intervention. Parents' perceived that it was their child's lack of desire to make changes to their eating and PA that had led to their attrition. Their perceptions are congruent with the views of parents in similar childhood obesity treatment settings (Cote et al., 2004; Lindelof, Nielson & Pedersen, 2010). Cote and colleagues (2004) suggest this raises important questions about parents including: (i) do parents regard their child's overweight as a medical threat? (ii) are parents using their child as an excuse to leave treatment? (iii) are parents empowering children with their health decisions instead of taking charge themselves? and (iv) are interventions tailored enough to meet individual families needs? Research is needed to gain further insight into parents' views towards their role in childhood obesity treatment interventions. This would allow future interventions to effectively target parent's motivations for being involved in treatment interventions (Cote et al., 2004).

Conversely, children suggested that it was their parent's unwillingness to actively engage in behaviour change that had a negative impact on their motivation and increased their want to leave the intervention. It is clear that unsupportive parents can be a major barrier to children establishing and maintaining a healthy lifestyle (Amiri et al., 2009; Cote et al., 2004). This emphasises the need for parents to be actively involved in making behaviour change efforts and recognising their role as the primary agent of change (Golan & Crow, 2004; Spurrier et al., 2008). To avoid this blame culture, future interventions need to encourage children and parents to take responsibility for their role in addressing their own, or for parents, their child's obesity. Families should be encouraged to work together to create a home context that supports a healthy lifestyle (Lindelof et al., 2010).

### **5.6.3 *Attitudinal/beliefs and their Influence on Attrition***

Parents' lack of concern or acknowledgement of their child's overweight is congruent with previous research suggesting that parental recognition of their child's obesity is commonly reported to be low (Parry, Gopalakrishnan, Parry & Saxena, 2008). This lack of recognition might explain why parents did not prioritise their attendance at

the treatment intervention and their subsequent attrition. Research suggests parents who place greater importance on addressing their child's weight report greater readiness to change and engage better in treatment interventions (Cobb, 2011). Treatment interventions need to make parents realise the seriousness of the health risks of their child's overweight to ensure that they engage and adhere to behaviour change attempts (Ward-Begnoche & Speaker, 2006). This is particularly important given the central role parents seem to play in families' eventual decision to exit treatment interventions.

Negative attitudes towards having a healthy lifestyle were expressed by children and parents and influenced their decision to drop-out from the treatment intervention. Previous research has reported similar negative perceptions towards healthy eating (Hart, Herriot, Bishop & Truby, 2003; Kearney & McElhone, 1999), and towards PA (Burrows, Eve & Cooper, 1999). Clearly treatment interventions need to tackle negative perceptions towards having a healthy lifestyle in order to reduce attrition. Treatment interventions need to raise children's and parents awareness that eating healthily and being physically active does not have to be boring but can be enjoyable and fun (Burrows et al., 1999).

Children suggested that the media pressures to be healthy heightened their resistance to making health behaviour changes and influenced their want to exit the treatment intervention. There is little evidence regarding the potential downside to health promotion campaigns in the media. Further research is needed to evaluate and assess the potential negatives of intensive health promotion campaigns. Alternatively, parents suggested the media added to the pressure created through today's 'obesogenic' environment to be unhealthy. Research concurs with parents' views suggesting that there is a relationship between unhealthy food advertisements and children's food choices and moreover children can influence parents regarding what they want to eat and what foods they choose to buy (Hastings et al., 2003). In line with parents suggestions, the World Health Organisation (WHO, 2003) argue there needs to be tougher restrictions for food adverts to address childhood obesity on the basis that exposure to fast food adverts encourages children to eat unhealthily (WHO, 2003).

Parents and children expressed different motivations to attending treatment interventions. For children it was primarily about losing weight, whilst for parents it was about improving their child's health, confidence and helping their child to make friends. Parents and children's motivations to attend treatment are clearly different thus

need to be targeted differently in treatment interventions (Barlow et al., 2007). For example, focussing on the potential health consequences might motivate parents yet health consequences might be too far in the distance to resonate with children and a different approach might be necessary to engage and motivate children (Hart et al., 2003).

#### ***5.6.4 Interpersonal Variables and their Influence on Attrition***

Children and parents reported that the lack of a strong bond between participants meant that the group had not provided a support network. This suggestion concurs with findings in the adult health behaviour change context (Cioffi, 2002). Expert recommendations, suggest that to increase the likelihood of groups bonding thus providing a social support network for families, interventions should be held within local communities and group children according to small age bands (Barlow et al., 2007).

Children emphasised their parents and families were the major sources of support needed for sustained involvement in treatment interventions and behaviour change efforts. Parents can influence children's health behaviours in numerous ways i.e. parental feeding practice, parental role modelling and parental influence on the physical home environment (Golan and Weizman, 2001; see Chapter 4). Parental support, and support from the family unit specifically in terms of actively engaging in health behaviour changes is considered vital for successful behaviour changes in children (Spurrier et al., 2008; Verheijden et al., 2005). Findings here reiterate the importance of actively engaging the whole family in behaviour change/ treatment process to facilitate the obese child's attempts to change their behaviours in the long-term and reduce the likelihood of attrition (Golan & Crow, 2004).

#### ***5.6.5 Environmental Variables and their Influence on Attrition***

Parents and children believed the school referral process to the treatment intervention (i.e. via the National Child Measurement Programme) led children to feel singled out and contributed to the stigma attached to obese children. Worryingly, attaching stigma to obesity in young people has been shown to be a barrier to effective intervention (Puhl & Latner, 2007). To overcome this, parents and children suggested running interventions in the school environment. Research suggests that the school environment should be considered as an appropriate context to deliver treatment

interventions (Hesketh et al., 2005). Moreover, there is evidence to suggest that engaging children in MCTIs from a young age, through the school environment could contribute to reducing the stigma felt by obese children (Turner & Savaser, 2010). The recent Cochrane review of interventions to prevent childhood obesity emphasised the need for the school curriculum to incorporate education around healthy eating, the importance of PA and having a healthy body image (Waters et al., 2011). Therefore future MCTI's should consider the potential for school curriculum to promote healthy lifestyles for all (i.e. healthy eating, PA & healthy body image). Addressing such issues within the school environment could reduce the stigma attached to overweight children and reduce the likelihood of attrition.

Children considered the home environment as the most important influence over their health behaviours. Children felt that when their home was unsupportive of health behaviour changes this influenced their decision to exit treatment prematurely. As highlighted previously (see Chapter 4) MCTIs have rarely incorporated the home environment into interventions despite this being acknowledged as a key context bearing influence on childhood obesity (Golan & Weizman, 2001). Whilst this represents a significant strength of the study, further research is required to assess the value of incorporating the home setting into MCTIs and to assess whether this can contribute to reducing attrition.

### ***5.6.6 Treatment Variables***

#### ***5.6.6.1 Enabling Factors***

Consistent with views from the adult weight management setting, parents and children suggested treatment primarily needs to develop families' confidence to make and sustain health behaviour changes (Cioffi, 2002). Self efficacy to maintain behaviour changes and to achieve a set weight goal were recognised as important enabling/facilitating factors to maintaining contact with an adult weight management programme (Cioffi, 2002). MCTIs need to encourage strategies to promote self efficacy for healthy eating and PA which could contribute to improving retention.

Parallel to adults' views in the adult weight management context, parents and children suggested MCTIs need to be flexible to each individual family's needs (Cioffi, 2002). Families should be free to exit treatment at whatever stage they feel ready to independently sustain health behaviour changes (Skelton & Beech, 2010). Parents and

children went on to suggest that the dose of treatment, length of intervention and delivery mode (i.e. in group settings or individual sessions) should be specific to individual family needs. Research in the adult diabetes treatment context has highlighted the importance of interventions being flexible to recipients' needs. This could include incorporating a range of delivery methods (e.g. telephone contact, home visits, internet contact), varying the length of the treatment and varying the intensity of professional support throughout the intervention. In doing so, this might improve the retention of participants (Gucciardi et al., 2008). For example, one parent and child suggested they had exited treatment prematurely as they were confident they could maintain their behaviour changes without professional support and did not perceive themselves as drop-outs. Therefore for this family a shortened version of the treatment intervention was sufficient enough to promote behavioural changes. Similarly in the adult weight management context, adults who were identified as drop-outs suggested they had not dropped out but were capable of maintaining their weight management efforts alone (Grossi et al., 2006). This finding reiterates the importance, and the need to tailor treatment interventions to individual family needs (Barlow et al., 2007) and perhaps to have clearer definition of what or how 'drop-out' is characterised in terms of treatment interventions.

#### *5.6.6.2 Inhibiting Factors*

Parents and children considered the limited weight loss in the initial phase of the treatment intervention as a major factor inhibiting their continuation. Findings are congruent with those in other childhood obesity treatment interventions and in the adult weight management context (Cote et al., 2004; Dalle Grave et al., 2005; Grossi et al., 2006; Gucciardi et al., 2006). This reiterates the need for MCTIs to manage unrealistic expectations from the outset. It also highlights the potential for families' achievement of weight reductions to harness their motivation in the initial phase of treatment. Therefore a more intensive initial phase of treatment could encourage greater weight reductions and reduce the likelihood of attrition (NOO, 2009).

Parents and children perceived that the intervention had only provided education regarding PA and healthy eating and that this was not enough to sustain their involvement in treatment. Treatment interventions need to move beyond education to develop families' confidence to make and sustain behaviour change and reduce the

likelihood of attrition (Murtagh et al., 2006). Despite children being satisfied with the behavioural strategies employed, including goal-setting and self-monitoring, parents suggested these strategies had not helped motivate them to make behaviour changes. This suggests that different approaches might need to be taken to motivate parents and children to change their health behaviours. Perhaps for parents it is important to concentrate on raising their awareness of the seriousness of childhood overweight and the important role they need to play in tackling it (Golan & Crow, 2004; Spurrier et al., 2008). For children it appears to be more about changing their attitudes, making PA and healthy eating fun and enjoyable so they want to engage in a healthier lifestyle.

Children and parents suggested that difficulties getting to the treatment venue had influenced their attrition. Practical variables have commonly been reported as contributing to participant attrition in the adult and child weight management context (Dalle Grave et al., 2005; Grossi et al., 2006; Zeller et al., 2004). This highlights the importance of locating MCTIs within community settings that are convenient for families to access.

