

**Prevention of obesity: exploring strategies
for intervention in preschool**

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Abstract

The proportion of overweight and obese children in England has increased considerably since 1995. One in five children starting reception class is now overweight or obese. Proposed reasons for this are numerous and indeterminate. They include infant feeding methods, genetics, change in eating habits and patterns, and increased sedentary behaviours. The preschool years are considered to be an optimal time to intervene in an attempt to reverse this trend. However, interventions to prevent or treat overweight in preschool-age children in the UK are scarce, with most research being conducted in the US and Australia. Previous research has demonstrated some positive results in changing some health behaviours, however, positive trends in overall obesity rates are lacking. Further research to determine which prevention strategies and methods are acceptable and operational in a 'real world' setting is required. Ninety-eight per cent of UK preschool-aged children now attend some form of childcare. Preschool settings may provide valuable opportunities to access children and their families not only for promoting healthy lifestyles, but also to develop and evaluate behaviour-change interventions.

This thesis presents a feasibility study of a behaviour-change nursery practitioner-led intervention conducted in four preschool centres in the North East of England. The study is underpinned by the MRC Framework: Developing and Evaluating Complex Interventions. The research was conducted in four phases: a preliminary qualitative study with parents of preschool children and nursery practitioners; development of a behavioural-change intervention; implementation of the intervention; and intervention evaluation.

Qualitative data revealed underlying complex communication issues between practitioners and parents regarding food provision, and roles and responsibilities. Preschool centres appeared to have difficulties with enforcing school health policies. 'Gatekeeper' permission and lower-hierarchical compliance were on-going problems throughout the study. The majority of nursery practitioners and parents stated 'liking' and 'finding' the intervention methods and activities acceptable and positive changes in family health behaviours were reported. This study shows that a preschool centre behaviour-change intervention is feasible, however, as demonstrated, further work with nursery practitioners is required to determine how personal attitudes and school policy application can be enhanced to progress such an intervention.

Feasibility studies of this type are important to inform further obesity prevention strategies research. The findings from this study are likely to have policy relevance and contribute to the body of literature.

Dedication

In memory of my dear, brave dad

David John McSweeney 10/05/1940 – 18/01/2014

Your love and pride will remain with me forever

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I would like to thank my friends, family and colleagues who have supported me in the writing of this thesis. In particular, I would like to thank my partner John for his continued love, encouragement and patience; my friends Liz, Pam, Marjory and Lynne for their 'positive thoughts' and helping me believe that I could complete such a task; Caroline for her proof-reading skills; my sister Lisa whose encouragement and literary knowledge proved invaluable; and my mum and dad who, despite their own challenges, encouraged and supported my decision to return to study throughout.

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- B. Nursery practitioner semi-structured interview guide
- C. Parent food map
- D. Parent physical activity map
- E. Nursery practitioner focus group
- F. Parent focus group topic guide
- G. Ethics approval
- H. Nursery practitioner training manual
- I. Parent completed 4-day diary
- J. Undergraduate project abstract
- K. Cooking challenge recipes
- L. Playground games sheet
- M. Adjusted parent goal setting sheets
- N. Increasing activity with Frisbee information sheet
- O. Presentations and seminars
- P. Training, courses and conferences
- Q. Papers (pending)

Part One

Setting the scene

Chapter 1- Introduction

Chapter 2 - Review of the literature

Chapter 3 - Behaviour change interventions

Chapter 1 Introduction

This doctoral thesis presents a mixed methods feasibility study of a nursery practitioner-led behaviour-change intervention. Four preschool centres in the North East of England took part. The study aimed to better understand which intervention methods and activities would be acceptable to nursery practitioners and parents of preschool children to inform a future randomised controlled trial. The ultimate aim of which, is to improve life-style behaviours to contribute to a decrease in the prevalence of childhood overweight and obesity.

In this chapter I will discuss the conception of this PhD study and the focus of the research. My position and place as a researcher is considered, and the main drivers for the research are introduced.

1.1.1 Conception of the PhD study

I am a post-graduate doctoral student funded by Fuse (The Centre for Translational Research in Public Health), a UKCRC Public Health Research Centre of Excellence which comprises of Durham, Newcastle, Northumbria, Sunderland and Teesside universities. I am based in the Human Nutrition Research Centre (HNRC) in Newcastle University. The Public Health Nutrition Research theme of the HNRC is led by Prof Ashley Adamson. Prof Adamson is PI of the Gateshead Millennium Study (GMS) (<http://research.ncl.ac.uk/gms>), which is a prospective birth cohort study of 1029 children who were born in Gateshead between 1999 and 2000. The study originated as a 'Feeding and Growth' study concerned with children who were at risk of 'failure to thrive' and as such collected detailed data on early growth. These data made it possible to use the cohort to explore the origins and development of childhood obesity. Parents were asked to complete a series of questionnaires on issues relating to feeding behaviour, development of and progress between birth and 13 months. In subsequent years, parents and children have been tracked and contacted on a regular basis to monitor and investigate the prevalence and emergence of overweight and obesity in children (Parkinson *et al.*, 2011). It emerged that infants in the GMS cohort study were heavier than the World Health Organisation standards (Parkinson *et al.*, 2011). In 2008 as part of my MSc studies I analysed GMS data for my dissertation to determine whether parent and child dietary behaviour was associated with parenting styles. This coupled with further GMS qualitative data and an investigation of the

literature concerning early feeding and obesity led to the concept and hypothesis of my PhD.

1.1.2 The researcher's standpoint

To place my approach to this PhD study in context, it is important to briefly describe my background. Prior to 2004 I worked for 18 years as a nursery practitioner in a variety of settings, mainly local authority nursery schools, with children aged 3-5 years. I have considerable experience working with teachers, other practitioners, students and parents of various social economic status backgrounds and ethnicities. My experiences have enabled me to appreciate the social and political complexities of working in educational establishments. In 2004, I entered full-time education, completing degrees in BSc Hons Food, Nutrition and Health at Abertay University in Dundee and as part of a 1+3 PhD studentship, an MSc Health Sciences at Newcastle University in 2009. It was my continuing interest in young children's well-being that led to my current role as PhD student.

Although my previous experience as a nursery practitioner may be considered advantageous in my present role, it was imperative that I was aware of my positionality, instrumental values (Greenbank, 2003; Hesse-Biber and Leavy, 2011) and the potential influence of this. This influence can be alleviated by the process of reflexivity. Hesse-Biber and Leavy (2011) describe reflexivity as 'the process through which researchers recognise, examine, and understand how their own social background and assumptions can intervene in the research process' (p. 120).

During my PhD studies, I elected not to reveal my past status to the study participants as I felt this might influence the research process; namely my perceived authority and knowledge other than that of student/researcher. However, I acknowledge that my previous experience may have influenced my interpretation and analysis of the study data and findings. Researchers who claim to conduct 'value-neutral' research are said to be misleading others (Greenbank, 2003).

1.2 The increase in obesity and media coverage

As I will discuss in further detail in the literature review (2.1.2), the prevalence of childhood overweight and obesity has risen considerably since 1995 (The Information Centre, 2006). Childhood obesity has become a global concern attracting international

Chapter One Introduction

attention from governments, Public Health bodies and academia as well as widespread reporting by the media; be it the increase in incidence, threat to future health, burden on the NHS or parental blame and so on. The section below highlights some recent media headlines with a brief explanation of the details:

Child of five taken from parents for being obese: Social workers say they didn't do enough to control weight (Hull, 2011), The Daily Mail

<http://www.dailymail.co.uk/news/article-2069986/Child-taken-care-obese-Parents-didnt-control-weight.html>

In Greater Manchester a 5-year old child was taken into care for being obese; he weighed one and half stones more than the average 5-year old. The social workers involved in the case maintained that the parents were not doing enough to maintain the child's weight.

Severely obese children's hearts already in danger (Gallagher, 2012) BBC News <http://www.bbc.co.uk/news/health-18930131>

This report followed the publication of a Dutch study, which found that 62 per cent of severely obese children under the age of 12 years of age already had one or more cardiovascular risk factors.

Fat parents to blame for childhood obesity epidemic by over-feeding under-fives, study [Early Bird] finds (Hope, 2010), The Telegraph

<http://www.telegraph.co.uk/news/uknews/7103587/Fat-parents-to-blame-for-childhood-obesity-epidemic-by-over-feeding-under-fives-study-finds.html>

Reports from the 'Early Bird' study conducted in Plymouth suggests that targeting obesity prevention strategies at primary-school-aged children may be too late and the focus should be on educating new parents and parents-to-be.

As the above headline examples demonstrate, childhood obesity has become very topical with many factors of 'blame' or causative factors being implicated; the evidence behind the media reports are discussed in Chapter 2.

1.3 Obesity health risks and costs

The 2006 Health Survey for England states that 'there is increasing evidence that childhood overweight and obesity can be linked with numerous long-term and immediate health risks' (The Information Centre, 2006, p. 18). Due to the unprecedented increase in childhood obesity since 1995 (2.1), this has become a public health concern. Immediate health risks include: asthma; sleep apnoea; chronic inflammation; cardiovascular risk factors; type 2 diabetes; back pain and psychological ill health (Reilly *et al.*, 2003b; National Obesity Observatory, 2009). Long-term health risks include: obesity persistence; cardiovascular risk factors; stroke; gall bladder disease; some cancers and reduced social and economic outcomes (Reilly *et al.*, 2003b; National Obesity Observatory, 2009). Furthermore, an association between overweight and a lower self-concept (how one perceives themselves) has been reported in girls as young as 5 years (Skouteris *et al.*, 2010a), therefore, preschool aged children may already be at increased risk of the negative psychological events of obesity (Griffiths *et al.*, 2010; Skouteris *et al.*, 2010a).

The Foresight Report (2007) predicted that 60 per cent of men, 50 per cent of women and 25 per cent of children under the age of 16 years could be obese by 2050 (Butland *et al.*, 2007). Furthermore, the age at which overweight/obesity develops is falling, with children at an increasingly younger age group being categorised as overweight/obese (Griffiths *et al.*, 2010). This has grave implications for future health care costs. In 2002, it was estimated that overweight and obesity cost the National Health Service (NHS) £3 billion (4.6% of total NHS expenditure) (Allender and Rayner, 2007) and that overweight and obesity was also responsible for 7.3 per cent of morbidity and mortality in the UK (Allender and Rayner, 2007). Foresight predicted that the wider costs of obesity to society could rise to £45.9 billion by 2050 (McPherson *et al.*, 2007). Preventing obesity in childhood is a fundamental part of addressing the global obesity epidemic (Heitmann *et al.*, 2009).

As part of a 2007 government strategy to reverse the obesity trend, a new Public Service Agreement (PSA) to improve the health and wellbeing of children and young people was established (National Health Service, 2009b). The PSA titled: *Improving the Health and Wellbeing of Young People* aims to reduce the percentage of obese and overweight children to 2000 levels by 2020 (HM Government, 2008).

Subsequently, the 2009 document *Healthy weight, healthy lives: one year on sets*

targets conducive for supporting children in the development of a healthy lifestyle during their early years, its aim for the future is 'one where every child grows up with a healthy weight, through eating well and enjoying being active' (Cross-Government Obesity Unit, 2009b p. 16).

1.4 Early years provision

The UK has become the highest spender on early years services in Europe (Alexander *et al.*, 2010). In 2010, 95 per cent of the 3-4 year old population had some form of free early education at maintained schools or in the private, voluntary or independent sector (National statistics, 2010). This figure rose to 98 per cent in 2012 (National Statistics, 2012). It follows then, that preschool settings may provide valuable opportunities to access children and their families not only for promoting healthy lifestyles, but also to develop and evaluate behaviour-change interventions (Birch, 2006; Story *et al.*, 2006).

However, a child attending preschool provision may be influenced not only by the food and physical activity opportunities made available to them throughout the day, but also the attitudes and behaviours of the nursery staff (Olstad and McCargar, 2009). Indeed in my own work experiences I have encountered an example of such attitudes in nursery staff who firmly believe children 'need' sugar to 'give them energy'.

Early years providers in England follow the mandatory Framework for the Early Years Foundation Stage (EYFS) (Department for Education, 2012). One component of the EYFS educational programme that must be implemented is Physical development, which involves 'providing opportunities for young children to be active and interactive; and to develop their co-ordination, control, and movement. Children must also be helped to understand the importance of physical activity, and to make healthy choices in relation to food' (Department for Education, 2012, p.5). It follows that an intervention with the aim of preventing obesity and improving family lifestyle choices which builds on these principles should be feasible within the remit of a nursery setting.

1.5 Structure of the thesis

This thesis has ten chapters divided into four parts as illustrated in Figure 1. Part one (as above) introduces the concept of my PhD study and the focus of my research (Chapter 1), a review of the literature (Chapter 2) and an introduction and discussion of behaviour change interventions (Chapter 3). Part two introduces (Chapter 4) and

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reports the findings of the preliminary qualitative study (Chapter 5) and discusses the development of (Chapter 6) and the measurement methods for the behaviour change intervention. Part three is concerned with outcome measures results (Chapter 7) and feedback and process of the intervention (Chapter 8 and Chapter 9). Finally, part four provides the overall discussion and conclusions for this PhD study (Chapter 10).

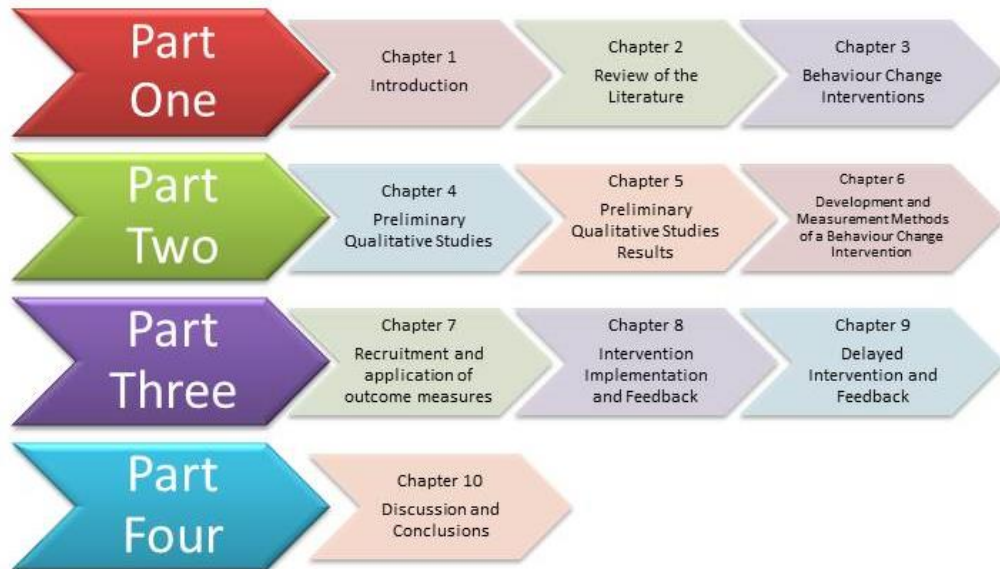


Figure 1 Illustrated structure of the thesis

In the following chapter I review the literature relating to childhood overweight and obesity; energy balance; children's diets, sedentary and physical activity behaviours; determinants of childhood obesity; and factors which may influence children's dietary consumption and physical activity and sedentary behaviours.

Chapter 2 Review of the Literature

'To say that obesity is caused by merely consuming too many calories is like saying that the only cause of the American Revolution was the Boston Tea Party'

Adele Davis, Nutritionist (1904-1974)

2.1 Childhood Overweight and Obesity

2.1.1 Introduction

As summarised in Chapter 1, the growing prevalence of childhood obesity has grave consequences not only for the individual but for society as a whole. This chapter will discuss the increasing prevalence of childhood obesity and the hypothesised influences and determinants contributing to the rise. Also reviewed are factors which may influence a child's dietary intake, physical activity and sedentary behaviours. Finally, reasons for targeting preschool children to attempt to reverse obesity trends are discussed.

2.1.2 Prevalence of childhood obesity

Childhood overweight and obesity in the UK has risen considerably since 1995 (The Information Centre, 2006). The proportion of overweight boys in England aged 2-19 years increased from 18.6 per cent to 20.3 per cent and girls from 23.5 per cent to 26.6 per cent between 1995 and 2000 (National Statistics, 2004a). The proportion of obese children in the same age group rose from 3.7 per cent to 4.8 per cent (boys) and 5.7 per cent to 6.8 per cent (girls) (National Statistics, 2004a).

The National Child Measurement Programme (NCMP), instigated in 2005, is a nationwide programme overseen by the Cross-Government Obesity Unit. The NCMP constitutes part of the implementation plan of the Government's *Healthy Weight, Healthy Lives strategy*. Primary Care Trusts (PCTs), now restructured as Clinical Commissioning Groups (CCGs) were responsible for ensuring that school children aged 5-6 years and 10-11 years are measured and that parents are informed of their child's results (Cross-Government Obesity Unit, 2009a). The NCMP is operated on an 'opt-out' basis; the programme has achieved high participation rates with 88 per cent of eligible children participating in the 2007/08 programme. More recently in 2011 the number of eligible children rose to 93 per cent (The NHS Information Centre, 2011).

The results are used for population level surveillance data to allow for analysis in trends of body weight. Moreover, the findings allow planning and delivery of local services for children (National Health Service, 2009a); collected data are used at both a national and local level to target resources to those most at need. The 2008/09 NCMP reported that there were no significant changes in the prevalence of overweight and obesity in both ages groups from the previous two years (National Health Service, 2009a). Although these results may have suggested a stabilising of the prevalence of obesity, the level of obesity was still high with significant differences between sub groups of the population by different social economic status and ethnicity (National Health Service, 2009a). The 2010/11 results showed a 0.4 per cent decrease in obesity in reception age children, however, year six boy's obesity rates increased by 0.2 per cent and girls by 0.4 per cent (National Obesity Observatory, 2012).

It is not only in affluent western countries that childhood obesity had become prevalent. Obesity rates continue to rise in many counties such as Mexico, India and China (Waters *et al.*, 2011). Furthermore, many countries have moved from being a country that is concerned with under-nutrition in childhood to one of over-nutrition. Obesity prevalence appears to be most common amongst the rich in less developed countries and low SES populations in more affluent countries (Poskitt and Edmunds, 2008). Globally, in 2010 the number of overweight children under the age of five, was estimated to be over 42 million (World Health Organisation, 2009).

2.1.3 Measuring childhood overweight and obesity

Measuring overweight and obesity in children can be problematic; the justification behind it has been questioned and apparent disparities criticised. Body Mass Index (BMI) is the most predominant measure used to assess overweight and obesity in childhood (Kremer *et al.*, 2006). It is thought that the high reliability of height and weight measurements provides a more robust measure of adiposity that can be used to compare adiposity within and between populations (Dietz and Bellizzi, 1999). However, Cole *et al.* (2005) argue that different circumstances require BMI to be reported in a certain manner. They maintain that BMI centiles is useful for classifying children's adiposity but is poor for quantifying change in adiposity. Cole *et al.* (2005) go on to report that BMI z-score (children's BMI is classified using thresholds that vary to take into account the child's age and sex (Dinsdale *et al.*, 2011)) is the most practical way to assess adiposity cross-sectionally in population statistics and for monitoring purposes.

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BMI has been criticised as a suboptimal indicator for total body fat which cannot measure body fat distribution (McCarthy *et al.*, 2001; Hatipoglu *et al.*, 2009). Furthermore, a US study conducted with children aged 7-17 years reported that BMI may underestimate the level of fatness in children due to differing levels of adiposity in children of different gender and race; but with similar BMI. Daniels *et al.* (1997) found that girls had higher total body fat than boys and white participants had higher total body fat than black participants of the same BMI. Centrally deposited adiposity is considered to be a high risk factor for co-morbidities associated with obesity (Hatipoglu *et al.*, 2009), therefore, other methods of body fat measurement may prove more effective than BMI calculations.

More accurate body fat measurements include dual x-ray absorptiometry, bioimpedance and hydrodensitometry, however, these methods are impractical with children and are expensive to apply (Hatipoglu *et al.*, 2009). Other methods such as triceps skinfold thickness are thought to be reasonably well correlated with percentage of body fat, however, differences in measurements between observers are common and people with larger percentages of body fat are more difficult to measure (Dietz and Bellizzi, 1999). Waist circumference (WC) measurement in children, until recently, was not considered an important measure of adiposity (McCarthy *et al.*, 2001). However, a study conducted in 2001 with British children aged 5-16 years, concluded that WC measurements could be as useful as BMI when identifying overweight and obese in childhood populations (McCarthy *et al.*, 2001). However, differences were found between ethnic populations which the authors conceded would need to be addressed. A further British study was able to track the rise in obesity prevalence in a cohort of children through the use of waist measurements. They reported, using comparable data from 20 years previously, the average child's waist size had increased by 4 centimetres (Rudolf *et al.*, 2004). The authors of a later Turkish study with children aged 6-18 years argued that neck circumference measurements may be a reliable method of adiposity measurement which is easier to apply with less need for multiple measurements as is the case with WC (Hatipoglu *et al.*, 2009).

It can be seen, therefore, that the measurement of overweight and obesity in childhood is problematic and heterogeneity has been recorded between studies (Westwood *et al.*, 2007). This makes comparisons of populations problematic. Cole *et al.* (2000) devised an international definition for measuring children in 2000 (International Obesity Taskforce (IOTF) cut points); a reference population was obtained by averaging across

a mix of surveys from six different countries (Brazil, United Kingdom, Hong Kong, The Netherlands, Singapore and the United States of America) with differing prevalence rates for obesity. Thus allowing international comparison of obesity prevalence rates; however it was conceded that it was mainly applicable for a westernised population (Cole *et al.*, 2000).

A study conducted in Australia examining the effects of the International Obesity Taskforce (IOTF) cut-points reported that using the 12 month-interval cut-offs, the prevalence of overweight was underestimated compared to the 6-month interval estimates, however this was age dependent; there was an over-estimation of overweight and obesity prevalence in 4-year olds and an under-estimation in 6-12- year olds (Kremer *et al.*, 2006). The authors concluded that the overall bias would depend on the age range of the population of those being surveyed (Kremer *et al.*, 2006). In The National Child Measurement Programme (NCMP) (see section 2.1.2) prevalence rates are calculated using specific UK National BMI centiles classification which provides centile curves for BMI for British children from birth to 23 years (Cole *et al.*, 1995; Dinsdale *et al.*, 2011).

Westwood *et al.* (2007) question the benefits of assessing childhood overweight and obesity as they maintain there is a lack of evidence of the potential harms associated with either monitoring or screening. They argue that there is currently little evidence of effectiveness of weight reduction interventions and the identification of individual children is unjustified (Westwood *et al.*, 2007). However, the Foresight Report states that despite the variability of methods used to collect data; it is apparent that the prevalence of childhood obesity is increasing (Butland *et al.*, 2007). The need to address the rapid rise in obesity is so great; intervention development still needs to proceed despite the evidence of effectiveness of interventions being incomplete or lacking (Butland *et al.*, 2007).

2.1.4 Section summary

Childhood obesity rates in England have risen considerably since 1995 with many disparities being reported within groups such as social economic groups for reception school age boys and ethnic groups. In order to monitor the changing trends childhood measurement programmes need to be implemented. However, inconsistencies between methods has been criticised and the potential harm of monitoring and

assessing childhood overweight has been added to the debate. Despite these concerns, addressing the reported increases is imperative.

2.2 Energy balance and obesity

Overweight and obesity is the result of a long-term imbalance between energy intake (diet) and energy expenditure (physical activity) (Jebb and Moore, 1999; Gibney *et al.*, 2003; Bandini *et al.*, 2004). Changes in energy balance are rarely sudden or unexplained and are likely to occur gradually over a long period of time (Barasi, 2003). Although genetics may increase the susceptibility of an individual to obesity, it is ultimately energy imbalance which leads to weight gain (Gibney *et al.*, 2003). In order for weight loss to occur, energy expenditure must exceed energy intake. However, this assumption has been criticised as being too simplistic. When energy balance is disturbed, the body attempts to restore equilibrium by making various adjustments to the different components of the equation (Barasi, 2003). Restriction of energy intake and increased energy expenditure has been shown to achieve weight-loss in the short term, however Hafekost *et al.* (2013) argue that this formula has not been proven to provide a successful treatment in the long-term and the body's mechanism to achieve homeostasis is more complex. Maintaining adequate physical activity and exercise have long been promoted as having a positive impact on energy balance (Gibney *et al.*, 2003; Thivel *et al.*, 2013) in addition to the numerous health benefits such as reducing risks of heart disease, stroke, osteoporosis, cancer and for improving mental health (Fentem, 1994).

Consensus in the literature has not been reached as to how differing combinations of diet, physical activity and sedentary behaviour impacts on the development of obesity. Furthermore, studies using the doubly labelled water method have reported substantial underreporting of energy intake in both obese and non-obese people, therefore comparisons between obese and non-obese people are often inaccurate and cannot be used to determine whether obese people consume more energy than their non-obese counterparts (Gibney *et al.*, 2003). In the UK, energy intake data suggests that children consume less energy than they did 50 years ago, however, it has been suggested that dietary patterns and the types of foods consumed has changed (see section 2.4.1). Due to the reported decrease of energy intake, the rise in obesity in children is posited to be attributable to a decrease in energy expenditure (Poskitt and Edmunds, 2008). In more recent research, the effect of sedentary behaviour on energy

balance has been deliberated (see more about sedentary behaviour in section 2.6.1). An early study conducted by Johnson *et al.* (1956) found that the obese teenage girls in their study consumed less energy than their non-obese counterparts and inactivity was found to be more important than energy consumed.

Most studies reviewing the relationship between an individual's daily activities and energy consumption have been conducted in adults and more consideration needs to be given to children (Thivel *et al.*, 2013). How energy balance has changed to account for the dramatic increase in childhood obesity in so many countries over the past 20 years requires investigation (Poskitt and Edmunds, 2008). A review of physical activity, sedentary behaviour and energy balance concluded that sedentary behaviour such as TV viewing in preschool children (see section 2.6.1) may contribute to the development of long-term obesogenic behaviours lasting into adulthood (Reilly, 2008). As discussed, energy balance and the development of adiposity is a complex issue with myriad factors to consider. The following section discusses the evidence from the literature of some of the determinants that may be instrumental in the development of overweight and obesity in childhood and/or later life.

2.2.1 Section summary

Overweight and obesity is the result of a long-term imbalance of energy intake and expenditure. In order for weight-loss to occur energy expenditure must exceed energy intake, however, it has been argued that the body's mechanism to achieve homeostasis is more complex. Studies have shown that adequate physical activity has a positive effect on energy balance. A lack of study consensus and discrepancies in dietary data collection methods has resulted in a failure to determine which combinations of dietary, activity and sedentary behaviours contribute to the development of obesity. More research is needed in children in particular.

2.3 Determinants of energy intake and energy expenditure

2.3.1 Introduction

The development of childhood obesity is multifaceted as demonstrated by the Foresight obesity segmented map for children (Vandenbroucke *et al.*, 2007) in Figure 2. The purpose of the map is to illustrate the interlinking, intricate pathways that influence an individual's energy balance which in turn may affect their propensity to

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obesity; the sheer complexity of the map does not allow for reading clarity on such a small scale. However, the main drivers are reported as: psychological ambivalence, physical activity, degree of primary appetite control, and force of dietary habits. These are expanded to include factors such as learned activity patterns, energy-density of food offerings and availability of passive entertainment options. Butland *et al.* (2007) describe the process as 'a consequence of interplay between a wide variety of variables and determinants related to individual biology, eating behaviours and physical activity, set within a social, cultural and environmental landscape' (Butland *et al.*, p. 79).

However, despite evidential links with possible determinants, establishing a causal association is complicated. (Monasta *et al.*, 2010). Furthermore, Monasta *et al.* (2010) speculate that some determinants may appear to have more important links with obesity simply because they are the determinants for which it is easier to implement an intervention for change.

The following sections will review evidence from the literature of some of the determinants that may be instrumental in the development of overweight and obesity in childhood and/or later life. I felt it pertinent to report details of the following factors as they feature predominantly in childhood obesity literature and have caused some debate of the strength of their significance. The first seven discussed determinants in this section, although highlighted as important in the literature, were not taken forward in the current study. However, social-inequality which has received increased attention in public health research is an aspect that has been incorporated in this PhD study. The World Health Organisation (2010), p. v emphasise the importance of ‘uncoupling the link between social determinants and environmental inequalities through targeted actions focusing on the most vulnerable and disadvantaged population groups’.

2.3.2 In utero programming

The link between the intrauterine environment and the subsequent development of childhood obesity has not been clearly established and remains controversial (Olstad and McCargar, 2009). However, there is evidence from both epidemiological and animal studies that suggest that the programming of obesity can arise from environmental influences occurring in embryonic and neonatal life (Taylor and Poston, 2007). The strongest evidence of in-utero programming comes from the Dutch Famine studies (Rogers and Euro-BLCS Study Group, 2003); it was found that children born to mothers exposed to famine in early pregnancy were more likely to be obese in later life (Taylor and Poston, 2007). It is thought that in having to adapt to a limited supply of nutrients, the foetus permanently changes their structure and metabolism (Barker, 1998). Conversely, it has been suggested that children born to mothers who have been over-nourished before or during pregnancy may also be at risk of developing obesity in early childhood (Olstad and McCargar, 2009). However, one study utilising data from the Avon Longitudinal Study of Parents and Children (ALSPAC) comparing the associations between maternal BMI and offspring and paternal BMI and offspring, hypothesised that if there was a specific maternal effect of intrauterine programming,

then maternal associations should be stronger. Subsequent obesity in childhood and the influence of the intrauterine environment remains inconclusive; some factors may be attributable to the intrauterine environment but may also be genetic in origin (Rogers and Euro-BLCS Study Group, 2003).

2.3.3 Genetics

Genetics may play a part in how the body handles energy and heritability estimates for obesity are thought to be high (Walley *et al.*, 2006); relatives of obese individuals are thought to have up to a 9-fold increase in the risk of developing obesity (Stone *et al.*, 2006). A common variation in the *FTO* gene has been associated with BMI and obesity from childhood into old age (Frayling *et al.*, 2007). A 2010 systematic review reported that several studies had confirmed heritable links with parental height, weight, BMI and percentage of body fat (Monasta *et al.*, 2010). However, these high heritability rates have been challenged by some researchers, they argue that the statistical models used to generate estimates can be misleading and do not take account of environmental influences (Smith *et al.*, 2007). Furthermore, wide variations of the proposed size of genetic contribution to obesity have been reported (Monasta *et al.*, 2010). Recent research has documented obesity related phenotypes (Martinez-Hernandez *et al.*, 2007). In the 1960s the 'thrifty gene hypothesis' was proposed; whereby genes that predispose an individual to obesity would have been advantageous in populations where food was scarce. However, the same genes in today's calorie rich environment pose a threat for those who are susceptible to obesity (Walley *et al.*, 2006). Later studies show that gene-environment interactions play a major part in obesity risk, thus individuals who have inherited genes that predispose them to obesity need to modify their lifestyle choices to limit the risk (Martinez-Hernandez *et al.*, 2007). It has been argued that the major increase in obesity in such a relatively short time period cannot be attributed to genes alone and the environment has a bigger part to play (Taylor and Poston, 2007).

However, in an American study researching mothers' perception of obesity in their preschool children, almost all the participating mothers believed that genetics or heredity was an instrumental determinant of their children's weight (Hughes *et al.*, 2010). This may have implications for public health interventions which aim to improve weight status in children if a parent considers their child's weight to be pre-determined.

2.3.4 Birthweight

There is strong evidence that low birthweight is associated with increased risks of heart disease and diabetes in later life, however the evidence linking low birthweight and subsequent obesity is less clear (Butland *et al.*, 2007). Several studies have examined the association between birthweight and adiposity in later life, however, comparisons between studies are difficult due to differing methodologies (Rogers and Euro-BLCS Study Group, 2003). There is some evidence to suggest that birthweight is related to BMI and risk of overweight in young adulthood (Rogers and Euro-BLCS Study Group, 2003), however, as previously discussed on page 16, some twin studies have shown an association with height but not adiposity (Rogers and Euro-BLCS Study Group, 2003). Some studies suggest that babies who are born small and then display rapid 'catch-up' growth in early infancy are most at risk (Taylor and Poston, 2007). A study conducted in Helsinki on 8760 people born between 1934 and 1944 found that the age of the child was crucial for adiposity rebound (the period between the ages of 3-7 years where body fatness declines before increasing again) (Whitaker *et al.*, 1998; Cole, 2004); children in whom it occurred early, around the age of 4-5 years, were shown to have higher rates of obesity in later life (Barker, 2007). Furthermore, it was shown that children who were small and thin at birth and at age one year, displayed adiposity rebound at an earlier age (Barker, 2007). Rogers and Euro-BLCS Study Group (2003) argue that some studies fail to control for social economic status (SES) in their analysis. Low SES is associated with low birthweight and the prevalence of obesity decreases with increasing SES, therefore the true relation between low birthweight and subsequent obesity could be concealed.

2.3.5 Infant Feeding

Breastfeeding is strongly recommended for several reasons: breastfed infants are less likely to develop gastric, respiratory and urinary tract infections, juvenile onset diabetes and atopic disease (Department of Health, 2003). However, research is divided as to whether breastfeeding reduces the long-term risk of obesity. A review by Singhal and Lanigan (2007) presents evidence of the potential mechanisms by which breastfeeding could protect against obesity. They surmise that breastfed children may be at less risk of developing obesity as mothers who breastfeed are more likely to maintain other healthy dietary and lifestyle behaviours. Furthermore, it is thought that breastfed babies

are able to control the amount of milk they consume, thus self-regulating their energy intake (Singhal and Lanigan, 2007; Robinson and Godfrey, 2008).

An earlier review by Hediger *et al.* (2001), stated that the evidence for breastfeeding having a protective effect against obesity was inconclusive, they maintained that breastfeeding may simply displace the potentially more energy dense formula feeding. It was concluded that the strongest predictor for BMI status in young children was the mother's concurrent BMI (Hediger *et al.*, 2001).

A further systematic review reported weak evidence for prolonged breastfeeding having a greater protective effect on mean levels of adiposity than short-term breastfeeding, however, although the authors concluded that breastfeeding could not be advocated for protecting against obesity, they were reluctant to completely rule out the possibility of breastfeeding having some protective effects (Owen *et al.*, 2005). It can be seen that although breastfeeding may appear to produce some protective effects against obesity, the underlying mechanisms have yet to be fully comprehended (Robinson and Godfrey, 2008).

2.3.6 Sleep duration

Cross-sectional studies suggest that there is an association with the amount of sleep a child has and their weight status (Rudolf, 2009). US surveys report that over the past 50 years there has been a decline in the average self-reported sleep duration by 1.5 – 2 hours per night (Cappuccio *et al.*, 2008); this is thought to be due to changing lifestyles. Literature from bio-medical studies suggest that inadequate sleep may disrupt hormones that regulate appetite and metabolism (Snell *et al.*, 2007). A meta-analysis of studies conducted in population samples from France, Tunisia, Japan, Germany, USA, Brazil, Portugal, UK, Canada, Taiwan and China found that there was a consistent increased risk of obesity amongst 'short sleepers' in adults and children in all countries (Cappuccio *et al.*, 2008). 'Short sleep' in young children is defined as less than or equal to 10 hours per night. A study conducted by Snell *et al.* (2007) in the US with children aged 3-12 years, found that for every additional hour a child stayed up at night their BMI was increased by 0.12 SD and for every additional hour of sleep their BMI was lowered (0.12 SD). Additionally, it appeared that the effect was greater in younger children; the chances of being overweight or obese decreased by 9 per cent for every extra hour of sleep (Rudolf, 2009). However the authors did conclude that their lack of ability to account for pubertal status, which may be a confounder, may

have weakened the association (Snell *et al.*, 2007). Although a strong link has been found between sleep duration and obesity in many countries, the cross-sectional nature of studies cannot infer a causal relationship. Furthermore, Cappuccio *et al.* (2008) argue that shortened sleep may simply be an indicator of overall poor lifestyle choices. However, a more recent review concluded that sleep duration could be a modifiable risk factor for obesity. Health care professionals working with overweight/obese children were recommended to be aware of their clients sleep patterns and provide advice where necessary (Liu *et al.*, 2012).

2.3.7 Parental obesity

Having at least one obese parent is thought to be the highest predictor for childhood obesity (Toschke *et al.*, 2007; OIstad and McCargar, 2009), especially in children under 10 years of age (Lobstein *et al.*, 2004). A prospective cohort study in the UK studying the factors for rapid weight gain in children, reported that pre-pregnancy weight and maternal and paternal weight status when the child was aged 3-years was associated with more rapid weight gain in the child (Griffiths *et al.*, 2010).

The 2007 Health Survey for England reported that in households where one or both parents were overweight/obese the prevalence rate for childhood obesity was higher. It was found that 24 per cent of boys living with overweight/obese parents were classified as obese and 21 per cent of girls. In comparison, of those children living with 'normal' or underweight parents, only 11 per cent of boys and 10 per cent of girls were recorded as obese (The NHS Information Centre, 2009).

Furthermore, a UK retrospective cohort study found that children who had two obese parents were fatter and the mean BMI of the child increased as the degree of parental fatness increased (Lake *et al.*, 1997). Wen *et al.* (2010) found that mothers who did not have any concerns about their own overweight status were twice as likely to be unconcerned about their own child's weight status. Another cohort study conducted in the US between 1965 and 1971, found that the age and weight status of the child also had a direct impact on the likelihood of becoming an obese adult. It was found that before the age of 3 years the primary predictor of becoming an obese adult was the parent's obesity status. However, from the age of 3-9 years the child's and parent's obesity status were both key predictors; as the child aged the child's obesity status took precedence as to whether they would become an obese adult (Whitaker *et al.*, 1997).

An overweight/obese parent may have an indirect or direct influence on the weight outcome of their child. They may directly communicate their weight related concerns (if they have any) to the child or indirectly model their weight related concerns and behaviours, such as dieting, appearance and so on (Haines *et al.*, 2008). It is thought that encouraging parents to adopt a healthy lifestyle and avoiding becoming obese themselves may be an effective prevention measure of childhood obesity (Summerbell, 2007).

2.3.8 Environmental determinants

There has been much research studying what has been coined as ‘obesogenic environments’; this is defined as ‘the sum of the influences that the surroundings, opportunities or conditions of life have on promoting obesity in individuals and populations (Swinburn and Egger, 2002, p. 292). Thus, an obesogenic environment may encourage the consumption of food and discourage physical activity (Reidpath *et al.*, 2002). Although it remains inconclusive as to how much the environment can be responsible for encouraging obesity; there are trends and themes emerging which are associated (Lake and Townshend, 2006; Butland *et al.*, 2007). The environment does not only incorporate the physical environment, but also includes costs, laws, policies, social and cultural attitudes and values (Swinburn and Egger, 2002). These factors can be sub-divided into ‘micro-environmental’ elements (such as schools, workplaces, homes and neighbourhoods) which are influenced by ‘macro-environmental’ elements (education and health systems, government policy and society’s attitudes and beliefs) (Lake and Townshend, 2006). One Australian study linked low income areas with accessibility of fast-food. It was found that those living in the areas with the lowest individual median incomes had two and a half times more exposure to fast-food outlets than those living in the highest individual median areas. Furthermore, those living in the wealthiest areas had no exposure to fast-food outlets at all within their postal district (Reidpath *et al.*, 2002). However, whether this is linked to risk of obesity is not yet known. A further study conducted in the US, reported that people who lived in ‘high walkable’ neighbourhoods (areas conducive for safe, enjoyable walking) walked on average over an hour more than people living in ‘low walkable’ areas. Moreover, the percentage of overweight was higher in the ‘low walkable’ neighbourhoods; 60 per cent as compared to 35 per cent (Lake and Townshend, 2006).