#### ***5.6.7 Implications for Practice***

Practitioners need to assess families' outcome expectations of MCTIs and their preparedness and willingness to change. This is, so that families with unrealistic expectations, fears regarding change or, those lacking in motivation, can be identified and issues addressed prior to treatment. Evidence here suggests this might reduce the likelihood of attrition. Strategies other than face to face support should also be considered during the follow-up phase of treatment. This could include telephone follow-ups or, text and email services. Developing online communities to support families in MCTIs should be considered as a potential strategy to reduce attrition. Such an approach would provide an ongoing support network to facilitate the maintenance of health behaviour change which has been proven as an effective strategy in reducing drop-out in an adult, internet mediated walking programme (Richardson et al., 2010).

Professionals should work with children and parents to set manageable, realistic goals at the start of treatment. An exploration of parents and children's motivations/reasons for initiating treatment might also help increase the likelihood of meeting all participants' needs. In turn this could increase the possibility of them remaining in treatment for the duration. Practitioners must highlight to parents the

potential negative consequences and thus the importance of addressing and taking greater responsibility in prioritising their child's weight. From the child's perspective, data here suggests the parental modelling of healthy behaviours would be one approach to achieve this.

#### **5.6.8 *Implications for Research***

MCTIs need to assess participant satisfaction and be responsive to families' needs to ensure they are satisfied with the treatment process. Research is needed to assess the potential for strategies to reduce attrition that have been successful in other adult health contexts. For example, incorporating a pre-treatment phase to manage client's expectations to ensure families have realistic expectations of what they can achieve from MCTIs (Barrett et al., 2008). Given that motivational variables emerged as major factors influencing attrition, the use of MI strategies should be further investigated in the childhood obesity treatment context (Resnicow et al., 2006). This appears particularly salient in light of the success of applying MI to maintain and renew motivation in the adult weight management context (Grossi et al., 2006; West et al., 2010).

Research needs to consider different approaches to referring overweight/obese children from the NCMP within schools to child weight management services. This could reduce the likelihood of overweight/ obese children gaining negative perceptions of treatment interventions from the outset thus could decrease the possibility of their attrition. Research is needed to test the value of incorporating the home setting into treatment interventions as parents and children suggested the importance of modifying the home environment to support a healthy lifestyle. This finding is in line with previous research suggesting the importance of a supportive home context for health behaviours (Fulkerson et al., 2010; Spurrier et al., 2008).

Potential for innovative strategies to deliver personalised aspects of support and ongoing support including internet mediated, and telephone support should be further investigated. These methods could offer cost effective, less time consuming means of providing personalised guidance and a support network for children who perceive their family to be unsupportive and could contribute to reducing attrition (Richardson et al., 2010). Continued qualitative research to uncover the perceptions of parents and children towards attrition will ensure interventions are better equipped to tailor treatment to

families' needs in the future (Cote et al., 2004). Finally, it seems appropriate that researchers are encouraged to explore the value of structuring treatment into phases and varying the intensity and mode of support in an attempt to reduce attrition.

### **5.6.9 Limitations**

A number of limitations were identified in the present study. There are factors that have been reported to predict attrition (e.g. higher BMI status, ethnicity & SES) that were not examined here. That said, it was not the purpose of this study to uncover the variables that predict attrition but to gain a greater insight into families' reasons for attrition. Given that parents and children's' reasons for attrition were similar irrespective of when they had dropped out (i.e. in the initial phase or follow-up phase), no attempt was made to examine potential differences between early and late drop-outs. Although the views of parents and children in this study were similar to those previously reported from MCTIs in clinical settings (e.g. Cote et al., 2004), the results might not be generalisable to interventions offered in other settings (e.g. clinical settings) with different child populations (e.g. preschool children). Also, one parent and child suggested they did not perceive themselves as having dropped out, thus research needs to consider categorising drop-outs according to families' reasons for leaving treatment rather than one homogenous group. As highlighted in Study 2 (see Chapter 3), the open-ended nature of this qualitative approach, means it is possible that the researcher's own views, conflicts and prejudices might have influenced the themes that were subsequently identified. An attempt was made to minimise this by involving two post-doctoral researchers in the review process. This meant that where discrepancy occurred, a consensus could be reached. Although a purposeful sample was gathered, it is acknowledged that the actual make up of the sample in terms of the parents and children involved was partly determined by convenience. Again, as in Study 2 (see Chapter 3) the researcher could not be certain that 'saturation' was achieved yet given the time constraints and that no new themes or subject matters appeared to emerge towards the last interviews, 20 interviews was deemed an appropriate amount.

## **5.7 Chapter Summary**

This qualitative study aimed to better understand attrition from MCTIs so that future interventions are equipped to meet families' needs and therefore improve retention. The results confirm that attrition is a multifaceted and complex construct

whereby participant's (in this case parents & children) pre-treatment characteristics interact with treatment variables to influence the decision to leave treatment prematurely (Cote et al., 2004; Dalle-Grave et al., 2005). Given the complexity of reasons that children and parents voiced for their attrition this highlights the difficulties health professionals face in their attempts to treat childhood obesity.

Findings here also suggest that children and parents have a tendency to blame each other for their attrition, particularly regarding a lack of motivation to lose weight and change behaviour. This is important as it highlights a need for interventions to encourage parents to take responsibility for providing a supportive environment for health behaviours and to facilitate weight reductions in their children. Concurring with research findings in the adult weight management context (Dalle Grave et al., 2005; Gucciardi et al., 2008) psychological and motivational factors (i.e. initial weight loss not matching expectations, reduction in motivation, & perceived costs outweighing the benefits) appeared to be strong influencers on attrition. Findings reiterate the requirement for interventions to be tailored to the needs of the individual/family and place the participant at the centre (Barlow et al., 2007). This chapter contributes to the limited evidence base regarding families' reasons for attrition. Further qualitative work should be conducted to explore these issues in greater depth so that the needs of treatment recipients can be better met in future interventions.

# **Chapter 6**

## **Synthesis, Recommendations and Conclusions**

## **Chapter 6: Synthesis, Recommendations and Conclusions**

### **6.1 Chapter Purpose**

Childhood obesity in the UK is a serious public health concern. The Health Survey for England (2010) revealed that 33.6% of children in year six are either overweight or obese and 22.6% of children in reception year are either overweight or obese (HSE, 2010). There is considerable evidence that childhood obesity is linked to numerous long-term and immediate health consequences (NOO, 2009). Developing effective and sustainable intervention options is vital to avoid serious health consequences later in life (NICE, 2006). Moreover, to establish a downward trend in the prevalence of excess weight in children, sustainable treatment is vital (Department of Health, 2011).

The aim of this thesis was to advance knowledge regarding the sustainability of outcomes from multi-component childhood obesity treatment interventions (MCTIs). To achieve this, the thesis explored the following research questions 1) to what extent can the outcomes from a MCTI be sustained through use of a maintenance intervention? 2) what are the determinants of drop-out and retention in MCTI's? and 3) does increasing stakeholder involvement in the design of treatment interventions improve outcomes and programme adherence? The purpose of this chapter is to:

- Present a synthesis of the key findings
- Discuss the implications of the findings for future practice and research
- Provide a conclusion to the thesis
- Provide a reflection on the research process

### **6.2 Synthesis of Findings from Study 1, 2, 3A and 3B (Chapters 2 -5)**

Having critically reviewed the research evidence in Chapter 1, Chapter 2 (Study 1), a systematic review of MCTIs in the childhood obesity context was carried out to identify current limitations and gaps in the literature (Staniford et al., 2011). Acknowledging recommendations from Chapter 2 (Study 1), Chapter 3 (Study 2), detailed a qualitative inquiry into stakeholders' views towards a MCTI, particularly their views on the maintenance of behaviour changes (i.e. PA & healthy eating) and weight related outcomes. Chapter 4 (Study 3A) reports the pilot study to test the

efficacy of a maintenance intervention to sustain treatment outcomes which was informed by stakeholder opinion (Chapter 3), underpinned by Self Determination Theory (SDT: Deci & Ryan, 1985, 2000) and incorporated Motivational Interviewing (MI: Miller & Rollnick, 1991; 2002) and cognitive behavioural strategies. In light of expert recommendations (Bellg et al., 2004; Breckon et al., 2008) and findings from Chapter 2, the pilot study reported treatment fidelity (TF) of the intervention (MI) alongside weight related, behavioural and SDT related outcomes. The aim of evaluating TF was to identify whether the intervention was delivered and received as intended. Chapter 5 (Study 3B) detailed a qualitative study that aimed to explore parents and children's reasons for attrition from a MCTI. This was considered important given the high attrition reported in the literature (Chapter 2) and in light of recruitment difficulties and attrition encountered with the maintenance intervention (Chapter 4). The key findings from the four studies that comprise this thesis are as follows.

### ***6.2.1 Synthesis of findings from Chapter 2 (Study 1)***

The systematic review detailed in Chapter 2 (Study 1) revealed that MCTIs incorporating a physical activity (PA), healthy eating and behavioural component, and encouraging family involvement (i.e. presence of at least one parent at the intervention) appeared to provide the most promising approach to childhood obesity treatment, providing positive outcomes in the short-term (Luutikhuis et al., 2009; Whitlock et al., 2010). However, only a small number of studies reported positive long-term treatment outcomes (i.e. >12 months). As such, there is limited understanding of how best to sustain MCTI outcomes. Other common limitations identified in MCTIs included the retention of participants, little use of theory in the design of interventions and virtually no consideration of TF.

Limitations identified were consistent with previous reviews (Luutikhuis et al., 2009; Whitlock et al., 2010). Chapter 2 (Study 1) concluded; future interventions should provide a fuller account of their theoretical underpinning and detail the fidelity of the specific counselling intervention employed (e.g. cognitive behavioural approach, MI based approach) more clearly in order that effective interventions can be accurately replicated (Breckon et al., 2008; Resnick et al., 2005). Stakeholders' views towards treatment should also be better incorporated into the design of interventions with a view to improving programme adherence, reducing drop-out, and leading to sustained

outcomes from treatment. Informed by these recommendations, Chapter 3 (Study 2) provided a qualitative inquiry into stakeholders' views towards MCTIs, specifically the maintenance of treatment outcomes.

### ***6.2.2 Synthesis of Findings from Chapter 3 (Study 2)***

Using in-depth semi-structured interviews Chapter 3 (Study 2; Staniford et al., 2011) highlighted a discrepancy between the views of treatment recipients and treatment deliverers' regarding the maintenance of health behaviour change (i.e. PA & healthy eating). Parents and children (i.e. treatment recipients) reported little confidence in their own ability to transfer and sustain health behaviour change into their 'real lives' i.e. their home context. As such, the desire for ongoing professional support was common and deemed necessary to maintain health behaviour and weight related changes. Conversely, health professionals suggested that ongoing support would be unrealistic on the basis of cost effectiveness, with the consensus view that the majority of families would simply 'drop-out'. Instead, health professionals suggested treatment interventions needed to create autonomous individuals who exit treatment and independently sustain behaviour change and weight related outcomes. These findings concurred with research in the adult healthcare and mental health context, reporting incongruence between patients and healthcare professionals view of treatment (Pellatt, 2007; Pryor & O'Connell, 2008). To close the gap between treatment recipients and treatment deliverers' views towards childhood obesity treatment (Pellatt, 2007), an intervention was applied to examine how maintenance strategies could be employed to develop participant's autonomous motivation and confidence to sustain health behaviour change and weight related outcomes in their 'real lives'.

### ***6.2.3 Synthesis of Findings from Chapter 4 (Study 3A)***

With this in mind, Chapter 4 (Study 3A) reports the pilot study applied to test the efficacy of a maintenance intervention to improve children's ability to sustain health behaviour, and weight related changes following participation in a MCTI. It was considered key to develop the intervention in line with relevant theoretical underpinnings (MRC 2000; 2008). Therefore, the maintenance intervention was underpinned by SDT (Deci & Ryan, 1985; 2000) and in recognition of stakeholders' views as outlined in Chapter 3 (Study 2). MI was incorporated into the intervention alongside cognitive behavioural strategies to promote facets of SDT, specifically

autonomous motivation and perceived competence. Research supports the use of MI and cognitive behavioural strategies to promote more autonomous motivations and to enhance perceived competence for behaviour changes (West et al., 2010). The fidelity of the maintenance intervention was also assessed to address the limitations of previous research (see Chapter 2). The results suggested that children in the maintenance intervention successfully maintained behavioural change (i.e. PA & healthy eating) and weight related outcomes at six month follow-up. Improvements in behavioural and weight related outcomes were associated with improvement in children's autonomous motivation, perceptions of an autonomy supportive treatment context and perceived competence for PA and healthy eating behaviours. These findings are consistent with research in the adult weight management and behaviour change contexts supporting the use of SDT to promote the maintenance of behavioural outcomes (e.g. Fortier et al., 2007; Williams et al., 1996; 2002; 2006).

These findings provide initial support for the use of SDT as a relevant theory to underpin maintenance strategies in the childhood obesity treatment context. Furthermore the findings provide preliminary support for the use of MI as part of MCTIs to promote more self determined motivation in the childhood obesity treatment context. Findings from the maintenance intervention were also congruent with qualitative data reported in Chapter 3 (Study 2) suggesting the need for MCTIs to promote participant's autonomous motivation and confidence to independently maintain behavioural and weight related outcomes (see Chapter 3). In line with findings in the adult weight loss maintenance context, results here suggest taking a motivation focussed approach in interventions could provide an effective strategy to improve the sustainability of weight related, and behavioural outcomes (West et al., 2010). Findings support the potential for cognitive behavioural strategies (e.g. self-monitoring, goal-setting, problem solving & promoting independent choice making) to promote sustained behavioural changes and weight related outcomes (Braet et al., 2004; Vignolo et al., 2008).

Results of the maintenance intervention in Chapter 4 also provided support for stakeholders' views in Chapter 3 (Study 2) suggesting the importance of a supportive home environment in sustaining behavioural change and weight related outcomes. Incorporating the home context into the maintenance intervention appeared to offer children the opportunity to modify the home and facilitate the transfer of health

behaviours into their 'real lives'. Children's views in Chapter 3 (Study 2) also emphasised the importance of parents taking the lead in creating this supportive home context particularly by acting as a healthy role model.

Findings support research demonstrating the value of home-based sessions to improve children's healthy eating in the prevention of childhood obesity (Fulkerson et al., 2010). Findings are congruent with the ecological viewpoint which recognises the home environment as an influential context over a child's weight (Davison & Birch, 2001, Golan & Weizman, 2001). From an ecological perspective then, the home environment, and other social contexts in which a child regularly interacts (e.g. the school, other family members & caregivers homes & the local community) must be modified to support health behaviour change. Without changes in one or all of these environments it is likely to be very difficult for a child to maintain health behaviour change (Davison & Birch, 2001). This suggests barriers to children's PA, healthy eating and healthy weight must be addressed at all levels of the ecological model (i.e. individual, school, community & national level). There is evidence from this thesis that doing so, can increase the likelihood of children being able to sustain health behaviour change and weight loss maintenance which is encouraging. However, larger scale longitudinal trials incorporating long-term follow-up (>12 months) and a robust research design are required to establish the strength of this assertion.

In terms of the assessment of TF in the maintenance intervention, corrective feedback from the audio recorded session highlighted the importance of ongoing supervision as part of treatment deliverers training in order to ensure they reach the level of competence in their delivery of MI (Miller et al., 2004). The positive feedback regarding the researcher's use of autonomy/support, empathy and collaboration (i.e. global dimensions of MI) alongside participants positive perceptions of an autonomy supportive treatment climate provides support that the MI aspects of the intervention were delivered and received as intended and reported (Bellg et al., 2004). The delivery of behavioural change techniques in line with definitions proposed in the taxonomy of behaviour change techniques could enhance the replicability of the maintenance intervention (Abraham & Michie, 2008; Michie et al., 2011). Reporting of TF improved the reproducibility of the maintenance intervention which is encouraging for practitioners who might want to replicate effective interventions (Resnick et al., 2005). Furthermore, the assessment of TF is crucial in the piloting phase of interventions to

identify what works and what does not in order to refine the intervention (Barownoski et al., 2009).

A number of limitations were identified in the piloting of the maintenance intervention (see Chapter 4). These included the lack of validated measurement tools to assess SDT variables in children and the researcher's competence in MI (i.e. MITI: Moyers et al., 2005), reliance on subjective measures of behavioural outcomes (i.e. self report of PA & healthy eating), small sample size, limited uptake of ongoing support and families dropping out prior to taking part in the maintenance intervention. Problems with recruitment suggest that despite families' calls for ongoing support (see Chapter 3) the majority of families did not want to commit to the six week maintenance intervention. Furthermore a number of families dropped out prior to starting the maintenance intervention, reiterating problems around the retention of participants in treatment interventions, particularly in the long-term (Chapter 2). Findings are congruent with health professionals' views voiced in Chapter 3 (Study 2) who suggested in reality the majority of families would be unlikely to commit to ongoing support.

#### ***6.2.4 Synthesis of Findings from Chapter 5 (Study 3B)***

In light of the findings in Chapter 4, Chapter 5 detailed (Study 3B) a qualitative study designed to explore children and parents' reasons for attrition, and factors they perceived would have reduced the likelihood of their drop-out. Findings confirmed the complexity of families' reasons for attrition (Cote et al., 2003). Psychological and motivational factors (i.e. the child and/or parent had limited motivation or readiness to change) were the major reasons for drop-out. This provides further support for taking a motivational focus to MCTIs similar to the SDT based approach to the maintenance intervention (Chapter 4) and research in the adult weight maintenance literature (West et al., 2010).

Children and parents primarily blamed each other for their attrition from the MCTI. For children, they blamed their parents' lack of motivation to change their own health behaviours and act as good role models. Whereas parents blamed their child's lack of desire to make health behaviour changes. Treatment not meeting initial expectations (i.e. weight loss expectations); the perceived costs outweighing the benefits of a healthy lifestyle; negative attitudes towards a healthy lifestyle and parents lack of recognition of their child's overweight as a problem were also significant factors voiced

for attrition. Findings were congruent with previous studies of attrition in the childhood and adult healthcare context (Cote et al., 2003; Dalle Grave et al., 2005; Gucciardi et al., 2008).

Qualitative data in Chapter's 3 and 5 revealed that incongruence was common between stakeholders regarding the best approach to achieving sustainable outcomes from MCTI's and how to improve participant retention. As highlighted previously, this incongruence between treatment patients and health professionals has been seen in other adult healthcare contexts (Lester, 2005; Pellatt, 2007; Pryor & O'Connell, 2008). Indeed, Pellatt (2007) highlighted that the lines of communication between stakeholders need to be improved in attempt to enhance congruence and improve working relationships between treatment recipients and deliverers within interventions. Qualitative data here (Chapter 3 & 5) highlights the potential value of considering key stakeholders' views in the design, implementation and evaluation of interventions (MRC, 2008).

#### ***6.2.5 Summary of the Synthesis of Findings from the Four Studies***

Collectively, findings from Chapters 2 to 5 emphasised that for treatment to be responsive to diverse family needs MCTIs need to involve an individualised element. The systematic review detailed in Chapter 2 (Study 1) support these results suggesting that a number of MCTIs involving a personalised element demonstrated sustainable results. For example, Fennig and Fennig (2006) developed personalised PA and dietary plans for children and Reinehr et al. (2006) provided individual psychological care for children. Both these studies displayed sustained weight loss in up to four year follow-ups. Results here appear to support the value of tailoring treatment, and remaining flexible to individual families' needs in line with expert recommendations (Barlow et al., 2007).

The review in Chapter 2 (Study 1) revealed that taking a phased approach (i.e. gradually reducing the intensity and dose of professional support) to treatment could offer a strategy to enhance the flexibility of MCTIs to different families' needs (e.g. Braet et al., 2004). Qualitative data in Chapter 5 support this finding as parents and children suggested treatment should be flexible so that families can exit treatment when they feel ready, rather than having a prescribed length to treatment for all, irrespective of individual factors and motivation. The consideration of stakeholders' views (see

Chapter 3 & 5) could improve the specificity and sensitivity of MCTIs allowing treatment to be tailored to individual families' needs.

### **6.3 Implications from this Thesis**

The implications for practice and research from each of the four studies in this thesis have already been considered on an individual basis (see Chapters 2 to 5). Therefore the following section will provide a synopsis and consider the implications for practice and research from the thesis as a whole. This will allow consideration of the implications from the four studies collectively in light of the original aims of the thesis (see Chapter 1) which was ultimately concerned with improving the sustainability of outcomes from MCTIs.