2.3.9 Inequalities

There are inequalities in obesity risk by socioeconomic status (SES), ethnic group and gender. As rates of obesity have increased, inequalities in childhood obesity have become wider with the highest increases seen in children from low SES backgrounds (Law *et al.*, 2007) and in women (Apovian, 2009). Data from the National Obesity Observatory report that there is an almost linear relationship between obesity prevalence in children and the Index of Multiple Deprivation score for the area they live in (NHS, 2010b) and obesity prevalence among children living in the 10 per cent most deprived areas in the country is nearly twice that for children living in the least deprived areas (Ridler *et al.*, 2013).

A study conducted by Wang (2001) comparing nationwide surveys in the US, China and Russia, found that different SES groups are at different risk and this risk varies between countries. Thus, higher SES populations in China and Russia were more likely to be obese; however, in the US it was low SES groups who were more at risk. Another American study had similar findings; black American high SES girls were considered to be more at risk of developing obesity than white children from low SES backgrounds (Wang and Zhang, 2006).

In Britain, Asian children are more likely to be obese than their white counterparts (Law *et al.*, 2007). A 2009 study conducted in three varying SES wards of Leeds reported that there was evidence of childhood obesity spreading across the SES groups. The authors concluded that different environmental mechanisms for causing overweight/obesity were apparent in differing SES groups (Edwards *et al.*, 2009). Relationships have been reported between child obesity prevalence and level of household income (Davidson, 2007). It is thought that ethnic disparities in obesity are likely 'due to environmental, contextual, biological and socio-cultural factors in addition to parental education and family income' (Wang and Zhang, 2006, p. 741).

Utilising data from the Avon Longitudinal Study it was shown that socioeconomic inequality was wider in girls than in boys. Four-year-old daughters of degree educated women had lower BMIs than daughters of less educated women (Howe *et al.*, 2010).

It is unclear why disparities in population sub-groups are becoming wider; some researchers posit that this demonstrates a genetic link (Apovian, 2009). However, as Taylor and Poston (2007) argue, the dramatic increase of obesity in a relatively short

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space of time cannot be attributed to genetics alone, and it is likely that environmental factors have a larger part to play. It has been suggested that the increase in prevalence among low SES groups and the influences of intergenerational effects will see social inequalities in obesity reinforced (Law *et al.*, 2007) and most children will stay in their within their SES, thus tracking their obesity risk factors (Langnase *et al.*, 2004). The 2010 Marmot Review on Health Inequalities report that health inequalities arise from social inequalities and action to address the issue needs to be on a universal scale (Marmot *et al.*, 2010). Blacksher (2008) believes that it is 'ethically unacceptable' not to attempt to interrupt the intergenerational effects of childhood obesity and the disproportionate prevalence of obesity among low SES children 'constitutes an injustice' (Blacksher, 2008 p. 37). However, an intervention that improves the health of a nation overall may also increase inequalities (Babones, 2009), this has been coined as an 'inverse prevention law' (Lorenc *et al.*, 2013).

Moreno *et al.* (2004) put forward the concept of obesogenic families. They maintain that within the micro-environment of the home; families can display an arrangement of dietary and activity patterns that are conducive to promoting the development of obesity within the family. Swinburn and Egger (2002) would argue that it is disadvantaged groups, such as those with low SES and low educational attainment that are at a higher risk of obesity, as a low SES is associated with limited healthy lifestyle choices and a lower uptake of healthy messages. Furthermore, social inequalities have a direct impact on health outcomes, which may operate through both environmental and non-environmental mechanisms thus disadvantaged groups may have poorer access to services such as green spaces, health information and healthier food choices (World Health Organisation, 2010).

In their study looking at the changes in association between overweight and family income in the US, Wang and Zhang (2006) concluded that prevention of childhood obesity should be a priority with a particular emphasis being placed on low SES and ethnic minority groups. In the UK, Marmot *et al.* (2010), in their review stressed the importance of prioritising expenditure to reduce the effects of inequality in children under the age of five years. This priority has been taken into account within this PhD research.

2.3.10 Section summary

The development of childhood obesity is multi-faceted and many potential determinants are reported in literature they include: in utero programming; genetics; birthweight; infant feeding; sleep duration; parental obesity; environmental determinants; and inequalities. However, the strength and causal pathways of these determinants are unclear. Inequalities in health has recently received much attention and The World Health Organisation emphasise the importance of targeting actions that focus on the most vulnerable and disadvantaged groups.

The following sections (2.4 and 2.6) discuss the evidence about children's dietary patterns and consumption and factors which may have an influence on dietary consumption.

2.4 Children's Diets

2.4.1 Changes in dietary patterns

Dietary consumption patterns have altered considerably in the past four decades. In the 1970s most food was prepared and consumed at home (Goran *et al.*, 2005). However, the necessity for home food preparation has been significantly reduced with the availability of pre-prepared and convenience foods in most shops (Mennell *et al.*, 1994). Supermarkets are a central determining factor for many contemporary diets; with persuasive marketing strategies and frequent promotions, consumers can become accustomed to weekly shopping routines within their local store (Darnton *et al.*, 2009). Foods which are most likely to be 'on offer' are those that have the highest profit margins, these tend to be processed foods such as biscuits, cakes and processed meats (Darnton *et al.*, 2009).

There has also been a rapid increase for opportunities to eat away from home; with numerous restaurants, take away outlets and snack bars available in every urban location (Mennell *et al.*, 1994). It is reported that the previous twenty years have seen an increase in 6 to 17-year-old children's soft drink consumption (Goran *et al.*, 2005); in the UK, soft drink consumption rose by 30 per cent between 1997 and 2007 (Gibson and Neate, 2007). Data from America reports that within the past twenty years, daily mean consumption rose from 5 oz. (142g) to 12 oz. (340g). Furthermore, in the 1950s the average soft drink portion was 6.5 oz. (184g), however present day portion sizes

can reach up to 64 oz. (1814g) (Goran *et al.*, 2005). In the 2009/10 National Diet and Nutrition Survey (NDNS) data, it was reported that children aged between 1.5 and 3 years consumed on average (including non-consumers) 58g of 'not low-calorie' soft drinks, this contributes to approximately 19 per cent of total daily intake of non-milk extrinsic sugars (NMES) (Food Standards Agency, 2010b). A study conducted in Northumberland over two decades (1980 – 2000) found 11-12 year old children's consumption of total sugars were consistently reported at around 22 per cent of total energy. However, the sources of consumption changed during the time period, with less sugars being consumed in the form of table sugar and a marked increase of consumption from soft drinks (Rugg-Gunn A.J *et al.*, 2007).

The cost of food in relation to the proportion of household expenditure has been lowered. However, a recent Department for Environment, Food and Rural Affairs (DEFRA) report stated that when consumers were asked which issues were most important to them when food shopping; price was their number one priority (Darnton *et al.*, 2009). Sources of cheaper foods tend to be more energy dense and less healthful, that is, they are high in fats and sugars and low in vitamins and minerals (Butland *et al.*, 2007). The changes in consumer buying, consumption and the 'unstructured' eating habits associated with the availability of 'food on the go' may be an important factor in the rise of obesity prevalence (Butland *et al.*, 2007).

2.4.2 Trends in children's diet

The National Diet and Nutrition Survey (NDNS) of Young People aged 4-18 years (Department of Health, 2000) was conducted in 1997. Dietary intake, recorded over a 7 day period, showed that the most commonly consumed foods were white bread, savoury snacks, chips, biscuits, boiled, mashed and jacket potatoes and chocolate confectionery. Fruit and vegetable intake was varied: 47 per cent of boys and 59 per cent of girls ate raw and salad vegetables, 40 per cent of the group ate green leafy vegetables and around 60 per cent ate 'other' cooked vegetables. Fruit intake was mainly apples and pears (50 per cent), bananas (40 per cent), citrus fruits (25 per cent) and soft fruits (approximately 33 per cent). Consumption of sugary carbonated drinks was high; 75 per cent, with 45 per cent consuming diet soft drinks varieties. Levels of saturated fats and non-milk extrinsic sugars (NMES) were higher than recommended intakes. The main source of NMES coming from carbonated drinks and chocolate confectionery. The mean energy intake reported was lower than recommended

average requirements in all age groups; especially in girls aged 15-18 years (Department of Health, 2000) (this may be partly due to under-reporting of food consumption in this age group). Despite the reduced energy intake, the young people in this survey were taller and heavier than those in previous surveys (Department of Health, 2000).

In 2010, headline results from the 2008/09 NDNS rolling programme fieldwork were published (Food Standards Agency, 2010b). This provides a sample of 1131 individuals aged 1.5 years to 65 years of age. Young people were subsequently divided into three age groups: 1.5-3 years, 4-10 years and 11-18 years. The report comments on observed differences in results from previous surveys but does not report statistical differences. The results showed some reduction in the intake of saturated fats, although levels were still higher than recommended daily intakes. NMES were lower than previous surveys, in children aged 4-18 years; the intake of NMES as a percentage of food energy fell from 16-17 per cent to 15 per cent which can be compared with the recommended daily intake of no more than 11 per cent (Food Standards Agency, 2010a). The major sources of NMES were beverages; cereals, cereal products; sugars; preserves and confectionery. Soft drinks contributed 19 per cent for children aged 4-10 years. Consumption of vegetables was higher in toddlers (age 1.5-3 years), and in children aged 4-10 years than in previous surveys. Consumption of fruit was higher in younger children and toddlers and older boys but not older girls. The mean consumption of milk was reduced in all age groups, white bread remained the main type of bread consumed, and meat consumption increased in all age groups and mean consumption of fish and fish dishes was slightly higher in toddlers and younger children than in previous years. Fruit juice consumption increased in all age groups apart from older girls and the consumption of chocolate confectionery reduced in all age groups (Food Standards Agency, 2010b).

It can be seen that although the intake of fat and NMES were still higher than recommended levels and those children meeting the 5-a-day fruit and vegetable guideline was very low, there were some positive changes such as an increase in fruit and vegetables in some age groups and a reduction of chocolate confectionery.

2.4.3 Socio-economic status and diet

The 2000 National Diet and Nutrition Survey report suggests that although there were some regional differences in diet, there were no major differences in energy and

macronutrient intake. However differences were noted between socio-economic status (SES); children from lower socio-economic classes were more likely to have lower levels of macro and micronutrients. Lower SES boys in particular were also found to have lower levels of energy, fat intake and most vitamins and minerals (Department of Health, 2000). More recent data reports that children's fruit and vegetable intake varies with household income; those in the highest income bracket were most likely to meet the 'five-a-day' target than those of a lower SES (Department for Education, 2013b).

Disadvantaged members of the population may be more vulnerable to societal effects which may lead to obesity (Butland *et al.*, 2007). Families on a low income may be reluctant to introduce foods which the family may reject and are less likely to experiment, sticking with foods they know their children will eat (Dowler *et al.*, 2000). Individuals with a lower socio-economic status are more likely to consume energy-dense foods such as fried foods and take-away foods and place more importance on price and less on health when considering food purchases (Roberts and Marvin, 2011; Konttinen *et al.*, 2012). Furthermore, it has been reported that the recession has impacted food spending. Consumers have responded to higher food prices and increasing income constraints by switching to 'cheaper calories'; there has been a substantial shift towards purchases of processed foods and away from fruit and vegetables (Institute for Fiscal Studies, 2013).

2.4.4 Section summary

Children's dietary consumption patterns have changed considerably in the past four decades, with greater consumption of snack foods and high energy drinks. Cheaper foods and changes in consumer buying have also contributed to family dietary changes. An early report of The National Diet and Nutrition Survey of young people has documented some positive changes since the 2000 survey such as increased fruit and vegetable consumption in younger children, however the consumption of fat and NMES was still higher than recommended levels. The recent recession has seen consumers increasingly switching to 'cheaper calories' in the form of processed foods.

2.5 Factors which may influence children's dietary consumption

2.5.1 Introduction

This section highlights factors that are thought to influence children's dietary consumption; some of which are linked with the obesogenic environment hypothesis as described previously (2.3.8). Many factors inevitably overlap, for example, 'modelling' and 'parental influence'. However, to simplify the account of these factors, they have been divided into the following categories (Figure 3).

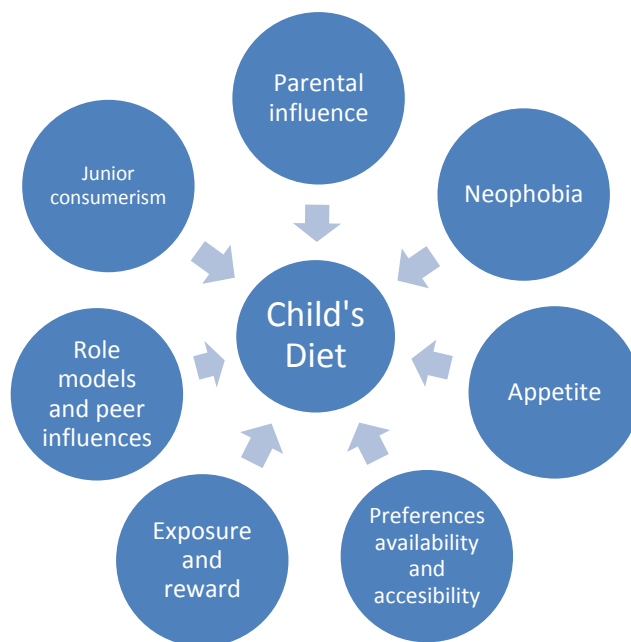


Figure 3 Factors which may influence children's dietary consumption

2.5.2 Parental influence

Parental influence is undoubtedly a major factor influencing a child's dietary consumption. Given the complexity of 'parental influence' which encompasses parenting styles, parental control and feeding practices; 'parental influence' will be reviewed in greater depth in this section.

2.5.2.1 Parenting styles

It has been suggested that parenting styles have an enormous impact on children's socialisation, self-esteem, behaviour and up-bringing; which in turn influences their dietary preferences, consumption and habits (Carlson and Grossbart, 1988; Kremers *et*

al., 2003; Dixon and Banwell, 2004). Baumrind (1967) divides parenting styles into three distinct categories: Authoritarian, Authoritative and Permissive. Overall these styles have been summarised into two dimensions: control/demandingness and warmth/responsiveness (Hubbs-Tait *et al.*, 2008). Authoritarian (high control and low warmth) (Hubbs-Tait *et al.*, 2008) parents attempt to shape and control their child by means of strict rules, they discourage and punish wilful behaviour. Children's conduct is measured by religious or other high standards. The child is expected to 'stay in their place' with little or no autonomy or verbal discourse, parents believe children have responsibilities similar to adults but few rights (Baumrind, 1967; Baumrind, 1980; Carlson and Grossbart, 1988). Baumrind does not define what is meant by 'adult responsibilities' in this context; how much responsibility the child is expected to undertake is not known, although this is likely to differ from parent to parent. Authoritative (high control and high warmth) (Hubbs-Tait *et al.*, 2008) parents positively encourage verbal discourse. They set standards for their children and expect mature behaviour; however, this is fostered in a warm, supportive way. The parent will enforce their control but recognises that there should be a balance between adult and child responsibilities and rights; autonomy and self-expression is valued and encouraged (Baumrind, 1967; Baumrind, 1980; Carlson and Grossbart, 1988). Finally, permissive (low control and high or low warmth) (Hubbs-Tait *et al.*, 2008) parents allow the child to regulate their own behaviour and remove as many restraints as possible without compromising on safety. They can be warm and supportive and the parent will consult with the child to attempt to reason with them without exerting their parental opinions. The child is believed to have adult rights but few responsibilities (Baumrind, 1967; Baumrind, 1980; Carlson and Grossbart, 1988). More recent literature has added a fourth category: neglectful parents. The parents are too self-involved or shrink from parental duties; they believe the child does not require guidance and have little adult responsibilities or rights that warrant adult intervention. Therefore, they do not encourage or monitor their child's behaviour and can be emotionally cold (Carlson and Grossbart, 1988).

2.5.2.2 Modelling

Parental modelling is considered to be one of the most important factors influencing children's food consumption (Reinaerts, 2006). Bandura's 'Social Learning Theory' (Bandura, 1977) proposed that children's eating habits are influenced by their close role models. He believes that most human behaviour is learned through observation

and that people have a capacity to acquire patterns of behaviour through these observations (Bandura, 1977). Children have been shown to change their food preferences in line with their 'respected others' (Birch and Marlin, 1982). Several studies indicate how a parent's food related behaviour and attitudes may influence their child's habits and preferences; both positively and negatively (Rozin, 1984; Carlson and Grossbart, 1988; Longbottom *et al.*, 2002; Wardle *et al.*, 2005; Gregory *et al.*, 2010). Indeed a study conducted by Brown and Ogden (2004) suggests that parental modelling has a consistent impact upon a child's dietary behaviour. Modelling may not only influence a child's dietary intake but it may also give rise to a child emulating a parent's attitude to food and body satisfaction/dissatisfaction (Brown and Ogden, 2004). It is thought that 'models' who possess certain pleasing characteristics and qualities are more likely to be influential to an observer (Bandura, 1977). As a child grows older and becomes more autonomous, their social circle widens and they find new 'models' to emulate.

2.5.2.3 Parental control

Parental control/practices differ from parenting style, although they are thought to be linked (Hubbs-Tait *et al.*, 2008). A parenting style describes the whole child-parent interaction across a wide range of situations. Whereas parental control is more domain specific; for example the practice of child feeding (Kremers *et al.*, 2003). Child feeding practices can be divided into different aspects; such as restriction and pressure to eat. For example a parent who uses restriction wishes to control the consumption of fatty, sugary foods, whereby a parent using pressure is attempting to increase the consumption of 'healthy' foods (Wardle *et al.*, 2005).

It has been suggested that mothers from middle and higher social class families are more likely to exert control over the foods their child is allowed to eat, encouraging more healthful consumption habits (Vereecken *et al.*, 2004; Wardle *et al.*, 2005). Carnell *et al.* (2011) report that health and practicality were the two primary motivations for parents' choice of feeding practices for their preschool children. Conversely, Wardle *et al.* (2005) reported that increased parental control was likely to be associated with reduced fruit and vegetable intake and was positively correlated with neophobia (see 2.5.3). Moreover, restrictive practices have been linked with childhood weight gain in some studies (Kremers *et al.*, 2003; Blissett and Haycraft, 2007).

A parenting practice may in turn be influenced by a child's characteristics, that is, a parent who has concerns about their child being overweight may introduce restrictive feeding practices in response (Birch, 2006). In a study where parents were asked why they did not try to enforce healthful eating, many reported that they were unwilling to expose themselves and their family to stressful, confrontational meal-times (Noble, 2007). Additionally, as previously discussed, families with low-incomes are less likely to experiment, sticking with foods they know their family will eat, thus the parent will take more account of their child's likes and dislikes (Dowler *et al.*, 2000; Noble, 2007); this practice has been associated with reduced consumption of vegetables (Vereecken *et al.*, 2004).

2.5.2.4 Transmission belts

It is thought that the parenting style adopted by the parent plays a critical role in the effectiveness of the parenting practice that is imposed upon the child (Blissett and Haycraft, 2007). Schonpflug (2001) maintains that parenting styles are 'transmission belts' (p. 176) which can promote the transmission of values. Some parenting styles are thought to be more effective at this than others. Schonpflug believes that positive emotional interactions between a parent and child, such as authoritative styles, will enhance transmission of values. Children raised by authoritative parents score highly for social development, self-esteem and mental health (Kremers *et al.*, 2003); this has been shown to extend into adulthood (Rothrauff *et al.*, 2009). Authoritarian style parenting is thought to reduce transmission (Schonpflug, 2001) and may cause lower psychological well-being in adulthood (Rothrauff *et al.*, 2009). Blissett and Haycraft (2007) posit that 'parenting styles are good predictors of children's Body Mass Index (BMI), fruit and vegetable intake, healthier eating, physical activity and sedentary behaviours' (p. 477). A Dutch study with 16-17 year olds, assessing fruit consumption, reported consistent and predictable differences between the adolescents who described their parents as authoritative, authoritarian, indulgent or neglectful (Kremers *et al.*, 2003) (see section below for details). However, it is thought that a child's stage of development, that is, their level of autonomy and the order of their birth will impact the effectiveness of the transmission of values (Schonpflug, 2001).

2.5.2.5 Feeding practices

As previously discussed child feeding practices can be separated into different aspects such as restrictive and pressure to eat (Wardle *et al.*, 2005). It has been suggested that

Chapter Two Review of the Literature

parents enforcing, for example, restrictive measures in an authoritative style may be more successful in transmitting their values than another parenting style (Kremers *et al.*, 2003). It is thought that feeding practices delivered in an authoritarian style is likely to restrict the development of the child's self-control of eating (Vereecken *et al.*, 2004) and children of authoritarian parents are five times more likely to be overweight than children of authoritative parents (Rhee *et al.*, 2006; Blissett and Haycraft, 2007). A 2006 US study which measured 872 first graders (6 years of age) found that of the four assessed parenting styles; children of authoritarian mothers had the highest risk of overweight (BMI \geq 95th percentile). Furthermore, studies suggest that strict dietary restriction in this context may actually increase a child's preference for the restricted foods (Kremers *et al.*, 2003; Vereecken *et al.*, 2004). Permissive style parenting has been associated with higher consumption of soft drinks and sweets (Vereecken *et al.*, 2004). However, as with authoritative parents, permissive parents are more likely to consult and interact with their child whilst shopping and making food choices (Carlson and Grossbart, 1988). A Belgian study, by Vereecken *et al.* (2004) with preschool children and their mothers which measured the influence of mother's educational level on food parenting practices and the food habits of the children concluded that an authoritative parenting style was instrumental in facilitating the development of a child's self-control and healthy eating habits. This too was the finding in a study with adolescents measuring fruit consumption. The children who had been raised in an authoritative environment ate considerably more fruit than children raised with other parenting styles. Children raised in an indulgent (permissive) environment consumed more fruit than those in authoritarian or neglectful homes. No differences were found between neglectful and authoritarian homes (Kremers *et al.*, 2003).

However, other studies conducted in Europe have reported parenting styles to be of little relevance when measuring fruit and vegetable intake (De Bourdeaudhuij *et al.*, 2009). This may be due to cultural differences when measuring parenting styles. As discussed above, there is a plethora of literature which posits that a feeding practice can be adopted by any style of parenting and it is the delivery of the practice through the parenting style that is critical. However, an American study conducted by Hubbs-Tait *et al.* (2008) which analysed 239 parents of first graders child feeding practices and parenting styles, by the Child Feeding Questionnaire and the Parenting Styles and Dimensions Questionnaire, concluded that a parent's style can be predicted from the feeding practice implemented. Thus, suggesting that a parent with a specific style of parenting is more likely to adopt a particular feeding style. Restriction and pressure

were linked to authoritarian styles; modelling, monitoring and perceptions of responsibility were linked to authoritative parenting and low modelling to permissive styles (Hubbs-Tait *et al.*, 2008).

2.5.2.6 Adopted parenting style

The parenting style adopted by a parent is reported to be dependent on several factors. Intergenerational studies report that parenting styles are passed on from one generation to the next through parental modelling (Serbin, 2003). This reiterates how Bandura's Social Model of Learning (page 37) applies to many aspects of behavioural values. Furthermore a Dutch study comparing fruit and vegetable intake of teenagers with their parents reported parenting style, found that parents with religious beliefs (Catholic, Protestant and Islamic) were more likely to adopt an authoritative or authoritarian style, whereas parents with no religious beliefs are were likely to adopt a permissive or neglectful style of parenting (Kremers *et al.*, 2003). Parenting style is also thought to differ between ethnic groups and social economic status (SES) (Rothrauff *et al.*, 2009). Parents of low SES are reported to focus on their child's external behaviours such as obedience rather than internal characteristics such as autonomy and may use more authoritarian styles. Similar findings were found in a study with Latino parents and children, parents who were younger, unemployed or less educated were more likely to use controlling feeding styles (Arredondo *et al.*, 2006). However, Rothrauff *et al.* (2009) posit that in the context of difficult living environments, an authoritarian style may actually benefit the child; providing rules and enforcing control may keep the child safe and promote better attainment at school.

The inclusion of parenting style awareness and modification is a regular recommendation of research regarding children's dietary habits and obesity prevention interventions (Arredondo *et al.*, 2006; Rhee *et al.*, 2006; Hubbs-Tait *et al.*, 2008; Scaglioni *et al.*, 2008; Gubbels *et al.*, 2009; Rudolf, 2009; Gerards *et al.*, 2011). However, despite the evidence that parenting styles, specifically the promotion of an authoritative style, may be instrumental in the development and maintenance of childhood obesity (Scaglioni *et al.*, 2008; Gerards *et al.*, 2011), there have been few studies that have incorporated parenting styles into an intervention design.

2.5.3 Neophobia

Food neophobia is the reluctance or refusal to eat certain foods (Dovey *et al.*, 2008) or a fear of new food (Russell, 2008). It is thought to be an evolutionary survival response by which children avoided ingesting something potentially dangerous (Dovey *et al.*, 2008). Neophobia in children is thought to develop once the child becomes mobile and peaks between the ages of 2-6 years (Adessi *et al.*, 2005). In a 2005 UK study looking at the effect of parental control over children's eating habits; it was found that after parental influence, food neophobia was the next strongest factor influencing a child's dietary habit. Boys in particular were shown to have an aversion for vegetables (Wardle *et al.*, 2005). A child affected by neophobia is likely to have a limited diet which will undoubtedly restrict their nutrient intake and willingness to eat a varied diet, thus establishing preferences that may encroach adult dietary habits (Dovey *et al.*, 2008).

2.5.4 Appetite

It has been suggested that satiety responsiveness, food cue responsiveness and a preference for energy dense foods are associated with adiposity even at a very early age (Carnell and Wardle, 2008b). In their study Carnell and Wardle demonstrated that in two separate groups of children, group (i) aged 8-11 years and group (ii) aged 3-5 years, a higher BMI score was associated with lower satiety and higher food cue responsiveness (Carnell and Wardle, 2008a). However, appetite is the culmination of many factors such as parental feeding style, environmental influences and genetic variances (Carnell and Wardle, 2008b; Cole *et al.*, 2010). Although evidence suggests that appetite may be partly inherently genetic, in his study with preschool children, Johnson (2000) demonstrated that children who were recorded as either under or over eating were able to change their regulation of energy intake through role play and interactive play with dolls (see page 71 for further details).

2.5.5 Preferences, availability and accessibility

'Whether genetic predispositions are manifested in food preferences that foster healthy diets depends on the eating environment, including food availability and child feeding practices of the adults' (Birch, 1999, p. 41). A 1995 study conducted in the US concluded that differences in food preferences and a willingness to try new foods were associated with inherent psychological factors. A sample of 146 adults were surveyed about their attitudes to foods and willingness to participate in certain recreational

activities; the findings revealed that those who enjoyed eating and trying a variety of foods were more likely to be open to new experiences, whereby those who did not enjoy new tastes or consuming a variety of foods tended to have a negative reaction to new recreational experiences (Raudenbush *et al.*, 1995). This indicates that preferences may be partly genetic in nature.

Furthermore, it has been found that 4-5 year old children who have overweight or obese parents have a higher preference for fatty foods and a lower liking for vegetables (Wardle *et al.*, 2001). Studies researching children's fruit and vegetable consumption have indicated that exposure is an important factor for preference, consumption and consequential habitual intake. A Dutch study (Reinaerts, 2006) found that 'habit' was the most influential correlate of fruit and vegetable consumption for children aged 4-12 years. 'Habit' in this context is described as behaviour that has become so automatic through repetition, it no longer requires conscious decision making (Reinaerts, 2006). A further study also looking at the effects of habit on children's fruit and vegetable consumption concluded that for children who like fruit and vegetables, they only needed them to be available to become habitual. However, children who claimed to dislike fruit and vegetables needed them to be accessible (i.e. peeled/prepared) as well as available to become habitual (Webber Cullen *et al.*, 2001; Burchett, 2003).

A 2009 Australian study reported that 72 per cent of surveyed parents found 'availability of healthy food' a barrier for achieving a healthy diet for their child (Slater *et al.*, 2009). However, in the same study 'child resistance' was also cited by 89 per cent of parents as a barrier. It is difficult to ascertain whether it is a lack of available 'healthy food' (therefore non-habitual) that leads to the child being resistant or if the child's resistance leads to the parent being reluctant to providing the child with 'healthy' options.

2.5.6 Exposure and reward

There are many factors which may affect a child's food acceptance; one of the most significant is thought to be early life exposure to food within their culture (Harris, 2008). The findings from the Wardle study, as discussed above, suggest that the children of the overweight/obese parents may not have been introduced/exposed to 'healthy' foods (Wardle *et al.*, 2001). Children are likely to consume the same foods as their parents through everyday practicalities, that is the parent purchasing the same food for the whole family to consume (Wardle, 1995). Indeed, familiarity has been shown to

have an important effect on children's food preferences and the child's preference for a food tends to increase with the frequency of their exposure (Birch *et al.*, 1987; Domel *et al.*, 1993; Horne *et al.*, 1995). This phenomenon is described as the 'mere exposure' effect (Blissett and Haycraft, 2007). Although babies have an innate preference for sweetness, at age 6 months only those who have been routinely been given sweet drinks show a preference when tested (Benton, 2004). It has been suggested that young children may need up to 5-10 exposures to a new food before they will accept that food (Barasi, 2003).

In 2003 a study with 5-7 year olds in three London primary schools (two intervention, one control) demonstrated how through a repeated daily exposure intervention, the children increased their preference and consumption of a targeted vegetable. Children who were in the 'reward' group received a sticker for consuming the targeted vegetable, however their preferences and consumption proved non-significant as compared to the exposure and control group (Wardle *et al.*, 2003). Furthermore, a modelling and rewards intervention with preschool children in Wales found a lasting increase in young children's snack-time consumption of fruit and vegetables (Horne *et al.*, 2010).

The use of rewards to encourage consumption of a targeted food is highly controversial and debated. It has been suggested that rewards when used and delivered in an appropriate context can be an extremely effective way of altering children's preferences (Horne, 1998). However, Birch and Marlin (1982) argue that rewarding a child's consumption of a particular food will not increase a preference for it, but will actually cause a decrease. This point along with the child receiving mixed messages was noted by Baxter and Schroder's example of parents rewarding vegetable consumption with a favoured food (Baxter and Schroder, 1997). In their study, Birch and Marlin used play sessions as a reward for consuming a required fruit drink; they discovered that this method did indeed reduce the preference for the drink (Birch and Marlin, 1982). However, the 'Food Dudes' intervention (see page 69) which used rewards in conjunction with peer modelling found the intervention to be extremely effective in changing children's fruit and vegetable consumption habits (Horne *et al.*, 1995). Thus, the context and delivery of the reward would appear to be key factor.

2.5.7 Role models and peer influences

Parental modelling has already been discussed in section 2.5.2.2. Peer modelling can also have powerful repercussions, particularly if the model is of a similar age or slightly older than the observer (Horne, 1998). A study conducted by Kelly *et al.* (2006) asked parents what their perceptions of healthy eating were and how different factors affected their primary school aged children's eating habits. 60 per cent of the parents surveyed believed that peer pressure was responsible for their children asking for snacks, crisps and carbonated drinks. Conversely, 44 per cent acknowledged that peer pressure also contributed to requests for fruit and healthy snacks.

Bandura's theory maintains that televised role models are very effective in capturing a child's attention; children and adults have been shown to acquire new attitudes, emotional responses and styles of conduct through televised media (Bandura, 1977). This theory may explain the reported success of the Food Dudes intervention (see page 69) which used televised role models to encourage fruit and vegetable consumption. However, although visual imagery is important to younger children whose verbal skills are still developing; it is thought that some children do not require visual modelling clues. Simply hearing a friend express their dislike of a particular food may be enough to influence and change the observer's preference (Horne *et al.*, 1995). Peer modelling may be more influential than parental modelling after the age of 8 years (Longbottom *et al.*, 2002). However, some studies have indicated that preschool children are greatly influenced by peers, especially if the model is older than them. Thus, a 3-year-old may be more likely to change their preferences in line with peers than a 4-year-old in a preschool setting (Alles-White and Welch, 1985).

2.5.8 Junior consumerism

Children who are influenced by factors other than their parents may have a dominant role within the family when determining which foods should be purchased and consumed within the household (Baxter and Schroder, 1997). The 1995 National Food Survey reported that there was clear evidence that children throughout the U.K had a limiting effect on the household consumption of fresh green vegetables (Baxter and Schroder, 1997). This was determined by participating households keeping a one week record of all foods bought and consumed by the family. Additional characteristics of family members were also recorded, thus constructing a picture of the family's eating

habits and lifestyles (Ministry of Agriculture and Office of Population Censuses and Surveys, 1997).

Several studies report that due to factors such as changes in the composition of households, higher socialisation of children (Kelly *et al.*, 2006) and an increasing number of single parent households (National Statistics, 2004b); children appear to be becoming more independent consumers at an early age (McNeal and Yeh, 2003). Gelperowic and Beharrell (1994) maintained that although the U.K can be considered a matriarchal society when it comes to provision of food and running the household; mothers seemed to be losing power to their children when making food purchases. Gelperowic and Beharrell believe this is due to mothers consulting more with their children about household decisions in general which extends to which foods are purchased and consumed.

Turner *et al.* (2006) posit that children go through a consumer socialisation process which leads them to develop their own opinions and tastes about food. Additionally, it would appear that children from one parent families are able to exert more influence over food purchases than those living with two parents (McNeal and Yeh, 2003). Other theories which may explain why children can have such a strong influence on the family's shopping and consumption habits, are thought to be mechanisms such as the mass media and educational television programmes; which reinforce the idea that children have a role to play within society, that is, they are able to participate in decision making; be it on an individual or group level (Dixon and Banwell, 2004). This explanation relates to Bandura's Social Learning Theory, whereby televised role models can influence and initiate behavioural change in an individual (Bandura, 1977).

2.5.9 Section summary

Much is reported in the literature of the factors which may influence a child's dietary intake, the greatest influence undoubtedly in a young child's life is parental influence. A parent's feeding practices, parenting style, control and modelling behaviours can have both a positive or negative effect on a child's dietary consumption. The parent's practices or behaviours are in turn affected by other factors such as education, SES, religious beliefs and generational influences. It is recommended that future obesity prevention studies should consider parenting styles in their design; an authoritative style in particular is commended. Several other factors in addition to parental influence have been implicated with influencing a child's dietary intake, they include: neophobia;

appetite; preferences, availability and accessibility; exposure and reward; role models and peer influences; and junior consumerism. These factors need to be taken into consideration in intervention design and evaluation and many of the factors in this section such as parenting styles, availability and accessibility, exposure and reward, and role modelling have been incorporated into this PhD study.

2.6 Children's sedentary behaviour and physical activity

2.6.1 Sedentary behaviour

Reducing sedentary behaviour has become an important component within health promotion interventions and it is thought it should be independently assessed from physical activity (Reilly *et al.*, 2003a). Sedentary activities which have been linked to an increase in childhood obesity include television (TV) viewing, video games and computer screen time. However, although some studies have demonstrated strong links, the evidence is cross-sectional and lacking comparativeness (Rey-López *et al.*, 2007) and may be due to reverse causality (Monasta *et al.*, 2010). There has been a sharp increase in the number of children who have a TV in their bedroom (36%) and it has been found that those who do have their own TV watch significantly more TV than those who do not (Rennie *et al.*, 2005). It has been reported that children who watch more than two hours per day of TV consume less fruit and vegetables, more high energy drinks (Granich *et al.*, 2010) and consume a higher consumption of calorie rich 'unhealthy' food (Jago *et al.*, 2005; Rey-López *et al.*, 2007; Temple *et al.*, 2007). In 2007, it was reported that eating in front of the TV contributed to 20-25 per cent of an individual's daily dietary intake and that repeated eating whilst watching TV could result in the TV becoming a conditioned stimulus for eating (Temple *et al.*, 2007). However, Jago *et al.* (2005) reported no correlation between time spent watching TV and the percentage of energy consumed as fat, in their cohort study as described below.

Most studies linking TV viewing and adiposity are in children under the age of 10 years. The US study by Jago *et al.* (2005) followed a cohort of 138 3-year-old children over three years; they found that TV viewing and BMI was not strongly associated until the children were 7 years of age. Other studies have suggested that there may be a delayed effect of TV viewing on body fatness (Rey-López *et al.*, 2007). A study conducted with preschool children in Canada found an association not only with TV viewing and increased waist circumference at an older age but also a compromise in muscle fitness (Fitzpatrick *et al.*, 2012). Moreover, another US study reported that

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watching more than two hours per day was associated with higher risk of being overweight and higher adiposity in preschool children (Mendoza *et al.*, 2007). The same study found that computer use was linked to higher adiposity in preschool children but not in weight status. However, other studies found no link between obesity and video and computer games (Rey-López *et al.*, 2007). This may be due to TV viewing being a passive activity whereby the viewer is more likely to snack than a child who is engaged in a game (both hands are needed to play) (Rey-López *et al.*, 2007). It has also been suggested that watching TV can 'dishabituate' food cues, thus contributing to excess eating (Temple *et al.*, 2007).

In the prevention of childhood obesity it has been proposed that targeting a reduction in sedentary behaviour may be more effective than targeting increases in physical activity (Reilly *et al.*, 2003a). However, parents report using the TV as a 'babysitter', especially in the case of multiple siblings, furthermore, they are most likely to restrict a child's viewing on the grounds of the programme not being suitable, rather than concerns about sedentary behaviour (Pocock *et al.*, 2010). This may have implications for sedentary behaviour reducing interventions.

To date there are no guidelines in the UK relating to how much TV children should be exposed to. Australia and the US have adopted guidelines which provide parents with recommendations to restrict their children's TV viewing to no more than 2 hours per day (NHS, 2012b). Okely and Jones (2011) who conducted a review in Australia also recommend that:

- Children under the age of 2 years of age should not spend any time watching TV or using electronic media
- Children aged 2-5 years should not sit, watch TV or use other electronic media for more than one hour per day
- Infants, toddlers and preschool children should not be sedentary, restrained or kept inactive for more than an hour at a time, with the exception of sleeping

In July 2011 for the first time, Government recommendations were issued by the Department of Health for reducing sedentary behaviour in the under-fives in the UK; they were:

- Physical activity should be encouraged from birth, particularly through floor-based play and water-based activities in safe environments
- Children of preschool age who are capable of walking unaided should be physically active for at least 180 minutes, spread throughout the day
- All under 5s should minimise the amount of time spent being sedentary (being restrained or sitting) for extended periods (except time spent sleeping)
(Department of Health, 2011b)

Sedentary activity can be difficult to measure, recording of TV viewing can be used as a proxy for inactivity; however, this is methodologically limited. Accelerometry has been shown to be effective not only for measuring children's physical activity but also their inactivity (Reilly *et al.*, 2003a). However, a recent systematic review of the validity and reliability of sedentary behaviour measures, reported that although accelerometers provide accurate measurements of sedentary behaviour, they cannot give context or provide information about the type of sedentary behaviours being engaged. Furthermore the cost of the equipment and the technical expertise required to analyse the data, may restrict the use of accelerometers for a lot of studies (Lubans *et al.*, 2011).

The Health Survey for England reported in 2008, which asked children and adults to recall their activity over previous weeks, reported that the average total sedentary time for boys and girls on weekdays (excluding time at school) was 3.4 hours each and 4.1 and 4.2 hours respectively at the weekend. Younger children showed less variation for week or weekend days, however, after the age of 9 years the proportion that were sedentary for 6 hours or more increased across all ages (The Health and Social Care Information Centre, 2009). As discussed in the following section, it has been shown that parents may overestimate their children's physical activity level when completing questionnaires.

2.6.2 Physical activity

There is evidence to suggest that physical activity (PA) has a protective effect against weight gain in childhood (Steinbeck, 2001) and physical inactivity can be a contributing factor in the maintenance of childhood obesity (Trost *et al.*, 2001; Reilly, 2008). However, Metcalf *et al.* (2010) recently argued that physical inactivity was the result rather than the cause of obesity. In their study following 202 children aged 7-10 years,

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the authors concluded that a higher body fat percentage at age 7 years predicted a decrease in daily moderate and PA.

The recommended levels for childhood PA is 60 minutes of moderate intensive activity per day (Department of Health, 2010b) and 180 minutes of activity per day for under-fives (as discussed above) (Chief Medical Officers, 2011). However, studies show that most children are not reaching the recommended levels despite there being a widespread perception that young children are spontaneously active (Reilly *et al.*, 2004; Timmons *et al.*, 2007; Brown *et al.*, 2009). One Scottish study following children aged 3-5 years-of-age, reported that the children in the study typically only achieved 20-25 minutes per day (Reilly *et al.*, 2004). Boys are more likely to reach the recommended levels than girls, and for girls who do reach the recommended levels, this level declines from the age of about 8 years (The NHS Information Centre, 2009; Tucker *et al.*, 2011).

Preschool children tend to have sporadic short bursts of vigorous activity which is followed by less-intensive recovery periods (Hinkley *et al.*, 2008). It is commonly believed that children will automatically develop motor skills as they mature, however, Wang (2004), posits that children need continuous practice and instruction to allow their performance level and movement range to increase. Moreover, Williams *et al.* (2008) report that children with better developed motor skills may find it easier to be physically active.

In a Canadian qualitative study with nursery practitioners, some practitioners felt that parents needed education in the form of newsletters, workshops and information about free activities in the local area to promote PA: 'if we don't educate the parents, how are we going to educate the kids?' However, it was conceded that it was likely that the parents who 'needed to be there' would not participate or 'turn up' (Tucker *et al.*, 2011).

The 2009 NICE guidelines for promoting physical activity for children and young people, recommend that families should be given 'homework activities' which children and parents/carers can do together. Or advice should be given on how to promote a supportive home environment (National Institute for Health and Clinical Excellence, 2009).

There is evidence that children's physical (in)activity tracks to adolescence and adulthood (Campbell and Hesketh, 2007). A US study conducted in 2005 observed 470

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five-year old children's physical and sedentary behaviours for three years. It was found that the children's sedentary behaviour was more predictable than their PA (Janz *et al.*, 2005). An earlier US study tracked 130 children aged from 7-12 years of age; the authors reported that tracking of physical fitness and PA was moderate to high. They also concluded that sedentary behaviour tracked more so in boys and PA more so in girls (Janz *et al.*, 1999).

Regional differences can be seen in the levels of children's PA; in 2007, children in London were less active than the rest of England, with the highest percentage of children reaching the recommended levels residing in the South West (The NHS Information Centre, 2009).

The measurement of PA is problematic, especially in children (Warren *et al.*, 2003; Rennie *et al.*, 2005; Campbell and Hesketh, 2007). Furthermore, measuring the activity levels of very small children poses additional problems as the nature of their play is erratic and difficult to characterise (Steinbeck, 2001). Different types of PA in children are hard to distinguish and measure as their activity is less structured than adults (Steinbeck, 2001). Moreover, the variation of methods employed makes study comparisons complex.

The most common method used, due to its ease of use and financial advantage, is 'self-report'; this may lead to recall bias and has limited validity and reliability among children (Trost *et al.*, 2001). Families taking part in behaviour-modification interventions have a tendency to over-report their levels of PA (Reilly *et al.*, 2008). As part of the Gateshead Millennium Study, Basterfield *et al.* (2008) measured 130 6-7 year old children's PA levels by accelerometer over 7 consecutive days. Parents were also asked to record their children's activity levels by means of the Health Survey for England Physical Activity Questionnaire. The questionnaire results significantly overestimated the levels of habitual moderate to vigorous PA achieved by the participating children; thus questioning the validity of such methods. Ideally parent reported methods should be supported by the use of direct objective measures where possible.

Using direct observation of behaviour as a criterion method, Reilly *et al.* (2003a) found that the use of accelerometry was a practical way to measure PA activity even in young children.

It is unclear whether obesity preventative interventions that focus on PA are more or less effective than dietary interventions (Brown and Summerbell, 2009), however, there is some evidence to suggest that combined multi-component lifestyle interventions may prove more effective (Bautista-Castano *et al.*, 2004; Brown and Summerbell, 2009) (see page 83 for details). The following section (2.7) explores factors which may have an influence on physical activity and sedentary behaviour.

2.6.3 Section summary

There is some evidence that sedentary behaviour may be linked to childhood obesity, however, this may be due to reverse causality. Watching more than two hours of TV a day is thought to increase a child's risk of being overweight and other activities such as video games and use of computer screens are linked to increases in sedentary behaviours. Most studies show that children are not reaching the recommended levels of daily activity and parents have been shown to over-estimate their child's activity level. For the first time in 2011 the UK Government issued guidelines to reduce sedentary behaviour in the under-fives which included 180 minutes of activity per day.

2.7 Factors which may influence children's sedentary behaviour and physical activity

2.7.1 Introduction

In young children, it is thought that the environment and the family are important factors for activity, mainly by reducing sedentary behaviour (Thorn *et al.*, 2010). However, it is important to note that sedentary behaviour is *not* the opposite of physical activity (Okely and Jones, 2011), a person can engage in physical activity and still be sedentary.

2.7.2 Sedentary behaviour

As discussed in section 2.6.1 it has been suggested that the increased use of electronic media and technology is linked to an increase in sedentary behaviour in children and young people (Rey-López *et al.*, 2007). Some parents believe that watching TV can be an educational activity and if children are 'dancing and jumping to programmes' it may increase activity (Pocock *et al.*, 2010, p.349). A recent report by the British Heart Foundation reviewing the effectiveness of 'Exergaming' (interactive

screen-based activities such as Dance Revolution and Wii Boxing), concluded that early evidence suggests that some Exergames may produce an energy expenditure in children equivalent to light physical activity. However, the findings are limited to a few studies with small participant numbers (Loughborough University, 2012).

A 2010 review reports that the correlates of sedentary behaviours in preschool children are lacking and the evidence that does exist is largely inconclusive. Consistent evidence was shown to exist for only two variables; sex and outdoor play both of which were shown to have no association with television viewing (Hinkley *et al.*, 2008). A later study tracking 10-year-olds' sedentary behaviour over one year found that SES had an impact on children's sedentary behaviour with children from a higher SES exhibiting greater increases in sedentary time than those of a lower SES (Atkin *et al.*, 2013). However, this is in contrast to a report published by the British Heart Foundation which reported higher sedentary behaviours in lower SES groups (BHF National Centre, 2012). Other factors thought to influence sedentary behaviours were parents' weekend viewing and computer use, whole-family participation in sport or recreation and rules regarding playing outside (Atkin *et al.*, 2013). Although some of these factors may have an influence on preschool children's sedentary behaviours, the evidence is lacking.

2.7.3 Physical activity

A US study exploring low-income families' views of obesity risk factors found that very few parents (7.4%) ranked low levels of PA as a top risk factor (Hernandez *et al.*, 2012). Parental levels of PA have been associated with children's levels (Trost *et al.*, 2001; The NHS Information Centre, 2009; Tucker *et al.*, 2011); thus a child with one or more parents who participate in moderately intensive activities is more likely to be active also. However, a 2011 review of parental influences on young people's PA concluded that there was insufficient evidence to support a link between a parent and child's PA and parenting style and a child's PA. Nevertheless, strong evidence was reported for parental support such as watching a child perform PA or signing them up for a PA programme (Trost and Loprinzi, 2011).

Despite the perceived importance of parents being role-models for their children (section 2.5.7) (Dwyer *et al.*, 2008), parents of young children have reported that they although they feel responsible for their child's diet, they were less decisive about PA and relied on school/preschool staff to ensure their child was adequately active (Hart *et al.*, 2003; Tucker *et al.*, 2011). Parents felt that children would receive more structured

and routine activity at preschool (Irwin *et al.*, 2005). Conversely, Tucker *et al.* (2011) reported that preschool staff expected parents to provide a home environment that complemented the positive activity messages children received in childcare.

Carers/nursery practitioners have also been highlighted as important role models for young children's PA. However, previous studies show that some practitioners do not encourage or present enough opportunities for children to engage in moderate to vigorous PA (Brown *et al.*, 2009). Nursery policies and practices can dictate group spaces, use of time and nursery practitioner education (Dowda *et al.*, 2004; Pate *et al.*, 2004). Children in preschool centres with better educated teachers/practitioners display higher levels of moderate to vigorous physical activity (MVPA) (Story *et al.*, 2006). More recent research reported that 15 minutes of *vigorous* physical activity was associated with 0.36% lower percentage of body fat in preschool children (Collings *et al.*, 2013). Practitioners who supervise children's outdoor play whilst standing or sitting down are inclined to encourage children, especially girls, to participate in sedentary conversation as opposed to active play (Larson *et al.*, 2011). Conversely, preschool staff in an Australian preschool centre felt that *parents* were not modelling positive PA behaviour to their children (Dwyer *et al.*, 2008). It would seem therefore, that despite the awareness of the importance of modelling such behaviours to young children, in practice, this is not always the case.

The preschool years are considered to be of great importance for developing physical skill efficiency and gross motor patterns; thus laying a foundation for later enjoyment of physical activity (Wang, 2004; Iivonen and Sääkslahti, 2013). Physical active play is also hugely beneficial both psychologically and socially (Timmons *et al.*, 2007). Carers are recommended to provide activities that are interesting and challenging. The focus for preschool children is to practice old skills while developing new ways of achieving them; such skills include 'backward', 'sideways', 'faster', 'hopping' and 'skipping' (Wang, 2004).

2.7.4 Section summary

The evidence determining which factors may influence a child's sedentary and PA behaviours is inconclusive, however research with older children does indicate that parental support may be instrumental for PA. It has been reported that nursery workers and carers are important role models for physical activity; however, not enough

opportunities are being presented to children and needs to be addressed through collaboration and working with parents.

2.8 Why target preschool aged children

Globally, it was estimated that in 2010, 43 million preschool children in developing and developed countries were overweight or obese, with a further 92 million estimated to be 'at risk' of overweight (Onis *et al.*, 2010). In the UK one in four children are starting school overweight; that is, their BMI is greater than 85th centile (National Health Service, 2009a). Overweight 2-5-year-olds are at least 4 times more likely than their lean peers to become overweight adults (Olstad and McCargar, 2009). It is more difficult to reduce excessive weight-gain in adolescents and adults than in childhood, therefore, there is growing consensus that obesity prevention strategies in early childhood may be key (Osei-Assibey *et al.*, 2012).

It is posited that all children pass through 'critical periods' in their development whereby they are at an increased risk of developing obesity. These critical periods include intrauterine life, infancy and the preschool years; developmental alterations may induce a permanent change in the structure and function of organs and tissues, which, in turn may leave the child at a greater risk of developing overweight and obesity (Olstad and McCargar, 2009).

Reilly (2008) posits that there has been twenty years of positive energy balance in preschool children and suggests that the preschool years may be a critical period for the development and establishment of obesogenic behaviours. Campbell and Hesketh (2007) propose that 'early childhood provides a unique opportunity within which to establish lifestyle behaviours that will promote health and minimise the risk of development of fatness' (p. 328). In addition, Goldfield *et al.* (2012) consider the preschool years to be a beneficial time to promote physical activity as young children are 'completely responsive to the environmental control (day care provider/parent) of the eating and activity environment' (p. 1331). That is, behaviour in early years is more malleable than in later life (Skouteris *et al.*, 2012).

As discussed in previous sections, it can be seen that the increase in overweight and obesity within the population is speculated to be the result of myriad factors such as changing lifestyles, genetics, infant feeding, inequalities, and environmental determinants and so on. The rise of childhood overweight and obesity has increased

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dramatically since 1995 causing concern for the future health of children and adults and the burden placed on the NHS due to the associated co-morbidities.

Researching modern lifestyles and behaviours and how they can be modified to halt the rise has become paramount. Modifications such as increasing activity levels, reducing sedentary behaviours, educating parents about optimal parenting styles and so on are being explored. Targeting preschool children and preventative strategies as discussed in Chapter 3; are thought to be the way forward.

In 2009 a NHS document: *Tackling Obesity through the Healthy Child Programme: A Framework for Action*, was written with the aim of providing guidance and practical advice to reduce the risk of obesity in babies, toddlers and preschool children (Rudolf, 2009). The document is divided into key themes: eating behaviour, nutrition, play, screen-time, sleep and parenting. There is a considerable emphasis that an authoritative parenting style is optimal, especially for children's dietary behaviours.

There is evidence in literature which suggests that interventions with the aim of preventing or treating obesity in children should use parents as agents of change, or that the parents should at least be involved in the intervention. The parents' involvement is considered key to the success of the intervention. It has also been suggested that interventions that incorporate a theoretical underpinning for behaviour-change may also prove more effective.

Figure 4 draws together by means of a conceptual model the pertinent elements from the literature used to inform this study. The model is divided into three sections: it can be seen in the green section that the concern of the increase of childhood obesity has highlighted a lack of preventative interventions in preschool-age children, despite 98 per cent of preschool children now attending some form of childcare. As discussed previously in this review, the pathways leading to obesity are indeterminate (see section 2.3). As highlighted in the blue section of the model, changes in lifestyle leading to an 'obesogenic' environment which is thought to negatively impact on energy balance (intake and expenditure) has been implicated. Moreover, it has been established that socio-economic inequalities in the under-fives are widening. The final section of the model (purple) is concerned with ways in which the increasing obesity prevalence can be tackled. Preventative strategies such as behaviour-change interventions are recommended. In the preschool age group in particular, parents are considered to be the main drivers of any behaviour-change, therefore, strategies which

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encourage an authoritative parenting style are advocated. Finally, as discussed in section 3.1 there is a paucity of studies which have or report a theoretical underpinning.

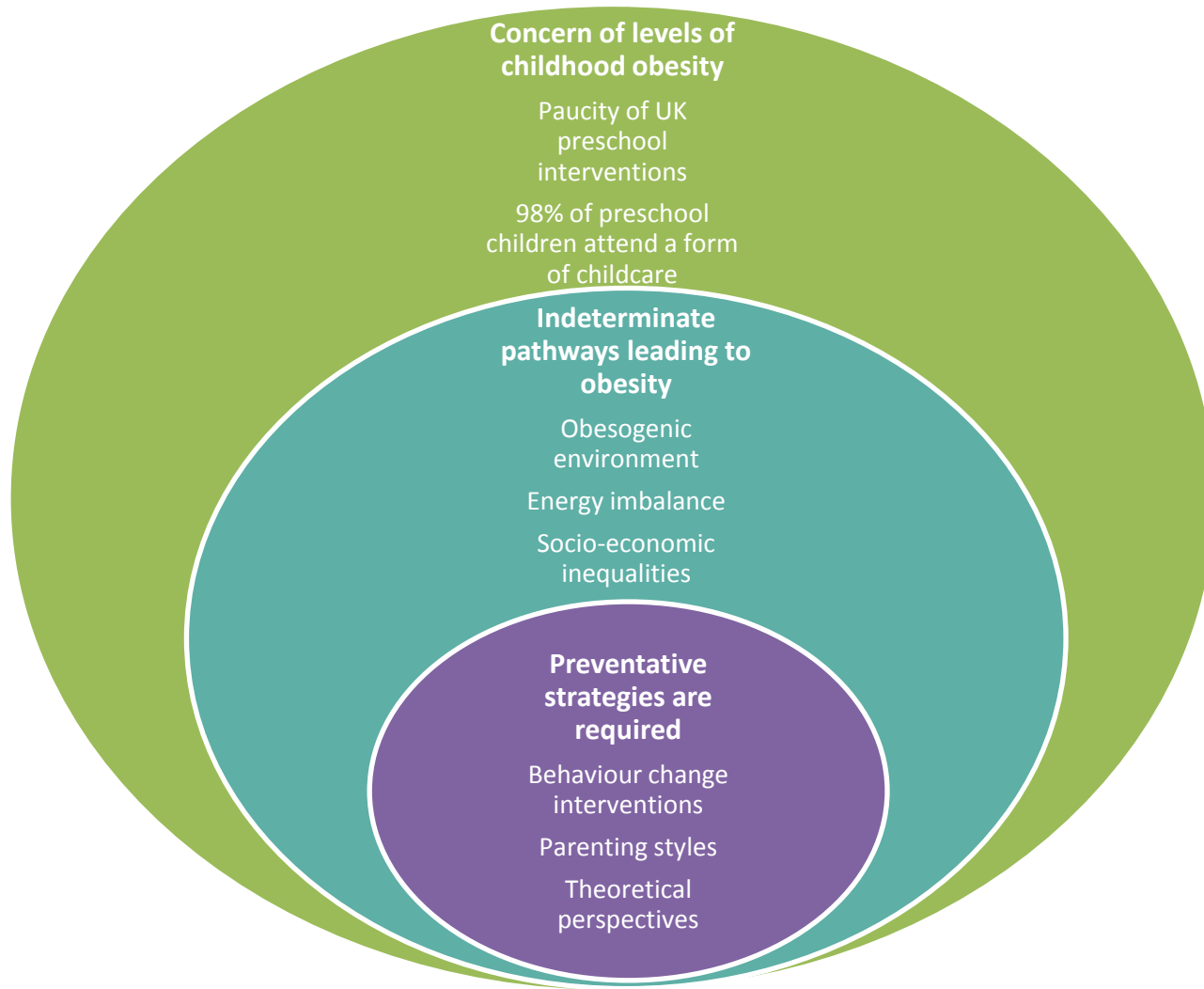


Figure 4 Intervention conceptual model

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The next chapter of this thesis introduces and discusses the theory of and approaches to behaviour change interventions primarily with the aim of obesity prevention conducted with young children in different settings.

Chapter 3 Behaviour change interventions

As has been previously discussed in the introduction and literature review, childhood overweight and obesity have serious implications not only for the health of the individual child but also for wider effects of society in terms of clinical and public health costs (Reilly *et al.*, 2003b) and governments internationally are being advised to take action (Waters *et al.*, 2011). Olstad and McCargar (2009) maintain that due to the complexity of identifying potential risk factors for obesity, all children are potentially at risk of becoming obese. Furthermore, evidence suggests that children pass through 'critical life periods' whereby they are at an increased risk of developing obesity (Olstad and McCargar, 2009) (see page 47) Therefore, every child could benefit from an intervention promoting a healthy lifestyle (Ells *et al.*, 2005).

Interventions that focus on the prevention of overweight and obesity are considered to be the most feasible option (Lobstein *et al.*, 2004) and prevention is considered to be an international public health priority, however, the impact of interventions on preventing obesity remains poorly understood (Waters *et al.*, 2011). Treatment of established overweight and obesity can be problematic, costly (to NHS services and therefore society at large) and psychologically demanding for an individual (Battle and Brownell, 1996). Once obesity is established it is difficult to reverse through interventions, therefore, primary prevention is considered to be essential (Waters *et al.*, 2011). There is a plethora of literature describing interventions aimed at preventing overweight and obesity in childhood reporting differing degrees of success. Interventions have been implemented in schools, nurseries, community settings, primary care settings and so on and may be national, regional or local. Despite this, there is insufficient evidence to suggest which specific intervention components are most effective successful in preventing or halting the rate of childhood overweight and obesity (Brown and Summerbell, 2009; Waters *et al.*, 2011). However, although they may not have a direct impact on obesity, several interventions demonstrate some success in having a beneficial effect on children's overall health (Bautista-Castano *et al.*, 2004). Lobstein (2006) maintains that many potentially useful interventions have been conducted, however, they are not able to demonstrate 'best practice' as the interventions have been insufficiently evaluated or have failed to include childhood adiposity in their outcome measures. Furthermore, the long-term effectiveness of an intervention, such as changes in obesity prevalence, is not often followed up.

In their review examining the effectiveness of interventions in the prevention of childhood obesity, Bautista-Castano *et al.* (2004) report that interventions designed to run from 6 months to one year appear to be more effective than short term interventions and that parental involvement can have a beneficial impact on the effectiveness of an intervention (this is discussed in more detail in section 3.7). However, Lobstein (2006) argues that once an intervention ceases, the child is once again immersed into the same obesogenic environment they were in before. Making new practices a routine part of everyday life (embedding) and sustaining embedded practices in their social context (May and Finch, 2009) is problematic all areas of health research. This is likely to be key to the sustained impact of any intervention. Lobstein (2006) believes that interventions need to address obesity issues in the wider context encompassing population wide policy issues. However, Finegood *et al.* (2010) consider individual solutions to be of equal importance.

3.1 Theoretical perspectives

Prevention interventions contain some element of behaviour change, whether it be ceasing a current behaviour or adopting new behaviour(s). This could be relevant for individuals/families/or professional organisations. There is a plethora of theories relating to behaviour change (also known as social cognitive models (Barker and Swift, 2009)) and it is uncertain which theory can best predict and ultimately lead to behaviour change (Taylor *et al.*, 2006). However, despite the uncertainty, literature highlights the importance of developing interventions with a theoretical underpinning; interventions which have a theoretical grounding have been shown to be more effective in producing longer-term behavioural change than those without (Powell and Thurston, 2008). Furthermore, theory may help to explain why or how an intervention has had an effect on the behaviour being targeted (Barker and Swift, 2009). The manner in which an intervention is delivered can have a significant impact on the effectiveness of the intervention; it is important to consider the setting and the needs of the intervention participants (Powell and Thurston, 2008), that is, age, gender, ethnicity, education level and SES before applying a theoretical construct, as it has been shown that certain theories can predict behaviour in some groups but not others (Baranowski *et al.*, 2003).

In the area of dietary change, it has been argued, that much eating behaviour is not an intentional behaviour per se but is influenced greatly by external cues (Barker and Swift, 2009) and environmental factors (Baranowski *et al.*, 2003); this may account for

the lack of intervention effectiveness in areas of dietary behaviour change. Psychological models of behaviour change are said to emphasise individualistic behaviour change strategies which Delormier *et al.* (2009) believe implies a 'separation of people and their environment'. Understanding how the social context affects health behaviour is believed to be necessary for more powerful interventions (Delormier *et al.*, 2009). Research into eating behaviours has been criticised for being overly 'bio-medical', that is, having a focus on food in terms of nutrition, poor diet and links to related health problems such as obesity and dental caries (Albon, 2005).

A sociological approach to food and eating behaviours considers food to be also a matter of considerable social and emotional significance (Warde and Hetherington, 1994). Group eating patterns are studied and these patterns are explained in relation to their sociocultural contexts, that is, eating patterns are understood to reflect systems of meaning constructed by people (Delormier *et al.*, 2009). For example it has been suggested that family meals construct 'home and family'; Brannen *et al.* (2013) report that a 'family' is not a naturally occurring collection of individuals but rather it is constructed from day to day through activities like eating together.

However, the ways in which people feed their families is very complex, and it is said to occur in a network of social relationships which include and *go beyond* the individual and the household (Delormier *et al.*, 2009). Within the theory of child socialisation it has been proposed that the study of child-parent relations should be expanded beyond the dyadic phenomena (Peterson and Rollins, 1987). That is, the parent – child dyad should encompass other contexts such as extended family ties, the neighbourhood, ethnic identification, religious, and educational institutions. For example, in a recent study conducted with young teenagers, it was reported that the teenagers' eating habits in school were deeply embedded within the school context (Wills *et al.*, 2005). Therefore, a sociological approach dictates it is important to consider not just the family context but other micro-climates with which the person is associated.

An intervention should include strategies which would shape conditions that need to be created to enable healthy food choice patterns (Delormier *et al.*, 2009). However, despite the acceptance that children have many environments, (Harris, 1995) argues that what is learned in one environment is used in another only if it proves useful in both. Therefore, it is important that behaviour change interventions with children promote a holistic, consistent message across the child's environments i.e. home,

nursery, and extended family and so on. See section 3.12 for further discussion about influences in the wider environment.

In the area of behaviour-change theory, Baranowski *et al.* (1997) maintain that selecting theories that demonstrate a higher predictiveness of behaviour, such as the Theory of Reasoned Action (TRA) or a 'polytheoretical' approach, that is, a dual-level intervention, may enhance intervention effectiveness (Baranowski *et al.*, 2003).

Although the application of behaviour-change theory has been implemented with children for the treatment adherence of diabetes and asthma management, there is very little information in literature regarding the use of behaviour change models for childhood overweight and obesity prevention (Weber Cullen *et al.*, 1998; Beckman *et al.*, 2006; Powell and Thurston, 2008). This may be due to the concepts being overly complex or concepts not being appropriately applied (Baranowski *et al.*, 2003). In a 2010 review of preschool children's obesity preventive interventions (Hesketh and Campbell, 2010), the authors reported that none of the reviewed studies revealed which theoretical models, if any, were used (see page 73).

More recent work, a systematic review which identified effective behavioural models and behaviour change strategies underpinning obesity prevention interventions in children aged 4-6 years (Nixon *et al.*, 2012b), reported which models have been used in childhood obesity research. They include: the trans-theoretical model; theory of planned behaviour; health belief model; social cognitive theory and sociological models. However, due to the development immaturity of the younger child some of these models may not be age-appropriate. Furthermore, the child's social and physical environment (a sociological approach) needs to be taken into account so that the most appropriate model is selected. The section below briefly highlights some of these most commonly used behaviour change models; additional model explanations of the theories can be found in Appendix A.

The Theory of Reasoned Action (TRA)

The TRA focuses on two main elements: the belief or probability that a particular outcome will occur and the assessment of the outcome(s) (Bowling and Ebrahim, 2005). The TRA has been successful in explaining the dietary behaviours such as fat intake, salt intake and milk consumption (Brewer *et al.*, 1999).

Theory of Planned Behaviour (TPB)

The TPB appears to be the most extensively used model in behaviour change interventions (Taylor *et al.*, 2006). The TPB is an extension of the TRA emphasising the importance of self-efficacy (Bowling and Ebrahim, 2005). The TPB posits that behavioural intention which necessarily precedes actual behaviour, results from interactions between an individual's attitude towards the behaviour in question, their beliefs and what others think of the behaviour and their perceived level of control over the behaviour (Hargreaves, 2011). The TPB has demonstrated its usefulness for predicting factors directly related to healthy eating behaviour but not for predicting the indirect effect of intention, thus, other factors other than intention may be driving healthy eating behaviour (Fila and Smith, 2006). However, critics of such behaviour models stress that it should be recognised that individuals do not live in a 'social vacuum' (Hargreaves, 2011).

Behaviour Learning Theory (BLT)

One adaptation of the BLT is 'operant conditioning'; behaviours are performed in response to stimuli. That is, reinforced behaviours increase and punished behaviours decrease. Within this framework there is no need of cognitions or thoughts as an explanation of behaviour (Baranowski *et al.*, 2003). A requirement of this framework is to gain control of the stimuli and reinforcers in an individual's life and to reinforce only the desired behaviours, it has been suggested that some, but not all, parents may be proficient in changing their child's behaviour in this manner (Baranowski *et al.*, 2003). Children, often unconsciously, react to the benefits of one action compared with another action. The quality of positive attention given while praising may further its function as a reward (Owen *et al.*, 2012). However, compliance by the child may be affected by the quality of the parent-child relationship which may impact the value of praise or reprimand.

Social Cognitive Theory (SCT)

SCT is one model that has been used extensively in the design of dietary interventions (Baranowski *et al.*, 2003). Key environmental variables of the model include 'modelling' and 'availability'; which have been identified as potential influential factors of a child's dietary intake (see page 29). One of the primary concepts of SCT is goal setting which has demonstrated some success in adults, resulting in changes in the consumption of

fruit, juices, vegetables and lower consumption of fat; however little evidence exists in the literature with regard to children (Baranowski *et al.*, 2003; Beckman *et al.*, 2006). One US study conducted with US children aged 5-18 years reported that with the SCT model, dietary self-efficacy could be improved through intervention in the 5-10 year old children age group but not in the 11-18 year olds (Rinderknecht and Smith, 2004). The authors concluded that the older children may have been more influenced by peer pressure.

Bandura's Social Learning Theory

This model which has demonstrated some success in dietary interventions with primary school aged children (see page 29) has already been discussed in some detail in the literature review.

Of the 12 studies included in Nixon *et al.* (2012b) review, 9 were reported to have demonstrated significant favourable changes in specific outcome measure categories. These studies used SCT/SLT in the development of the intervention. As previously discussed, 'modelling' and 'availability' are key factors of SCT which is appropriate for young children as they have an innate propensity to imitate. Much of their behaviour is learned through observation of the significant adults in their life.

However, it has been argued that behaviour change models present poor to modest predictive power (Baranowski *et al.*, 2003; Bowling and Ebrahim, 2005), particularly in relation to eating behaviour (Barker and Swift, 2009) and rely on measures of cognitions. Cognitions are defined as:

'mediating internal mental processes such as knowledge, attitudes and beliefs that allow individuals to enact their self-perceptions, revise their behaviour, or alter their environment so as to bring about outcomes in line with their self-perceptions and personal goals' (Barker and Swift, 2009, p. 206).

Measuring individuals' cognitions is problematic and relies on self-reports (Barker and Swift, 2009). Cognition theories predict deliberate intentional behaviour and evidence suggests that in some areas of health behaviour change, such as smoking cessation, exercise and HIV risk control, mortality and morbidity rates have been reduced, although it is not known exactly how much can be attributed to the behaviour change model adopted (Taylor *et al.*, 2006). However despite the uncertainty surrounding the

effectiveness of behaviour-change theory, as discussed in section 3.11.1, the MRC Framework Developing and Evaluating Complex Interventions (Craig *et al.*, 2008a), on which this work is based, stresses the importance of identifying and developing theory.

3.1.1 Barriers and facilitators of behaviour change

As described in the literature review (Chapter 2), many factors affect a person's propensity to develop overweight and obesity. In order to reverse, halt or change potentially modifiable influences, current behavioural practices must be ceased or new behaviours adopted. However, the ability of a person to change established behaviours is dependent on a number of barriers and facilitators and differs from person to person. Barriers and facilitators may be environmental, cultural or social; Figure 5 and Figure 6 highlight some examples of barriers and facilitators which may impact behaviour change.

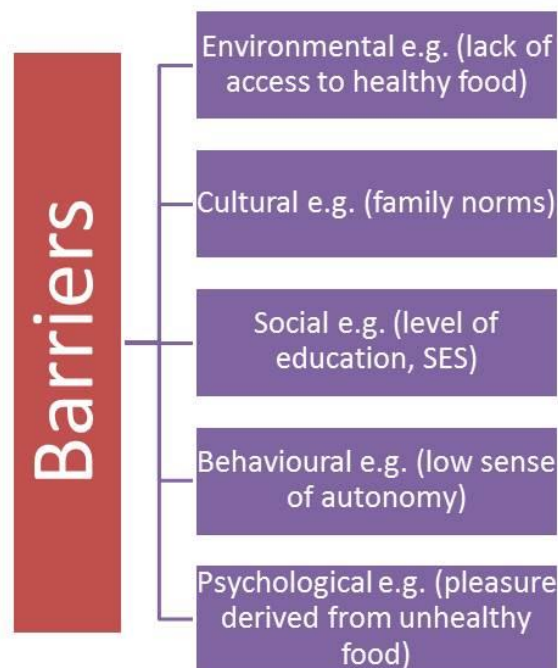


Figure 5 Example of barriers to behaviour change



Figure 6 Example of facilitators of behaviour change

3.1.2 Inequalities

As indicated previously, social economic status inequalities can act as a barrier for many. People from disadvantaged backgrounds are less successful in achieving behaviour change following participation in formal programmes such as smoker's clinics. This lower chance of success is thought to be due to lower starting levels of behaviour and the physical and /or social environments that undermine their attempts at change (Michie *et al.*, 2008). Previous research has indicated that the treatment of childhood obesity with the parents as exclusive agents of change is far more effective than interventions targeting children alone (Langnase *et al.*, 2004). However, a family intervention, with children aged 6-7 years, for the treatment of childhood obesity conducted in Germany concluded that a low SES served to be a barrier for the implementation of the intervention. The authors reported that different SES groups needed different intervention strategies which takes into account the individual family's context; they concluded that it simply was not enough to focus on generic health measures (Langnase *et al.*, 2004).

3.1.3 Section summary

Prevention strategies are considered to be the most feasible route for tackling rising childhood obesity. There is a plethora of theories relating to behaviour change and previous research highlights the importance of developing interventions with a theoretical underpinning, however, there is a paucity of information regarding the use of behaviour change models for overweight/obesity prevention in childhood. Changing ingrained behaviours is complex and is dependent on a number of potential barriers and facilitators.

3.2 Strategies for the prevention of childhood overweight and obesity

This section considers different strategies and interventions that have been implemented in various settings with young children primarily with the aim of obesity prevention. A sample of interventions pertinent to the current study conducted prior to 2012 will be highlighted to illustrate differing methods and contexts with a particular focus on preschool interventions (see Table 1). More recent findings and recommendations from the literature for preschool intervention arising since 2012 are discussed in section 3.11.1.1.

3.2.1 Policy background

Although this chapter is primarily focusing on interventions and published evidence, it is important to highlight the wealth of policies, strategies and initiatives that have been implemented with the aim of improving lifestyle choices and the subsequent health of children in the UK. In 2008 the Government published the report *Healthy Weight Healthy Lives* (Cross-Government Obesity Unit *et al.*, 2008); the aim of the report was to document how the government's vision of being the first country to reduce the obesity epidemic, could be facilitated and achieved by different governmental bodies working together. Strategies and initiatives aimed at improving children's lifestyle behaviours include: the Child Health Promotion Programme; Sure Start Centres; Healthy Schools Programme; The Children's Plan, and the PE and Sports Strategy (Cross-Government Obesity Unit *et al.*, 2008). In 2009, a further report *Healthy Weight Healthy Lives: One Year On* (Cross-Government Obesity Unit, 2009b) was published. This report reflected on the impact of work previously undertaken and introduced new strategies such as 'Change4life' (see page 63) and the Enhanced Healthy Schools programme. In addition, legislation has been implemented to protect children against

the negative effects of food advertising and marketing; this is discussed further in the next section.

3.3 Food Marketing and Advertising

Studies have shown that marketing strongly influences children's food preferences, requests and consumption (Cairns *et al.*, 2013). Marketing strategies have been developed to appeal to all age groups, even children as young as preschool age (Nestle, 2006). Dose-response relationships have been reported between advertising and alcohol consumption in teenagers; alcohol promotion may increase the likelihood of starting to drink alcohol and increase the amount of consumption (Anderson *et al.*, 2009). Foods that are specifically targeted to children are likely to be high in fat or salt or sugar (HFSS). In 2003 the Government proposed a change in the way food and drinks were advertised to children.

The aim of Ofcom's (the independent regulator of television advertising in the UK) regulatory objective was to 'reduce significantly the exposure of children under 16 to HFSS advertising, as a means of reducing opportunities to persuade children to demand and consume HFSS products' (Ofcom, 2007, p.1). In 2005, the Food Standards Agency (FSA) developed a nutrient profile to identify which foods were HFSS so that this could be applied to TV food advertising. In 2006, a progressive ban on the scheduling of HFSS advertising in children's airtime was introduced. This culminated in an all-out ban in January 2009 of HFSS foods from children's channels and other channels during children's airtime and programmes that are not targeted specifically at children but are likely to attract a large children's audience (Ofcom, 2010). An Ofcom (2010) review reported that children were exposed to significantly less advertising in 2009 than they had been in 2005. However, a more recent report suggests that despite the tighter regulations, children are still exposed to the same level of 'junk' food advertising (pre-ban) through non-child specific programmes (Adams *et al.*, 2012).

3.4 Social Marketing interventions

In their 2004 review for the International Obesity Taskforce, Lobstein *et al.* (2004) concluded that public health obesity prevention programmes need to focus on the entire population and should promote health rather than appearance, thus reducing any stigmatisation associated with overweight/obesity. Social marketing is defined as:

‘The application of commercial marketing technologies to the analysis, planning, execution and evaluation of programmes designed to influence the voluntary behaviour of target audiences in order to improve their personal welfare and that of society’ (Gordon *et al.*, 2006, p. 1134).

The 2004 Government report – ‘Choosing Health’ (Department of Health, 2004) emphasised how individuals and communities would be supported in taking more control of their health while maintaining pressure on the social and economic determinants of health (French, 2009). Social marketing aims to achieve changes to resistant or persistent behaviours and not just to provide information (Department of Health, 2011a). Social marketing can also impact public policy as well as individual behaviour (Evans, 2008) and can optimise public health by facilitating relationship building with consumers (Radha, 2011). An activity is classed as social marketing when it is based ‘on a real understanding of the target audience: who they are, what they think and believe and what they need’ (Department of Health, 2011a, p. 11).

Social marketing campaigns have demonstrated some success in three areas: preventing tobacco use, promoting diet and physical activity and preventing AIDS and HIV (Evans, 2008). A review by Gordon *et al.* in 2006 analysed the effectiveness of different types of social marketing interventions/campaigns; they reported that there was strong evidence for tobacco prevention interventions but weaker evidence for the effectiveness of smoking cessation interventions. With regard to nutrition interventions, the review authors concluded that social marketing was able to influence nutrition related psychosocial variables, such as attitudes towards healthy eating, and positive changes were found in some studies for physiological variables for blood pressure and cholesterol, however, no differences were reported for changes in BMI. Moreover, social marketing was shown to have an impact on physical activity psychosocial variables, such as perceived social support to exercise, and knowledge but again the evidence for physiological changes was weak (Gordon *et al.*, 2006).