#### **6.3.1 *Implications for Practice***

Findings from Chapters 2 to 5 highlight that intervention protocols might be enhanced by incorporating an individualised element whereby diverse family needs can be addressed. Practitioners should be encouraged to assess children's and parents' expectations, motivations and preferences for treatment acknowledging this could allow them to be responsive to their changing needs throughout the intervention. Practitioners should consider delivering cognitive behavioural strategies such as goal-setting, action plans, problem solving, encouraging child decision making in line with definitions provided in the taxonomy of behaviour change techniques (Michie & Abraham, 2008; Michie et al., 2011) in order that they can evaluate their competency in delivering the proposed techniques. Qualitative data here (see Chapter 3 & 5) suggests that for parents, it is important that they realise the seriousness of their child's overweight and their need to take a leading role as a healthy role model and creating a home context to support health behaviour changes. For children, practitioners should consider strategies to make healthy lifestyle changes appealing to them so they are motivated and develop personalised reasons for wanting to become healthier. This could include providing fun PA opportunities, teaching children how to cook and bake healthy tasty food and setting goals for PA and healthy eating to challenge children.

Chapter's 3 and 4 demonstrate the importance of autonomy and perceived competence in the maintenance of behavioural change and weight related outcomes from MCTI's. Practitioners should consider creating an atmosphere that supports a child's and their family's autonomy and promotes their confidence to sustain their

behavioural changes and weight related outcomes. Practitioners might consider training in MI as a potential strategy to encourage more autonomous motivations, improve the client centeredness of interventions and could contribute to individualising treatment. MI might also be a potential strategy to help parents resolve any ambivalence regarding the seriousness of their child's weight. This could improve parents' motivations to make health behaviour changes through helping them acknowledge the importance of addressing their child's weight. Evidence from the adult weight management context supports taking a motivational focus to weight maintenance, incorporating MI as a strategy to elicit and support personally motivated reasons for weight management as a strategy to promote sustained autonomous motivation for behavioural changes (West et al., 2010). Furthermore adopting an MI style can contribute to creating an autonomy supportive treatment climate to improve client's autonomy and competence in their ability to maintain behavioural changes (see Chapter 4; Flaherty, 2006). Where practitioners decide to incorporate MI into childhood obesity treatment, a key issue to consider is adequate training and assessment/evaluation to ensure MI is delivered competently (Breckon et al., 2008). Personal reflections made as the deliverer of the maintenance intervention detailed in Study 3A (see Chapter 4) highlighted the importance of establishing a rapport with families within the first weeks of a MCTI. This is particularly important as it can allow practitioners to gauge families' motivations and the likelihood of them remaining involved in the intervention. This might also offer the opportunity to allow practitioners to respond to the changing needs and motivations of families throughout MCTIs.

In light of qualitative data in Chapters 3 and 5, practitioners should consider including an orientation/ pre-treatment session to manage unrealistic expectations and to assess families' motivations for treatment. Research has suggested the inclusion of an orientation session can reduce the likelihood of attrition and improve treatment outcomes (Germann, Kirschenbaum & Rich, 2006). This pre-treatment phase might offer the opportunity to improve families' motivations to change which could in turn increase the likelihood of them engaging in treatment. Germann et al. (2006) suggest that an orientation/ pre-treatment session should detail the structure of the programme, expected behavioural and attitudinal requirements for families to help align their expectations of the intervention with health professionals and should assess families' motivations to identify those ready to make changes.

Collectively, results from the four studies suggest the need for MCTIs to be flexible to diverse family needs. One potential strategy showing promise in making MCTIs more flexible is taking a phased approach to treatment i.e. reducing the intensity and dose of professional support and the mode of treatment support (i.e. group, individual or internet-based) (Chapter 2).

### ***6.3.2 Implications for Research***

Whilst this thesis has addressed a number of research questions, the process has generated further issues that need to be addressed. Moreover, the findings from the four studies have implications for improving the design, implementation, evaluation and reporting of future MCTIs. Future qualitative work should attempt to engage a wider range of stakeholders in the design, implementation and evaluation of MCTIs including General Practitioners (GPs) given that they might be the commissioners of future programmes in this context. To ensure accurate evaluation of MCTIs, the fidelity of the intervention needs to be reported fully i.e. the fidelity to theory, provider training, implementation, treatment receipt and enactment (Bellg et al., 2004; Breckon et al., 2008). Future MCTIs need to be underpinned by relevant theory (MRC, 2000; 2008). Stakeholders' views should be considered in the design of MCTIs in attempt to develop more client centered treatment (MRC 2000; 2008). Pilot studies should be conducted in order to test the efficacy of MCTIs on a smaller scale and refine interventions before implementing as a large scale RCT (Barownoski et al., 2009; MRC, 2008). To ensure researchers can assess the sustainability of interventions, where possible interventions need to report treatment outcomes beyond 12 months. Whilst there is some evidence of studies that have done this, (e.g. Braet et al., 2004; Epstein et al., 1990; 1994; Vignolo et al., 2008) further work is still required.

In terms of future research directions, further research is required to test the value of incorporating an orientation/pre-treatment session prior to MCTIs as a strategy to reduce attrition and improve treatment outcomes. A large scale RCT is required to test the value of a SDT based intervention, given the positive findings of the pilot study (see Chapter 4). Further research is needed to test the efficacy of using MI within childhood obesity treatment interventions given the promising results in the adult weight maintenance context (West et al., 2010). Further qualitative research with families of children who have successfully maintained behavioural change and weight

related outcomes is required. This will provide alternative perspectives and add to the opinion and views of stakeholders presented in this thesis. It is likely that this would provide much needed insight into factors related to the maintenance of treatment outcomes in the childhood obesity context (Ogden et al., 2006). Further qualitative research is also required with families involved in treatment interventions in clinical settings and with diverse samples including populations identified at increased risk of obesity including Asian ethnic groups and low socioeconomic status. This will allow identification of their specific needs in order to tailor MCTIs to their specific cultural and/or diverse needs (Barlow et al., 2008).

Findings from Chapters 3, 4 and 5 suggest the potential value of incorporating the home environment into MCTIs. The evidence here suggests that having home-based sessions allows the opportunity to modify the home environment to support health behaviour changes and thus increase the likelihood of achieving sustained behavioural changes and weight maintenance. Preliminary evidence from a childhood obesity prevention programme supports the feasibility of a home-based intervention to improve health behaviours e.g. increase fruit and vegetables consumption (Fulkerson et al., 2010). Further research is required to test the value of incorporating the home setting within MCTIs in attempt to improve the sustainability of MCTIs.

In light of the qualitative comments provided by children and parents participating in the maintenance intervention in Study 3A (see Chapter 4) alongside personal reflections as the deliverer of the maintenance intervention, this experience highlighted the importance of incorporating qualitative data alongside quantitative data. Qualitative data can compliment quantitative data as part of a thorough process evaluation highlighting issues that might not have been brought to light otherwise. This information can be used to refine and improve the intervention design (Patton, 2002). For example, whilst delivering the maintenance intervention it became clear that just because a family attended and complied with the intervention whilst they were at the intervention sessions, this did not mean they adhered to healthy lifestyle changes in their 'real life' home settings. Therefore it is important to recognise that compliance at intervention sessions does not guarantee a families success in terms of making lifestyle changes and achieving weight related outcomes.

Further research is required to test the value of taking a phased approach to MCTIs, given that evidence in the adult weight management context supports having an

initial intensive (i.e. weekly sessions) first treatment phase followed by a less intensive maintenance phase (i.e. biweekly sessions) (West et al., 2010). This could offer the chance for families to exit treatment when they feel ready rather than having a prescribed treatment time for all families.

#### **6.4 Limitations of this Thesis**

The specific limitations of each of the four studies presented in this thesis were considered individually in Chapters 2 to 5. Therefore this section aims to discuss the general limitations to the collective body of work. For all studies detailed in Chapters 3 to 5, the sample was not a diverse sample. Thus the views represented here are not likely to reflect those of the general population limiting the generalisability of the findings. As highlighted in the previous section a broader diverse sample is required in future research to ensure the views represented are reflective of the general population.

Although this thesis has referred to childhood obesity treatment, children involved in the present research were aged from 7-13 years old. It was recognised that their views do not represent the views of younger children (i.e. < 7 years old) or older children (i.e. adolescents: aged 13 – 16 years old), again limiting the generalisability of findings. Furthermore maturation was not assessed which can impact weight gain and weight loss in children. Future research should assess maturational status using subjective and objective measures of maturational status to ascertain the overall index of maturational status (Baker et al., 2007).

#### **6.5 Reflective Practice**

The purpose of this section is to provide brief insight into the development of the research, the challenges and dilemmas that I encountered throughout and what I have learnt from the research process. In social research reflexivity is a useful tool as it can open up unconscious motivations and implicit biases, examining the implications associated to the researcher's position, perspective and presence (Finlay, 2002). Reflexivity does not eradicate these influences, yet it gives important contextual and relevant information to assist the reader to make judgements on the quality and credibility of the research (Devine & Heath, 1999). The purpose of this section is to provide brief insight into the development of the research, the challenges and dilemmas that I encountered throughout and what I have learnt from the research process.

Throughout the research process my role has involved developing working relationships with families to aid recruitment and gain the trust of participants. As the primary researcher, I conducted all participant interviews detailed in the qualitative studies (Chapters 3 & 5). Also, I developed, delivered and evaluated the maintenance intervention detailed in Chapter 4 (i.e. Study 3A). It could be suggested my close working with families compromised 'neutrality' of the research. However, on reflection, this proved invaluable to the research process as I developed a rapport with participants prior to interviews or taking part in the maintenance intervention. Developing a rapport with participants is particularly important when dealing with personal or private issues such as weight as participants are more likely to feel comfortable to open up to someone whom they feel they can trust (Kondora, 1993).

It became clear that being immersed in a research project for such an extended period of time inevitably can lead to a degree of subjectivity. Therefore several steps were taken to ensure the trustworthiness of the qualitative data reported in Chapter 3 and 5 (i.e. Study 2 & 3B) and to ensure the reliability and validity of quantitative data detailed in Chapter 4 (i.e. Study 3A). To ensure trustworthiness and avoid bias in the interpretation of the qualitative interview data (see Chapter 3 & 5), peer consultation took place in development of the themes and sub themes that emerged (Mays & Pope, 1995). Furthermore, member checks were conducted during the data analysis section to avoid inaccurate interpretations of stakeholders' views (Parahoo, 1997). Reporting of TF in the pilot intervention (Chapter 4), contributed to enhancing the reliability and validity in conclusions drawn regarding the efficacy of the maintenance intervention (Bellg et al., 2004).