3.4.1 ‘CLOCC’

In 2006, the Consortium to Lower Obesity in Chicago Children (CLOCC) developed a public health intervention which encouraged healthful eating and physical activity in children aged 3-7 years. The intervention also encouraged youth and adult involvement; (Evans *et al.*, 2007) it has been shown that social marketing can help parents influence their children behaviours (Evans, 2008). The CLOCC intervention

named '5-4-3-2-1 Go!' delivered five key messages: eat 5 or more fruits and vegetables per day; drink 4 servings of water per day; eat 3 portions of low-fat dairy products per day; don't watch more than 2 hours of TV per day and, engage in at least 1 hour of physical activity every day. The intervention developed a strong 'healthy lifestyle' brand and collaborated with the local communities and key civic leaders (Evans *et al.*, 2007). Evaluation of the intervention included follow-up telephone interviews with parents. It was concluded that the 5-4-3-2-1-Go! message was feasible and effective with positive reported changes in health behaviours such as increased intake of fruit and vegetables and increased physical activity (Stahl *et al.*, 2011).

3.4.2 'Change4life'

'Change4Life' is a UK society-wide Government prevention programme with the aim of encouraging young families to eat 'better' and become more active (<http://www.nhs.uk/Change4Life>). It is the social marketing component of the Government's (Labour) *Healthy Weight, Healthy Lives* strategy (Department of Health, 2010a). The campaign focuses on 'fat *in* the body' rather than 'being fat' with an emphasis to reframe obesity as a health issue rather than a cosmetic one. The message promoted is that obesity is caused by modern lifestyles, thus removing any individual 'blame factors'. The campaign, founded in January 2009, was backed by the Department of Health; it is promoted widely on television, on-line, on bill boards and in the press. Surveyed families whose current behaviours identified them of being 'at risk' of developing obesity, were targeted, invited to join the campaign and sent further support packs. 'Change4Life' provides many resources and has links with other companies and organisations such as the Co-operative supermarket chain. The programme extended its focus with the development of many sub-brands, such as Start4Life, Muckin4Life and Bike4Life and includes, babies, preschool children and pregnant women. The campaign is not aimed just at the general public but also encompasses non-governmental professional bodies and organisations and industry who have a vested interest in the health of its clients (Department of Health, 2010a), thus building a coalition of partners.

The first year report from Change4Life stated that, through a tracking study, over one million mothers had claimed to have made changes to their children's diet or activity levels as a result of Change4Life. Analysis of sales data, through basket analysis, also suggests that families are making changes to the types of foods being purchased;

differences were recorded between the intervention (families actively engaged with Change4Life) and control group (demographically comparable families not engaging with Change4Life). Change4Life intervention families were buying more low-fat milk and low-sugar beverages, however, the report states that these early findings require more in-depth analysis (Department of Health, 2010a). The initial targets set were all exceeded; these included the target of families to be 'reached', brand awareness, number of families to complete 'How are the Kids?' questionnaire, and for number of families still to be involved after one year (Department of Health, 2010a). Six months after the start of the campaign, 44,833 families were found to be still 'interacting' with Change4Life. The initial findings indicate that through Change4Life, people may be changing their behaviours, (they report a strong desire to change) however, there is a risk of social desirability bias in the reporting within the tracking study and the early findings need to be interpreted with caution (Department of Health, 2010a).

A 2006 UK review of marketing interventions, concluded that social marketing interventions/campaigns could be beneficial in a range of settings and that there was little evidence of social marketing interventions causing harm (Gordon *et al.*, 2006). However, Ells *et al.* (2005) argue that although a population-based programme is preferable, it should not eradicate the use of interventions that are tailored to more specific groups of people.

3.5 Sure Start Children's Centres

Sure Start has been one of the most ambitious Government initiatives in recent decades; the centres aim to provide integrated services for children under the age of five years and their families. Although the centres are based on research evidence and a sound rationale, they have yet to demonstrate the 'hoped-for impact' (House of Commons Children, 2010). The Department for Education (2013b) define Sure Start Children's Centres as:

'A children's centre should make available universal and targeted early childhood services either by providing the services at the centre itself or by providing advice and assistance to parents (mothers and fathers) and prospective parents in assessing services provided elsewhere. Local authorities must ensure that children's centres provide some activities for young children on site' (p. 6).

In 2010, 3,500 Sure Start centres were established throughout the UK. Most services are free to parents apart from some childcare costs (Department for Children, 2008). In 2010, a report was published detailing the quality of the Sure Start programme for children aged 3-4 years. It was found that staff qualifications were comparable with other non- Sure Start preschool provision. The centres were open for more weeks in the year and for longer hours, the staff-child ratio was found to be slightly better. Several child outcome measures were examined, they included, child physical health, cognitive and language development. It was reported that children in Sure Start Local Programmes were not showing greater language development by age five years than children in comparable areas (Melhuish *et al.*, 2010). No indication was provided of children's physical health and of the quality of food provision in the centres.

3.6 Primary Care

Within the primary care sector the General Practitioners' (GP) role traditionally has been viewed as providing treatment rather than prevention, however, with the rise of immunisation and screening, there is now a strong established culture of prevention within clinical settings (Stettler, 2004). Despite this assertion, childhood obesity prevention programmes are few within this setting and studies of this type in literature are lacking; none could be found for this review. The National Institute for Health and Clinical Excellence (NICE) identified a lack of cohesiveness for behaviour change models within healthcare services, they maintain the uncoordinated use of methods and theories has impacted the success of health interventions (Powell and Thurston, 2008). GPs have been criticised for providing dietary and exercise advice that is too generic, whilst not taking account of individual needs or specific groups of people (Hearn *et al.*, 2008). Furthermore, it has been reported that some parents feel they receive conflicting advice from professionals and feel they are 'blamed' if their child is overweight (Pocock *et al.*, 2010). A 2011 survey of health care professionals (n= 116) in two regions of the East Midlands in the UK found that health visitors and nursery nurses needed to improve their knowledge of health risk from obesity. Furthermore, GPs and practice nurses capacity to identify and manage 'at risk' infants was also thought to require intervention (Redsell *et al.*, 2011).

3.7 Family/Community Interventions

The family home environment plays an important role in determining a child's risk of developing obesity; especially in younger children (Lobstein *et al.*, 2004). Previous

evidence suggests that parental involvement is necessary in treatment programmes for successful weight loss in young children (Lobstein *et al.*, 2004) and interventions which involve parents may prove more effective (Brown *et al.*, 2007). Randomised controlled trials that focused on early intervention and family-based behavioural approaches to weight management have been shown to lead to long term weight loss in children (Tyler and Horner, 2008). Examination of community and family interventions in the literature reveal that the main focus is on weight loss and management of obesity rather than prevention. This is possibly due to the nature of the 'problem', that is, if a child is not overweight or obese, the parents or the family GP will not see a need for their family to participate in a healthy lifestyle/diet/physical activity programme. However, it has been shown that a child is at an increased risk of becoming overweight/obese if one or more parents is obese (Lobstein *et al.*, 2004). A large retrospective cohort study conducted in the U.S in 1997 concluded that parental obesity more than doubled the risk of obesity in adulthood among both obese and non-obese children under the age of 10 years (Whitaker *et al.*, 1997) (See page 20).

Furthermore, it has been shown that parents can be unaware of any weight issues their child may have (Lobstein *et al.*, 2004), as the prevalence of child overweight has increased, their child may not look 'out of place' among their peers. Parents who participated in the UK Gateshead Millennium Study were found to have poor recognition of their children's weight status; 68 per cent of parents whose child was classified as overweight or obese identified them as being of 'normal' weight (Jones *et al.*, 2009). Additionally, parents may acknowledge their child has a weight problem but are in denial of the consequences that might occur as a result (Lobstein *et al.*, 2004). In a US study, 21 low-income mothers enrolled in Kentucky's Special Supplemental Nutrition Program for Women, Infants and Children. Mothers with overweight preschool children were interviewed. It was concluded that health care professionals may think that mothers of overweight children are in denial and unwilling to accept responsibility. However, Hughes *et al.* (2010) posit that it may be a mother's natural response to guilt of 'passing on their genes' or not being able to provide a healthy lifestyle for their child. This highlights the potential to promote a healthy lifestyle for all, not just for those who would visibly appear to benefit, therefore, children who are overweight/obese or who have overweight/obese parents do not need to be specifically targeted, thus reducing stigmatisation. However, recruitment to such an initiative could be problematic if parents consider their child to be of 'normal' weight. One programme which aims to

prevent as well as treat obesity in children which involves the whole family is the MEND programme as described below.

3.7.1 A family/community programme for the prevention of childhood overweight/obesity

Mini-Mend, a component of MEND (Mind, Exercise, Nutrition, Do it), is a community-based multi-component 10 week healthy lifestyle programme for families with young children of any weight aged 2-4 years. The structured group programme allows parents/carers to be supported in establishing healthy habits and making healthy behaviour changes for themselves and the whole family (Sacher *et al.*, 2008). The original MEND programme for children aged 7-13 years who are above a healthy weight and their families, which is Lottery funded, is available in over 350 locations throughout the UK and has been customised for use in several other countries such as Australia, the US and Denmark. Family involvement is essential with at least one parent attending the sessions with the child. The intervention focuses on diet and nutrition education, increasing physical activity and behaviour change. Evidence suggests interventions that combine nutrition education and physical activity are more effective if implemented with behaviour modifications (Bautista-Castano *et al.*, 2004). Self-reported feedback suggested that parental health-related behaviours such as providing a wider range of fruit and vegetables had improved. The trial was deemed to be feasible and acceptable to families (Sacher *et al.*, 2008).

3.8 Primary school interventions

Although this PhD thesis focuses on preschool children, it is important to draw from evidence of interventions conducted in school settings as many nursery schools/classes are based in primary schools and therefore, research conditions and issues are likely to be similar. Furthermore, some behaviour change elements of primary school interventions may be relevant for families of younger children, however, Summerbell (2007), highlights the need to be cautious when planning prevention strategies for preschool children; what works in older children may not be relevant for younger children.

The school environment is widely promoted as a suitable setting for promoting healthy lifestyles (Warren *et al.*, 2003; Van Lippevelde *et al.*, 2011), with an obvious practical element of their use (Lobstein, 2006). Moreover, there is potentially access to a wide

Chapter Three Behaviour Change Interventions

range of social groups. However, Davidson (2007) reports that teachers may lack the necessary skills needed to address increasing obesity rates. Moreover, curriculum-based interventions rely on the motivation, training of staff and their ability to deliver the programme (Harrison and Jones, 2011).

As previously discussed (page 29), Bandura's Social Learning Theory describe how role models such as teachers (more so with younger children) and peer models can influence a child's dietary habits and preferences (Bandura, 1977). However, it has been argued that teacher modelling can only be effective if the model is enthusiastic and is not in direct competition with peer models. Davidson (2007) also argues that teachers have the potential to transfer negative values as well as positive ones. Girls are more likely to respond to peer models, especially in the area of food behaviour (Hendy and Raudenbush, 1999). Conducting research in school environments can be challenging, there are complex multi access issues that need to be addressed before any work can begin (Harrell *et al.*, 2000; Heath *et al.*, 2007). Not only does the researcher need to be able to access the school/administration staff but also the head teacher, teachers, classroom assistants, parents and in some cases pupils. Parents report that they prefer personal contact with their child's school to be on an informal basis (Van Lippevelde *et al.*, 2011). Van Lippevelde *et al.* (2011) found in their study with parents of children aged 10-12 years that parents agreed that dietary and physical activity promotion should be a joint effort between home and school. However, they did not feel that the school could have any influence over their child's sedentary behaviour. Another British study found that both parents and school staff believe schools to be an important site for health promotion (Sahota *et al.*, 2001a). However, establishing good relationships between parents and school is not easy; and mutual respect is not always present (Alexander *et al.*, 2010).

School interventions can be of a multi-component (complex intervention) or single component design, for example, an intervention may consist of two or more behaviour change elements such as diet, physical activity and sedentary behaviours. A single component design could be, for example, an intervention to decrease the consumption of soft drinks. Evaluation of obesity prevention school interventions has yet to determine whether a single component or a multi-component approach is more effective for the prevention of childhood overweight and obesity (Brown and Summerbell, 2009). A more recent review concluded that modifications to the school

physical environment were most likely to be effective together with social and educational changes (Harrison and Jones, 2011).

3.8.1 The Food Dudes

One single component school intervention designed to encourage and increase the consumption of fruit and vegetables, The Food Dudes, which was developed by Bangor University, is underpinned by two theories; peer modelling and rewards. As discussed in the previous section, peer modelling can strongly influence a child's dietary habits. Rewarding 'good' dietary behaviour has been highly debated; some studies show that rewarding the consumption of a certain food item actually causes a decrease in the liking for the particular food (Carnell and Wardle, 2008b). However, Horne (1998) believes that when used appropriately rewards can be 'a highly effective component of procedures employed to children's preferences' (p. 134). The Food Dudes intervention delivers their message by means of animated video characters who are older than the targeted audience, they encourage the children to assist them in their 'battle against General Junk' (Horne, 1998, p. 134) by encouraging children to consume and increase their daily fruit and vegetable intake. The children's consumption of the targeted fruit and vegetables are monitored and rewarded with 'Food Dude prizes'. Horne maintains that delivering one component of the study separately (i.e. the video without rewards) is not as effective as the combined peer modelling and rewards intervention which provided long term dietary changes (Horne, 1998). The intervention was piloted in several primary schools in England and Ireland; the success of the programme prompted the Irish Government to roll out the programme to all primary schools in 2007. The Food Dudes have demonstrated that it is possible to increase a child's consumption of fruit and vegetables using this programme with results that were sustained up to 12 months after the intervention.

3.9 Preschool based interventions

Whilst there have been numerous obesity prevention interventions conducted in primary schools, there is a lack of interventions targeting children in preschool settings. As discussed in section 2.8, Reilly (2008) suggests that the preschool years may be a critical period for the development and establishment of 'obesogenic' behaviours. Furthermore, Campbell and Hesketh (2007) propose that 'early childhood provides a unique opportunity within which to establish lifestyle behaviours that will promote health and minimise the risk of development of fatness' (p. 328).

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A UK review of obesity prevention interventions conducted in 2007 (Brown *et al.*, 2007) concluded that in the 2-5-years age group, there was evidence for small but important beneficial effects of interventions that aimed to improve dietary intake, provided they were not based on nutrition education alone. In a more recent systematic review, ten preschool-based interventions were reviewed (Hesketh and Campbell, 2010); all but two were conducted in the US, of the other two, one was a UK study and the other was conducted in Thailand. Half were single component type interventions; four focusing on increasing physical activity; and one changing dietary behaviour. Of the multi-component interventions; three combined dietary and physical activity behaviours and two physical activity and sedentary behaviour. Nine of the studies demonstrated some degree of success in modifying behaviours, however, only two were shown to have any impact on modifying behaviours and reducing BMI (Mo-suwan *et al.* (1998): increasing physical activity and Fitzgibbon *et al.* (2005): healthy eating and increasing physical activity).

None of the reviewed studies reported which theoretical models, if any, were used. The authors concluded that there may be a potential benefit for increasing physical activity in preschool settings. Furthermore, they suggest that behaviours thought to be contributable to obesity (such as sedentary behaviour) may be positively influenced in preschool settings (Hesketh and Campbell, 2010). Conversely, D'Onise *et al.* (2010) found limited beneficial health outcomes from preschool interventions in their review, however, they did concede that 'high quality' interventions may produce small beneficial effect.

There is a plethora of recommendations and strategies for intervention design of overweight and obesity prevention and the following proposals are pertinent to the current study. In their review, Bluford *et al.* (2007) advocate the use of a theoretical frameworks when developing preschool interventions as they believe this will improve programme effectiveness. Additionally, they report that parental involvement can also enhance effectiveness. The parents' ability to act upon their children's developing food behaviours and attitudes, through their own modelling behaviours is a powerful educational intermediary (Hart *et al.*, 2003). This conviction is echoed in a review conducted by Skouteris *et al.* (2010b) which looked at parental influence in preschool interventions. They reported that the modification of parental variables known to be associated with obesity-promoting behaviours, such as feeding styles, role modelling and nutrition knowledge may show promise. However, the authors acknowledged

several methodological limitations in the reviewed studies and recommended further research into this area.

When considering outcome measures; Matusik and Malecka-Tendera (2011) believe that a reduction of BMI should be the aim of treatment programmes and the primary aim of prevention programmes with children should be the reduced incidence of overweight and obesity new cases per year.

Generalisation of preschool intervention findings has been found to be problematic due to the diversity of methodologies, strategies, definitions of obesity and outcome measures (Bluford *et al.*, 2007; Hesketh and Campbell, 2010). Of the interventions included in the Bluford *et al.* (2007) review, not all behavioural changes included were measured, and for those that were measured, they were based primarily on parental reports. Some of the prevention interventions that did not report significant changes in weight status demonstrated significant life-style behaviours changes conducive for improved health status, such as reducing sedentary behaviour (Dennison *et al.*, 2004). Further research is required to determine which factors and methodologies are most effective in preschool settings (Bluford *et al.*, 2007).

The following sections highlight one single component and one multi-component preschool based intervention in detail. The single intervention was selected for the novel aspect of giving preschool children control over their eating habits and the second, for the engagement of nursery staff and parents in the intervention with activities to be completed at home. Also summarised are the findings from other preschool (age 3-5 years) based obesity prevention interventions conducted between 1995 and 2009 (Table 1).

3.9.1 Improving preschoolers' self-regulation of energy intake

Evidence suggests that obesity could be partly due to an individual's over responsiveness of external food cues such as 'time to eat', and encouragement to eat from others, rather than relying on internal satiety cues (Wardle, 2007). Parents act as a role model for normative behaviours (Johnson, 2000), thus a child whose parent constantly displays overeating habits may construe these behaviours to be normal. A single component preschool intervention conducted in the US tested preschool children for their ability to regulate their energy consumption. Intervention children were taught the concepts of hunger and satiety through role play and interactive play with dolls,

they were taught the anatomy and practical elements of eating and asked to think about their own cues of hunger during snack times. Baseline measurements revealed an association with children's eating, adiposity and their mother's disinhibition of their own food intake. Children whose mothers reported difficulty in controlling food were found less able to regulate their energy intake. The intervention was reported to have a positive effect on children who either over or under ate; both groups of children showed improved ability to self-regulate after the six week intervention (Johnson, 2000). These results are comparable with a later study by Carnell and Wardle (2008a) who reported an association with lower satiety responsiveness, higher food cue responsiveness and higher adiposity. Johnson (2000) demonstrated that even very young children can be taught to regulate their energy intake; however, they report that parental behaviours and attitudes would have to be addressed for the sustainability of any behaviour change.

3.9.2 An intervention to reduce TV viewing by preschool children

It has been reported that decreasing sedentary behaviour, such as TV viewing, may increase the effectiveness of a multi-component intervention (Bautista-Castano *et al.*, 2004). One US multi-component study, which incorporated reducing sedentary behaviour with nutrition education and increasing physical activity, made reduction of TV viewing the main aim of the second year of their study with preschool children (Dennison *et al.*, 2004). Parents were asked to record their children's weekly viewing of TV, videos and computer use; anthropometric measurements were recorded three times over an 8 month period. The intervention, which was conducted in preschool centres by research staff, engaged the children in discussions and activities. Discussions were facilitated by the telling of a story featuring a popular American cartoon family – The Berenstain Bears (Berenstain Enterprises Inc, 2013). Children were also encouraged to make 'No TV' signs to take home and devise a list of activities that could replace TV viewing. Successful TV-free weeks were celebrated with a party. Staff and parents were encouraged to participate. The results showed that children in the intervention group had reduced their TV viewing by 3.1 hours per week and those in the control group had increased viewing by 1.6 hours per week. It was also reported that the percentage of children watching more than 2 hours of TV/videos per day reduced from 33 to 18 per cent. Body Mass Index (BMI) was shown to reduce in the intervention group. (Dennison *et al.*, 2004). This study may have been biased by parental recording of the child's viewing habits and social desirability may have

impacted on the results. Moreover, long-term temporal implementation of this behaviour change may prove difficult; it is possible that if the intervention had been delivered by preschool practitioners it may have a more sustainable effect. Without inclusion of the practitioners, once the novelty of the visiting researchers ended, the nursery may have reverted to their normal routine. Due to children leaving to start formal education or moving areas, long-term follow-up was not possible.

3.9.3 Preschool prevention interventions (1995-2009)

The following table (Table 1) summarises the findings of interventions conducted in preschool centres with children aged 3-5 years that have the aim of obesity prevention, between 1995 and 2009. 2009 was chosen as a cut-off date as I was reviewing interventions prior to the development of the current feasibility study. The table reports the study; the study sample; intervention format and type of intervention (i.e. single or multi-component type); outcome measures; and results. Despite the reiterated importance in literature of a theoretical underpinning, only one of the reviewed studies, 'Tooty Fruity Veggie in Preschools' (Zask *et al.*, 2012), reported which theoretical models, if any, were used.

Table 1 Summary of preschool interventions 1995-2009

	Study	Sample	Design/aim (single or multi-component)	Outcome measures	Behaviour -change theories	Results
1	(Mo-suwan <i>et al.</i>, 1998) Effects of a controlled trial of school-based exercise program on the obesity indexes of preschool children	Setting: Two privately owned Kindergartens in Thailand Participants: 292 4-5 year old children	Design: RCT Aim: School-based aerobic exercise programme: 15 min walk before class, 20 min aerobic dance session after afternoon nap 3 times per week for 29.6 weeks Component Single	Weight, height and triceps skinfold thickness.	None reported	Prevalence of obesity and triceps skinfold thickness decreased in both intervention and control groups. Girls in the exercise group had a lower likelihood of having an increasing BMI slope than the control girls did (odds ratio 0.32; 95% CI: 18, 0.56)
2	(Johnson, 2000) Improving preschoolers' self-regulation of energy intake	Setting: Two separate preschool centres in the US Participants: 31 3-4 year old children	Design: Pre-test and post-test design Aim: Children took part in individual and group activities designed to help them recognise internal satiety cues for 6 weeks Component: Single	Ability to self-regulate measured by an established compensation index. Anthropometric measures - height, weight and skinfold thickness	None reported	At baseline children's eating related to their adiposity and to mother's disinhibition. Both over-eaters and under-eaters responded to the intervention, improving their ability to self-regulate. Of the 25 children who completed the protocol, 17 improved (scored closer to ideal), 4 stayed the same (6 10%), and 4 showed decreases in compensation <i>P</i> , .001)

	Study	Sample	Design/aim	Outcome measures	Behaviour-change theories	Results
3	(Dennison <i>et al.</i>, 2004) An intervention to reduce television viewing by preschool children	Setting: Preschool or day care centre in the US Participants: 102 2.5-5.5 year old children	Design: RCT Aim: Intervention children received a 7-session programme designed to reduce television viewing as part of a health promotion curriculum. Control children received a safety and injury prevention programme Component: Single as part of a 2-year multi-component programme	Change in parent-reported child television/video viewing and height, weight, skinfold thickness and BMI	None reported	Intervention children decreased their television/video viewing by 3.1 hours per week. Children in the control group increased their viewing by 1.6 hours per week. There were no statistically different differences in children's growth. Adjusted difference between means, -4.7 h/wk; 95% CI, -8.4 to -1.0 h/wk; <i>P</i> = .02
4	(Williams <i>et al.</i>, 2004) Cardiovascular risk reduction in preschool children: the 'Healthy Start' project	Setting: Nine 'Head Start' centres in New York City Participants: 787 4-5 year old children	Design: RCT Aim: Intervention groups: (i) Food service modification and safety education materials (ii) Food service modification and nutrition education Control group: safety education materials Component: Single	Serum cholesterol, weight and height	None reported	Significant decrease in serum cholesterol among preschool children in the food service modification groups as compared to controls (-6.0 versus -0.4 mg/dL). No difference in growth measures

	Study	Sample	Design/aim	Outcome measures	Behaviour-change theories	Results
5	(Fitzgibbon <i>et al.</i>, 2005) Two year follow-up results for Hip-Hop to Health Jr: a randomised controlled trial for overweight prevention in preschool minority children	Setting: Twelve 'Head Start' centres in Chicago Participants: 289 (year one) and 300 (year two) 4-5 year old children	Design: RCT Aim:14 week (3 times weekly) healthy eating and exercise intervention: 20minute lesson followed and 20 minutes of physical activity Component: Multi	BMI and dietary intake	Social cognitive theory Self-determination theory	Post intervention changes in BMI did not differ significantly between groups. However, at year 1 and year 2 post intervention BMI increases were reduced in intervention groups. No significant differences in food intake apart from per cent of energy from saturated fat year 1 post intervention between intervention (11.6%) and control (12.8%) children (p= .002)
6	(Reilly <i>et al.</i>, 2006) Physical activity to prevent obesity in young children: cluster randomised controlled trial	Setting: Thirty-six nurseries in Glasgow Participants: 545 preschool children (mean age 4.2years)	Design: Cluster randomised single blinded trial Aim: Physical activity programme in nursery (three 30 min sessions over 24 weeks) plus home based health education aimed at increasing physical play and reducing sedentary behaviour. Component: Multi	Main: BMI Secondary: physical activity and sedentary behaviour via accelerometry	None reported	Children in the intervention group had significantly higher performance in movement skill tests than control children at 6 month follow-up (P=0.0027; 95% confidence interval 0.3 to 1.3) but no changes in BMI sedentary behaviours

	Study	Sample	Design/aim	Outcome measures	Behaviour-change theories	Results
7	(Alhassan <i>et al.</i>, 2007) The effects of increasing outdoor play time on physical activity in Latino preschool children	Setting US Participants: 32 3-4 year old Latino children	Design: RCT Aim: Intervention group received increased outdoor free play (two additional 30 minute slots per day for two days) Component: Single	Physical activity assessed by accelerometry	None reported	Differences between groups in changes in total daily activity were not statistically different (CON, 0.491.3; RECESS, 0.390.8)
8	(Hannon and Brown, 2008) Increasing preschoolers' physical activity intensities: An activity-friendly preschool playground intervention	Setting: University based preschool centre in the US Participants: 76 3-5 year old children attending a	Design: Pre-test and post-test Aim: Portable outdoor play equipment was added to the playground to encourage increased physical activity Component: Single	Levels of sedentary behaviour, light, moderate and vigorous physical activity via accelerometry	None reported	Compared to pre-intervention, sedentary behaviour decreased by 16%. All physical activity intensities increased: light – 3.52%, moderate – 7.76%, vigorous – 4.66%. Age effects were also significant with the older children displaying higher intensities of vigorous play.

	Study	Sample	Design/aim	Outcome measures	Behaviour-change theories	Results
9	(Trost <i>et al.</i>, 2008) Feasibility and efficacy of a “move and learn” physical activity curriculum in preschool children	Setting: Four part-time preschool centres in the US Participants: 2 3-5 year old children attending one of	Design: RCT Aim: Intervention classes received an 8 week “move and learn” programme involving integration of physical activity into all aspects of the curriculum Component: Single	Physical activity assessed by accelerometry	None reported	Physical activity levels were similar between groups for the first 6 weeks. The intervention group children demonstrated significantly higher levels of moderate-to-vigorous intensity physical activity than controls in the final two weeks of the programme (p<0.05)
10	(Bayer <i>et al.</i>, 2009) Short- and mid-term effects of a setting based prevention programme to reduce obesity risk factors in children: A cluster-randomised trial	Setting: 2658 Kindergartens in 4 regions of Bavaria Participants: 5-6* year old children *Children in Germany start school at age 6 years	Design: Cluster RCT Aim: ‘TigerKids’ programme - activities which encourage improving health behaviours in the day care setting that can also be maintained at home Component: Multi	Prevalence of fruit and vegetable consumption. Consumption of high calorie soft beverages. Overweight and obesity. Further dietary habits and motoric testing	None reported	The programme led to an increased proportion of children with high fruit and vegetable consumption that was sustainable with adjusted odds ratios of 1.59 (1.26:2.01) and 1.48 (1.08:2.03 after 18 months. There were no significant statistical differences between groups for prevalence of overweight and obesity.

	Study	Sample	Design/aim	Outcome measures	Behaviour-change theories	Results
11	<p>(Adams <i>et al.</i>, 2009)</p> <p>Results: (Zask <i>et al.</i>, 2012) Tooty Fruity Vegie in Preschools: an obesity prevention intervention in preschools targeting children's movement skills and eating behaviours</p>	<p>Setting: 18 preschools and 13 matched control schools in Australia</p> <p>Participants: 3-5 year old children</p>	<p>Design: Quasi-experimental</p> <p>Aim: Skills development and awareness-raising for parents, staff and children. Social support for parents to foster behaviour changes in their children</p> <p>Component: Multi</p>	<p>Body mass index and waist circumference</p>	<p>The Health Belief Model Competence Motivational Theory 10 Dimensions of Community Capacity</p>	<p>In comparison to controls, children in intervention preschools significantly improved movement skills, had more fruit and vegetable serves and were less likely to have unhealthy food items in their lunch boxes following the intervention. There was also a significant difference in waist circumference growth and a reduction of BMI Z scores (-0.15, $p=0.022$)</p>

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It can be seen in Table 1 that of the eleven interventions reviewed; seven were single component type interventions, four focusing on increasing physical activity (1, 7, 8, 9), two on changing dietary behaviour (2, 4) and one reducing sedentary behaviour (3). Of the multi-component interventions, three combined dietary and physical activity behaviours (5, 10,11) and one physical activity and sedentary behaviour (6). Nine of the studies demonstrated some degree of success in modifying behaviours, however, only three were shown to have any impact on reducing BMI, Mo-suwan *et al.* (1998): increasing physical activity and Fitzgibbon *et al.* (2005): healthy eating and increasing physical activity and Zask *et al.* (2012): dietary and physical activity behaviour changes.

Table 2 summarises individual intervention components that were identified as having a positive effect on certain lifestyle behaviours such as sedentary behaviour. It can be seen that of the studies which demonstrated an impact on BMI, three advocate teacher-led structured physical activities; one a reduction of TV/DVD viewing; and one the use of home-based activities and the increased consumption of fruit and vegetables. However, despite the positive findings, the authors (Nixon *et al.*, 2012a) caution against focusing on separate components and advise that a combination of strategies that each demonstrates positive evidence of behaviour change may prove more effective.

Table 2 Identified effective intervention components

Intervention component	Study	Rationale for use
Teacher-led structured physical activities	Mo-suwan et al., 1998 Fitzgibbon et al., 2005 Reilly et al., 2006 Trost et al., 2008 Bayer et al., 2009 Zask et al., 2012	Increase preschool children's activity
Decrease TV/DVD viewing	Dennison et al., 2004 Fitzgibbon et al., 2005	Reduction of sedentary behaviour
School food service modification	Williams et al., 2004	Improving dietary behaviours
Home-based activities to increase physical activity	Reilly et al., 2006 Bayer et al., 2009 Zask et al., 2012	To foster a holistic approach by including parents and the wider family
Home-based activities to improve dietary behaviours	Bayer et al., 2009 Zask et al., 2012	To foster a holistic approach by including parents and the wider family
Addition of portable outdoor play equipment	Hannon and Brown, 2008	Reduction of sedentary behaviour
Increased consumption of fruit and vegetables	Bayer et al., 2009 Zask et al., 2012	Improve dietary behaviours
Regular consumption of water	Bayer et al., 2009	To replace sugary drinks
Use of puppets/ project character to 'communicate' health messages to children	Johnson 2000 Bayer et al., 2009	Child-friendly engagement methods

3.10 The UK preschool sector

In England several types of preschool (ages 3-5years) education and care are available to families. Care-based establishments include day-care centres, social services day nurseries, private day nurseries, child-minders, nannies, as well as relatives (grandparents etc.). Educational-based establishments include play-groups (these may be voluntary or local authority run), nursery schools and nursery classes attached to primary schools.

It has been reported that attending a high- or medium- quality preschool had a lasting effect on social and behavioural outcomes and a high quality preschool is especially beneficial for the most disadvantaged children (Department for Education, 2013a).

The Government spends approximately £5 billion a year on early education and childcare; £2 billion of which is funded early education places (Department for Education, 2013a). This entitles all 3- and 4-year olds to 15 hours of early education and care for 38 weeks of the year. There has been a particular emphasis on improving access for children from disadvantaged backgrounds as children from workless households or low-income families are less likely to attend early years settings; 87% of children from disadvantaged families compared to 97% of non-disadvantaged families (Speight *et al.*, 2010).

Full-day care settings were the most widespread of all the different types of group based childcare provision in 2011. However, as the provision of full-day care settings has increased in recent years, the proportion to be found in the most deprived areas has decreased (from 30% in 2007 to 25% in 2011). This suggests that new settings which have opened in this time period have been clustered in the wealthier areas (Brind *et al.*, 2011).

Families from less disadvantaged backgrounds are more likely to access private nursery provision or childminders as they may have the freedom to choose or the need (both parents working) to pay for additional care (Speight *et al.*, 2010). Only 19% of all childminders are found in the 30% most deprived areas (Brind *et al.*, 2011).

Early Years provision nursery schools remain particularly important in the 30% most deprived areas of the country, where 59% of all nursery schools were to be found in

2011). However, primary schools with nursery and reception classes still account for the majority of early years places (Brind *et al.*, 2011).

This PhD project focused on preschool children, their parents and nursery practitioners in the environment of preschool centres. The main focus for this research was local authority nursery schools and nursery classes attached to primary schools specifically aimed at 3-5 year olds. Nursery teachers and practitioners working in an educational setting are accustomed to following and delivering curriculum-based standards. The Early Years Foundation is implemented in all nursery classes and nursery schools (see section 1.4) and requesting practitioners to deliver a health promotion programme should be feasible within their remit. In addition, in the case of nursery classes the opportunity to engage with older siblings and the school as a whole would be available.

Furthermore, the focus for the study was children aged 3-5, which local authority nursery schools and nursery classes specifically cater for. The evidence, as discussed in section 2.1.2, shows that 1 in 5 children are overweight or obese by the time they start primary education and that adiposity rebound may have an influence at this age (section 2.3.4). Intervening with children's health behaviours before they start primary school may prove beneficial. Moreover, in my experience of working with young children of this age, they have the capacity to share what they learn at nursery with their parents and wider family.

In addition, as reported above, families from a disadvantaged background are more likely to access preschool provision in the form of nursery schools and nursery classes attached to primary schools. Furthermore, as discussed in section 2.3.9, children from low SES backgrounds are more likely to be overweight or obese than their less disadvantaged counterparts. Targeting local authority nursery schools/classes should provide access to families who are more likely to suffer health inequalities. Health inequalities have been identified as needing more targeted intervention (see section 2.3.9).

3.10.1 Section summary

Obesity prevention interventions and initiatives with young children have been conducted in various settings, these include: government initiatives; social marketing campaigns; Sure Start programmes; family and community interventions; primary schools; and preschool centres.

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In summary, the main findings of past prevention interventions and initiatives are: despite tighter regulations, children are still being exposed to high levels of 'junk food' advertising (Adams *et al.*, 2012). Social marketing strategies can support individuals and communities to take more control over their health and campaigns have been shown to influence nutrition related psychosocial variables (Gordon *et al.*, 2006). However, Ells *et al.* (2005) believe that they should not eradicate interventions that are tailored to more specific groups of people. Sure Start programmes have not achieved the 'hoped-for-impact' (House of Commons Children, 2010) and no report of the impact of health variables could be found for this thesis. There are no obesity prevention interventions for children in primary care. Primary schools are widely promoted as a suitable setting for promoting health (Warren *et al.*, 2003; Van Lippevelde *et al.*, 2011), however there are multi-access issues and teachers may lack the necessary skills to address obesity (Davidson, 2007). Moreover, the engagement and motivation of staff to deliver an intervention may prove challenging (Harrison and Jones, 2011); this may impact future embedding and sustainability. Parental involvement can increase the effectiveness of interventions (Lobstein *et al.*, 2004; Brown *et al.*, 2007), however, parents with 'normal' weight children may be reluctant to participate in prevention interventions (Epstein *et al.*, 2001). Interventions involving nutritional information, which promote physical activity along with cognitive behaviour modifications could be the determining factors in the prevention of childhood obesity (Bautista-Castano *et al.*, 2004). The very low levels of physical activity that have been observed in preschool children suggest that increasing physical activity may be beneficial (Hesketh and Campbell, 2010). Interventions of 6 months to 1 year appear to be more effective than shorter or longer ones (Bautista-Castano *et al.*, 2004) and, interventions which have a theoretical underpinning may increase the effectiveness of the intervention (Powell and Thurston, 2008).

As previously discussed, interventions with the aim of preventing childhood overweight and obesity may be effective in changing certain lifestyle behaviours, however, to date, they have not been found to have an impact on reducing the prevalence of obesity (Plachta-Danielzik *et al.*, 2007). Furthermore, there is insufficient evidence to assess the effectiveness of dietary interventions versus physical activity interventions (Brown and Summerbell, 2009). Assessing the effectiveness of one type of intervention over another is problematic; as discussed interventions have been conducted in different settings, with different age groups, variable outcome measures and implementation conditions (Bluford *et al.*, 2007; Brown and Summerbell, 2009; Hesketh and Campbell,

2010). Moreover, Brown and Nelson (2006) conclude that many interventions may demonstrate a lack of success due to factors such as a failure to identify target behaviours, poor implementation of intervention and measurement and evaluation issues.

Additionally, it is thought that a lack of theoretical underpinning may impact intervention design (Baranowski *et al.*, 2003; Powell and Thurston, 2008). Systematic reviews of prevention interventions have highlighted strategies that demonstrate some success in addressing lifestyle behaviours amenable to change (Bautista-Castano *et al.*, 2004; Ells *et al.*, 2005; Bluford *et al.*, 2007; Brown *et al.*, 2007; Brown and Summerbell, 2009; Hesketh and Campbell, 2010). Furthermore, positive behavioural changes have been demonstrated in children as young as three years of age; this suggests that intervening in the preschool years may have an overall benefit to children's long-term health and subsequent risk to obesity. However, there is a paucity of interventions targeting children in preschool settings and as discussed above, due to the heterogeneity of studies to date, further research is required.

3.11 Gaps in the Evidence

The 2009 document *Tackling Obesity through the Healthy Child Programme: A Framework for Action* (as discussed on page 47) identified several areas which require more research with children aged 0-5 years (Rudolf, 2009) (Table 3). The identified gaps continue to be of relevance in 2013.