The research journey has been a continual learning process where I have had to learn to overcome a number of challenges, as a researcher and as an individual. Important lessons I learnt early on was that research rarely goes to plan, it is unpredictable and can lead to feelings of frustration. For example, I did not envisage the extent of the difficulties I faced when recruiting families for the maintenance intervention (see Chapter 4). Thus participants in the maintenance intervention had to be self selected. This highlighted the importance of remaining flexible and adaptable as a researcher as often timescales can change and are unpredictable due to factors out of your control e.g. ethics approval, recruitment and retention. Whilst this can be frustrating staying focussed on the tasks at hand and staying resilient in the face of

adversity are key skills this process has developed that will be important beyond this thesis.

During the writing up process, I learnt the importance of dealing with constructive criticism which is an important part of developing your academic writing skills. I found it was important not to personalise criticism but to view it as an opportunity to learn from others in the field and to grow, develop and improve the writing and communication of my research. My knowledge base has expanded in terms of; quantitative and qualitative methodologies; the sustainability of childhood obesity treatment interventions, designing client centered treatment; and effective practice in the design and evaluation of complex interventions (i.e. MCTIs). The practical experience gained from employing multiple methods has been an invaluable training experience.

## **6.6 Conclusions**

The results from this thesis contribute to the evidence base regarding the sustainability and retention of MCTIs in the childhood obesity context in the following ways.

- The thesis is unique in the consideration of a range of key stakeholders' views (i.e. health professionals, children and parents involved in a MCTI & parents who dropped out of a MCTI) towards issues around the sustainability and retention of MCTIs.
- Key stakeholders should be involved at all levels of design, implementation and evaluation of treatment interventions.
- The pilot of the maintenance intervention was unique in the childhood obesity field given the consideration of SDT underpinnings, acknowledgment of stakeholders' views, incorporating the home context into treatment and evaluation of TF.
- MCTIs should target autonomous motivation and perceived competence for PA and healthy eating given the important role they appear to play in sustained behaviour changes (Williams et al., 1996; 2002; 2009).
- MI should be considered as a strategy to incorporate into MCTIs to promote autonomous motivation for behavioural changes in aim to promote sustained weight related changes.

- Where possible, when treatment deliverers adopt MI, adequate training including ongoing supervision should be provided and this should be independently assessed to ensure treatment deliverers competency in MI and thus enhance the fidelity and replication of the intervention (Madson & Campbell, 2006; Moyers et al., 2005)
- Findings illustrate the importance of a supportive home context in maintaining PA, healthy eating and weight related outcomes. With this in mind, MCTIs need to consider incorporating the home environment into treatment in aim to create a context that supports health behaviour changes and weight related outcomes.
- In view of the ecological perspective and findings in this thesis, barriers to a child's PA, healthy eating and healthy weight must be addressed at all levels of the ecological model in order for families to make sustainable lifestyle changes (Davison & Birch, 2001).
- TF needs to be addressed in future interventions to enhance strength in conclusions, allow refinements to be made and allow for the accurate replication of sustainable interventions.
- Disparities highlighted between treatment recipients and treatment deliverers towards MCTIs need to be addressed to ensure effective equal relationships in developing future interventions (Pellatt, 2007).
- Treatment deliverers need to be responsive to the different motivational needs across children and parents.
- MCTIs should consider incorporating a pre-treatment/ orientation phase to manage families' expectations regarding treatment given the important role this appears to play in attrition and sustaining behavioural changes and weight related outcomes.
- MCTIs should consider incorporating an individualised element to allow tailoring of treatment to be responsive to the diverse and changing needs and preferences of families throughout treatment.

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**Word Count: 67, 862**

# **Appendix A:**

## **Participant Information Sheet (Study 2)**



*Sheffield Hallam University*

**Faculty of Health and Wellbeing Research Ethics Committee  
Sport and Exercise Research Ethics Review Group**

**Participant Information Sheet**

<b>Project Title</b>	Childhood Obesity Treatment: A qualitative study of key stakeholders perspectives
<b>Supervisor/Director of Studies</b>	Dr Jeff Breckon and Dr Robert. J. Copeland
<b>Principal Investigator</b>	Leanne Staniford
<b>Principal Investigator telephone/mobile number</b>	07882548753

### **Purpose of Study and Brief Description of Procedures**

(In this study we are trying to find out what you think of programmes like the MEND programme. We are interested in what you think should be involved in programmes like this.

Your participation in this study will involve one interview that will last approximately 20-30 minutes. The interview will ask questions to try and get your views/ perceptions on programmes like MEND that can help overweight children and adolescents to adopt healthy lifestyles and could help treat obesity. Specifically, the interview will include questions about the importance of physical activity, nutrition, family involvement and behavioural strategies that are commonly used to help change behaviour.

Participation in the interview is optional, you do not have to answer any questions if you don't want to, you can have a break at any point if you feel necessary during the interview and you can stop participation at anytime if you no longer want to be involved. Before completing the interview you have to sign an informed consent form and parental consent is required for children involved in the study. Parents have the option of accompanying their child to the interview if the child or parents would like to do so.

The interview will be tape recorded with your permission to allow the information to be transcribed and analysed at a later date. All data will be stored anonymously in a safe, secure locked office. Data will only be kept for the duration of the study and will be given back to the participant if they wish so. To ensure anonymity participants will be identified by a participant ID number and transcripts will be stored under this number. If you have any further questions regarding the study feel free to contact the primary researcher on the contact details given below.

Miss Leanne Staniford

Email: [L.Staniford@shu.ac.uk](mailto:L.Staniford@shu.ac.uk),

Tel: +44 (0) 114 225865

*Not a legal explanation but a simple statement*

## **Appendix B:**

### **Informed Consent and Child Assent Forms (children > 8 years old) (Study 2)**



**INFORMED CONSENT FORM**

**TITLE OF PROJECT: Childhood Obesity Treatment: A qualitative study of key stakeholders perspectives**

**The participant should complete the whole of this sheet himself/herself**

Have you read the Participant Information Sheet?

YES/NO

Have you had an opportunity to ask questions and discuss this study?

YES/NO

Have you received satisfactory answers to all of your questions?

YES/NO

Have you received enough information about the study?

YES/NO

To whom have you spoken?

.....

Do you understand that you are free to withdraw from the study:

- at any time
- without having to give a reason for withdrawing
- and without affecting your future medical care

YES/NO

Have you had sufficient time to consider the nature of this project?

YES/NO

Do you agree to take part in this study?

YES/NO

Signed ..... Date .....

(NAME IN BLOCK LETTERS).....

Signature of Parent / Guardian in the case of a minor

.....

**Appendix C:**  
**Risk Assessment**  
**(Study 2)**



Sheffield Hallam University

**Faculty of Health and Wellbeing Research Ethics Committee  
Sport and Exercise Research Ethics Review Group**

**Risk Assessment Pro Forma**

<b>Procedure</b>	Qualitative semi structured interviews. The interview schedules involve asking questions about childhood obesity treatment interventions in order to elicit key stakeholders perceptions
------------------	--

<b>Date Assessed</b>	07/09
----------------------	-------

<b>Assessed By (Principal Investigator)</b>	Leanne Staniford
---	------------------

<b>Hazards</b>	<b>Risks and Specific Control Measures</b>
Psychological discomfort due to exploration of potentially sensitive issues	Risk: <b>C1 x L1= R1: Low</b> Participant information sheet highlights there is no obligation to answer any of the questions, and they have the right to withdraw at any point. Also no questions are personal they are questions about the treatment rather than seeking personal information which should minimise any psychological discomfort.
Physical discomfort (due to interviews being too long)	Risk: <b>C1 x L1= R1: Low</b> Interview schedule piloted and amended if deemed too long, participants allowed to take break if necessary, refreshments provided if thirsty/ hungry during course of interview.

<b>Confidentiality Risks</b>	<b>Risk: C1 x L1= R1: Low</b> Only consent forms will contain personal information about the participants. Only the principal researcher and the two supervisors will have access to any personal information and interview data. All interview data will be stored on a secure computer under password protection. Consent forms and interview recordings will be stored a locked drawer within a secure office. Interview recordings will be either given back to participant or destroyed.
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**Risk Evaluation (Overall)**

Overall, this study involves low risk procedures, which can be easily and effectively controlled for using methods described above.

**General Control Measures**

Is a pre-screen medical questionnaire required? Yes [ ] No []

**Emergency Procedures**

If any emergency should occur then the principal researcher will act accordingly and appropriately and is aware of the sports centre evacuation procedures and will ensure participants meet at the appropriate evacuation point

**Monitoring Procedures**

In order to monitor all of the above control measures the following procedures will be implemented:

- Before conducting any interviews within this study, the interviewer will have to receive training in interview techniques in order to develop competence in interview delivery.
- The three versions of the semi structured interview schedules will be piloted with one child, one parent and one intervention deliverer. Following feedback and researcher assessment of the appropriateness of questions amendments will be made to ensure control measures are followed.
- A member of staff from the sport centre venue will brief the principal researcher so the interviewer will know exactly what to do in the case of an emergency.

<b>Review Period</b>	06/09
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<b>Reviewed By (Supervisor)</b>	<b>Date</b>
Dr Jeff Breckon	11/07/09

**Appendix D:**  
**Participant Information Sheets**  
**(Study 3A)**

## RESEARCH INFORMATION SHEET (PARENT / CARER)

**Title:** Evaluation of a 6-week GOALS maintenance phase

**Investigator:** Leanne Staniford, Paula Watson

We are doing some research to try out a maintenance support phase after GOALS. On this sheet there is information to help you decide if you would like to take part in this research.

### **What does the research involve?**

We are trialling a new 6-week maintenance intervention for people who have completed GOALS. We aim to find out whether the extra intervention will help families keep up their healthy changes. If you take part in the study you will be in one of two groups:

***Intervention group:*** You will take part in a 6-week maintenance support programme. This will involve 2 individual support sessions and 4 group sessions (all approximately 1hr long). Sessions will involve activities and discussions to help you keep up your healthy changes. Individual sessions will be arranged at your own home for your convenience to help with specific issues you need help/support with. Group sessions will take place at the Belve Community Centre and will encourage using the group support to help keep up with healthy lifestyles. You will be asked to provide research measures to help us see how the intervention works for you.

***Comparison group:*** We need some people to take part in the study but without taking part in the intervention. If you are in this group **you will not take part in the intervention**, but you will provide research measures.

### **Research measures – BOTH groups**

Both groups will provide the following research measures at the start, 6 weeks, 3-months and 6-months:

**Height and weight**– we will measure how tall you are and how much you weigh. This will take approximately 10 minutes.

**Questionnaires** – you will be asked to fill in some questionnaires about how confident you are that you can keep up with healthy eating and activity and how confident you are to do this by yourself (once GOALS is finished). Questionnaires will take approximately 30 minutes.

## **General questions**

### **Can I choose which group I'm in?**

If you would prefer to be in one group over the other please indicate this on your consent form. If you do not indicate a preference you will be randomly allocated to a group.

### **Do I have to be in the GOALS graduate club to take part?**

No. But if you are in the intervention group you will need to be able to attend the Belve Community Centre on a Wednesday evening, as the group intervention sessions will take place at the same time as the GOALS graduate club.

### **Do I have to take part?**

No. If you choose not to take part you simply continue with GOALS after-care as usual.

### **If I say yes, can I drop out later?**

Yes

### **If I take part in the research will I still be able to join the GOALS graduate club and have my GOALS follow-ups?**

Yes. Your usual GOALS after-care will continue.

### **What are the risks of taking part in the research?**

There are no known or foreseeable major risks involved.

### **What are the benefits of taking part in the research?**

You will receive extra information about your progress and be able to share your views to help us improve GOALS. If you are in the intervention group, you will receive additional support from the GOALS team.

### **Where can I get further information?**

**Leanne Staniford**

[L.Staniford@ljmu.ac.uk](mailto:L.Staniford@ljmu.ac.uk)

07882 548753 / 0151 231 4408

## RESEARCH INFORMATION SHEET (CHILD)

**Title:** Evaluation of a 6-week GOALS maintenance phase

**Investigator:** Leanne Staniford

You are invited to take part in some research to help us see if we can help you keep up your healthy changes. This sheet tells you what is involved.

### What will I have to do?

**You will be in one of 2 groups:**

***Intervention group:*** You will take part in a 6-week course for people who have finished GOALS. Leanne will come to your house twice and you will come to the Belve with other families four times. Like Target Time, you will do fun activities to help you keep up your healthy changes. We will measure you and ask you to fill in some questionnaires to see how you are getting on.

***Comparison group:*** We need some people to take part in the study but without coming to the course. If you are in this group **you will not take part in the course**, but we will measure you and ask you to fill in some questionnaires to see how you are getting on.

### **BOTH groups – what will we measure?**

**Height and weight** – we will measure how tall you are and how much you weigh.

**Questionnaires** – you will fill in some questionnaires about how you are getting on.

**Discussions** - we will talk with you about how you are getting on, either with your family or with other children.

### **How often will you do these things?**

At the start, after 6-weeks, 3-months and 6 months.

### **Could anyone tell who the information is from?**

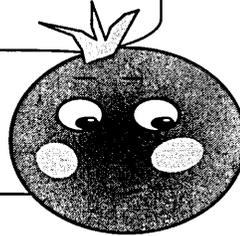
No. All names will be removed.

### General Questions

**Do you have to take part in the research?** No. And if you'd prefer not to, that's fine – you can still come to the GOALS graduate club and have your follow-ups as usual.

**If you say yes, can you drop out later?**

Yes



### Where can you find out more?

**Leanne Staniford** 07882 548753 / 0151 231 4408 [l.staniford@ljmu.ac.uk](mailto:l.staniford@ljmu.ac.uk)

# **Appendix E:**

## **Informed Consent and Child Assent Forms (children > 8 years old) (Study 3A)**

**CONSENT FORM**

**Title:** Evaluation of a 6-week GOALS maintenance phase

**Investigators:** Leanne Staniford

**NAME:** \_\_\_\_\_

**CHILD'S NAME:** \_\_\_\_\_

I have read the information provided in the parents information sheet Y/N

I have discussed the study with my child and he / she understands what is involved Y/N

I have had an opportunity to ask questions about anything I don't understand Y/N

I understand that our GP will be informed about our participation in the study Y/N

**Group preference**

**Please tick one box to show your group preference:**

I would like to take part in **either** the intervention or the comparison group

I would like to take part, but only if I am part of the **intervention group**

I would like to provide **comparison measures**, but cannot/do not wish to attend the weekly intervention

**I give consent for myself and my child to participate in the above study.**

**Parent/Guardian**

**SIGN:** \_\_\_\_\_ **DATE:** \_\_\_\_ / \_\_\_\_ / \_\_\_\_ **PRINT NAME:** \_\_\_\_\_

**Researcher**

**SIGN:** \_\_\_\_\_ **DATE:** \_\_\_\_ / \_\_\_\_ / \_\_\_\_ **PRINT NAME:** \_\_\_\_\_

**ASSENT FORM (Children over 8)**

**Title:** Evaluation of a 6-week GOALS maintenance phase

**Investigators:** Leanne Staniford

Has somebody explained what the study is about to you? Yes / No

Do you understand what you will have to do? Yes /No

Have you asked all the questions you want? Yes/ No

Are you happy to take part? Yes /No

**If you DO want to take part in this study, please write your name and today's date here:**

**NAME:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

**Thank you for your help**

**Appendix F:**

**Ethics Approval  
(Study 3A)**

28 April 2009

Miss Leanne Staniford  
Principal Researcher  
Sport and Exercise Sciences  
Henry Cotton Campus  
15-21 Webster Street, Liverpool  
L3 2ET

Dear Miss Staniford

**Study title:** A Pilot study of a maintenance intervention to improve the sustainability of the GOALS healthy lifestyle intervention  
**REC reference:** 05/Q1502/28  
**Amendment number:** 5  
**Amendment date:** 16 April 2009

The above amendment was reviewed at the meeting of the Sub-Committee of the REC held on 24 April 2009.

#### **Ethical opinion**

Amendment reviewed and approved

The members of the Committee present gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

#### **Approved documents**

The documents reviewed and approved at the meeting were:

Document	Version	Date
Participant Information Sheet: Child PIS maintenance phase	5	16 April 2009
Participant Information Sheet: maintenance phase	5	16 April 2009
Participant Consent Form: Child Assent	5	16 April 2009
Participant Consent Form: Parent	5	16 April 2009
Maintenance Phase Protocol	5	16 April 2009
E-mail authorisation from Dr R De Soysa		05 January

		2009
Emergency information forms	5	16 April 2009
Notice of Substantial Amendment (non-CTIMPs)	5	16 April 2009

### **Membership of the Committee**

The members of the Committee who were present at the meeting are listed on the attached sheet.

### **R&D approval**

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

### **Statement of compliance**

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

<b>05/Q1502/28:</b>	<b>Please quote this number on all correspondence</b>
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Yours sincerely

**Ron Wall**  
**Committee Co-ordinator**

**Faculty of Health and Wellbeing Research Ethics Committee  
Report Form**

Principal Investigator: Leanne Staniford

Title: The efficacy of a cognitive behavioural maintenance strategy to sustain outcomes after childhood obesity treatment.

Checklist:

Application form	✓
Informed consent form	✓
Participant information sheet	✓
Risk assessment form	✓
Pre-screening form	n/a
Pre-screening form (under 18)	n/a
Collaboration evidence/support	✓
CRB Disclosure certificate	✓

Recommendation:

Acceptable:

Not acceptable, see comments:

Acceptable, but see comments:

Comments:

Signature : Edward Winter Date: 13th August 2009

Professor Edward Winter, Chair  
Faculty of Health and Wellbeing Research Ethics Committee

***Please remember that an up-to-date project file must be maintained for the duration of the project and afterwards. The project file might be inspected at any time.***

***Note: Approval applies until the anticipated date of completion unless there are changes to the procedures, in which case another application should be made.***

Name of Supervisor : Jeff Breckon/Rob Copeland

# **Appendix G:**

## **Example Session Plan from the Maintenance Intervention (Study 3A)**

<b>Programme</b>	Maintenance Support Intervention		
<b>Title</b>	Group problem solving session		
<b>Session Number</b>		<b>Session duration</b>	60 minutes
<b>Session</b>		<b>Week</b>	3
<b>Participants</b>	Group Session		
<b>Learning Outcomes/ Session Aims</b>	<ol style="list-style-type: none"> <li>1. Review of Progress</li> <li>2. Brainstorm problems that families are having with regards to maintaining healthy eating and PA</li> <li>3. Group discussion to identify solutions to overcome families problems</li> <li>4. Set goals using children's action plans based on the solutions identified in the session to each child and/or families problems</li> </ol>		
<b>Resources (if appl)</b>	Action plans, flip chart paper and pens		
<b>Target Self Determination Component</b>	Autonomy Support		

**Activity 1:**

**Time:** 5 mins

**Description:** Review of past week? Review children's action plan to see how they went on with their goals.

---

**Activity 2:**

**Time:** 5 minutes

**Description:** Identify problems and barriers that children and their families feel they are having with regards to trying to maintain their healthy eating and PA. In small groups each group will be given a piece of flip chart paper to brainstorm their problems and barriers they are facing with regards to maintaining their healthy eating and PA. Ask children to think of barriers specifically to PA and healthy eating within their home environment.

---

**Activity 3**

**Time:** Identifying solutions to their barriers/problems and identify ways to overcome them as a group.

**Description:** Brainstorming ideas as a group to help each other come up with potential solutions to the problems identified in activity one.

**Activity 4:**

**Time:** 5 minutes

**Description:** Use children's action plans to set a goal for their healthy eating and PA which could build on their goals from the previous week or one of the problems identified in the session.

**Appendix H:**  
**Risk Assessment:**  
**(Study 3A)**

## 16) Risk Assessment

Provide details of the risk and explain how the control measures will be implemented to manage the risk.

- **Psychological discomfort** (due to exploration of a potentially sensitive issue)

**Control Measure:** Interventionist is trained and experienced in working with families and their overweight and obese children in the treatment context. The focus of the maintenance programme as in the main treatment phase will be on achieving healthy lifestyles rather than weight. Any weight issues raised by families will be dealt with in a sensitive manner and any more serious issues families can be referred to clinically trained professionals.