Table 3 Tackling obesity through the Healthy Child Programme

Identified Gap	Action Required
Parenting	<ul style="list-style-type: none"> • Effects of parenting interventions as a preventive strategy • Role of mothers and fathers' influence on child's health
Eating behaviour	<ul style="list-style-type: none"> • Trial of 'real world' interventions which aim to help parents learn the skills of responsive feeding
Play and sleep	<ul style="list-style-type: none"> • Trials of interventions promoting adequate amounts of sleep and the effect on weight gain • Trials of unstructured preschool physical activity interventions
Settings	<ul style="list-style-type: none"> • Adequately powered trials in day care settings required • More home interventions required
Health professionals	<ul style="list-style-type: none"> • Clinical tool to assist professionals and parents to identify 'at risk' babies • Trials to evaluate the effect of motivational enhancing approaches

It can be seen in Table 3 that parental involvement is identified as a key area that requires more research and development; the document highlights the potential role of parenting styles and they advocate the promotion of an authoritative parenting style (section 2.5.2.1). It is interesting to note that apart from 'responsive feeding' there is no other mention of dietary intervention; based on recent systematic reviews, this appears to be an area that requires further investigation and development as it has yet to be identified what the main focus of such an intervention with preschool children should be (Brown and Summerbell, 2009). Furthermore, Rudolf emphasises the need for 'unstructured' physical activity interventions with preschool children; based on previous evidence, this may be difficult to measure and evaluate (Steinbeck, 2001). It has been suggested that targeting a reduction in sedentary behaviour in children may prove more effective than targeting increases in physical activity (Reilly *et al.*, 2003a).

3.11.1 Developing future interventions

Baranowski *et al.* (2009), p. 3 maintain that 'behaviour change interventions must be developed to meet the needs and capitalise on the strengths of specific groups of people using a specific delivery method'. Ells *et al.* (2005) also highlight the importance of developing interventions that are tailored to specific groups of people. Furthermore, Finegood *et al.* (2010) advocate the need for more 'practice-based evidence' as opposed to 'evidence-based practice', thus learning from what works in the 'real world' when addressing the complexities of obesity prevention. Bluford *et al.* (2007) propose that due to the multi-factorial causes of overweight and obesity, interventions should be multi-component, focusing on more than one strategy in a variety of settings. Future interventions should also target strategies and techniques which aid parents in modifying their child's diet and physical activity patterns (Skouteris *et al.*, 2010a).

Possible behavioural influences on obesity of the targeted group should be identified and behaviours which are amenable to change should be easily measurable; that is, validated measures that are acceptable to the target population (Baranowski *et al.*, 2009). If validated measures are not available, new data should be collected in the form of focus groups and interviews. However, it is important to draw on the evidence base of previous studies and to adapt them where necessary. Thus, future prevention intervention programmes may prove efficacious and produce more consistent results.

3.11.1.1 Recent intervention evidence

The following information was not available when the preschool intervention for this PhD was being developed but it is included for completeness. Many of the points such as encouraging fruit and vegetable consumption and discouraging the provision of 'unhealthy' foods such as energy-dense snacks; discouraging eating whilst watching TV; parent engagement strategies; increasing physical activity and; targeting improved gross motor skill development consolidate and reiterate findings previously reported. However, it should be noted that with the exception of the 'Tooty Fruity Veggie' preschool intervention which reported its results in 2012, it is only more recently that literature has reported and discussed the importance of integrating behaviour change theories into preschool obesity prevention interventions. The importance of precise reporting of behaviour change interventions has become paramount. Michie *et al.* (2013) have published results of the first stages of a programme of work to develop an

international taxonomic classification system for behaviour change techniques which builds on previous work.

3.11.1.2 *The Toybox Intervention*

The Toybox intervention was developed using an evidence-based approach; utilising the findings of four reviews and a systematic review of behavioural models underpinning school-based interventions in preschool for the prevention of obesity in children aged 4-6 years (Summerbell *et al.*, 2012). The article provides physical activity, sedentary behaviour, and healthy eating recommendations for developing a preventative intervention with preschool children. Recommendations are highlighted in Table 4.

Table 4 The Toybox intervention recommendations

Target area	Recommendation
Sedentary behaviour	Discourage the provision of a screen in the bedroom (TV, computer, PlayStation etc.)
Physical activity	Encourage the use of active transport Encourage the development of a large, active play enhancing all-weather play area in preschools
Dietary behaviour	Encourage the broad provision of a broad of a broad variety of healthy foods especially fruit and vegetables, and discourage the provision of unhealthy foods such as sweetened soft drinks and energy dense snacks Discourage the behaviour of eating while watching TV or using games consoles

3.11.1.3 The Romp and Chomp obesity prevention intervention

The Romp and Chomp programme was a family-centred, settings- based intervention aimed at societal change in Victoria, Australia from 2004-2008 (De Silva-Sanigorski *et al.*, 2012). The environmental audits demonstrated positive impacts on policy, nutrition, physical activity opportunities, and staff capacity and practices with results being more substantial in preschool settings. It was reported that efforts must be directed toward developing context-specific strategies as identified in Table 5.

Table 5 Romp and Chomp intervention- key components

Target group	Recommendation
Stakeholders	Stakeholder engagement
Early years practitioners	Capacity building of early years educators and care providers
	Initial professional development, training and resources
	Professional development for health professionals
	Policy and guideline implementation
Parents	Social marketing and parent engagement strategies
	Parent education materials and resources

3.11.1.4 Other evidence

In 2012, a review which focussed only on physical activity interventions in preschools in Canada (Goldfield *et al.*, 2012), highlighted other factors to consider (Table 6) which are generalisable to other western childcare settings .

Table 6 Physical activity review findings and recommendations

Target	Finding/recommendation
Preschool environment	The social and physical environments where preschool children spend their time has a powerful influence
	The addition of portable play equipment in outside areas is positively correlated with MVPA
Children	Increasing physical activity by 30 minutes a day is effective in improving body composition in preschool children
	Targeting improved fundamental and gross motor skills may lead to greater participation in PA and sports later in life
Early years practitioners	Preschool practitioner engagement and personal investment in PA interventions can vary greatly
	Positive and consistent reinforcement for preschool practitioners may enhance morale and increase the likelihood of compliance

3.12 Discussion and implications for study

Evidence suggests, childhood overweight and obesity has become a national crisis with potentially 25 per cent of under 16-year-olds being obese by 2050, in the UK one in four children are already overweight when starting school; that is, their BMI is greater than 85th centile (National Health Service, 2009). Furthermore, socioeconomic inequalities in obesity prevalence in children continue to widen (Ridler et al., 2013). As

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previously discussed, children may pass through 'critical periods' (page 47) that leave them more susceptible to developing obesity, and it is during these periods that intervention may prove most successful.

As reported above, interventions with the aim of preventing overweight or obesity in children have been conducted in many forms. Despite many interventions reporting favourable behaviour modification outcomes; few have demonstrated a reduction in the prevalence of obesity. There are many factors which will determine the 'success' of such an intervention, ranging from participant recruitment, compliance, delivery and intervention evaluation.

Due to the inconsistencies and uncertainties surrounding interventions with preschool children and their families, further research with this age group is paramount. Owing to the number of children accessing some form of preschool education, the development of appropriate interventions in these settings could prove to be an ideal environment in which families' health behaviours potentially could be modified. In this age group parents are responsible for most aspects of their child's health behaviours such as dietary intake and sedentary behaviours; therefore, it is imperative that parents are included in preventative interventions. Moreover, as demonstrated in the literature, more emphasis should be placed on parenting styles and providing practical strategies conducive for positive health behaviours.

However, it is recognised that 'downstream' interventions that target individual behaviours such as nutrition education are more likely to increase inequities than upstream interventions which may involve policy change (Raine, 2010; Langford and Panter-Brick, 2013). As advocated in social marketing literature; there is a need to obtain a 'real understanding of the target audience: who they are, what they think and believe and what they need' (Department of Health, 2011a, p. 11). Owing to the length of time many children are spending in childcare, it is of equal importance that nursery teachers, practitioners and other nursery workers are included as agents of change supporting and advocating a healthy lifestyle. Furthermore, engaging nursery staff to deliver such an intervention may contribute to a holistic approach and sustainment of such behaviour changes. Social marketing strategies such as targeting interventions towards those who have a reason to care and who are ready for change; activating people; and using strategic and efficient uses of resources (Aras, 2011) will aid and enhance the delivery of such an intervention. As recommended by De Silva-Sanigorski

et al. (2012) (see Table 5) social marketing strategies can be used to enhance parental engagement. Furthermore, social marketing strategies can be used ‘to take the message into the heart of communities’ (Jackson, 2009, p. 260). Although this research is specifically targeting nursery classes and nursery schools it can be argued that a preschool environment is a community in itself. The impact of an intervention has the potential to reach the wider community and environment through the wider family (grandparents, aunts, uncles etc.), siblings’ school, mother’s groups, child play centres, and religious institutions and so on.

The Dahlgren and Whitehead (1991) Policy Rainbow describes the layers of influence on an individual’s potential for health. Some factors are described as being fixed such as age and sex; whilst other factors such as personal lifestyle and the physical and social environment are potentially modifiable. Figure 7, which is an adaptation of the Policy Rainbow, illustrates the interrelationships between the factors which may influence an individual’s health.

In the current study the main focus is on individual lifestyle factors (diet, physical activity) and the social and community networks (nursery settings, schools). However, it is important to acknowledge that although many factors such as ‘individual lifestyle’, ‘living and working’ and ‘general socioeconomic, cultural and environmental’ have been described as feasibly modifiable, they are not always within an individual’s control and depend on impact of the wider environment. A different way to approach behaviour change in this context may be to not to focus on individual lifestyle behaviours per se but to modify the environment at a higher level such as policy change within the nursery setting.

However, the purpose of the current study is a feasibility study to determine whether a practitioner-led intervention that has the aim of improving lifestyle behaviours in preschool children and their families, thus reducing overweight and obesity risks would be acceptable and practical in a nursery environment. Once this is established, this may inform future work which focuses on the wider impact such as policy change.

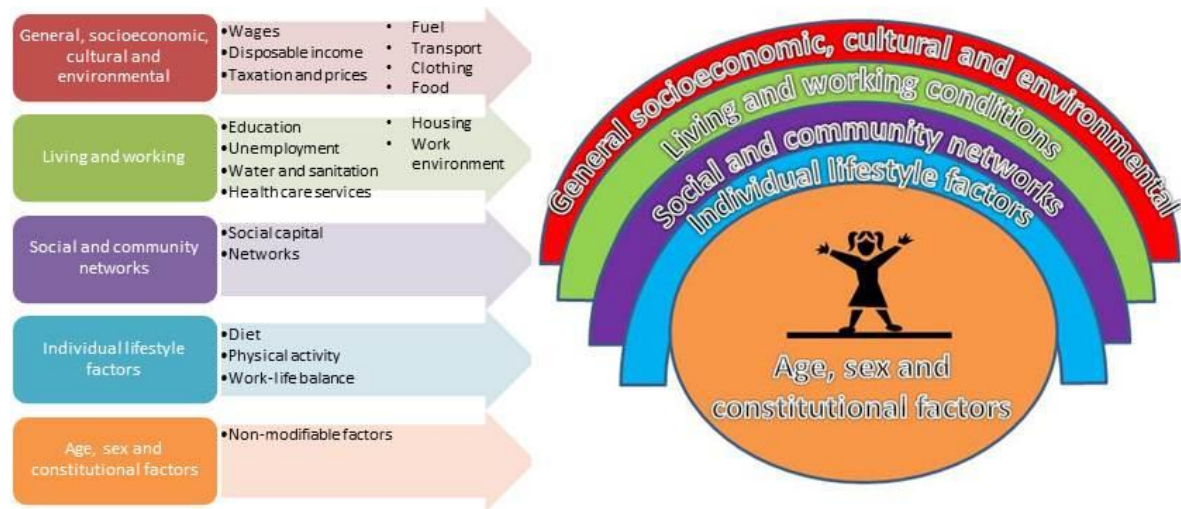


Figure 7 Adapted Dahlgren and Whitehead Policy Rainbow

A further gap that was addressed was the lack of studies reporting and demonstrating a theoretical underpinning in the planning and implementation of prevention interventions with young children.

Based on the evidence reviewed, my primary aim was to consider factors such as parenting styles, sedentary, physical activity and dietary behaviours. However, as previously discussed, it is imperative to consider the needs and requirements of the targeted population; therefore a preliminary qualitative study was conducted with parents of preschool children, nursery teachers and nursery practitioners to determine the views and attitudes of nursery practitioners with regards to childhood overweight and obesity prevention interventions, and to determine which lifestyle behaviours in the targeted population may be amenable to change. This project was conducted in four stages as described in the Methods chapters (Chapter 6).

3.13 Aims and objectives

3.13.1 Aim

To develop and test the feasibility and acceptability of an intervention for the prevention of overweight and obesity in childhood, with a particular focus on early childhood. The objectives stated in the section below were developed at the commencement of this PhD study; however, following evaluation of phases one and two of this study (see Chapter 5) an additional objective was added (section 3.13.3).

3.13.2 Objectives

- To identify and evaluate current/past community, school and family based dietary, physical activity and lifestyle change interventions, with a particular focus on preschool aged children
- To elicit theoretical evidence from literature
- To collect data from key stakeholders to inform decision making for intervention development
- To determine from available evidence, which intervention strategies may be considered acceptable, viable and appropriate for families and children in various preschool settings
- To develop and then test potential interventions
- To test the feasibility of the evaluation tools

3.13.3 Additional objective

- To train nursery practitioners to deliver a preschool-based behaviour-change intervention

The project was underpinned by the MRC framework: Developing and evaluating complex interventions (Craig *et al.*, 2008b). Table 7 illustrates the process of this research mapped to the MRC framework.

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The 'development' stage consists of identifying the evidence base, identifying and developing theory, and modelling processes and outcomes. The 'feasibility and piloting' stage comprises of testing procedures (including evaluative procedures), estimating recruitment size and retention and determining sample size. The evaluation stage includes assessing the effectiveness of the intervention.

Table 7 MRC Framework and research process

MRC Framework		PhD research process
Development	Identifying the evidence base Identifying/developing theory Modelling processes and outcomes	<ul style="list-style-type: none"> • Literature review • Methods development • Phase one and two data collection: interviews, mapping activities and focus groups • Data analysis
Feasibility/ piloting	Testing procedures Estimating recruitment size/retention Determining sample size	<ul style="list-style-type: none"> • Intervention design • Phase three data collection: outcome measures • Intervention testing • Process analysis • Phase four: interviews, questionnaires • Process analysis, evaluation and conclusions
Evaluation	Assessing effectiveness Assessing cost-effectiveness Understanding change process	

3.13.4 What is a complex intervention?

It is important to establish what the elements of a ‘complex intervention’ are. The description below is taken from the Developing and evaluating complex interventions document (Craig *et al.*, 2008b).

Some dimensions of complexity

- Number of, and interactions between, components within the experimental and control interventions
- Number and difficulty of behaviours required by those delivering or receiving the intervention
- Number of groups or organisational levels targeted by the intervention
- Number and variability of outcomes
- Degree of flexibility or tailoring of the intervention permitted

Implications for development and evaluation

- A good theoretical understanding is needed of how the intervention causes change, so that weak links in the causal chain can be identified and strengthened
- Lack of impact may reflect implementation failure (or teething problems) rather than genuine ineffectiveness; a thorough process evaluation is required to identify implementation problems. Complex interventions can be difficult to evaluate due to the discernment of the effectiveness of the various components (Science and Technology Committee, 2010-12)
- Variability in individual level outcomes may reflect higher level processes; sample sizes may need to be larger to take account of the extra variability, and cluster-rather than individually-randomized designs considered
- Identifying a single primary outcome may not make best use of the data; a range of measures will be needed, and unintended consequences picked up where possible
- Ensuring strict fidelity to a protocol may be inappropriate; the intervention may work better if adaptation to local setting is allowed

The Government Science and Technology Committee report that the substantiation of the effectiveness of behaviour-change interventions is required to contribute to the evidence base (Science and Technology Committee, 2010-12).

The above points were taken into account during the development, testing and evaluation stages of the project.

3.13.5 What is a feasibility study?

'Feasibility studies are pieces of research conducted before a main study in order to answer the question 'Can this study be done?' They are used to estimate important parameters that are needed to design the main study' (NHS, 2012a). Moreover, Sahota *et al.* (2001b) recommend that due to the complexity of evaluation, behaviour change trials should be conducted in three phases: a development and validation phase, a feasibility phase and a multi-centre trial.

The NIHR Evaluation, Trials and Studies Coordinating Centre (NETSCC) provide the following criteria list needed for or information gained by conducting feasibility studies:

- Standard deviation of the outcome measure, which is needed in some cases to estimate sample size
- Willingness of participants to be randomised
- Willingness of clinicians to recruit participants
- Number of eligible patients, carers or other appropriate participants
- Characteristics of the proposed outcome measure and in some cases feasibility studies might involve designing a suitable outcome measure
- Follow-up rates, response rates to questionnaires, adherence/compliance rates, ICCs in cluster trials etc.
- Availability of data needed or the usefulness and limitations of a particular database
- Time needed to collect and analyse data

Feasibility studies do not evaluate the outcome of interest; that is evaluated in the main study. If a feasibility study is a small randomised controlled trial, a power calculation is not normally undertaken. The sample size should be adequate to estimate the critical parameters for example, the recruitment rate (NHS, 2012a).

3.13.6 Rationale for mixed methods

As discussed above a behaviour change intervention can be identified as a complex intervention with multiple layers and dimensions of complexity. Therefore, in order to attempt to capture and evaluate the effectiveness of such an intervention ‘this demands analysis that is informed by multiple and diverse perspectives’ (Brannen, 2005, p. 9). A mixed methods approach is commonly used in health services research and the MRC complex intervention guidelines highlight the importance of the use of qualitative methods particularly in the theoretical and modelling stages of an intervention (Bowling and Ebrahim, 2005; Craig *et al.*, 2008a). Furthermore, qualitative techniques can help identify the ‘active ingredients’ of an intervention and determine which groups of participants are more likely to respond to an intervention (Bowling and Ebrahim, 2005). Therefore, a mixed methods approach was adopted for this study.

The subsequent chapters describe the development, process and conduct of the feasibility study for this PhD research.

Part Two

Development Work

Chapter 4 - Preliminary Qualitative Studies

Chapter 5 - Preliminary Qualitative Studies Results (a & b)

Chapter 6 - Development of and measurement methods of a
behaviour change intervention

Chapter 4 Preliminary qualitative studies

4.1 Introduction

As previously discussed in the literature review (page 28) there is a body of evidence which suggests that practitioner and parental involvement is key for the potential effectiveness of an intervention aimed at obesity prevention in children (Bautista-Castano *et al.*, 2004). Moreover, as discussed in section 3.1, Baranowski *et al.* (2009) highlight the need to ensure interventions meet the needs and capitalise on the strengths of the targeted population and that evidence is practicable in the 'real world' (Finegood *et al.*, 2010).

This PhD research project was conducted in four phases; this chapter describes the methods used in phases one and two which were preliminary qualitative studies to obtain the views and attitudes of nursery practitioners (NP) with regards to childhood overweight and obesity prevention interventions, and to determine which lifestyle behaviours in the targeted population may be amenable to change. Utilisation and analysis of data collected in phases one and two informed phase three; a feasibility study to explore whether a practitioner-led intervention that has the aim of improving lifestyle behaviours in preschool children and their families, thus reducing overweight and obesity risks would be acceptable and practical in a nursery environment. Following analysis and evaluation of the feasibility study, elements of an adapted action research model were used, to inform phase four (see section 6.7.1). That is, the feedback received from NPs and parents informed a revised methods intervention to be tested further. Figure 8 illustrates graphically how the first two phases of the project proceeded.

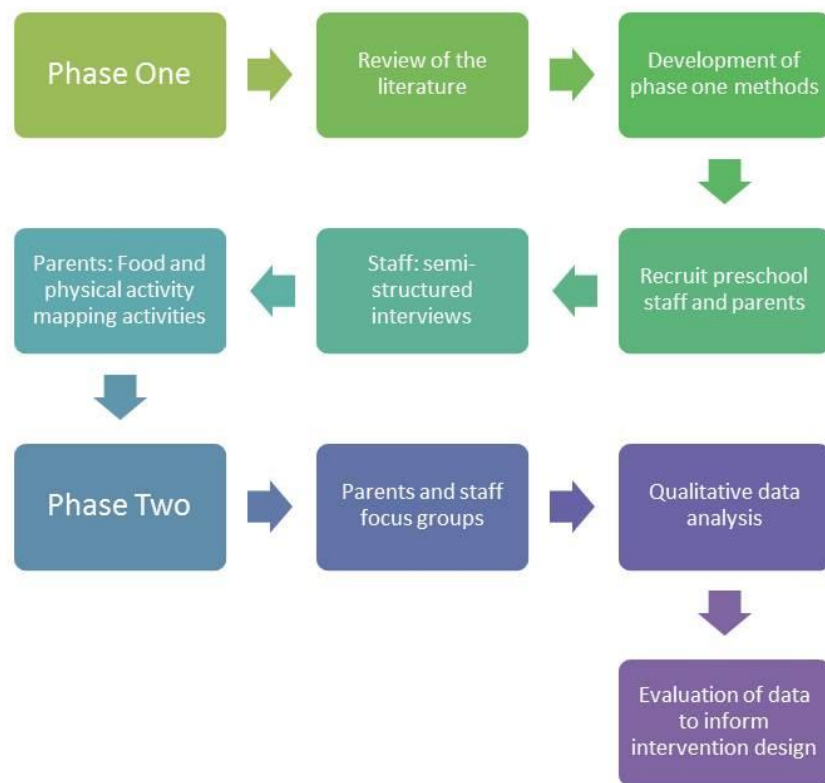


Figure 8 Flowchart of phases one and two

4.1.1 Use of qualitative methods

‘Qualitative research aims to generate insight, describe and understand the nature of reality in human experiences’ (Williamson, 2009, p. 202). Moreover, researchers are interested in ‘how humans arrange themselves and their settings and how inhabitants of these settings make sense of their surroundings through symbols, rituals, social structures, social roles and so on’ (Berg, 2004, p. 7). Researchers who favour qualitative methods accept subjectivity and believe that research can often document ‘different or multiple realities’ (Greenbank, 2003, p. 793).

Research methods have often been criticised as something that is ‘done on people’ rather than ‘with people’. Qualitative methods are underpinned by a holistic approach that aims to gain an ‘Emic’ observation, that is, an insider’s perspective (Williamson, 2009). However, not all research questions can be answered using qualitative research methods (Wuest, 2011).

A qualitative rationale was selected for aspects of the study due to the nature of the project; a positivistic paradigm will develop and construct theory. Before a behaviour change intervention can be designed and implemented, it is important to gain insights, views and knowledge of everyday practices from the study population in question as reported in the MRC complex intervention guidelines (Craig *et al.*, 2008a) (section 3.13). Furthermore, the purpose of a feasibility study, as discussed in section 3.13, is to collect information from participants such as recruitment, willingness to be randomised and to participate in the study (Arain *et al.*, 2010). The use of qualitative methods to evaluate a feasibility study can provide information to improve recruitment procedures, the measurement tools, evaluation methods, and so on of future studies (Fonteyn and Bauer-Wu, 2005). In an Australian study by Hesketh *et al.* (2005) exploring healthy eating, activity and obesity prevention; the importance of consulting the views of potential participants to an intervention study through the use of qualitative methods was deemed as fundamental in order to facilitate the sustainability of an intervention. Furthermore, the social marketing literature highlights the importance of including qualitative research such as interviews and focus groups as research should 'never assume to already know the answers' (Jackson, 2009, p. 260).

Therefore, for this study, it was pertinent to utilise qualitative methods to determine the feasibility and acceptability of an intervention for the prevention of overweight and obesity in childhood. Although the main aim of the present feasibility study was to develop and test an obesity prevention intervention, the terms 'overweight' and 'obesity' were not used in communication with the nursery staff and parents, instead the focus was on improving 'health'. This was a conscious decision as it removed any issues of 'blame' if a child was overweight and any reluctance by parents to participate if their child was not perceived to have any weight issues. The following sections introduce the qualitative methods employed in phases one and two of this PhD research.

4.2 Phases one and two methods

In the following sections I describe the methods used for this phase of the study. The nursery practitioners took part in semi-structured interviews and focus groups. Interviews and focus groups were selected for the targeted population as these are deemed suitable methods for gathering information about food choice and other

lifestyle behaviours (Rabiee, 2004). Parents completed mapping activities and also took part in focus groups.

4.2.1 Semi-structured interviews

Semi-structured interviews were selected for gathering information from the nursery practitioners as they are the most widely used interviewing format for qualitative research (DiCicco-Bloom and Crabtree, 2006). They are a simple, efficient and practical way of getting data. They combine a mix of 'closed' and 'open' ended questions, although the questions are planned, they are designed to be flexible (Bowling and Ebrahim, 2005), thus allowing narratives of the interviewees to flow and expand, which may add further unplanned dimensions to the topics.

To ascertain the nursery school practitioners' (NP) views and attitudes of the health of the families they worked with and health promotion activities within the nursery setting; staff were invited to participate in a semi-structured interview. The semi-structured interview topic guide questions (Appendix B) were designed to incorporate a range of issues that were identified in the review of the literature, such as: "Who is responsible for ensuring children follow a healthy lifestyle?" Additionally, to elicit departmental practices and policies, questions such as: "What is the nursery's practice regarding fizzy drinks, sweets, crisps and so forth?" Finally, questions of a more personal nature were asked, such as, "Do you think your own actions and views on diet and healthy living have an impact on the children in your care?" The interview sessions were recorded and transcribed. NPs were interviewed in a quiet area of the nursery (i.e. the staff room) by myself on a one-to-one basis. Gift vouchers to the value of £10 were issued to thank participants for their time and support.

4.2.2 Food mapping

Food mapping, which originated from social work 'eco-maps' (Harold *et al.*, 1997), is thought to be a useful tool for highlighting a person's current dietary behaviour, as the visual representation accentuates areas which may be amenable to change (Albon, 2007). The original food map concept as developed by Albon (2007) (Figure 9) was further developed in this study to incorporate physical activity.

Food mapping has been used in a Northern Irish study exploring the links between diet and health in adolescents. The authors concluded that the food mapping exercise

supported both the findings of the questionnaires used, and provided a greater insight into the diets of a subsample of adolescents; highlighting which people were instrumental in shaping their diets (Walsh and Nelson, 2010).

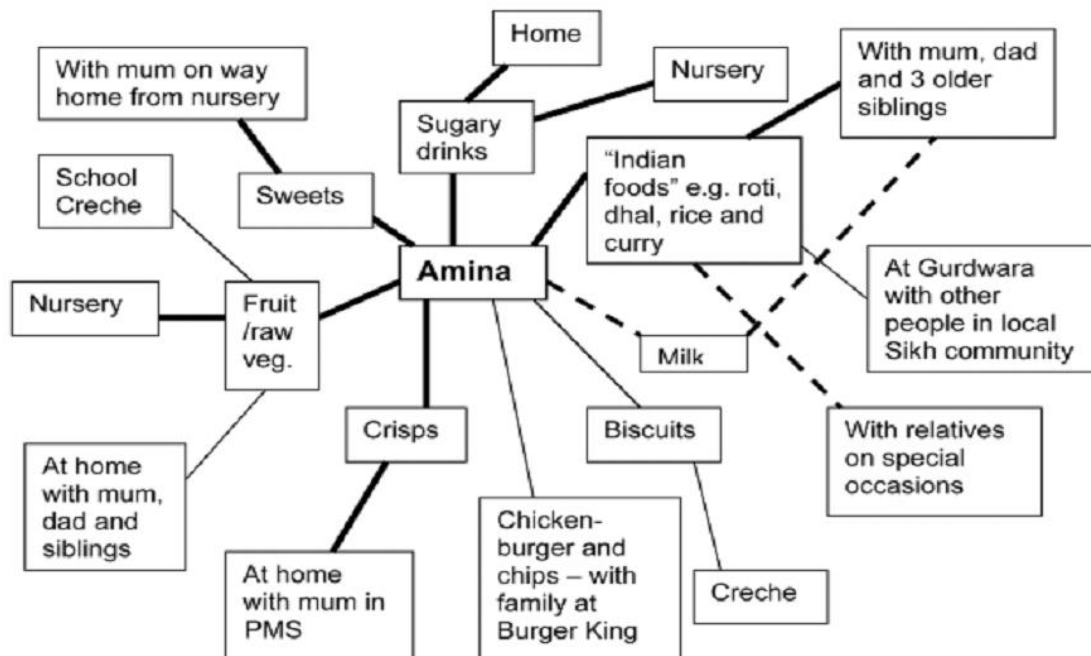


Figure 9 Example of a completed food Map (Albon, 2007)

In the present study mapping exercises were chosen as a way of gathering family and child information relevant to the study. For the food (Appendix C) and physical activity (Appendix D) mapping sessions the parent was asked to describe their child's typical week with regards to their dietary intake and physical activity and sedentary behaviour. This was then linked to people and places, thus emphasising the people and situations which may have an influence on a child's dietary and physical/sedentary behaviours. Moreover, the activity prompted further discussion about their child and their family behaviours and habits. It also provided an insight into the parent's views of nursery practices. This in turn informed phase three of the study.

The majority of the sessions (n=12) were carried out in the child's nursery school; as with the practitioners, this was conducted in a quiet area of the nursery on a one-to-one basis. The dialogue between researcher and parent was recorded and transcribed.

4.2.3 Focus groups

Focus groups are not a methodology but simply a tool for collecting qualitative data (Côté-Arsenault and Morrison-Beedy, 2005). Rabiee (2004) believes them to be particularly suited for exploring the complexities around food choice and other lifestyle behaviours as group and cultural 'lived in' experiences can be explored. The participants are guided by the moderator with open ended questions, however the focus of the session is the spontaneous responses gathered and the interactions between the participants (Rabiee, 2004; Côté-Arsenault and Morrison-Beedy, 2005). Focus groups allow the researcher to explore gaps between policy and practice and to investigate health behaviours that are considered 'normal' or 'deviant' (Bowling and Ebrahim, 2005). The focus group narratives may also highlight group norms within the different nursery settings, thus determining whether environmental factors influence practitioner views and opinions. In contrast to individual interviews, the researcher may have less control over the proceedings, however, this is not always perceived to be disadvantageous (Bryman, 2004) as diverse and new themes may emerge.

To enrich data, answer any emerging questions or to explore common themes elicited from the interviews; NPs were invited to participate in a focus group discussion. It was also hoped that a group discussion would generate ideas for the intervention and allow NPs and parents to express their opinions of the feasibility of the proposed methods and tasks. Parents who completed the Food and Physical Activity mapping exercises (discussed above) were also invited to participate in a separate focus group discussion to further explore themes and issues arising from the mapping data and to learn more about the 'biographies and life structures of the group participants' (Berg, 2004, p. 123). Due to difficulties with parent attendance (see section 5.3), further recruitment drives were undertaken to reach a wider range of parents such as street recruitment; parents with young children were handed an information flyer. Flyers were also distributed in shops, libraries and leisure centres. Nursery schools who had not previously taken part in the study were contacted and three consented to distribute flyers to the preschool parents. Finally, through a university contact, the researcher attended a church mother and toddler group to recruit parents.

It was a conscious decision to conduct the parental and practitioner focus groups on a separate basis as the composition of a group may have affected the dynamics of discussion. For example, heterogeneous groups, such as the general public and health

professionals would not be a desirable mix for optimal discussion and gathering of information (Sim, 1998; Rabiee, 2004).

4.2.3.1 Nursery practitioner focus groups

The practitioner focus group was conducted by myself and one other colleague who acted as a scribe. With the participants' permission, the meeting was recorded. The recording was transcribed and stored securely. The practitioners were invited to attend a session at Newcastle University in the early evening to allow for attendance after work. Beverages, sandwiches and fruit were provided due to the timing of the session.

The research objectives for the session were:

1. To explore practitioners' opinions of the importance of health promotions within nursery settings
2. To further explore practitioners' views of the role of parents in health promoting behaviours
3. To determine strategies, which promote healthy lifestyle behaviours in preschool children and their families, that can be delivered by practitioners – that are acceptable to both practitioners and parents
4. To determine possible barriers and facilitators for intervention implementation

The participants were led through a series of topics relating to health promotion, parental engagement, strategies to promote health and intervention implementation (Appendix E). The practitioners were given a prioritisation exercise; incorporating topics relating to the Early Years Foundation curriculum. This was to elicit discussion about the importance and relevance of health promotion within the nursery curriculum. The exercise involved placing, in order of importance, 24 cards stating different aspects of the curriculum such as 'exploration and investigation, language for communication and thinking, self-confidence and self-esteem' and so on. Participants were also asked to reflect on the aspects least important to them.

Practitioners were then asked to discuss their thoughts and feelings about health promotion to parents, what the role of the parent was, how they had engaged parents in health promotion in the past and what the benefits and barriers were.

Finally, the practitioners were given examples of previous research findings involving preschool children in relation to diet and physical activity. Issues and ideas that had been generated from the interviews and mapping activities were also presented. They were asked to discuss these points and relate how they could be applied practically in their own nursery setting.

The main points of the discussion of each topic were recorded on flip-charts to aid memory and to provide a method of feedback at the end of the session. Moreover, the main points of discussion were summarised at the end of the session so that participants could check and confirm the content of the meeting.

4.2.3.2 Parent focus groups

The parent focus groups were organised in two separate locations; a nursery centre that had been used previously for the Gateshead Millennium Study focus groups and a church hall where mothers were recruited from a mother and toddler group. Following a request from one of the parents, a crèche was arranged for the church hall meeting and participants were provided with refreshments and a £10 gift voucher. Prior to these meetings, a pilot focus group was conducted with university staff and students to test the process and activities (Appendix F).

The research objectives for the session were:

1. To explore parents' perceptions of healthy lifestyles
2. To elicit parental views of healthy lifestyle practices/promotion within nurseries
3. To explore strategies to encourage healthy family lifestyles that parents may find useful and acceptable which can be implemented at home through advice from NP

The parents were shown cards with different types of health behaviours printed on them such as 'eat breakfast', 'eat together as a family' and so on. They were asked to place the cards in order of importance. This was a mechanism to elicit conversation about their knowledge of and their views of health. Additionally, it would highlight family norms and differences.

Parents were then asked to think about the practices at their child's nursery and what sort of strategies they used to encourage a healthy lifestyle and whether they had

taken part in any programmes or projects. How NPs communicated health practices and events were also discussed.

The parents were then shown various resources such as leaflets, books and charts relating to healthy eating and physical activity in children. These included: Change4life (Department of Health, 2012), Caroline Walker Trust (The Caroline Walker Trust, 2007-2012) and HENRY (HENRY, 2012). They were asked to handle the resources, discuss them and then explain why some were liked or disliked.

Finally, as with the practitioners, the parents were given information about previous research with children in relation to healthy behaviours and issues generated from phase one data. They were asked to consider how acceptable and practical it would be to apply some of the practices at home and/or nursery.

The sessions were recorded, transcribed and stored securely. Flip-charts were provided to record main thoughts and information and the main points summarised and confirmed.

4.2.4 Recruitment

Recruiting participants to engage in a research project is considered to be the most challenging aspect of the research process (Blanton *et al.*, 2006). Recruitment issues in trials mean that they very often overrun; it is thought that approximately 81 per cent of clinical trials are delayed due to inadequate recruitment (Nasser *et al.*, 2011) and 10 per cent of trials are abandoned due to recruitment failure (Gabbay and Thomas, 2004).

Schools are a particularly challenging environment in which to recruit participants, as discussed in Chapter 3, there are many layers of access to be negotiated. Even if access is granted by 'gatekeepers' such as head teachers it does not guarantee the cooperation of other participants such as nursery practitioners and parents (Wanat, 2008).

Factors influencing recruitment and retention include project design, privacy, reaching under-represented groups, communication (Blanton *et al.*, 2006), inconvenience, expense and concerns about information and consent (Gabbay and Thomas, 2004). Moreover, participants may not be willing to participate in research if they cannot understand or identify with the validity and relevance of the study (Patel *et al.*, 2003).

The relationship between study staff and participants is of utmost importance (Blanton *et al.*, 2006) and building rapport will encourage continuing participation thus aiding retention (Patel *et al.*, 2003). Patel *et al.* provide a criteria list of recruitment strategies:

- Do not underestimate the importance of initial contact with staff from key recruitment sites
 - Provide adequate information using a variety of methods
 - Clarify roles, responsibilities and expectations of potential collaborators
 - Show appreciation for help received
 - Remember to give feedback
- (Patel *et al.*, 2003)

It has been reported that professionals respond more positively to research projects if contact is made using stationery with letterheads, an original signature and coloured graphics (Patel *et al.*, 2003). Incentives are thought to increase recruitment, however, it has been found that altruism also has a role to play and should be highlighted in publicity materials (Gabbay and Thomas, 2004). Moreover, it has been suggested that finding common ground with intended participants may prove beneficial in earning their cooperation (Wanat, 2008).

4.2.4.1 Recruitment strategies

The main purpose of the first two phases of this study was to elicit the views and attitudes of nursery school practitioners: Early Years Practitioners and/or Nursery Nurses and to interview parents of preschool children whose children attended either a Local Authority Nursery School, a private Nursery School or no nursery provision at all.

Many of the Gateshead primary schools who are involved in the GMS have nursery classes or schools attached to them. To ensure that different socio-economic groups were selected, areas of Newcastle were also targeted. The school head teachers were contacted by letter and follow-up telephone call to ascertain whether they would be willing to participate in a further study involving practitioners and preschool children. The HNRC also has links with private nursery chains, the managers were approached in the same way. Parents whose children did not attend any nursery provision were sourced from a group of parents who had previously taken part in a HNRC child feeding study and had expressed an interest to participate in further studies.

For focus group recruitment, staff and parents who participated in the interviews and mapping exercises were re-contacted to invite participation. However, due to recruitment difficulties, further strategies were required (see section 5.3.1) and parents were contacted via additional schools, street recruitment and through a church mother and toddler's group.

4.2.5 Reflexivity

As discussed in the introduction (section 1.1.2), I felt it important that I present myself as a research student and not let my previous status influence the relationship with the participants. I made sure that I wore my student identity badge when meeting with participants and presented myself as a researcher in parent literature. This would also help to disassociate me from the schools so that the parents did not think that I was staff member or teacher (Yee and Andrews, 2006) which may have impacted their perception of the project.

4.2.6 Transcription of audio records

All interviews and focus group sessions were digitally recorded and back-up copies generated. The audio files were transferred via a secure mode to an external transcription service. The files were transcribed verbatim and transcripts stored electronically.

4.2.7 Analysis

The interviews and focus group sessions were recorded and transcribed. The data were coded and analysed using 'thematic analysis' to identify major themes, sub-themes and categories. Table 8 summarises which group of participants participated in each data collection activity and how the data was analysed.

Table 8 Phase two analysis summary

Method	Who?	Analysis
Semi-structured interviews	Nursery practitioners	Thematic analysis
Food and physical activity maps	Parents	Content analysis Thematic analysis
Focus groups	Nursery practitioners Parents	Thematic analysis

Thematic analysis is a means of bringing cohesiveness to fragments of data that otherwise would be meaningless if viewed separately; it can be used to build theoretical models or find solutions to real-life problems (Aronson, 1994). It is an iterative analysis that reveals patterns in the data. The analytical process consists of four stages (1) read verbatim transcripts (2) identify possible themes (3) compare and contrast themes, identifying structure among them, and (4) build theoretical models (Guest *et al.*, 2012). The goal of thematic analysis is to describe and understand how people think, feel and behave in a certain context (Guest *et al.*, 2012). Figure 10 illustrates the 'Analytic Hierarchy' (Ritchie and Lewis, 2003), this model was used to assist the process of data analysis. Figure 11 defines which steps of the process were utilised.

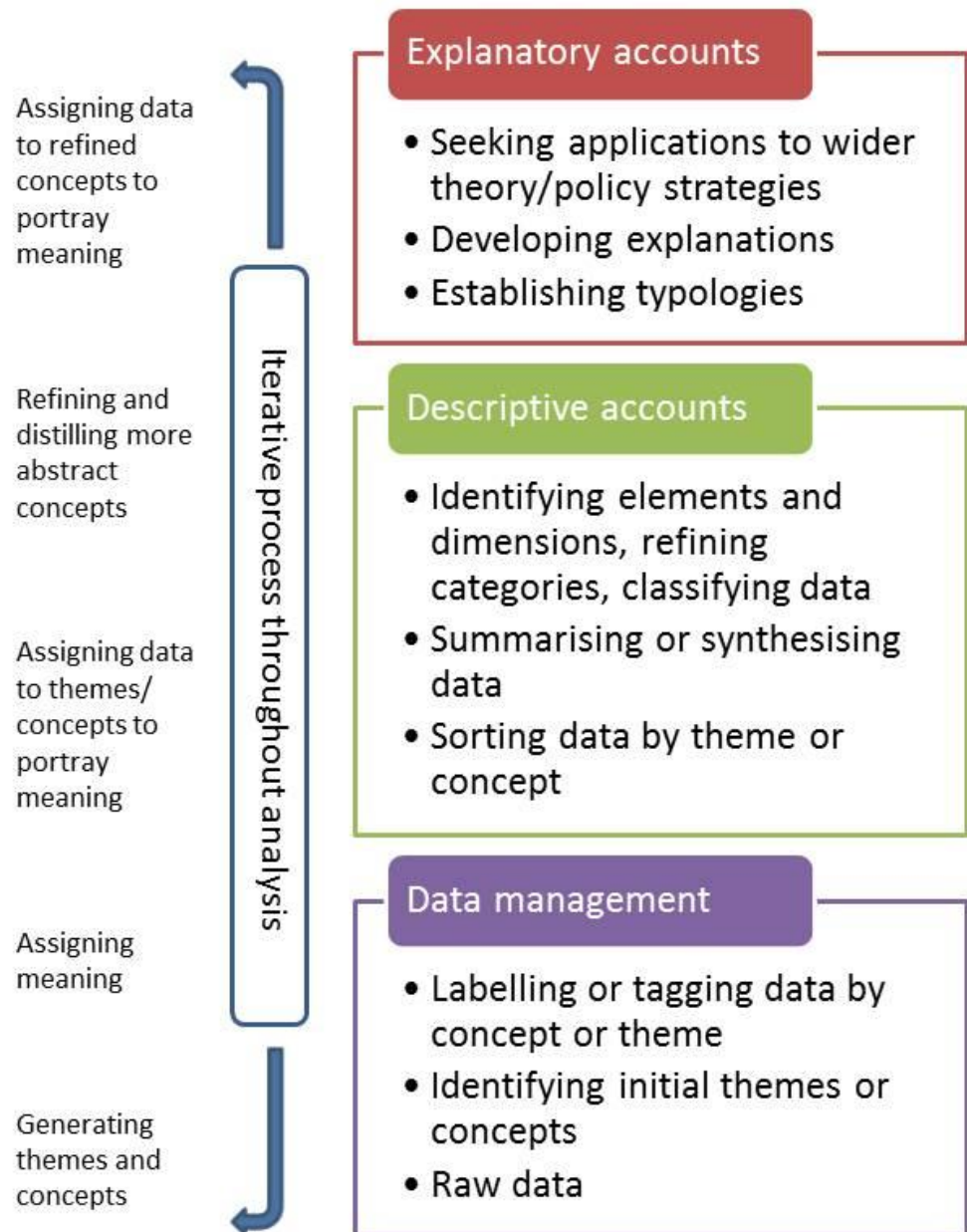


Figure 10 The Analytic Hierarchy (Ritchie and Lewis, 2003)

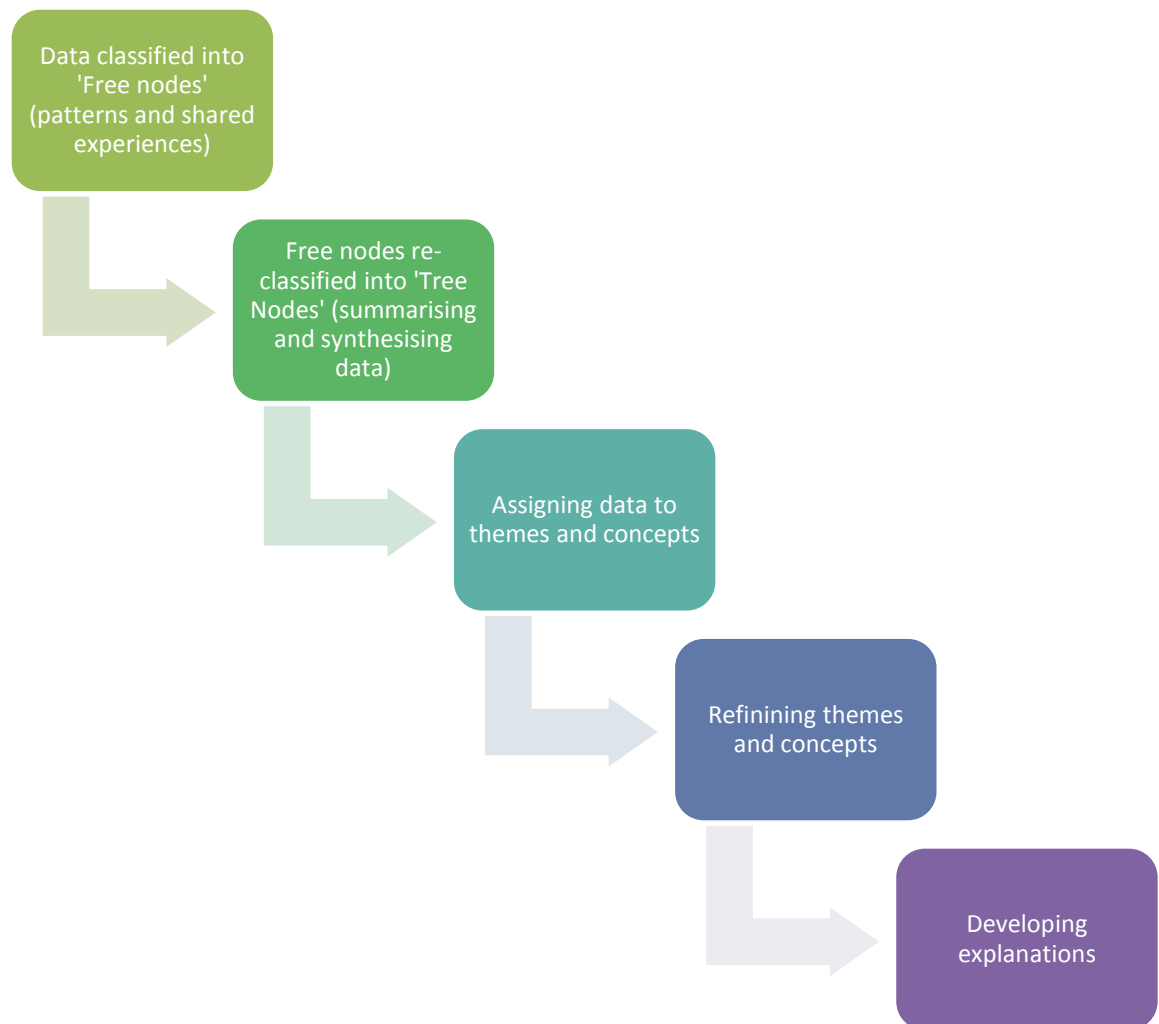


Figure 11 Process of data analysis using NVivo data management programme

The data were managed using NVivo 9, a qualitative data analysis package (QSR International, 2011).

The transcripts were copied into the NVivo programme, each transcript was individually analysed and initial patterns of experience and concepts were highlighted and tagged. Following this process, the data were re-analysed to expand and develop the initial patterns. The patterns were then combined to develop themes. The themes were refined and explanations developed. The food and physical activity maps were scanned and stored electronically in the NVivo programme; the maps were examined and the patterns and themes linked to the mapping exercise transcripts.

4.3 Summary

This chapter introduced the methods used for phases one and two of this PhD study. The methods include semi-structured interviews, mapping activities and focus groups; the method of analysis for these was also presented. In the following chapter I present the results from the qualitative studies in two parts (a) parents and (b) nursery practitioners.

Chapter 5 Preliminary Qualitative Studies: Results

5.1 Introduction

As discussed previously, the purpose of the first and second phases of this study was to elicit the views and attitudes of nursery school practitioners with regards to health behaviours and practices. This chapter presents the results of the mapping activities, practitioner interviews and focus groups.

Twenty-three schools were sent study information letters and received follow-up telephone calls. School recruitment proved time consuming and head teacher contact was governed by school 'gatekeepers'; namely school administrative staff. Many follow-up telephone calls had to be repeated as the head teacher was often 'unavailable', 'in a meeting' or there was a failure for the message to be passed on.

Head teachers from five nursery schools consented to participate, a 21% recruitment rate. From these five nurseries, 17 NPs consented to take part. Two nurseries were local authority attached to primary schools, two were private and one was a community nursery. Community nurseries are run by the Local Authority with opening times to suit a standard working day, from 8am – 6pm, Monday to Friday, 51 weeks of the year. The majority of practitioners who participated in the study were aged between 36-45 years (Table 9). The number of 'years qualified' and 'years of service' working in the same nursery were varied.

Fifteen parents from the five nurseries consented to participate, seven of which whose children attended local authority nurseries, two attended private nurseries, five, a community nursery and one child did not attend any nursery provision. I had anticipated that more children who did not attend any nursery provision may have been obtainable, however, as from 2010, all 3-4 year olds are entitled to receive 15 hours free nursery education for 38 weeks of the year (HM Government, 2011). This will have undoubtedly increased the rate of nursery places. Nine children of the fifteen parents were girls and six boys. Eleven of the children were aged 4 years and four children aged 3 years; eight children attended a part-time nursery place daily, one child part-time a few days a week, two children attended a nursery full-time daily and three, full-time a few days a week. All of the participating parents were mothers with one exception and their mean age was 33 years (24-45) see Table 10.

Table 9 Description of Nursery Practitioners

Age group	n	Years qualified	n	Years of service	n
16-25	2	1-4	6	1-4	5
26-35	2	5-9	3	5-9	5
36-45	8	10-14	3	10-14	2
46-55	4	15-20	3	15-19	2
Over 55	1	20 or more	2	20 or more	3

5.2 Parent mapping activities

As previously discussed, 15 parents completed the mapping activity (see section 5.2.3). The attributes of the participating parents are illustrated in Table 10. Parents were aged between 24 and 45, seven of which were aged between 26-35 years of age. Five of the parents were married, three were living with a partner, one was in a steady relationship, two were separated and four classed themselves as single. Three of the parents had an undergraduate degree; eight parents reported having 'some additional training' such as college or apprenticeship training. Three parents' level of education was 'completion of secondary school' and one parent had completed some secondary school education.

Table 10 Description of parents who completed the mapping activities

Age group	Marital Status	Level of Education	Gender of child	Age of child	Siblings of child
16-25	Single	Some secondary school	Female	3	None
16-25	Living with a partner	Completed secondary school	Female	3	None
16-25	Living with a partner	Some additional training	Female	4	Two or more mixed ages
26-35	Separated	Some additional training	Male	3	None
26-35	Married for the first time	Undergraduate university	Male	4	One younger
26-35	Single	Completed secondary school	Female	4	Two or more older
26-35	Single	Some additional training	Female	4	Two or more mixed ages
26-35	Separated	Some additional training	Female	4	Two or more older
26-35	In a steady relationship	Some additional training	Male	4	One older
26-35	Single	Some additional training	Male	4	One older
36-45	Married for the first time	Some additional training	Female	4	One older
36-45	Married for the first time	Undergraduate university	Male	3	One older
36-45	Married for the first time	Some additional training	Male	4	One older
36-45	Married for the first time	Undergraduate university	Female	4	Two or more mixed ages
36-45	Living with a partner	Completed secondary school	Female	4	One older

5.2.1 Parent mapping activity results

Figure 12 is an example of the food and physical activity mapping activities conducted with the parents. The thickness of the line denotes the strength of the relationship, this is determined by the parent; for example it can be seen that the child in Figure 12 eats fruit at home and nursery on a frequent basis but only has fish at home or ‘Nana’s’ between once a week and a month.

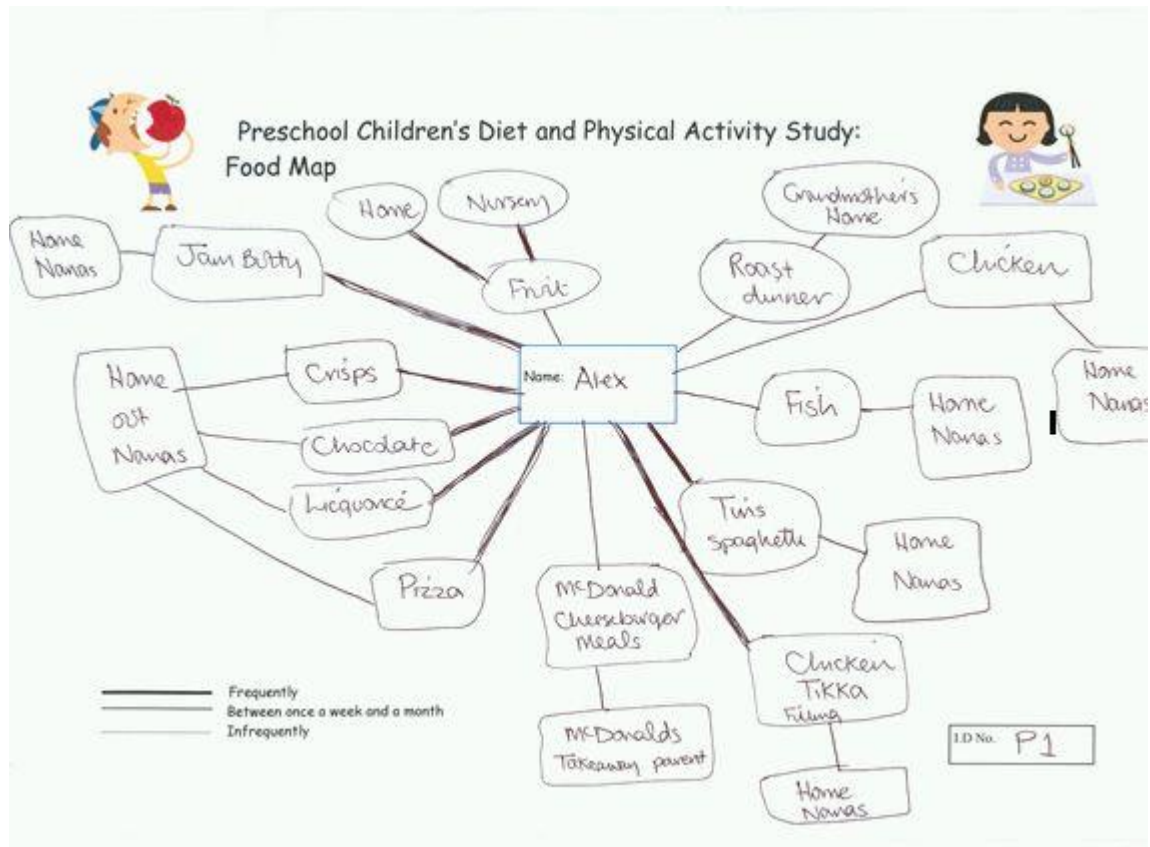


Figure 12 Example of completed food map

The map in Figure 13 is an example of the physical activity maps.

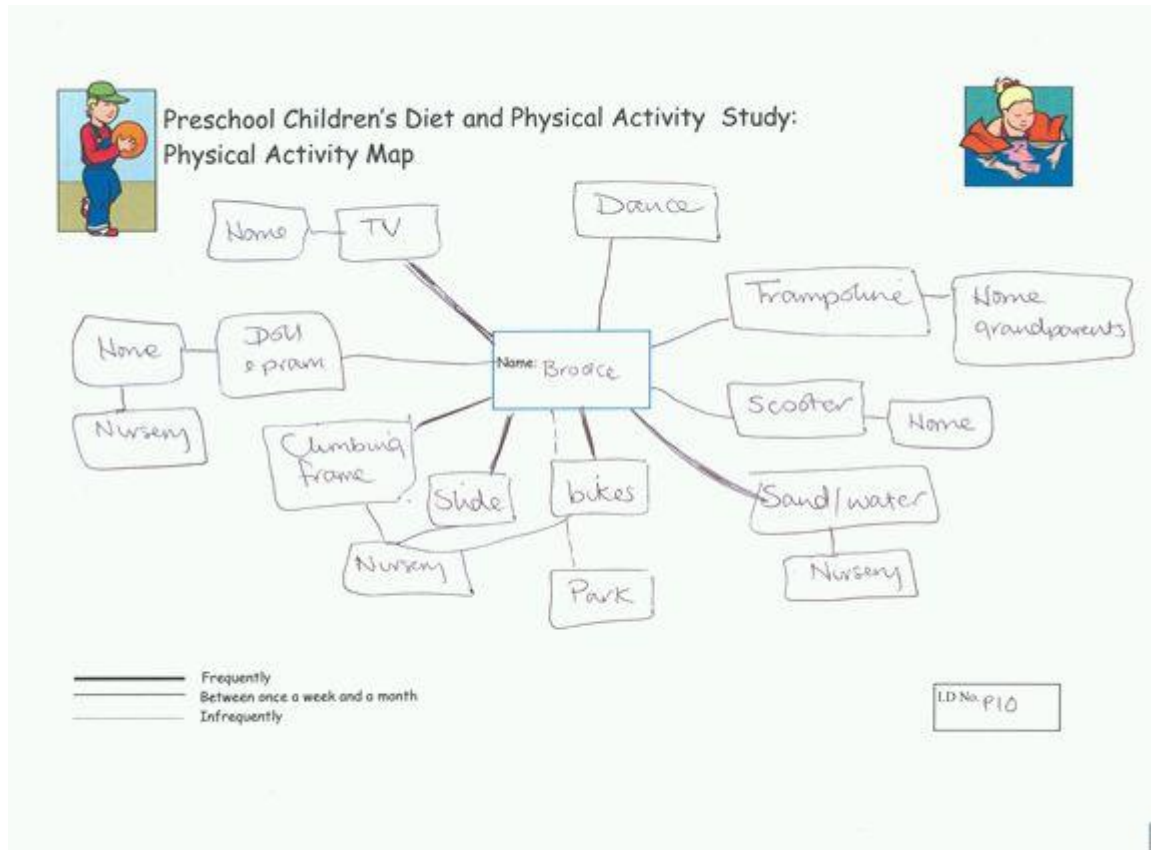


Figure 13 Example of completed physical activity map

As with the food maps, the thickness of the line denotes the strength and frequency of the relationship. It can be seen that the child in Figure 13 plays on a bike at nursery on a frequent basis but takes their own bike to the park on an infrequent basis.

5.2.2 Analysis of mapping activity

This section reports results from the parent mapping activities (transcripts and visual observation). Figure 14 illustrates the emergent themes from the data; these were classified under the headings 'dietary practices', which included issues such as family norms and conflicts; 'parenting issues' such as feelings of guilt and communication; and 'activities', both at home and nursery. Many of the themes were concerned with parenting styles, practices and role models.

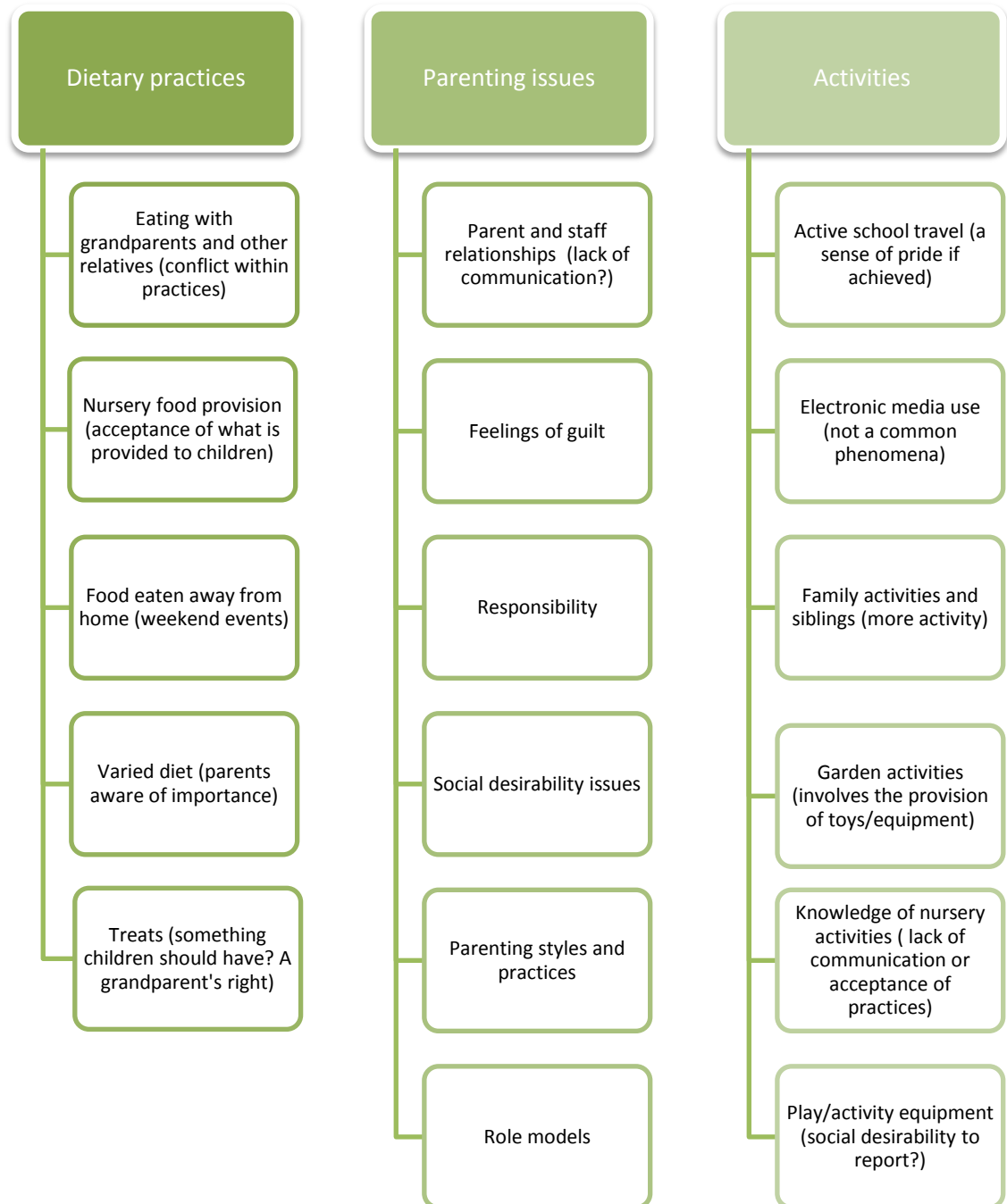


Figure 14 Emergent themes from parent mapping diet and physical activity data

5.2.3 Food maps analysis

5.2.3.1 Introduction

The visual analysis of the maps revealed common features among the families. In all fifteen children most meals were consumed at home, followed by nursery, grandparents/relatives homes and 'eating out'. The consumption of takeaways and food at restaurants was a regular occurrence by six families. Fruit was most likely to be eaten at nursery and sweets, crisps and high energy snacks were more likely to be consumed with grandparents, other relatives or at home. Sweets were regularly eaten by over two thirds of the children. Vegetables were regularly consumed by nine of the fifteen children

The following sections discuss some of the emergent themes and issues arising from the mapping interviews. The respondents have been coded (see footnote)¹ and any names used are pseudonyms to protect identities.

5.2.3.2 How did parents respond to the questions asked?

Parents may consider being asked about their family and children's lifestyle behaviours challenging. Social desirability bias was apparent within some of the interviews. Social desirability bias is the 'pervasive tendency of individuals to present themselves in the most favourable manner relative to prevailing social norms' (King and Bruner, 2000 p. 80). In other words, respondents may consciously or unconsciously respond to interviews or survey questions to give the researcher the answer they think they want to hear or to hide behaviours they consider deviant or 'wrong'. The parents were more likely to report their child's favourite food was fruit and vegetables over other types of foods. Debbie, a mother of a 3-year old who attended a local authority nursery, was keen to emphasise the positive aspects of her son's diet. '*I'm trying to stick to the healthy stuff, so it doesn't sound as bad*'. (P1LA1). Once the mother ascertained that it was acceptable to talk about other aspects of her child's diet, she was more open and reported more about her family's diet:

'Yeah. Oh, liquorice, he loves his liquorice, all the usual rubbish, pizza..... Oh, as regular as everything else, we're terrible.....' (P1LA1)

¹ ID numbers

P= parent

LA1= local authority nursery one

LA2= local authority nursery two

P1= private nursery one

P2= private nursery two

CN= community nursery

Many parents wanted to stress that their children did not frequently eat certain foods that may be considered as 'unhealthy' such as sweets, biscuits and so on. Marjory, whose 4-year old son attended a community nursery, was keen to emphasise her son's dislike of 'unhealthy' snacks. *'Because he doesn't like crisps, he doesn't eat crisps'* (P15CN).

Healthy lifestyle messages such as 'five a day' are constantly portrayed in the media, in schools, doctors' surgeries and so on. Therefore, some parents may have a fear of their family's lifestyle habits being criticised by those who may be perceived to be in positions of authority; that is, NPs, teachers, health care staff and so on. Consequently, only reporting favourable behaviours may be a defence mechanism against this perceived criticism. Conversely, one mother acknowledged that others criticised her restrictive dietary actions.

'I won't buy crisps and sweets and that..... some people think I'm horrible, I won't buy biscuits in.....' (P5LA1).

It was interesting that this mother felt criticised by her decision not to provide her children with high energy dense snacks. She may have been criticised by friends or family members who believe children should be provided with 'treats'. Other family members of the children featured frequently in the food maps. This was sometimes favourable, such as going to relatives for a meal, however, as described in the next section, the feeding of children within families sometimes caused conflict.

5.2.3.3 Family relations

Grandparents were involved in many of the children's lives. Some children eat regularly at their grandparent's house (as they may provide childcare). Some families go to grandparents for Sunday dinner on a regular basis. However, most children tended not to consume meals with grandparents but were more likely to consume snacks with them. Items most frequently consumed were biscuits and sweets. Some parents seem resigned to the fact that grandparents would give their children sweets and 'treats' on a regular basis. One parent even spoke about how the grandparents felt it was 'their right' provide such foods:

'I would say actually for the sweet snacks it's probably more with grandparents... Yeah, it's a bit of a battle at the moment. It's... apparently it's a grandparent's right to give sweets'. (P4LA1)

Although the parent laughed after making this comment, the fact that she describes the situation as a 'battle' suggests that she is unhappy with the current situation. Pocock *et al.* (2010) found this to be a common phenomenon in his study of parental perceptions of obesity prevention. Another parent seemed irked that her child would eat some foods provided by the grandparents that he would refuse to eat at home.

'Em, and when he's with my parents, em, he sort of eats more like proper cooked... [laughs] cooked meals. You know proper dinners and things'. (P8P1)

The previous examples imply some tension exists between families within the role of food provision. Although some parents appeared unhappy about family members giving their children 'treats', the subject evoked much discussion and parents displayed differing views of what was a treat and how often one should be given. The next section discusses this in more detail along with eating away from home, as this too was seen as a 'treat' by some.

5.2.3.4 Treats and eating away from home

The majority of parents when discussing 'treats' were likely to refer to high energy dense foods and snacks such as fast food, sweets, crisps and biscuits. Marjory, mother of a 4-year old son, intimated that treats should be given to a child: *'He loves sweets, and I try to make sure I give him treats'. (P15CN).*

Providing sweets as a reward for good behaviour was highlighted by some parents; one child appeared to use the 'reward system' as a bargaining tool with her parents stating that she had 'been good' and therefore would ask if she could have sweets. There were different perceptions of what constituted a treat and how often it should be given. Laura, who stated that going to McDonalds was the 'weekend treat', then went on to describe how her son would be given a packet of sweets daily; this was evidently a norm for this family and sweets may not have been considered a treat but a daily occurrence. Another mother who was concerned about her son's previous dental treatment, restricted sweets to after meals:

'But he never has sweets in between..... meals anymore, sort of thing, but sometimes after a meal or if, I don't know, somebody has bought him some sweets when we've been out he's had to keep them until after his tea or whatever' (P8P1).

Restricting the consumption of high energy dense snacks was common with other parents. Jackie, whose son attended a local authority nursery part-time, admitted that she had to make a conscious effort to restrict his intake of biscuits: *'He likes biscuits.....Frequently – if I give in'* (P13LA1). Another mother whose son attended a private nursery displayed a very relaxed attitude, in comparison to the other parents, towards providing her family with high energy dense snacks:

'But I mean I do bake quite a lot of cakes and stuff and that..... a lot, you know, I mean I don't watch what, you know, I don't kind of count calories at all, em, and I will get if, you know, if I'm doing like, I do the internet shopping I always get some, er, crisps and stuff and that, but I wouldn't say they've actually got crisps and biscuits in the house but if.....I'll, you know, I'll get some once a fortnight, which I'll either take on a picnic or something'(P9P1)

This mother also stated that fruit was kept in a separate fridge and her children considered choosing fruit as a treat. The concept of snacks and treats appears to be very much individualised; attitudes and norms may be shaped by family traditions but are also likely to be influenced by complex environments that impact patterns of eating (Booth *et al.*, 2001). Some parents were very relaxed and incorporated high energy dense snacking into their everyday lifestyles, conversely, some parents felt it was something that had to be restricted or only given as a reward or infrequently.

The majority of the participating parents appeared to find the mapping exercise enjoyable and were very animated in describing their child's dietary intake. However, when asked about the types of foods consumed within the nursery environment, a lack of knowledge in this area was apparent in parents in all nursery settings. Many parents were certain that their child received fruit and milk but were unable to name other food types. This perhaps suggests a form of 'barrier' exists between nursery and home, perhaps in relation to communication or simply an acceptance of two separate establishments responsible for their own rules and practices. One exception to this was Lauren, whose daughter attended a local authority nursery breakfast club; the mother was able to state several food items. This may have been due to several reasons: the

nursery providing menus, the mother making the effort to find out or perhaps the child was very communicative and had good recall of her day at nursery.

5.2.4 Activity maps analysis

5.2.4.1 Introduction

In the first phase of interviews (n=10), parents were asked to describe the types of activities their child liked to do. The majority of parents focused on activities requiring large motor skills such as playing in the garden, swimming, walking and so on; very few spoke of sedentary type activities and quieter play. It was possible that social desirability may have been influencing the parents' responses; so, in the last set of interviews, I reworded the question and asked the parents to describe what the children liked to 'play' and 'do'. Consequentially parents' responses became more detailed; more sedentary type activities such as drawing, reading books and watching TV were recorded. Therefore, parents may associate 'activities' with being 'action-based' as opposed to everyday things in which their child participates. This highlights the importance of and awareness of how interview questions are posed and understood by respondents. Moreover, researchers need to be aware of following up and further exploring issues and comments raised by interviewees; this may help to assuage misinterpretations.

As with the food maps, visual analysis revealed many common features among the participating families. Eight of the fifteen children had access to a garden with play equipment such as trampolines, scooters, bikes and so on. Several children attended activities organised by outside agencies such as swimming lessons, ballet lessons, climbing wall and a PE type class. Many children took part in activities with their family such as swimming, walking, going to the park or a soft play centre. Only five of the fifteen children were said to use computer type games on a regular basis. However, the majority of children were said to enjoy watching TV.

5.2.4.2 Physical activity

Several parents were keen to highlight the types of play equipment their children had available to them, such as trampolines, bikes, scooters and so on: '*Rain or shine they like to be on the trampoline. Em, they like... they have a dance mat as well...*' (P4LA1).

The weather was a deciding factor as to how often many children were able to play in the garden. Parents spoke of how inclement weather would prevent them from being able to go outside as often as they liked. However, Catherine mother of a 4-year old girl emphasised that her children were able to go into the garden at any time:

'And then just general running and racing in the garden. They like to be outside as much as possible. We just keep welly boots by the back door as well...' (P4LA1).

Siblings were likely to be referred to as playing with their brother or sister in the garden.

Focus on 'active travel' to nursery; be it walking or by scooter was a consideration for some parents. Vanessa, mother of a 4-year old girl, seemed proud when reporting that her daughter walked the 20 minute trip to and from nursery every day:

'As I say we walk to school and back, and it's about a 20-minute trip... one way so she does it sort of like there and back... so 40 minutes' walk to school. And that's every day...' (P13LA1).

Family activities were reported as a regular feature by many of the parents; swimming and 'going to the park' were listed as favourites:

'On a weekend we tend to do things as a family, we either go swimming..... em, and then, em, we either go out to the beach or, we always do something like walking...' (P6LA1)

There was emphasis on the importance of doing things together as a family that was enjoyable. Having a dog appeared to be a catalyst for frequent family outings for some families: *'She does it every day [walks] because we've got a dog'* (P15LA2).

The use of outside agencies and classes such as swimming lessons, dance classes and 'soft play' were utilised by some parents, Beverly, mother to a 3-year boy was keen to use the activities as a means to *'tire him out'* (P7P1).

5.2.4.3 Sedentary activities

As previously discussed, many parents were keen to emphasise the vigorous activities in which their child participated. However, as discussed in the literature review (section 2.6.2), previous research has shown that parents have a tendency to over-estimate the amount of physical activity in which their child participates. This may have been the

case with Mandy, a mother to a 4-year old girl at a local authority nursery as she placed great emphasis on her children's active lifestyle:

'She doesn't watch TV. None of them do. Em, they like going and playing in the garden on the swings and on the... Yeah. They play in the tents and tunnels. And play bat and ball, don't you [her youngest child was present] in the garden? And Frisbee they like' (P5LA1).

A common theme, which is a prevalent occurrence among young children, was the employment of role and imaginative play. Dylan, 4 years of age, was described as a 'typical' boy with his toys.

'I mean he plays a lot with toys, with train sets, because he's.... he's quite... he spends quite a lot of time just pulling his trains along the tracks and lining up cars and, you know, what boys do' (P7P1).

Girls were more likely to be described as playing with dolls or in the 'home corner' at nursery. It is interesting that gender specified roles still strongly exist in young children. Not all play of this type can be described as sedentary; children's activity is very spontaneous and erratic. Therefore, a child playing with a train set on the floor may suddenly graduate to a child pretending to be the train running around the garden. More obvious sedentary activities such as reading books featured in many children's daily routine. The number of children who used computer games on a regular basis was low; only a third of the children were reported to do so. A 2003 U.S study reported that of the 58 per cent of 3-5 year olds who had used a computer, only 11.6 per cent did so on a daily basis (Calvert *et al.*, 2005). One mother indicated that her daughter was 'just not interested' whilst another reported that she restricted her daughter's computer use as it caused arguments between the siblings. Other parents reported the restriction of computer use; however, there appeared to be no such impositions on TV viewing and the majority of children were reported to enjoy regular viewing. Although this finding may conflict with the previous statement of parents over-estimating their child's physical activity; sedentary behaviour is not the opposite of physical activity and it is possible for a person to engage in both (Section 2.6). Therefore, this raises the question whether TV viewing in young children is a more acceptable activity than computer game use. Moreover, children of this age group may require adult help and supervision with computer technology whereby TV viewing is a more passive activity

not requiring any obvious supervision; this may have some bearing on the frequency of use.

5.2.4.4 Nursery activities

Echoing the food data, some parents were unsure of what types of things their child liked to do in whilst at nursery. The parents who did report activities were more likely to mention outdoor pursuits such as bikes, climbing frame and sand and water play. As before, this may be due to misinterpretation of the mapping question or an acceptance on the parent's behalf that the children are being appropriately entertained and educated whilst at nursery.

5.2.5 Section summary

The mapping activity was valuable not only to chart children's dietary habits, it also facilitated further conversation with regards to family dietary norms and lifestyle behaviours. The above sections have highlighted some of the emergent themes and issues. Some parents' body language and manner conveyed that social desirability bias was apparent in several interviews; parents may feel the need to demonstrate that they 'conform' to health-related messages. However, Lewis *et al.* (2010) believe there is a mismatch between public health messages and the lived experiences of individuals. Thus, in reality, although people are aware of what constitutes a healthy lifestyle, public health messages do not provide adequate support to facilitate positive behaviour change. Extended family members were important models in many children's lives; however, parents viewed their influence both in a positive or negative light, thus some family conflict over how to feed the children was apparent. The provision and concept of what was a 'treat' varied, with some parents providing sweets or fruit daily and for others 'eating out' was considered a weekend treat. There appeared to be a lack of knowledge as to what types of foods were being provided to their children in all preschool settings; this may be a view held by the parent that the nurseries would have the child's best interest at heart and therefore would only provide healthy foods to their children.

As with the food data, there appeared to be an element of social desirability bias when reporting children's activity patterns. However, as previously discussed, the initial wording of the questions may have shaped the parent's responses. Parents reported the active large motor play their children participated in. The garden was a prominent

feature in many children's lives with the majority having access to play equipment such as bikes, trampolines and so on. Some families emphasised the importance of doing things together as a family, such as going to the park, swimming and so on. The children engaged in many quieter, sedentary activities, although the use of computer games seemed to be restricted or discouraged whereas TV viewing was an acceptable part of family life. Again there appeared to be a lack of knowledge of the types of activities children engaged in whilst at nursery.

The next section reports findings from the parent focus group meetings. As discussed below, I had particular difficulties with recruitment and attendance for these groups. Due to the complexity of this issue, recruitment to research studies and its challenges is discussed in greater detail in section 7.4

5.3 Focus Groups with parents

5.3.1 Parent's group one

Of the original fifteen parents who consented to participate in the study, four consented further to participate in a focus discussion group. However, despite rigorous organisation and reminder phone-calls, none of the parents turned up to the session. The 'no-show' of participants, especially in relation to focus groups, is a common problem for researchers and is almost impossible to control for. This is especially so for 'hard to reach' groups and if the topic is deemed as sensitive (MacDougall and Fudge, 2001). Furthermore, participants may believe they will not be 'missed' if they decline to attend.

As described in section 4.2.3 the additional street and school recruitment strategies did not yield any potential participants, however several parents from the church playgroup recruitment drive consented to participate; this is described in further detail below.