- **Physical Discomfort :**

**Control Measure:** Children and parents will attend group sessions in a familiar surrounding where the main treatment phase took place so should feel comfortable in the surroundings. Individual sessions will take place in families homes with their consent. The interventionist will be accompanied by another trained professional who families are familiar with from the main treatment phase to ensure they feel at ease with professionals in their home.

- **Confidentiality Risk**

**Control Measure:** All outcome measures data will be collected in a safe, secure and confidential environment. All data will be stored in a password protected database which is only accessible to the primary researcher. Data will be stored anonymously and participants will be referred to by an identification number

- **Interventionist Safety measures**

**Control Measure:** As the interventionist will be visiting family homes certain measures will be taken to ensure safety. The interventionist will have a diary schedule detailing time, place, who will be attending and the content of each of the individual family meetings. The interventionist will make supervisors aware of these dates and times and provide them with a contact number in the case of emergencies. The interventionist will text a supervisor upon arrival at a child's session for home based sessions and then text again once they she has left.

# **Appendix I:**

## **Questionnaire to assess PA and SDT related outcomes (Study 3A)**

# **Keeping Up My GOALS Questionnaire**

## Physical Activity Questionnaire

Name: \_\_\_\_\_ Age: \_\_\_\_\_

Sex: M \_\_\_\_\_ F \_\_\_\_\_

We are trying to find out about your level of physical activity from *the last 7 days* (in the last week). This includes sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others.

### Remember:

1. There are no right and wrong answers — this is not a test.
2. Please answer all the questions as honestly and accurately as you can — this is very important.

1. Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times? (Tick only one box per row.)

	No	1-2	3-4	5-6	7 times or more
Skipping .....	<input type="checkbox"/>				
Rowing/canoeing .....	<input type="checkbox"/>				
In-line skating .....	<input type="checkbox"/>				
Tag .....	<input type="checkbox"/>				
Walking for exercise .....	<input type="checkbox"/>				
Bicycling .....	<input type="checkbox"/>				
Jogging or running .....	<input type="checkbox"/>				
Aerobics .....	<input type="checkbox"/>				
Swimming .....	<input type="checkbox"/>				
Baseball, softball .....	<input type="checkbox"/>				
Dance .....	<input type="checkbox"/>				
Football .....	<input type="checkbox"/>				
Badminton .....	<input type="checkbox"/>				

- Skateboarding .....
- Soccer .....
- Street hockey .....
- Volleyball .....
- Floor hockey .....
- Basketball .....
- Ice skating .....
- Cross-country skiing .....
- Ice hockey/ringette .....

Other:

\_\_\_\_\_ .....

\_\_\_\_\_ .....

2. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? (Check one only.)

I don't do PE .....

Hardly ever .....

Sometimes .....

Quite often .....

Always .....

3. In the last 7 days, what did you do most of the time *at break time*? (Check one only.)

Sat down (talking, reading, doing schoolwork).....

Stood around or walked around .....

Ran or played a little bit .....

Ran around and played quite a bit .....

Ran and played hard most of the time .....

4. In the last 7 days, what did you normally do *at lunch* (besides eating lunch)? (Tick one only.)

Sat down (talking, reading, doing schoolwork).....

Stood around or walked around .....

Ran or played a little bit .....

Ran around and played quite a bit .....

Ran and played hard most of the time .....

5. In the last 7 days, on how many days *right after school*, did you do sports, dance, or play games in which you were very active? (Tick one only.)

None .....

1 time last week .....

2 or 3 times last week .....

4 times last week .....

5 times last week .....

6. In the last 7 days, on how many *evenings* did you do sports, dance, or play games in which you were very active? (Tick one only.)

None .....

1 time last week .....

2 or 3 times last week .....

4 or 5 last week .....

6 or 7 times last week .....

7. *On the last weekend*, how many times did you do sports, dance, or play games in which you were very active? (Tick one only.)

None .....

1 time .....

2 — 3 times .....

4 — 5 times .....

6 or more times .....

8. Which *one* of the following describes you best for the last 7 days? Read *all five* statements before deciding on the *one* answer that describes you.

- A. All or most of my free time was spent doing things that involve little physical effort .....
- B. I sometimes (1 — 2 times last week) did physical things in my free time (e.g. played sports, went running, swimming, bike riding, did aerobics) .....
- C. I often (3 — 4 times last week) did physical things in my free time .....
- D. I quite often (5 — 6 times last week) did physical things in my free time .....
- E. I very often (7 or more times last week) did physical things in my free time .....

9. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

	None	Little bit	Medium	Often	Very often
Monday .....	<input type="checkbox"/>				
Tuesday .....	<input type="checkbox"/>				
Wednesday .....	<input type="checkbox"/>				
Thursday .....	<input type="checkbox"/>				
Friday .....	<input type="checkbox"/>				
Saturday .....	<input type="checkbox"/>				
Sunday .....	<input type="checkbox"/>				

10. Were you sick last week, or did anything prevent you from doing your normal physical activities? (Tick one.)

Yes .....

No .....

If Yes, what prevented you? \_\_\_\_\_

**Thankyou for completing this part of the questionnaire**

## How Confident Are you that you can keep up any healthy eating changes you made at GOALs?

The following question are about reasons why you would either start eating or continue with your healthy eating. Different people have different reasons for doing that, and we want to know what reasons are true for you. All 15 response are to the same question. If you are unsure about any questions JUST ASK ☺

Please use a number from the scale below to show how true each statement is to you for you, using the following 7-point scale:

1	2	3	4	5	6	7
not at all			somewhat			very
true			true			true

If you need any help understanding any question just ask the GOALs deliverer

### The reason I would *eat a healthy diet* is:

1. Because I feel that I want to take responsibility for my own health.
2. Because I would feel guilty or ashamed of myself if I did not eat a healthy diet.
3. Because I personally believe it is the best thing for my health.
4. Because others would be upset with me if I did not.
5. I really don't think about it.
6. Because I have carefully thought about it and believe it is very important for many aspects of my life.
7. Because I would feel bad about myself if I did not eat a healthy diet.
8. Because it is an important choice I really want to make.
9. Because I feel pressure from others to do so.
10. Because it is easier to do what I am told than think about it.
11. Because it is consistent with my life goals.
12. Because I want others to approve of me.
13. Because it is very important for being as healthy as possible.
14. Because I want others to see I can do it.
15. I don't really know why.

## TSRQ Physical Activity

The following question relates to the reasons why you would either start to do Physical activity regularly or continue to do so. Different people have different reasons for doing that, and we want to know how true each of the following reasons is for you. All 15 response are to the one question. Please be honest there are no right or wrong answers.

Please use a number from the scale below to indicate what is true for you, using the following 7-point scale:

1	2	3	4	5	6	7
not at all			somewhat			very
true			true			true

**The reason I would *do Physical Activity regularly* is:**

1. Because I feel that I want to take responsibility for my own health.
2. Because I would feel guilty or ashamed of myself if I did not do Physical activity regularly.
3. Because I personally believe it is the best thing for my health.
4. Because others would be upset with me if I did not.
5. I really don't think about it.
6. Because I have carefully thought about it and believe it is very important for many aspects of my life.
7. Because I would feel bad about myself if I did not exercise regularly.
8. Because it is an important choice I really want to make.
9. Because I feel pressure from others to do so.
10. Because it is easier to do what I am told than think about it.
11. Because it is consistent with my life goals.
12. Because I want others to approve of me.
13. Because it is very important for being as healthy as possible.
14. Because I want others to see I can do it.

15. I don't really know why.

### Keeping Up Healthy Eating

The next 4 questions relate to how confident you are in maintaining your healthy eating/diet. Please be honest there are no right or wrong answers. For each question use a number from 1-7 from the following scale to indicate your answer:

1	2	3	4	5	6	7
not at all			somewhat			very
true			true			true

1. I feel confident in my ability to maintain healthy eating
2. I now feel capable of maintaining healthy eating.
3. I am able to maintain healthy eating permanently.
4. I am able to meet the challenge of maintaining healthy eating.

### Keeping Up Regular Physical Activity

The next 4 questions relate to how confident you are in maintaining your healthy eating/diet. Please be honest there are no right or wrong answers. For each question use a number from 1-7 from the following scale to indicate your answer:

1	2	3	4	5	6	7
not at all			somewhat			very
true			true			true

1. I feel confident in my ability to do Physical activity regularly.
2. I now feel capable of doing Physical Activity regularly.
3. I am able to do Physical activity regularly over the long term.
4. I am able to meet the challenge of doing Physical Activity regularly.

## Healthy Eating

The next questions are about your GOALS Deliverer who delivered your maintenance intervention. The questions are related to your sessions and discussions about eating healthily

Please be honest there are no right or wrong answers.

In answering the questions, please use a number from the following 7 point scale:

1	2	3	4	5	6	7
not at all			somewhat			very
true			true			true

1. I feel that my GOALS deliverer provided me with choices and options about changing my eating/diet (including not changing).
2. I feel my GOALS deliverer understand how I see things with respect to my healthy eating/diet.
3. My GOALS deliverer had confidence in my ability to make changes regarding my healthy eating.
4. My GOALS deliverer listened to how I would like to do things regarding eating more healthily.
5. My GOALS deliverer encouraged me to ask questions about my diet.
6. My GOALS deliverer tried to understand how I see my eating/diet before suggesting any changes.

### Doing regular PA

The next questions are about your GOALS Deliverer who delivered your maintenance intervention. The questions are related to your sessions and discussions about becoming and keeping up your Physical activity

Please be honest there are no right or wrong answers.

In answering the questions, please use a number from the following 7 point scale:

1	2	3	4	5	6	7
not at all			somewhat			very
true			true			true

1. I feel that my GOALS deliverer have provided me with choices and options about exercising regularly (including not exercising regularly).
2. I feel my GOALS deliverer understand how I see things with respect to my exercising regularly.
3. My GOALS deliverer conveys confidence in my ability to make changes regarding my exercising regularly
4. My GOALS deliverer listen to how I would like to do things regarding my exercise.
5. My GOALS deliverer encourage me to ask questions about my exercising.
6. My GOALS deliverer try to understand how I see my exercising before suggesting any changes.