Literature highlights many reasons for recruitment difficulties in studies and projects. Some of the main reasons cited are: time factors; invasion of privacy (lower SES parents have greater concern about privacy (Spoth *et al.*, 1996)); lack of interest in the subject matter; perception that the subject matter is not relevant to the individual/family (especially in preventative studies) and logistical issues (Spoth *et al.*, 1996; Heinrichs *et al.*, 2005). One strategy to reduce the risk is to over-recruit (Bryman, 2004). Moreover, providing incentives such as shopping vouchers or gifts are thought to

enhance recruitment. However, a study conducted by Gabbay and Thomas (2004), recruiting volunteers to a condom trial, found altruism to be a common motivation for participation recruitment, therefore, incentives may not always be the reason for study participation.

Two parent focus groups were conducted; the first consisted of academic staff and students who worked at or attended a North East University. These parents were contacted and invited to attend through the University intranet; three parents responded and attended. This initially was intended as a pilot session to test the format of the guide; however, due to the richness and relevance of the data collected, I decided to include the data in the analysis.

The second group was the parents that were sourced through the church playgroup. I attended one of the playgroup sessions and informally spoke to parents inviting them to attend a focus group session. Twelve parents expressed an interest in attending and provided contact details. Follow-up phone-calls to invite parents to attend on a particular date reduced the numbers to six and three attended on the day. Ideal focus group numbers are considered to be between 6 and 10 participants; it is thought that participants in smaller groups may feel under pressure to speak (Côté-Arsenault and Morrison-Beedy, 2005). However, due to recruitment difficulties, the smaller groups had to be used.

5.3.2 Themes further explored in parent focus groups

Several themes emerged from the parent mapping data and the nursery practitioner interviews and focus groups (see Figure 14, Figure 15, Figure 16 and Figure 17); these formed the basis for further exploration in the parent focus groups. They included: health behaviours of the family's home environment and the impact on the child. Several themes were related to the family's relationship with the child's nursery, such as, the nursery's current health promotion strategies and initiatives; the communication of health messages to the families; everyday nursery practices and the roles and responsibilities of nursery schools. Furthermore, the parents were asked to discuss possible health promotion strategies that had been suggested by the nursery practitioners. Finally, the parents were given information from current literature in relation to changing dietary and physical activity behaviours.

5.3.3 Focus group analysis

The focus groups were audio-recorded and transcribed. Utilising NVivo 9, (as described before) as a management tool, the transcriptions were coded and thematic analysis was applied using the model as described in the methods chapter (section 4.2.7) as a guide. Figure 15 and Figure 16 illustrate the main themes that emerged from the parent focus groups (two figures are used for space and layout purposes). These were classified under the headings: health; health promotion; barriers; communication; emotion; family and home; nurseries; parents; and rules.

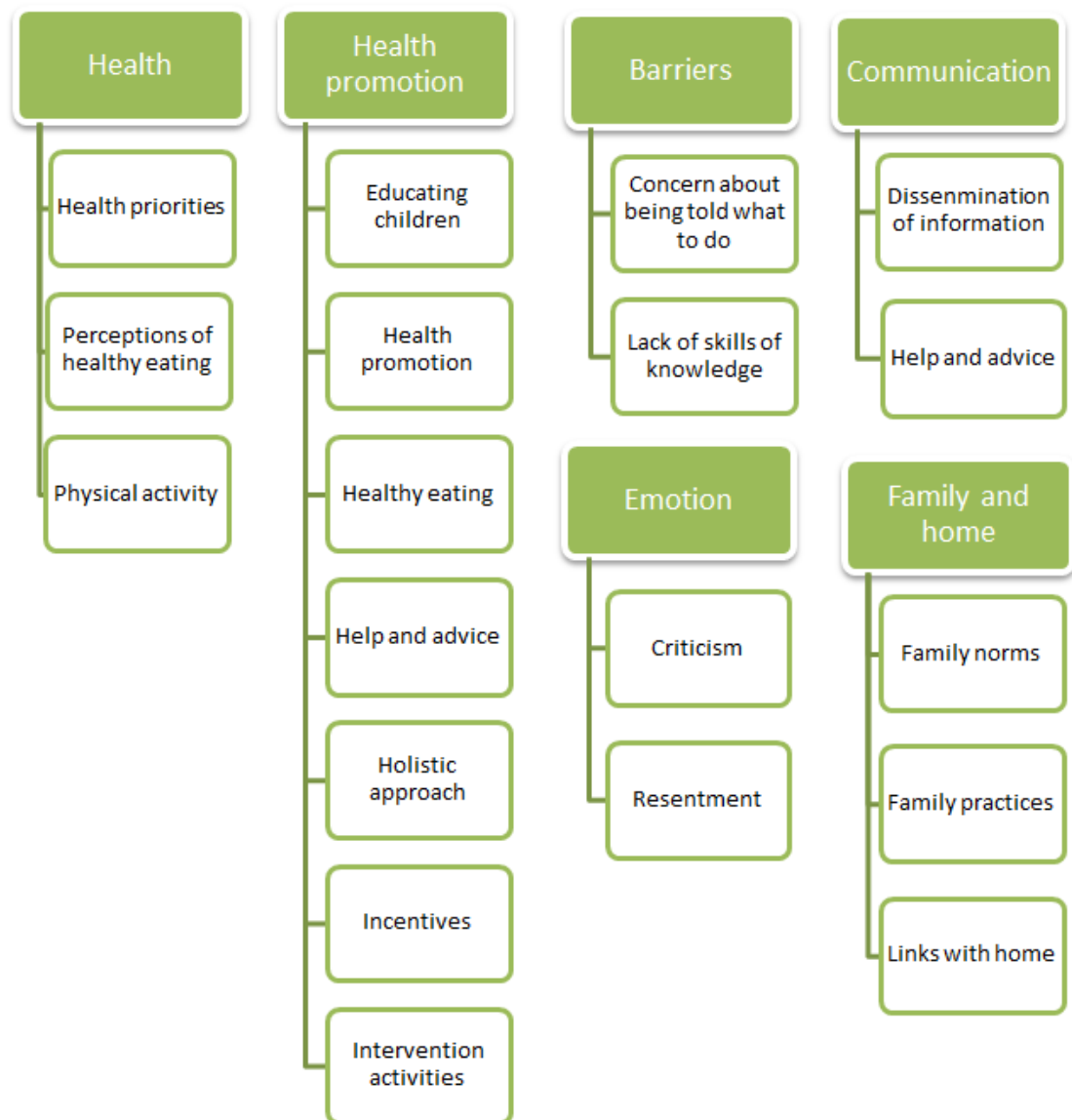


Figure 15 Parent focus groups emergent themes (1)

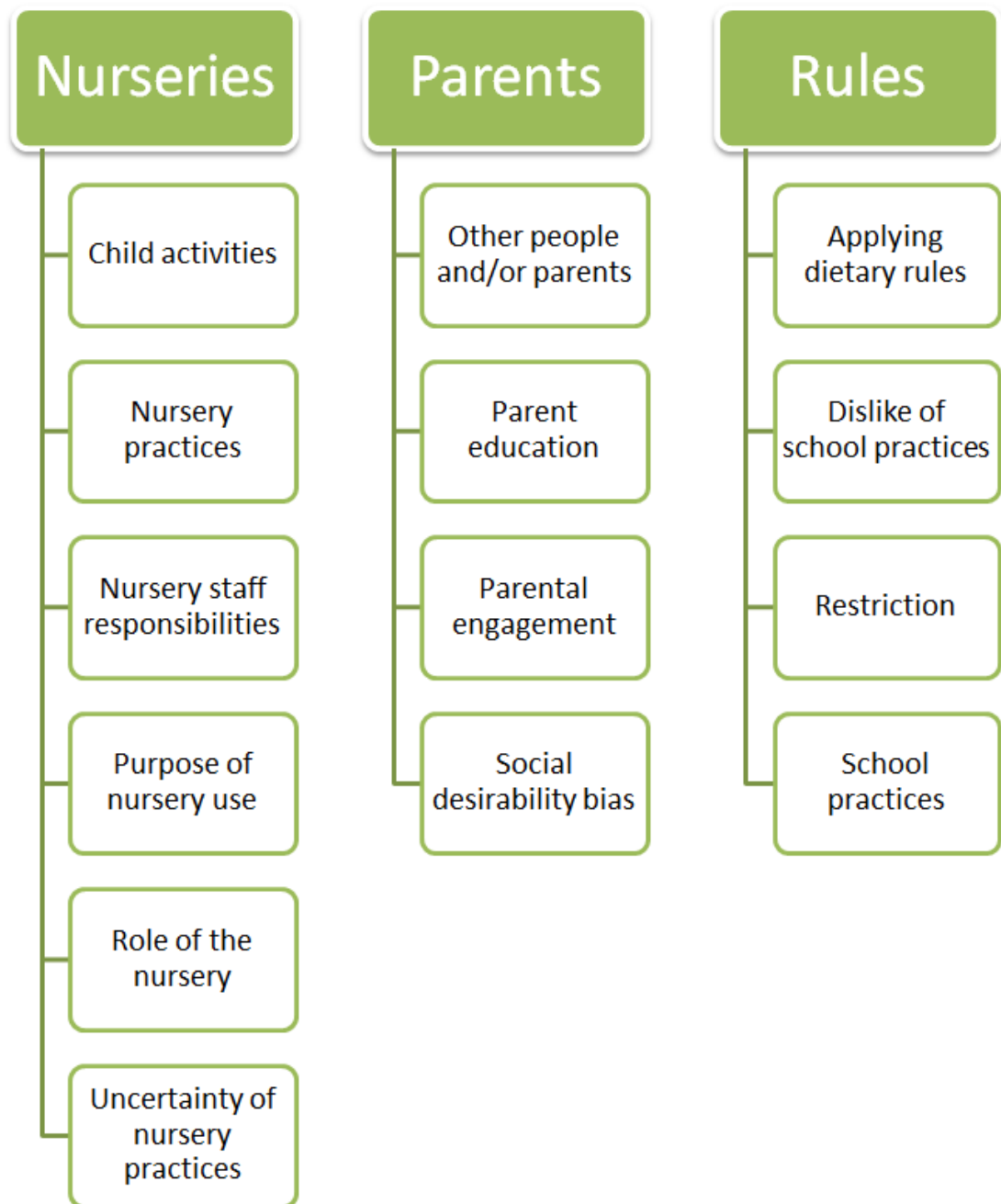


Figure 16 Parent focus groups emergent themes (2)

5.3.4 Focus group session one

As previously discussed, this group consisted of academics who were mothers. It was evident that the members of this group had confidence to participate and the session 'warmed up' very quickly. All participants exchanged views, shared ideas and did not require much prompting from the facilitator.

5.3.5 Focus group session two

The second group consisted of three mothers. One mother was of ethnic minority and was very quiet and required prompting several times throughout the session despite having very good spoken English. One of the mothers worked part-time in public health and was very articulate and knowledgeable; she was confident in expressing her opinions. I was under the impression that there were times when she did not agree with the third mother's views, however, she would remain quiet rather than disagree. The third mother appeared a little self-conscious in expressing her opinions at first but once the session progressed she was keen to participate and spoke frequently. At the close of the session the third mother was keen to express how much she had 'enjoyed' the session and reported it was a beneficial exercise that other parents should experience.

The following sections discuss some of the emergent themes. As before the participants have been given identity codes² and any names used are pseudonyms.

5.3.5.1 Health

The mothers appeared happy to share family health behaviours and habits. The importance of being a role model to their child was highlighted. Mothers in the first

² FG1 = Focus group session one

FG2 = Focus group session two

INT = Interviewer/researcher

RES = Respondent

focus group confessed to eating snacks and treats once their child was in bed whilst encouraging their child to eat healthily during the day.

'... but it is when they're not there, you know, you're not having to tell her no, she's not allowed one, but mummy and daddy are. So yeah, some of those sorts of foods, you know, we all eat very healthily when she's awake, but the wine and chocolate and crisps come out once she's gone to bed' (FG1RES1)

This practice may appear deceptive to some; however, perhaps it is a concerted decision to restrict their child's unhealthy snack consumption thus encouraging healthy lifestyle behaviours. How the parents will adapt the practices when the children are older is not known. In contrast two mothers in the second group did not entirely restrict treats but emphasised that the children were not allowed to eat them unless they had eaten "healthy foods" first.

RES2 'Yeah. Because I make a rule for my house, nobody is allowed to eat chocolate or crisps or drink until they've finished lunch.'

RES1 'Yeah, that's what I do as well, don't give them....'

RES2 'Yeah'

RES1 '... rubbish foods unless they've eaten the good food'

RES2 'Because maybe they eat crisps, and then...'

RES1 'They won't eat it' (FG2)

The mother describes treats as 'rubbish foods'. She may have described these types of foods in this way to her children to discourage over-consumption.

It is difficult to ascertain which method of restricting treats is most beneficial and honest for the child. Do the parents in the first group hope that by completely restricting treats their child will not develop a taste for them, or do the second group believe that by allowing the child to have treats after meals, it gives them a better understanding of how to balance their diets?

Parents in the first group emphasised the inclusion of physical activity in the child's day. One mother tried to incorporate activity into her child's daily routine. Another

described how she restricted her child's 'screen-time', as it forced her child to go outside more and find other things to do.

5.3.5.2 Changing health behaviours

There was consensus that changing ingrained lifestyle behaviours was difficult. The idea that nursery schools could give/offer healthy lifestyle advice to parents produced mixed reactions. It was agreed that nurseries were an ideal base for providing information but how it was delivered to parents produced much discussion. The belief that nurseries could just provide information or send information home with the child was deemed to be impractical and futile; encouraging parents to participate in activities was agreed to be the most efficient way of promoting change.

RES4 '.....Because if you say to children, "Right, this is really important," then they may go home and tell their parents, but that's not going to just make any difference, or a letter home to parents saying, "Don't let your child do this," they're just going to not really take any notice'

INT 'So you think it's important to try and get the parents to come in and get involved'

RES1 'And encourage them, yeah, definitely'

*RES4 'And encourage them to do activities with their children, because sometimes people don't feel they've got ideas about what else they can do...'
(FG2)*

There was repeated concern about being 'told what to do' by practitioners and the view that some parents may not want to change lifestyle behaviours or feel they are being told that they are 'bad' parents.

RES1 '[parents]... should have loads of information, like a little push into the right direction of how kids should be...'

RES4 'And doing it in a positive way, not just saying, "You mustn't do this, you mustn't do this, otherwise you're bad parents," but saying...'

RES1 'But it would be good if you did this, because these are ...'

RES4 ‘Yeah. “Come in to nursery and let’s learn together about how we can...’

RES1 ‘Yeah’

RES4 ‘...make some healthy ice lollies, smoothie ice lollies, or let’s do some positive activities’ (FG2)

The overall sense of the discussions was that the parents were talking about *other* parents and not themselves; it became a very much “them and us” type of conversation.

RES4 “... what it looks like, how to prepare it. Because so many people don’t know how to cook, you know, adults don’t know how to cook these days. And so the future generation needs to kind of learn those things”.

RES1 “Yeah, they need to obviously learn to survive as well, don’t they, to learn how to cook things”. (FG2)

One disadvantage of recruiting participants to a study is that those who are interested in the subject are the ones who are more likely to volunteer. Their interest may expand to having quite a comprehensive knowledge in the subject area; this may be one reason why participants are apt to talk about ‘others’ in a given situation rather than themselves, especially in the areas of health and giving advice.

The group that comprised of academics made the point that if nurseries were to be giving information and advice to parents then they would be more likely to listen to/read the advice if it was from a credible source such as the Department of Health and other governmental bodies. This particular view may be constrained to those with an academic background and may not necessarily generalise to other groups of mothers. It was felt that providing leaflets for the parents to pick up may be a subtle way of providing information and the advice might be taken more seriously if deemed official. Therefore, it was felt that the practitioners have a responsibility to ensure they are knowledgeable about the credibility of the information they are providing. This leads into the next theme of discussion – responsibility and roles.

5.3.5.3 Responsibility and roles

There was consensus that the overall responsibility of encouraging children to lead a healthy lifestyle lay with the parents, although as discussed previously, it was felt some

parents required help or advice. The parents were given information about previous research reporting that preschool children are not reaching the recommended levels of daily physical activity, even when attending a nursery place. This caused some disbelief amongst the groups. The responsibility for the child's physical activity suddenly seemed to be believed to be the nursery's responsibility; with the practitioner giving advice to parents to change habits at home if required.

INT '..... The research has shown that although they are at nursery, some children are still not as active as they should be. Do you feel this is the nursery's responsibility to address this? Would you be concerned if you thought your child wasn't getting the recommended advice?'

RES2 'There's some children at nursery that aren't active enough'

INT 'Yes'

RES1 'I see that as definitely being more the nursery's role than....'

RES2 'Yeah. Make them' [Laughter]

RES1 'Yeah, I mean, it is really hard, isn't it?'

RES2 'Get them outside' [Laughter]

RES1 'I think the nursery is fulfilling its duty of care if it's making available time outside, these little dance groups or whatever, games where they encourage people to play tag or whatever. But I suppose, yeah, you can't force a child who otherwise wants to sit on the floor outside. That's difficult to force them to take part. But I imagine in that situation the nursery should be talking to the parent, saying, "Look, they're really quite inactive here, are you doing things at home to make sure..." (FG1).

The above comment was in contrast to the overall concern that NPs should not be telling parents what to do with their children at home. However, it was coupled with the awareness that ultimately a practitioner should intervene when they are concerned about a child's well-being. There was further discussion of the role of the nursery and whether they should *only* be responsible for the child's welfare whilst at nursery. Once more the issue of being 'told what to do' was a concern:

INT 'Are there ways in which the nursery could encourage you to be more active at home with your children? [Pause] Or do you think nurseries have the responsibility to do this?'

RES2 'I think when the child's... yeah, that worries me, about the role that the nursery is actually playing. I mean, are they going to be involved in encouraging you to adopt healthy behaviours at home, and are they going to see it as part of their responsibility to encourage you to be more active with your child at home? Yes they have that responsibility when the child is there..... but I'm not quite sure how much they want to get involved in influencing your conduct at home'

RES1 'Yeah, I...'

RES2 '... because it's a bit of a minefield, isn't it?' [Laughter]

RES1 'I would agree with that, but while your child is at nursery, obviously they want and you want them to do everything possible to keep your child – well, safe as a priority...'

RES2 'Yes'

RES1 '... but healthy, happy...'

RES2 'Happy, yeah'

RES1 '... whatever. But at home, I think that definitely falls to the parents or wider family. I mean, much as the nursery could be a conduit of information... ..I just don't see that as their role' (FG2)

Deciding the nursery's roles and responsibilities was challenging for the groups. There was the feeling that ultimately the parents were responsible for their child's health, however, whilst at nursery the practitioners were responsible. It was felt that 'some' parents required help and advice and it was seen that nurseries would be a good conduit for health promotion information. It was thought that parents could be involved in nursery activities to 'learn', however, parents did not want to be 'told what to do'. This presents a challenge; how to balance promoting health messages to the whole family without being patronising.

The parents were asked to talk about their experiences of health promotion activities currently or previously conducted at their child's nursery.

5.3.5.4 Health promotion

A variety of health promotion activities that had taken place in nursery schools were discussed. Activities included growing vegetables in the garden, a one-off parent cooking class, taking children to the shops to buy fruit and vegetables, a 'walk to school' week, having visiting specialists such as dentists and dance instructors, and a 'Saturday family day'.

However, most of the activities described were one-offs or short-term. There was consensus that healthy lifestyle promotion needed to be part of the whole curriculum and incorporated into everyday activities. It was suggested that nurseries could work around 'themes' connected to the seasons and so on. Additionally a more holistic approach could be taken.

RES4 '... that it's built in, that it's not just like a one-week activity that's then over. It should be built in to everything they do'

RES1 'Yeah'

RES4 'And not just looking at diet as well, also looking at mental health and...'

RES1 'Definitely'

RES4 '... positive... being able to explain your feelings and describe how you're feeling, and being able to develop friendships, and all the things that make you feel good...'(FG2)

The use of restrictive practices within nurseries to promote health was discussed. One of the issues that arose from the NP phase one data collection was the provision of cakes, sweets and crisps to celebrate birthdays (section 5.4.5). It was found that although many nurseries had policies that did not allow the consumption of such foods at nursery; some parents were still providing cakes and so on. The nurseries either turned a 'blind eye' or insisted that treats be sent home with the parents. The focus groups were asked their opinions concerning birthdays.

INT ‘... how do you feel about the nursery not having any unhealthy snacks, cakes and things, at all’?

RES1 ‘I don’t really like cakes and stuff’

INT ‘Do you know if your nursery does birthday cakes, that sort of thing’?

RES1 ‘Yeah, well, [name of nursery] do that, like if it’s somebody’s birthday they’ll bring a cake in, which I don’t think that’s too bad. But if it was every day, I don’t think they should’

RES4 ‘Well, there will be, but if there are 30-odd kids in the class, there’s going to be quite a few birthdays. [Laughter]’ (FG2)

I got the impression from the mothers, that prior to this discussion; they had not really considered the provision of birthday cakes to be an issue. Again, this could be linked to the cultural norm of celebrating special occasions with food. Once the mothers ascertained that it could be a frequent occurrence within the nursery, they seemed torn in their opinions. There was a strong overall feeling that if nurseries were to impose an all-out ban on such foods it would be easier to enforce than to insist on the provision of ‘healthy’ cakes.

RES3 ‘Yeah. Because cakes, yeah, okay, it’s a sweet one, but because if you put ‘zero’ it means you can’t bring cakes at all’

INT ‘So do you think it’s difficult for nurseries to implement this’?

RES3 ‘To implement it. Because I don’t know about here, but we like to celebrate, because friends, they like to celebrate, a one-off celebration in the nursery’

RES2 ‘I think it’s easier for the nursery just to say “none” rather than to be the arbiter of what is healthy and what isn’t, because then you’re going to have the situation where a parent arrives with a cake, and the nursery staff might say, “Well, actually, that doesn’t fall into our list of ‘healthier’ cakes, so you can’t bring it.” So it just does away with all of that, it just says “none”. I mean, with [name of child], on her birthday, I would have a little birthday party and I would invite the friends that she wanted from the nursery, and that would be a time and a place for birthday cake and maybe pop and crisps and whatever. But you

don't take it into the nursery, because there might be parents who don't want their children to have cake' (FG1).

The above statement perhaps reiterates the feeling that ultimately it is the parent's role to decide if their child should be allowed to eat cakes and so on and nursery schools should not be responsible. However, this would require a considerable cultural shift both among parents and nurseries. Many nurseries maintain they already follow an 'unhealthy food' ban policy, which, as the evidence shows is not enforced. This questions whether the nursery practitioners do not wholly agree with the policies, or whether they simply find it too difficult a practice to enforce with parents who do not find it acceptable. Furthermore, despite having comprehensive policies, if schools do not have a monitoring or evaluation strategy, the policies may never be put into practice.

It is important to determine which health promotion strategies are acceptable and feasible by parents, therefore the next section discusses this in more detail.

5.3.5.5 Health promotion resources

The parents were shown a variety of widely available health promotion resources, these included; a child's cookery book, posters, reward charts, Change4life posters/information, 'Eatwell' plate and The Caroline Walker Trust 'Eating well for 1-4 year olds' resources. Some of the resources produced some confusion over how to interpret and use them. This proved useful for future reference as to what would be acceptable and practical for parents to use.

The groups were divided over their preferences. Focus group one found some of the resources over-simplified but conceded that although most of the information was basically 'common sense' (RES2,FG1), it provided some alternative ideas, for example, for healthy snacks. The portion size information was well received and it was felt that this was an area perhaps some mothers had trouble with.

RES1 'I think that's good, because it tells you how much and shows you the pictures of it and things'

INT 'Do you think that's quite useful then'?

RES1 'Yeah. Because sometimes I over-put stuff on the plate I think, like they can leave it if there's enough there. I'd rather give them more than too little sort

of thing. And obviously if they can't eat that much, then I'll just give them a little bit less'

INT 'So do you think something giving you an idea of portion size would be useful?'

RES1 'Yeah, I think that's good, yeah. And then you're not over-feeding them and...' (FG2)

The children's cookery book was liked for its ideas; however, it was felt to be too detailed and time-consuming. Highlighted in the second group was the use of reward charts. This was seen to be a simple way to encourage positive health behaviours in children.

RES1 'Sticker chart, because I think kids really adapt to that well, because they have it already in schools, so if they want to put sticker charts up, there would be something for them to look forward to, to enjoy their food that they're taking...'

INT 'Okay. So something you could carry on at home, then.'

RES1 'Yeah. I think I might start doing that myself, actually' (FG2)

Incentives were not only seen to be useful for children but for parents also. The next section explores this further and investigates how information can be best communicated to parents.

5.3.5.6 Incentives and communication

The parents felt that if the nursery was encouraging family healthy behaviours outside of nursery, then incentives should be provided to help with cost of certain activities such as swimming.

RES4 'And also... I mean, if they had, I don't know... when nursery broke up, they gave us a whole little booklet of stuff that had some vouchers for days out or... I mean, lots of it was for things like amusement parks and stuff like that that would still end up being quite expensive. But if they had... like Sure Start are doing free swims at (name of pool) every afternoon during the holidays'

INT 'Oh, that's good'

RES1 'Oh'

RES4 'And they're giving out vouchers, so you can get them. And that makes a lot of difference, because otherwise it's £3 per adult, and I don't know how much per child...'

RES1 'You can get...'

RES2 '£2.50 I think'

RES1 '... Fusion cards as well...' (A local discount card, (Newcastle City Council, 2012))

RES4 'Yeah, yeah, but for the adults, yeah'

RES1 '... I've got a Fusion card. Yeah, you can get it for the kids as well'

RES4 'So the free family swim means the whole family can go for nothing...'

RES1 'Yeah. That's excellent, that'

RES4 '... any day of the week, and that's brilliant'

RES1 'It's like giving them active exercise as well'

RES4 'Exactly, so if you've got a voucher that could actually entitle you to that'

As illustrated above, the topic of incentives or reduced rate activities generated much discussion. It is uncertain whether the attraction of such gifts is a motivation for the family to be active or if it is simply the human trait of appreciating a 'freebie'.

5.3.6 Section summary

NPs, in their focus group session (see section 5.4.4), discussed previous attempts to encourage parents to participate in school activities (not necessarily health promotion). Providing incentives such as vouchers, grocery packs and so on was considered to be an effective strategy for engaging parents. The parent focus group discussion reiterated that providing some sort of incentive may indeed prove beneficial.

A continuous subject matter of discussion throughout the focus groups was the issue of communication between staff and parents. If practitioners are to encourage families to participate in health promotion, what are the most effective strategies and methods? Current methods of communication included word of mouth, letters, daily diaries informing the parent what their child has eaten/done that day and newsletters. It was felt that some of these methods were not reliable especially if the child was collected by another adult and the information was forgotten/lost.

Parents were asked to consider what strategies they felt might be more effective. Email was suggested as a possible solution, with monthly updates. However, it was conceded that not all families are connected to the internet. Leaflets and pamphlets for the parents to pick up if wished was felt to be a less intrusive way to provide information, but this is perhaps a less efficient way to ensure blanket coverage.

It would appear a 'multi-communication' model would ensure that all parents/families are reached, however this may be more complex for nurseries to implement.

The next part of chapter five presents the nursery practitioner interview and focus group results.

Chapter 5 (b) Practitioner Data

5.4 Nursery practitioner interviews and focus groups

5.4.1 Introduction

Analysis of the nursery practitioner interviews and focus groups revealed reoccurring themes and issues; therefore, this section will report and discuss the two data collection methods as a whole.

The NP interviews (n=17) were all conducted on an individual basis at the practitioner's place of work. The majority of the interviews were during the day; the NPs were released/covered by other staff members to allow them to participate. One NP opted to meet at the end of the school day after the children had left.

NPs who had participated in phase one of the study (5 schools, 17 staff) were invited by telephone to attend a focus group session held in the early evening at the University. Despite all staff members previously expressing an interest to participate in a further discussion group; only five NPs agreed to attend. Reasons for not attending were mainly to do time and other commitments; one practitioner commented that she would be too tired to attend a meeting after 'working all day'.

Four of the practitioners who consented to attend were employed at the same nursery school, which is a community nursery and has provision for babies and toddlers as well as 3-5 year olds. Three practitioners attended on the day as one had forgotten a prior engagement and the practitioner who was coming alone from another nursery did not turn up. Due to the NPs being colleagues, the focus group session 'warmed up' very quickly; pre-existing acquaintance can be of benefit in focus groups (Rabiee, 2004).

Figure 17 illustrates the themes that emerged from the interviews and focus groups.

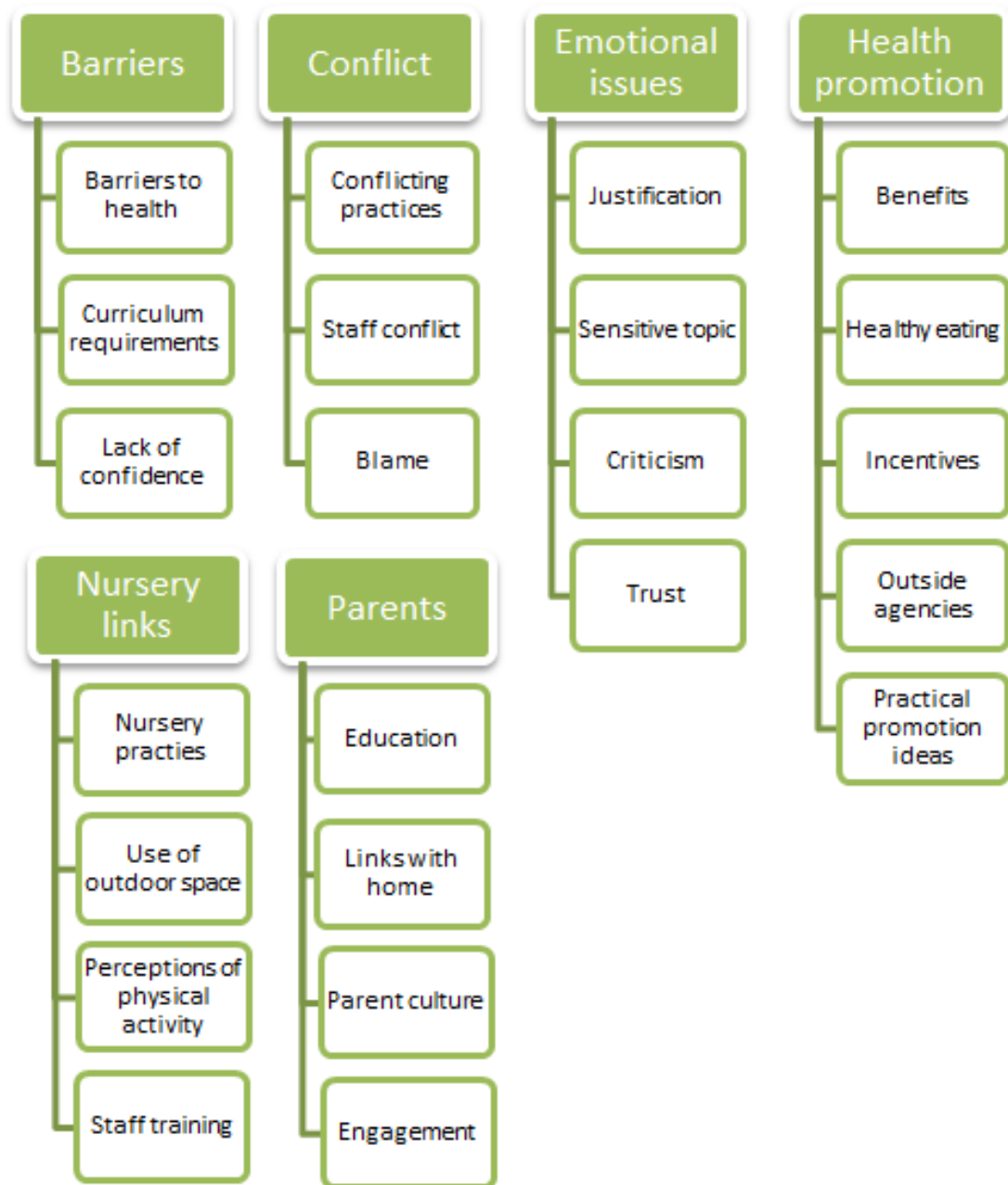


Figure 17 Nursery Practitioner interview and focus group emergent themes

The following sections identify and discuss some of the emergent themes and issues arising from both the practitioner interviews and focus group session. As with the

parents, the respondents have been coded (see footnote)³ and any names used are pseudonyms to protect identities

5.4.2 Blame

NPs were asked to give their views on where the responsibility lay for ensuring that children led a healthy lifestyle, therefore, ‘blaming’ parents may have been a reactive response to a very complex issue. Several staff stressed that they did not directly blame parents for the issues surrounding childhood overweight and obesity. Society, busy lifestyles and having to work were stated as impeding parents’ abilities to maintain their child’s health and/or to become involved in ventures that would assist them to do so. Catherine, a nursery nurse working in a private nursery, who was also a parent, expressed empathy for the parents’ situation: *‘I think its busy lifestyles of parents and I’m one myself so I’m not making judgements on anybody else....’ (T7P1).*

By saying she was ‘not making judgements’ suggests that she was and felt parents were ultimately responsible but did not want to admit to this. Another example came from Janet; who worked in a local authority nursery, she stated that society was responsible; however, she too was eager not to be seen blaming the parents:

‘...parents being...busy lives. It sounds awful, as though you’re putting all the onus on parents.....but I don’t blame parents; I just blame the way society is now’. (T9P2)

This reaction was common in many other staff members who also seemed reluctant to be seen to be ‘blaming’ parents.

Other comments were more explicit and non-apologetic. Staff may believe it wrong to be seen blaming parents, especially as ‘professionals’ who are in a caring educational profession; nevertheless negative views on parental practices were expressed. In an Australian study using qualitative methods to explore the issues of preschool children’s physical activity, the participating parents emphasised the importance of role modelling to their children. However, the NPs involved in the Australian focus group discussion

³ T= Teacher

LA2 = local authority nursery two

P2 = Private nursery two

LA1 = local authority nursery one

P1 = Private nursery one

CN = Community nursery

FG = Focus group

pointed out that the inferred modelling behaviour was not consistently evident among the parents (Dwyer *et al.*, 2008).

Some examples from the practitioners in the current study focused on the types of foods children were provided with by their parents which NPs classed as unhealthy foods. These views may be expressed as personal opinions or as a statement that the parental practices contravened nursery 'rules': *'Children come into nursery and they're eating crisps or sweets and they're met at the end of the day with sweets as well'* (T17LA2). Furthermore, despite many schools providing 'healthy lunchbox' guidance to parents, NPs were alarmed by children's lunchbox contents: *'I've also noticed what they have in their packed lunches...which gives me cause for concern'* (T17LA2). A systematic review conducted in 2010 reported that parents felt professionals blamed them for their child's weight problems (Pocock *et al.*, 2010); this may extend to other behaviours as perceived as 'unhealthy' by NPs.

The above quotes refer to parent practices; however, discussions between NPs during the focus group session highlighted underlying issues of disagreement between staff members. The NP below strongly expressed that she felt eating breakfast was important but acknowledged that not all her colleagues felt the same.

'... Have they had any breakfast? [the children] No, they have had a mini egg or a bar of chocolate and it is just highlighted that parents haven't got the understanding about healthy eating. They don't know how important that a breakfast could start them off on a good day and I think for staff as well they need to have an understanding that breakfast is the best start. If the children say they don't want any I think it is easy to just go off and let them play. I am a believer that they have got to sit down and try it, sometimes you are banging your head off a brick wall but you know I just feel that parents and staff don't understand the importance of starting off the day with a good meal. (FGNP1)

This statement highlights the issue of potential barriers to health behaviours occurring not only in the home as suggested by staff but also within the nursery environment. NPs may have preconceived ideas about health promotion and what constitutes a healthy lifestyle. Conflicting opinions may arise from a lack of standardised guidelines. Although nurseries may have policies advocating healthy practices within the nursery setting, understanding the issues which surround healthy behaviours is complex and staff may unconsciously resort to anecdotal information received via the media.

However, the majority of the NP contributing their views did believe that the nurseries were setting good examples.

Jenny, a community nursery practitioner, was keen to differentiate the nursery and parental feeding practices. She noted that: *'We wouldn't give them stuff, obviously, that the parents do give them'* (T14CN). The use of the word 'obviously' suggests that nursery practices were regarded as the key method and that the parents perhaps provided food regarded as unhealthy.

This explicit comment clearly lays the responsibility at the parents' feet. It turns the discourse into a very much 'them and us' situation. The staff know they are duty bound to follow nursery guidelines and they perhaps feel this must be demonstrated overtly. However, despite a potential lack of skilled knowledge, this situates the staff member into the role of 'professional' which may explain some of the current attitudes towards parents.

Similar suggestions by NPs that parents were responsible for lack of physical activity/exercise within the home, which may have been related to unhealthy weight gain and behaviours, were few. This may be due to food being central to survival; eating must take place on a daily basis, it has priority within the family. Physical activity is now, for the majority, a chosen activity, either done for leisure or to 'keep fit'; it is not considered an essential daily activity. Lee, who worked in a community nursery, felt that lack of exercise was an issue but he also placed the responsibility onto the local council and not just parents:

'... Too many, er, play station games etc. And then there's not enough playgrounds, the council have taken them all out, haven't they?' (T13CN).

The few comments that were made about physical activity being a cause of childhood overweight and obesity were declared in a similar fashion as the proposed dietary causes; that is, they were generic, remarks that could have been made by general members of the public. A previous study conducted with parents of primary aged children, reports that although parents believe that dietary responsibility for children primarily lies with the parents, who is ultimately responsible for a child's physical activity is not so clearly defined (page 41). This was considered to be a barrier to promoting physical activity within the family (Hart *et al.*, 2003).

Barriers to health promotion and healthy behaviours were a recurrent theme; the next section discusses these in more detail.

5.4.3 Barriers

NPs acknowledged that certain barriers may impede the adoption of healthy behaviours and lifestyle in families with young children. Whilst discussing health promotion practices within the nursery, the focus group participants, whose nursery caters for children aged 0-5 years, highlighted the importance of the babies in their care having access to outside space:

'What we have found in the baby room a lot is we haven't realised, we talked to the parents... and either they can't afford money or they just don't live somewhere where they can go outside..... try to get them out as much as we can as we have found they don't have at home which is a bit sad' (FGNP2)

A lack of finances was highlighted as a major barrier to access a healthy lifestyle, that is, being unable to afford a garden, being unable to buy 'healthy' food or to attend leisure facilities and so on; this is comparable with other studies (Noble, 2007; Dwyer *et al.*, 2008; Pocock *et al.*, 2010). Additional barriers were identified as a lack of time, working parents, a lack of interest and lack of knowledge. A lack of knowledge or interest was considered key to preventing parents becoming involved in nursery health promotion activities:

'You will get some that are really interested but some of them just want to bring them [child] to nursery and don't want to know' (FGNP1).