**Thank you for your time  
taken to fill in this  
questionnaire 😊**

**Appendix J:**

**Ethics Approval  
(Study 3B)**

11 March 2010

Miss Leanne Staniford  
Research Institute for Sport and Exercise Sciences  
Liverpool John Moores University  
62 Great Crosshall St, Liverpool  
L3 2AT

Dear Miss Staniford

**Study title:** A Qualitative Study to explore families reasons for dropping out of the GOALS Programme: A lifestyle intervention for obese children and their families in Liverpool

**REC reference:** 05/Q1502/28

**Amendment number:** 6, 23.2.10 Sub study 1

**Amendment date:** 23 February 2010

The above amendment was reviewed by the Sub-Committee in correspondence.

### **Ethical opinion**

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

### **Approved documents**

The documents reviewed and approved at the meeting were:

Document	Version	Date
Sub study 1CHILD ASSENT	1	
Sub study 1Participant Consent Form: PARENT CONSENT	1	
Sub study 1Participant Information Sheet: CHILD PIS	1	
Sub study 1Participant Information Sheet: PARENT PIS	1	
Sub study 1Protocol	1	05 February 2010
Notice of Substantial Amendment (non-CTIMPs)	6, 23.2.10 Sub study 1	23 February 2010
Covering Letter		23 February 2010

### **Membership of the Committee**

The members of the Committee who took part in the review are listed on the attached sheet.

### **R&D approval**

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

### **Statement of compliance**

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

**05/Q1502/28:**

**Please quote this number on all correspondence**

Yours sincerely

**Ron Wall**  
**Committee Co-ordinator**

**Appendix K:**

**Participant Information Sheets**  
**(Study 3B)**

## RESEARCH INFORMATION SHEET (PARENT / CARER)

**Title:** Talking to children and parents about GOALS – what stops families coming and how can we help them stay for longer?

**Investigators:** Leanne Staniford

We are doing some research to try and understand why people drop out from GOALS, and why people choose not to come to extra sessions after GOALS has finished. On this sheet there is information to help you decide if you would like to take part in this research.

### **What does the research involve?**

You will take part in one interview that lasts 20-30minutes. We will ask about your experiences of GOALS and your reasons for leaving / not attending extra sessions. This will help us improve GOALS so more families continue with the programme in future.

We will conduct the interview at your home at a time convenient for you. Interviews will be tape recorded, written down and all names removed. Anything you tell us will be kept confidential.

We will ask you:

- How satisfied you were with the support you received at GOALS
- What your reasons for leaving / not attending extra sessions were
- How we can encourage other families to keep GOALS up

Please remember there are no right or wrong answers to the questions we ask. So please don't worry about upsetting us! If you are honest it will help us improve GOALS so we can help other families.

### **General questions**

**Do I have to take part?**

No.

**If I say yes, can I drop out later?**

Yes

**If I don't want to answer a question, is that ok?**

Yes – you do not have to answer any questions you feel uncomfortable with. Just tell the researcher and we'll move onto the next question.

**What are the risks of taking part in the research?**

There are no known or foreseeable major risks involved.

**What are the benefits of taking part in the research?**

You will be able to share your views to help us improve GOALS.

**Where can I get further information?**

Leanne Staniford [L.Staniford@ljmu.ac.uk](mailto:L.Staniford@ljmu.ac.uk)

## RESEARCH INFORMATION SHEET (CHILD)

**Title:** Talking to children and parents about GOALS – what stops families coming and how can we help them stay for longer?

**Investigators:** Leanne Staniford

We are doing some research to find out why children sometimes stop coming to GOALS. Read this sheet to see if you want to take part.

### What will I have to do?

You will be asked to take part in one interview that will last 20-30minutes. We will interview you at home. We will record the interview, then remove your name and write down what is said.

### What will you ask me in the interview?

Here are some examples:

- What did you think of GOALS?
- Why did you stop coming?
- What could GOALS do to help you and other families keep coming?

### What if I don't know the answers?

There are no right or wrong answers. You can say whatever you want! It is important you tell the truth, because this will help us help other children like you.

### Will anyone be able to tell what I have said about GOALS?

No. All names will be removed so no-one will know who said what!

### Do I have to take part in the research?

No. And if you'd prefer not to, that's fine.

**If I say yes, can I drop out later?**

Yes

**Where can I find out more?**

**Leanne Staniford 07882 548753 / 0151 231 4408 [l.staniford@ljmu.ac.uk](mailto:l.staniford@ljmu.ac.uk)**

# **Appendix L:**

## **Informed Consent and Child Assent Forms (children > 8 years old) (Study 3B)**

**CONSENT FORM**

**Title: Talking to children and parents about GOALS –  
what stops families coming and how can we help them stay for longer?**

**Investigators: Leanne Staniford**

**NAME:** \_\_\_\_\_

**CHILD'S NAME:** \_\_\_\_\_

I have read the information provided in the parents information sheet.

I have discussed the study with my child and he / she understands what is involved.

I have had an opportunity to ask questions about anything I don't understand.

**I give consent for myself and my child to participate in the above study.**

**Parent/Guardian**

**SIGN:** \_\_\_\_\_ **DATE:** \_\_\_\_ / \_\_\_\_ / \_\_\_\_ **PRINT**

**NAME:** \_\_\_\_\_

**Researcher**

**SIGN:** \_\_\_\_\_ **DATE:** \_\_\_\_ / \_\_\_\_ / \_\_\_\_ **PRINT**

**NAME:** \_\_\_\_\_

**ASSENT FORM (Children over 8)**

**Title: Talking to children and parents about GOALS – what stops families coming and how can we help them stay for longer?**

**Investigators: Leanne Staniford**

Has somebody explained what the study is about to you? Yes  No

Do you understand what you will have to do? Yes  No

Have you asked all the questions you want? Yes  No

Are you happy to take part? Yes  No

**If you DO want to take part in this study, please write your name and today's date here:**

**NAME: \_\_\_\_\_ DATE: \_\_\_\_\_**

**Thank you for your help**

**Appendix M:**  
**Interview Topic Guide**  
**(Study 3B)**

**Study 3B: Interview Topic Guide and Potential questions/prompts**

<b>Topic and/or Purpose</b>	<b>Potential Questions</b>	<b>Potential prompts</b>
Opening conversation (opening up the conversation on their experience and subsequent drop out from the GOALS intervention)	Can you tell me a little bit about how you found GOALS? How did you find your experience at GOALS then? If I give you a million pounds to design your own GOALS programme to help kids lose weight and get healthy what would you do? Did you get what you wanted from it?	Why do you think that? Could you tell me a little bit more about that? What would you do differently? How? Why would you do that?
Opening up discussion around their reasons for drop out	(Name) said you stopped coming to GOALS can you tell me a bit about why that was if you don't mind? What stopped you from keeping going? What do you think of the ongoing support GOALS gives now? How would you help families keep up with healthy changes?	Can you tell me a bit more about what you mean by (barrier) that?  How would you change this?  Why would you do this? How do you think it could help?
Individual Psychology: Self esteem, self efficacy, food literacy, stress, perceived cost vs benefit of change, psychological ambivalence, expected vs actual outcomes, level of parental control, level of children control	What do you think you got from taking part in GOALS? Was it what you expected? Has it helped you to become healthy? Have you kept up with changes you have made? What do you think contributes to becoming overweight then?	If not, why not? In what ways? Why? How? Why do think you have not? How could GOALS have helped you do that? Do you feel more in control now then over (names) eating/activity?
Social Psychology: Education, peer pressure, family pressures, home environment, media consumption, availability of passive entertainment options, importance of ideal body and size image, societal attitudes to fatness	Can.... that pressure sometimes makes it difficult then? So do you think pressures from society can influence how healthy you are then? How does the media influence your attempts to be healthy then?	Things like programmes on tv are they helpful/ do they hinder you or do they not really affect you? Do healthy role models e.g. Steven Gerrard influence you?
Activity environment: Cost of PA, perceived danger of PA environment, walkability of environment	If time named as a barrier: Do you have other priorities then? So do you think the environment you live in has a big role to play in what activity you do?	
Food consumption: Portion size, energy density of foods, nutrition quality of food and drink	Do you think this has a big role to play then in staying healthy/ keeping a healthy weight?	Why do you think that?
Food production: Cost of food ingredients, societal pressure to consume food	Do you feel pressure from society then would you say to eat unhealthily?	
Biology: Appropriateness of maternal body composition, predisposition of activity, level of satiety	So it sounds like you maybe feel you are meant to be/ its in your make up to be bigger then?	
Societal Influence: Social milieu, tv watching,	So do you feel the people around you have a big influence over how active	Does that make it difficult? Does that make it easier?

supportive/unsupportive family context, perceived availability of time, social barriers costs etc.	you are then?	Could you tell me a little bit more about why that is then?
Media: Media pressures; media portrayal of obesity	So do you feel the media influence your lifestyle then?	Helpful? Unhelpful? In what way? Can you tell me a bit about it then?
Individual activity: Level of lifestyle activity, level of recreational activity, level of occupational activity, level of domestic activity, functional fitness	So for you is activity important in trying to lose weight?	Why do you think that?

**Appendix N:**  
**Risk Assessment**  
**(Study 3B)**

## **Risk Assessment**

Provide details of the risk and explain how the control measures will be implemented to manage the risk.

- **Psychological discomfort** (due to exploration of a potentially sensitive issue)  
**Control Measure:** Interventionist is trained and experienced in working with families and their overweight and obese children in the treatment context. The focus of the interviews is on reasons for dropping out which may be a sensitive topic for participants. The interviewer has received training in motivational interviewing. Motivational Interviewing strategies including empathic understanding, affirmations and reflections will be used to facilitate creating an empathic non judgmental environment and aid rapport building to help participants feel comfortable during the interview process. Any weight issues raised by families will be dealt with in a sensitive manner and any more serious issues families can be referred to clinically trained professionals.
  
- **Physical Discomfort :**  
**Control Measure:** Children and parents will complete interviews in their home environment so should feel comfortable in the surroundings.
  
- **Confidentiality Risk**  
**Control Measure:** All informed consent and assent forms, tape recording and transcribed data data will be collected in a safe, secure and confidential environment. All data will be stored in a password protected database which is only accessible to the primary researcher. Data will be stored anonymously and participants will be referred to by an identification number
  
- **Interventionist Safety measures**  
**Control Measure:** As the interventionist will be visiting family homes certain measures will be taken to ensure safety. The interventionist will have a diary schedule detailing time, place, who will be attending and the content of each of the individual family meetings. The interventionist will make supervisors aware of these dates and times and provide them with a contact number in the case of emergencies. The interventionist will text a supervisor on arrival at the participants house and when they have left.