A recurrent theme was a need for parents to be given practical advice or education to remedy any ignorance. Jenny a nursery nurse working in a community nursery, expressed her views:

'...but if the parents aren't educated in healthy eating, someone has got to intervene to show them how to..."' (T14CN).

However, some views were more specific, here the focus was on the immaturity of the parents. Maureen, a local authority nursery practitioner, felt that concentrating on parenting skills would be a solution:

'There are young parents who don't know... who need parenting skills on how to feed their children properly... they've got to be taught how' (T2LA1).

Education or the acquisition of skills does not necessarily lead to behaviour change. Moreover, parents may simply not be interested or feel patronised by, however well intended, advice. The NP who expressed a need for education offered mixed views on how this could be practically implemented and achieved. There was consensus that parents had to be 'got on the nursery's side' and adopt the nursery practitioners' way of thinking. Nursery practitioners working in a local authority nursery expressed their views about motivating and engaging in nursery promotions:

'But it'll be good as well to get parents involved.....because, obviously if we can get them both, you know, in the same frame of mind... it can only... it makes it easier doesn't it?'" (T1LA1).

However, engagement involves building a relationship between two parties; some parents may feel intimidated by the nursery practitioner's 'expert' role. Some comments focused on practical approaches that could be taught to parents such as cooking lessons: *'They need some sort of cooking lessons, ideas for packed lunches....'* (T17LA2).

However, despite these ideas of how parents could be 'helped' there was recognition that this was not always easy to put into practice; possibly due to a lack of time or resources. For some there was acknowledgement that parents may resist or have problems with an intervention. The main issue may not be due to a lack of education and a failing on the nursery's part to successfully deliver advice and information; it may be more of an issue with motivation and engagement, parents may simply not be interested or feel inadequate or threatened. Sandra, who worked in a community nursery, who may have been speaking from previous experience was quite negative about parents' acceptance of written literature: *'I know you can't be giving parents long-winded things...because they can't...they don't want to read anything like that'* (T15CN).

This is quite a broad statement encompassing all parents; there may be feelings of disillusion by previous attempts to engage with parents. Perhaps the strategies previously employed were not relevant to parents and she is acknowledging that different strategies need to be sought. It has been suggested that strategies that focus

on the 'how' rather than the 'what' may prove beneficial (Hart *et al.*, 2003), that is, giving parents information of how to deal with certain everyday situations such as food shopping with their child.

5.4.4 Parental engagement

NPs had some difficulties in describing ways in which working parents could be engaged and involved. However, there was an acceptance by one practitioner, who worked in a private nursery that demonstrated good staff/parental relationships through a parent cooperate, that some parents are simply inaccessible: *'I know you always have the odd parent who just doesn't make that extra effort which would be quite difficult...'* (T6P1).

Moreover, Maureen, who works in a local authority nursery, did not feel it was her role to target parents: *'It's their [parents] responsibility, unless they asked me for advice'* (T2LA1).

This remark reflected a view not held by others as the majority of NPs were quite positive about 'helping' parents and were willing to do so. However, Maureen may have felt that that a 'top-down' approach, thus assuming what the parent needs as opposed to the parent seeking advice may be less feasible or acceptable. Furthermore, Maureen may feel that it is simply not her role to promote health to parents.

Past methods of parent engagement (not necessarily for health promotion activities) included coffee mornings, newsletters and display boards. It was felt that a display board had generated some interest in the past and would perhaps be a good way to promote health behaviour.

Also highlighted was the difficulty of finding time to actually speak to parents on a one-to-one basis. The NPs felt that many parents were keen to just drop off their child and leave. Additionally, NPs felt that being 'tied to the room' that is, the room in which they worked on a daily basis, meant that they were not able to converse with the parents as much as they would like.

A lack of opportunities for the practitioners to converse with parents may impact everyday communication and engagement. For example, as previously discussed, it was apparent that many of the parents were not aware of the types of foods their child was eating whilst in nursery:

Despite NPs citing that 'healthy eating' policies were established within nursery settings; there would appear to be a number of issues in communicating these messages to parents. However, communication is a two-way process; it may be more than staff simply not relaying relevant information. Messages may not be conveyed in sufficient and appropriate ways for parents, for example some parents may need more than a message on a notice board or a newsletter; or as previously discussed, some parents may simply be too busy, distracted or simply not interested.

Furthermore, there may be an acceptance on the part of the parent that the nursery 'knows best' and therefore the parent has no concerns about the types of foods given to their child during nursery attendance. This finding was reported by Hesketh *et al.* (2005); parents in their study communicated that anything permitted at school/nursery was deemed to be healthy.

A parent's lack of engagement due to acceptance of nursery practices or communication methods may be contributing to the staffs' perception of the parents' 'lack of knowledge/ignorance' and so forth.

As a further way to encourage parental engagement, providing incentives was suggested by NPs, be it a coffee and sandwich to draw parents to a meeting or to provide a 'freebie' at the end of a meeting or programme such as a bag of fruit and so on. One practitioner described her personal experience of using incentives in her previous place of work as successful; however she did indicate that the particular social economic status (SES) of the locale may have had a bearing:

'Just from my own experience and that was an area like [deprived area of Newcastle] but if you definitely get something they will definitely come' (FGNP2).

In the focus group session with NPs, a strong parent culture or network was described as being instrumental for parental participation, word of mouth recommendations were understood to be a strong incentive:

'What we have found is that they [parents] are all intertwined, they all know somebody else and if one does it the other one wants to do it and we don't realise how much they know each other behind the scenes. (FGNP1)

This may suggest that if certain parents become involved in nursery activities, others may follow. Therefore, targeting groups rather than a blanket recruitment strategy may prove beneficial. The next section details current nursery practices in relation to health behaviours highlighting the difficulties of communicating the nursery policies to parents.

5.4.5 Nursery practices

As previously discussed (page 6), nursery schools have guidelines and policies relating to healthy eating and physical activity, despite the NPs role and responsibility in communicating these values to children and parents, the actual practices implemented by the nurseries undoubtedly send conflicting messages to parents as illustrated below.

There were conflicting issues around the area of 'treats' and birthday celebrations. Nursery staff made it clear that school policies prohibited providing children with sugary or fatty snacks such as crisps, cakes, sweets and fizzy drinks. However, there appeared to be inconsistencies even among staff belonging to the same nursery. Most nurseries discouraged parents providing birthday cakes. One community nursery had their own chef and made cakes on the premises; this was to 'cater for allergies and differing diets'. In all but one private nursery there appeared to be difficulty in enforcing the ban and sometimes cakes, party bags or snacks were provided:

'Sometimes parents can bring in a birthday cake or they might bring in snack, they do tend to be cake and crisps.....we might add fruit to it' (T17LA2).

The NP from this local authority nursery appeared to be unhappy with the current nursery practices, adding fruit to the 'unhealthy' snacks may have been a way to assuage any guilt in breaching nursery practices or she may have felt it was just the 'right' thing to do. Some nurseries did tolerate the provision of cakes and sweets from parents despite stating that the nursery's healthy eating policy did not allow such foods within the nursery environment. Therefore, the messages transmitted to parents appeared to be contradictory.

A common way to 'deal' with the issue in several nurseries was to place the responsibility of giving the children the 'treat' onto the parents

'We cut it up (cake) and let them take it home...it's up to the parents what they want to do...same with sweets and stuff as well...just send it home, we haven't got...we never allow them in here no, just send them home' (T11P2).

None of the NPs appeared to think that this practice may have been sending out contradictory messages to the parents and it appeared to be an accepted solution. Reasons may include a reluctance to upset the parents or children at a time that is commonly associated with 'treats' and celebration, so that 'normal' nursery policies are over-ridden. This also appeared to be the case for other celebratory occasions such as Christmas. Tracey, who works at a private nursery, which provides only organic food and which has a strong 'no sweets or birthday cakes' policy, explained what happened at Christmas:

'At Christmas we have sort of like little organic chocolates, but they take them home, they don't eat them at nursery' (T8P1).

It is not known who decides that the usual nursery policies should be overridden at Christmas; it may be a manager decision or a joint staff reaction to the 'pressures' of the Christmas season.

This provision of 'treats' for special occasions was also common at another private nursery:

'We might supply a little goody bag and then it's up to the parents if their child sort of wants, so it's sort of took away from us' (T9P2).

These conflicting practices and messages may be due to the difficulty in enforcing an 'all out ban' in the 'real' world where food and 'treats' are so abundant, available and integrated in daily contemporary life and part of food culture. Parents in a study conducted in Australia all believed that children should be provided with 'treats' (which they perceived to be food items considered to be 'unhealthy'), however there were differences of opinion as to how often 'treats' should be permitted (Noble, 2007).

One NP, Tracey who worked in a private nursery, felt it was important to provide a variety of foods

'I do think that children should be given certain foods that are classed as unhealthy, so chocolate, I don't think you should not have it in their diet altogether sort of thing. You should always give them the chance to try everything, but...explain to them' (T8 P1).

The above statement which contradicts school policy suggests that Tracey had strong feelings about educating children in the 'real' world and giving them choices. I suspect

that due to the, albeit, reluctant acceptance of cakes and sweets provided by the parents, other nursery practitioners may feel that a balanced approach is more realistic.

Also highlighted are communication matters between nursery establishments and parents, thus perhaps reiterating the ‘them and us’ issue which may be apparent. It is almost a compromise, a furtive agreement between staff and parents; ‘these are our rules but if you can’t adhere to them, here’s what we’ll do’. The staff may be governed by school regulations, such as practices and policies, but circumstances require them to make a decision whether to ‘break’ these rules; whether this is due to inner conflict, negotiation or resignation to events beyond their control is not known. These decisions may be made on an individual basis or as a collective undertaking; the strength of feelings from individual members of staff or personality type may be influential.

Maureen, who worked in a local authority nursery, was keen to accentuate her individual principles:

‘What I do, if children come in with crisps and sweets is take them off them. Other practitioners might ask them to finish them off or share them around, but I’m quite tough’ (T2LA1).

When asked in the focus group session how nurseries might enforce an all-out ban on high sugar, salt and fat snacks the NPs admitted that imposing such a policy could be difficult:

‘For the sugar and that they very rarely get, it’s Christmas time or if the parents bring a bag in with sweets we let them take home. We don’t actually have them at nursery. It is going to be hard, it will be hard’ (FGNP2).

It is interesting to note that some staff criticise parents for not being able to impose ‘healthy eating’ practices with their children and for ‘giving in’; however, as the evidence suggests, nurseries too may have difficulty in enforcing nursery regulations with parents in relation to healthy eating. Thus, the issues surrounding healthy eating are complex, intricate and determined by a number of factors.

One private nursery which appears to be the most ‘successful’ with regards to implementing policy practices, functions as a cooperative with parents. This egalitarianism approach as opposed to a ‘top down’ approach appears to underpin their success. Parents are regularly consulted about changes and practices within the

nursery and decisions are made by a parents' committee. However, this particular private nursery is utilised mostly by less deprived educated working families, whether this approach would work in other settings is questionable. Therefore, although most nurseries are following similar guidelines; enforcement and implementation of institutional regulations is likely to be context bound.

5.4.6 Section summary

The initial purpose of the one-to-one interviews and focus groups was to elicit the views of NPs of health promotion practices and to discern which practices were currently being implemented. Analysis of data not only obtained the desired information but also revealed complex communication and translational issues within the nursery settings which was not apparent from or reported by other studies in the literature.

Nursery policies and guidelines dictate which health practices NPs should implement in both private and local authority settings. It is the responsibility of staff to transfer these values to the children in their care and ultimately to the parents and extended families, ideally using a variety of communication methods. However, due to the complexities of food being inextricably linked with social events and everyday occasions; this process is loaded with complications.

It was evident from the mapping data that some parents were unsure of nursery policies and practices governing healthy eating. When asked to describe the sorts of things their child was given to eat at nursery some were uncertain. Additionally, many parents would provide cakes, sweets and other 'treats' on their child's birthday or other special occasions. It is not known whether the nursery's policies were not communicated adequately to the parents or the parents chose to or were allowed to 'bend' the rules.

There was some negativity from NPs associated with a number of the parental dietary practices, such as the types of foods the children were coming to nursery with and the lack of breakfast provision in families. There was a recurring theme that parents might need education and advice to improve their family's health behaviours. The NPs did not clarify who would be responsible for providing the education or advice; they also conceded that this may be difficult to achieve as not all parents were open to engagement. Furthermore, not all parents may feel they need or want advice. Educational solutions included 'getting the parents on board' and in the 'same mind-

frame' of the nursery staff. However, these solutions require clear, open communication; current nursery practices suggest that staff are having difficulties in executing their existing values and ideals to the parents with regards to practices involving birthdays and 'treats'. There appears to be underlying conflict between nursery regulations and parents that has culminated in an uneasy truce and an acceptance that if parents (or in some cases the nursery) provide 'treats' and so on, parents will be given the responsibility for deciding whether their child should be allowed them or not.

Conflicting beliefs about health practices occur between nursery staff members; this will not be conducive to any health promotion activities the nursery wish to promote; either to parents or to embed in nursery practice. Additional staff training was considered to be an option to resolve lack of knowledge and difference of opinion; however, I am of the opinion that some of this was more to do with personal values and beliefs and not a lack of training. Some NPs may feel that the nursery has higher priorities to deal with, or it may be due to a lack of confidence or skill in promoting health messages to parents that makes them reticent.

In conclusion, analysis of the data suggests that the main issues include moral implications surrounding food provision, especially in the case of parents providing food to their children. What they feed their children may ultimately label them as 'bad' or 'good' parents; this undoubtedly will add pressure to parents in the way their parenting skills are observed by others (in this case, nursery staff). Furthermore, staff attitudes and parental engagement appear to be key for health promotion activities within the nursery environment.

5.5 Preliminary qualitative studies discussion

Fifteen parents of preschool children took part in a food and physical activity mapping exercise. This exercise highlighted the everyday dietary and activity behaviours of preschool children. It also acted as a subtle tool to elicit parents' further knowledge of and views of health in nursery schools.

Seventeen nursery practitioners consented to be interviewed to elicit their views of health in preschool children and to determine which health promotion practices were currently conducted in nursery schools. NPs were also invited to attend a focus group discussion; three practitioners from the same nursery attended. Two parent focus

groups were conducted, one group consisted of mothers working at an academic institution and the second were mothers who attended a church playgroup with their child/children.

An overarching theme that emerged from the two group discussions was the concern of nurseries finding the right balance of communicating health promotion information and advice with not patronising or telling parents how to raise their children or live their lives.

It was felt that the nursery did have a responsibility to promote health to the children in their care. There was disbelief that some children, even though they were attending a nursery place, were not achieving the full recommended daily physical activity. It was interesting that this information provoked a change of opinion in the group. It was as if when faced with negative evidence of children's health, the parents then felt more should be done by the practitioners and the responsibility shifted somewhat.

As evidenced above, promoting positive health behaviours to families of young children is a complicated issue; several factors will affect the success of such an intervention. Ultimately the aim of trying to 'change' behaviour depends on many basic criteria that need to be explored and acknowledged.

5.5.1 What is the norm?

In this thesis the factors which may influence a child's dietary and physical activity behaviours have been discussed (page 13). For preschool children the main influences lie with the immediate family. Parenting styles, feeding practices (Carlson and Grossbart, 1988; Kremers *et al.*, 2003; Dixon and Banwell, 2004), religious beliefs (Kremers *et al.*, 2003), generational factors (Serbin, 2003) and so on will all determine what is considered to be 'the norm' within family settings. Furthermore, not only are 'norms' generated and practiced within family settings; these extend to other organisations and groups such as workplaces and schools.

It is the questioning of people's 'norms'; asking them to consider what they do and why they should follow advice to change their beliefs, which is the challenge of a behaviour change intervention and it is important to consider the individual needs of the participants (Powell and Thurston, 2008).

We can see from the qualitative data that the parents and the NPs have their own preconceived ideas of what it means to be healthy. The NPs believe that parents need help and education, conversely the parents I spoke to believed that *other* parents needed help and education. This perhaps illustrates that that a person's own 'norm' is acceptable but others are not. Moreover, mothers have reported conflict within family settings if nutritional advice contradicted the family's cultural norms (Hughes *et al.*, 2010).

Parents in this study report being happy to receive health promotion advice from their child's nursery but do not want to be 'told what to do'. Van Lippevelde *et al.* (2011) stated in their study, that parents prefer personal contact with their child's school to be on an informal basis. This discord presents the challenge; how to ensure that NPs are promoting the same (ideal) messages and that parents do not feel they are being patronised.

5.5.2 Is it the practitioner's role?

The majority of the NPs who participated in the individual interviews or focus group session indicated that they were happy to promote health and give advice to parents. However, the NPs understanding of what this might entail is uncertain. Did they believe it was the 'right' thing to say? They may feel that as a person in a professional role they have a duty to fulfil, however, as previously discussed, some practitioners found the enforcement of school policies difficult. One NP did question her role; she reported that she would only offer advice to parents if asked to. This raises the question of whether NPs feel that advising parents about health is part of their role. Most would agree that they have a requirement to teach the children about staying healthy but whether they would realistically be comfortable with extending this to the parents is another matter. Although the NPs reported that they felt parents needed help and education with their children's health, they were unable to detail where this help would come from and how it would be best delivered.

5.5.3 The intimacies of health

As illustrated in the data, discussing personal health behaviours can be quite emotive especially in the area of feeding children. Some parents were compelled perhaps by social desirability to emphasise the healthy aspects of their child's life. It is natural that parents do not want to be thought of as 'bad' parents and worry about being judged.

From the NPs perspective, as discussed in the section above, NPs may feel they are not in the position to advise parents on such matters. This has been highlighted in other studies where teachers are thought to lack the skills necessary to address such issues (Davidson, 2007).

5.5.4 Recruitment and commitment to a research study

As expected, one of the challenges a researcher faces is recruitment to a study. There appeared to be more success in recruiting members from an established group; this was evident in the parents from the established mother and toddler group and the staff members from the same nursery who perhaps encouraged each other to attend the focus group sessions. However, this possibly restricted the diversity of the group. The numbers who attended were very limited and there was quite a few 'non-attenders'. Rabiee (2004) recommends that over-recruitment of participants could aid maximum participation. However, due to the time limits of this PhD further extensive recruitment was not feasible.

5.5.5 Alternative qualitative methods

As previously discussed, recruitment and attendance of the focus group sessions was at times problematic. Although the literature advocates the use of semi-structured interviews and focus groups for health research; future research may benefit from the consideration of other methods. Parents may have been more amenable to complete a telephone interview although this would have created difficulties in completing the food maps. An on-line group forum chat may encourage the sharing of experiences and ideas in a less structured more accessible format. However, this may discriminate against parents who have low levels of literacy or who lack internet access.

5.5.6 Conclusions

The numbers attending the focus group sessions were limited; in ideal research conditions, further time would be devoted to sourcing participants. However, those that did attend were able to provide valuable data.

It was felt that nursery schools did have a responsibility to promote health to the children in their care. On a pragmatic level it was thought the incorporating health promotion into the curriculum throughout the year with a holistic approach was judged to be an effective way of reaching children and parents. However, an overarching

theme that emerged from the two group discussions was the concern of nurseries finding the right balance of communicating health promotion information and advice with not patronising or telling parents how to raise their children or live their lives. There was consensus that providing incentives for both children and parents may encourage participation in a health promotion intervention.

The issues, ideas and concerns that were raised from phase one and two of this PhD study were analysed and collated to develop phase three of the study – the development and implementation of a feasibility study of a behaviour-change intervention with the aim of improving lifestyle behaviours in preschool children and their families.

5.5.7 Development and recommendations

The ideas and considerations of the NPs and parents were incorporated in the intervention design. Following analysis of the preliminary qualitative studies the NPs would be asked to promote healthy eating and physical activity within the nursery setting as well as encouraging positive behaviour changes in families. In order to reach all the families (a holistic approach) the intervention information would be given to all families and all families would be encouraged to participate in the programme activities.

The following chapter discusses development of the intervention, the rationale for the selected intervention components, the design and intervention aims.

Chapter 6 Development and measurement methods of a behaviour-change intervention

6.1 Introduction

This chapter introduces phase three of this PhD project which was the development and implementation of a health behaviour change intervention to be implemented by NPs with preschool children and their families. Figure 18 illustrates the steps employed in for this phase. In this chapter I have described in detail the development and implementation of the intervention. This is considered imperative as ‘replication requires accurate and detailed reporting of the intervention’ (Michie *et al.*, 2009, p. 2).

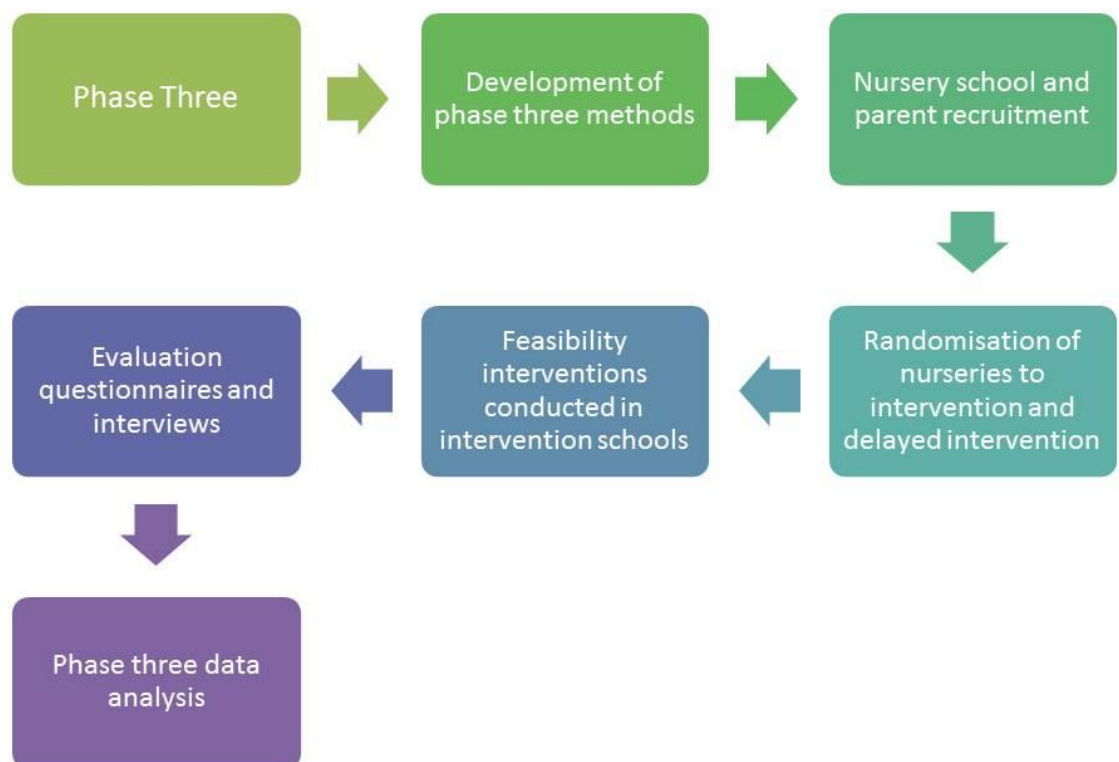


Figure 18 Flowchart of phase 3

6.2 Identified factors

As it was identified in the literature review (Chapter 2) there are many determinants and factors which may have an influence on a child's weight status. Due to the time limitations and resources (financial and human) of a PhD, it was not feasible to consider all the determinants reported. Table 11 summarises and justifies the rationale for the factors and determinants selected. It can be seen that the selected factors include parenting styles, inequalities, dietary behaviours (which include feeding), sedentary behaviours and physical activity. As discussed in 3.11.1, Bluford *et al.* (2007) propose that due to the multi-factorial causes of overweight and obesity, interventions should be multi-component, focusing on more than one strategy in a variety of settings. Future interventions should also target strategies and techniques which aid parents in modifying their child's diet and physical activity patterns (Skouteris *et al.*, 2010a). Other factors such as sleep duration, neophobia, and junior consumerism, although pertinent, were not included due to the paucity of evidence of use in previous interventions; such as effectiveness and measurement tools. Moreover, although of interest these factors were not the focus of the current intervention.

Chapter Six Development and measurement methods of a behaviour-change intervention

Table 11 Rationale for selected determinants and factors included in intervention design

Identified determinant/factor	Why included in intervention design
Parenting styles (authoritative)	<ul style="list-style-type: none"> • The importance of including parents in a lifestyle behaviour change intervention with young children has been identified • Previous research reports that an authoritative parenting style is optimum especially in the area of child feeding
Inequalities	<ul style="list-style-type: none"> • The NCMP report inequalities in obesity prevalence between the most and least disadvantaged • Individuals with a lower socio-economic status are more likely to consume energy-dense foods such as fried foods and take-away foods • The 2010 Marmot review stressed the importance of prioritising expenditure to reduce the effects of inequality in children under the age of five years
Dietary behaviours (availability and accessibility, exposure and reward)	<ul style="list-style-type: none"> • The NDNS report that children are eating more saturated fat and NMEs than recommended and are lacking in certain vitamins and minerals • Parents are important agents of change for young children's dietary habits
Sedentary behaviours	<ul style="list-style-type: none"> • Studies have shown that reducing sedentary behaviour such as TV viewing may be effective in young children • Watching more than 2 hours of TV per day is associated with higher adiposity • Government recommendations state that the under-5s should minimise time spent in sedentary behaviours
Physical activity (exposure and reward)	<ul style="list-style-type: none"> • Physical activity may have a protective effect against childhood adiposity • The under-5s are recommended to be active for at least 180 minutes throughout the day • Preschool based studies report that young children are not reaching recommended activity levels

6.3 Ethics

Ethical approval for the study was sought in two distinct stages. Stage one was for phases one and two of the study which were the preliminary qualitative studies to obtain the views and attitudes of nursery practitioners with regards to childhood overweight and obesity prevention interventions, and to determine which lifestyle behaviours in the targeted population may be amenable to change. Stage one was approved by the Faculty of Medical Sciences: Ethics committee, Newcastle University and no changes to the application were requested (the approval letter is included in Appendix G).

Following the analysis of phases one and two of the study, the results were used to inform phases three and four which was the development, implementation and evaluation of the intervention. Stage two ethical approval was sought for these phases. Detailed protocols and copies of all intervention materials were provided. Initially there was some discrepancy about the dietary advice being issued to the parents. One of reviewers felt there was too much emphasis being given to the promotion of animal and dairy products. See quote below from the reviewer's report:

'I take issue with the 'healthy eating' tips as it is biased heavily towards the consumption of animal products. I think it is very problematic to bestow this information on vegan participants, who may be given the impression that research has shown that their dietary preferences are problematic. Therefore, I suggest that either the form mentions explicitly which academic studies support the view that these are the '4 main food groups', or that the information is modified to provide a more balanced view of what counts as adequate nutrition. Also, the statement that 'Milk is a good drink for 1-4 year olds' could be modified as it relies on the tacit assumption that, provided it is nutritionally good, it is good. Also, five out of the six ideas mentioned later on include 'small glass of milk''

However, in the response to the report I reasoned that the study was not developing new dietary advice but the advice included was in line with existing government recommendations for children aged 3-5 years (Scientific Advisory Committee on Nutrition, 2011). This was accepted and the ethical approval was granted by the Newcastle University ethics committee (Appendix G).

6.4 Project branding

To create an intervention identity and a 'healthy lifestyle' brand (Evans *et al.*, 2007), as discussed in the literature review (page 61), it was decided that a relevant logo that was meaningful to the target audience was required. I wanted a character that the children would relate to and could be used as a mode to 'communicate' with the children in an age appropriate way. Using the acronym 'SKIP', the Study of Kids in Preschool name was developed. Utilising the Windows 2007 'Paint' programme a hand-drawn picture of a child skipping, to represent an active child, was designed to relate to the acronym (Figure 19). This logo was used on all correspondence documents, intervention materials and intervention merchandise.



Figure 19 Skip logo

6.5 Intervention development

Following the review of the literature, combining the analysis of phase one data and the focus group sessions, the following aims for the SKIP project were identified. Table 12 illustrates how the aims were developed and why they were included in the intervention.

- Reduce the consumption of high energy dense snacks in nursery and at home
- Increase the consumption and the awareness of the importance of a 'healthy' breakfast

Chapter Six Development and measurement methods of a behaviour-change intervention

- Reduce TV viewing
- Increase physical activity in nursery
- Increase family 'active time'

Table 12 Rationale for SKIP aims/targets

SKIP aim/target	Why included
<p>Reduce the consumption of high energy dense snacks in nursery and at home</p>	<ul style="list-style-type: none"> • NDNS data reports children are consuming more than recommended levels of saturated fat and NMEs • Phase one and two data revealed that children were consuming cakes and chocolate in nursery
<p>Increase the consumption and the awareness of the importance of a 'healthy' breakfast</p>	<ul style="list-style-type: none"> • Nursery practitioners reported that many children were arriving at nursery not having had breakfast or would be given chocolate or crisps in place of breakfast
<p>Reduce TV viewing</p>	<ul style="list-style-type: none"> • Many studies in literature have reported negative links with TV viewing, types of foods consumed and adiposity • US and Australian governments recommend that young children should not watch more than 2 hours of TV per day • Previous research has linked a reduction of TV viewing with reduced sedentary behaviours in young children
<p>Increase physical activity in nursery</p>	<ul style="list-style-type: none"> • Recent research reports that despite attending an education preschool facility, young children are not achieving the recommended levels of physical activity
<p>Increase family 'active time'</p>	<ul style="list-style-type: none"> • It is important to involve parents as agents of change. Encouraging parents to increase the whole family's PA fosters positive modelling behaviours • Nursery practitioners in the focus groups suggested including activities to encourage family activity

Figure 20 illustrates how the conceptual model, as discussed in section 2.8, links to the intervention and how the intervention will address the identified issues. As previously reported, there is a paucity of preschool interventions in the UK and 98 per cent of preschool children now attend some form of childcare. The current intervention aimed to reach a high proportion of families through childcare (nursery schools) promoting healthy behaviours which will add to the current body of evidence. As discussed in the literature review (section 2.3), the pathways leading to obesity are indeterminate. However, much of the literature reports of the rise of an ‘obesogenic’ environment which has led to negative impacts on energy balance. Also highlighted is the growing concern of the widening of socio-economic inequalities especially in the under-fives, which the current study aimed to address. In order to halt the increasing prevalence of childhood obesity it has been reported that preventative strategies are required. Such strategies include behaviour-change interventions which have a theoretical underpinning incorporating authoritative parenting styles as developed for this study (see section 3.1).

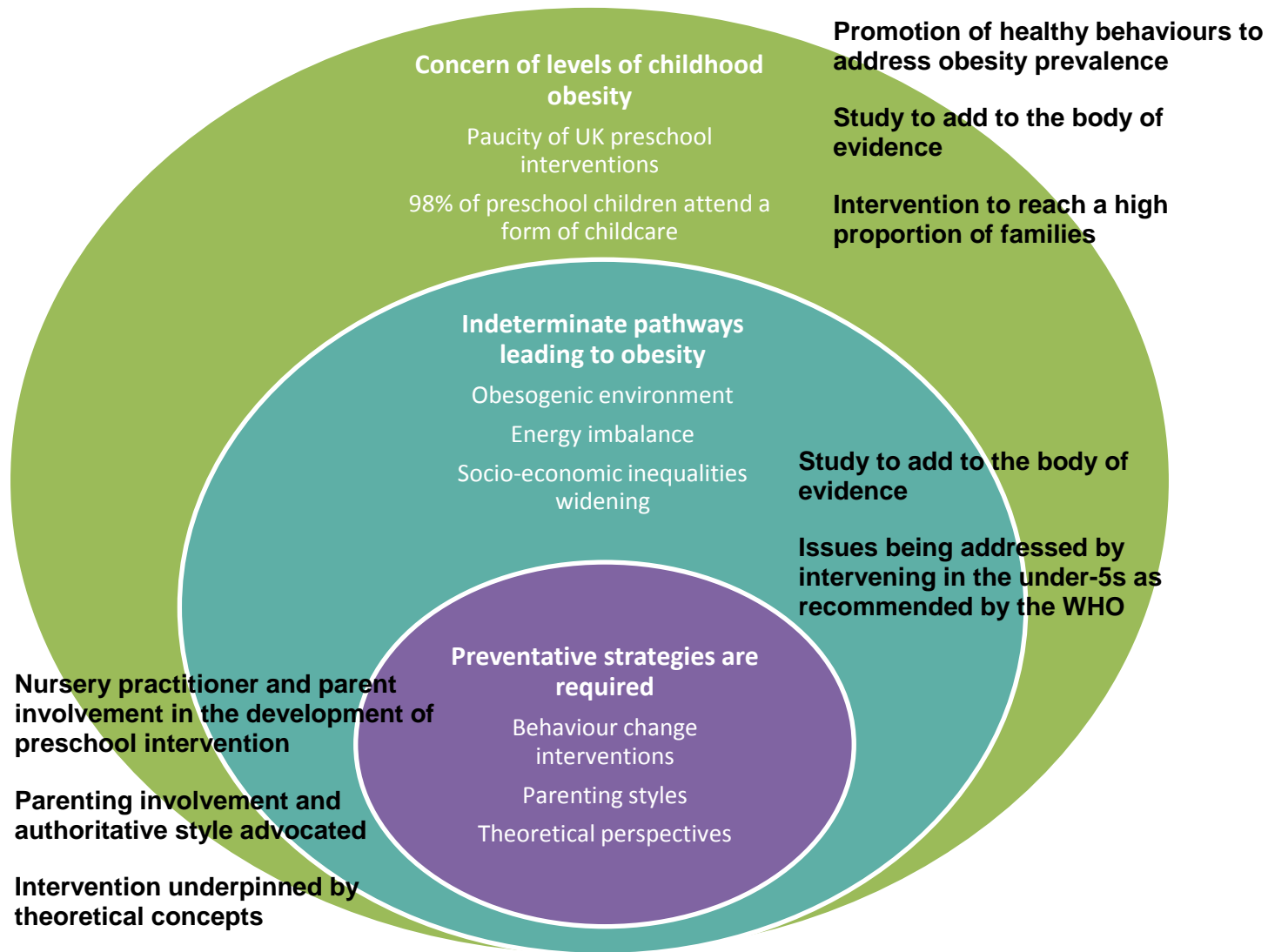


Figure 20 Linking the intervention with the conceptual model

6.6 Designing a behaviour change intervention

A behaviour change intervention can be defined as 'coordinated sets of activities designed to change specified behaviour patterns' (Michie *et al.*, 2011, p. 4). As discussed in section 3.1 interventions which have a theoretical grounding have been shown to be more effective in producing longer-term behavioural change than those without (Powell and Thurston, 2008). The revised MRC framework - Developing and evaluating complex interventions (Craig *et al.*, 2008b) (section 3.13) emphasises the need to identify the theoretical underpinning of the intervention in the development phase. Furthermore, Michie *et al.* (2011) highlight the requirement for matching a behaviour model with the target population and the context in which it will be delivered.

6.6.1 Theoretical models

Having appraised previous prevention intervention studies for behaviour change models (see section 3.1) I identified two behaviour change models which were considered to be a suitable match to the target population. They were Social Cognitive Theory (SCT) and Operant Conditioning (OC). Key environmental variables of the SCT model include 'modelling' and 'availability'; which have been identified as potential influential factors of a child's dietary intake (Baranowski *et al.*, 2003); especially in younger children who are potentially less influenced by peer pressure (Rinderknecht and Smith, 2004). Furthermore, 'goal setting' is one of the primary concepts of SCT which has demonstrated some success in adults (Baranowski *et al.*, 2003) and helps people evaluate their values and priorities and commitment to change (Beckman *et al.*, 2006); this was considered to be an appropriate method for the parents to support family lifestyle behaviour changes. OC uses reinforcement as a means of changing behaviour; this can be both positive and negative (McLeod, 2007). It has been suggested that this model may be suitable for some parents to implement with their children (Baranowski *et al.*, 2003). For example the use of sticker charts with children can reinforce a positive behaviour such as trying a new vegetable. Thus, the SKIP intervention is underpinned by two behavioural change models. However, as discussed in section 3.1 and 3.12, it is important to consider the wider environmental and sociological influences. For example in the current study, the nursery school setting, and how the micro-environment and embedded practices can be adapted to support positive behaviour change.

Table 13 highlights points from the work of Golley *et al.* (2011) which has been recommended when developing behaviour change techniques with parents in an obesity prevention setting. It can be seen that the recommended behaviour change techniques are such as goal-setting, prompt self-monitoring and provide contingent rewards are included in this study as explained in the next section.

Table 13 Designing and evaluating behaviour change interventions involving parents in an obesity prevention setting (Golley *et al.*, 2011)

Key points for intervention design	Key points for intervention evaluation
Include strategies that span the spectrum of the behaviour change process	Improve reporting of study quality and design including selection bias, confounders and where possible, dropout rates
Behaviour change techniques to consider include specific goal setting, prompt self-monitoring and self-talk, encourage barrier identification, restructure the home environment, set graded task and provide contingent rewards	Improve reporting of intervention content to include underlying theory, target of the intervention, behaviour change components including techniques and strategies used
Targeting one or more multiple behaviours to change can be effective	Recommend using taxonomy for consistent vocabulary to aid in study comparisons

6.6.2 Applying the theory

Advice was sought from a Health Psychologist (Dr Vera Araujo-Soares) to determine how the aims could be practically incorporated into a behaviour change intervention with sound behaviour-change theory underpinning. This coupled with behaviour change techniques theory and evidence from Michie et al.'s taxonomy of behaviour change; (Abraham and Michie, 2008; Michie *et al.*, 2010; Michie *et al.*, 2011) the following strategy was devised (Figure 21). As illustrated in the first two columns in Figure 21, the individual factors of a person, that is, beliefs about capabilities, skills and so on are interlinked with environmental factors such as barriers and social norms. It is important to consider these factors as the individual and environmental factors will impact a person's ability to adopt behaviour change techniques. As discussed in section 3.1.2, this is thought to be more profound in people from disadvantaged backgrounds as their starting levels of behaviour and social and physical environments may undermine any attempts at change (Michie *et al.*, 2008). The third column displays the 'SKIP targets', that is, the aims of the intervention. The relevant behaviour change techniques underpinned by Operant Conditioning (green boxes) and Social Cognitive Theory (dark blue boxes) as identified by the taxonomy of behaviour change are illustrated in the fourth column, and finally the mode of the application of each technique is demonstrated by means of the coloured triangles. For example, it can be seen that the behaviour change technique 'prompt practice' with the red triangle is applied by parent and staff modelling, providing informative literature and through feedback and praise.

The tables (Table 14, Table 15 and Table 16) following Figure 21, highlight in more detail the behaviour change technique, the individual and environmental factors which may be impact the behaviour and how these will be applied through the procedures, materials and providers of the intervention. The term 'session' refers to the month the procedure was delivered.

The section following the tables describes the development of the intervention materials and programme format.

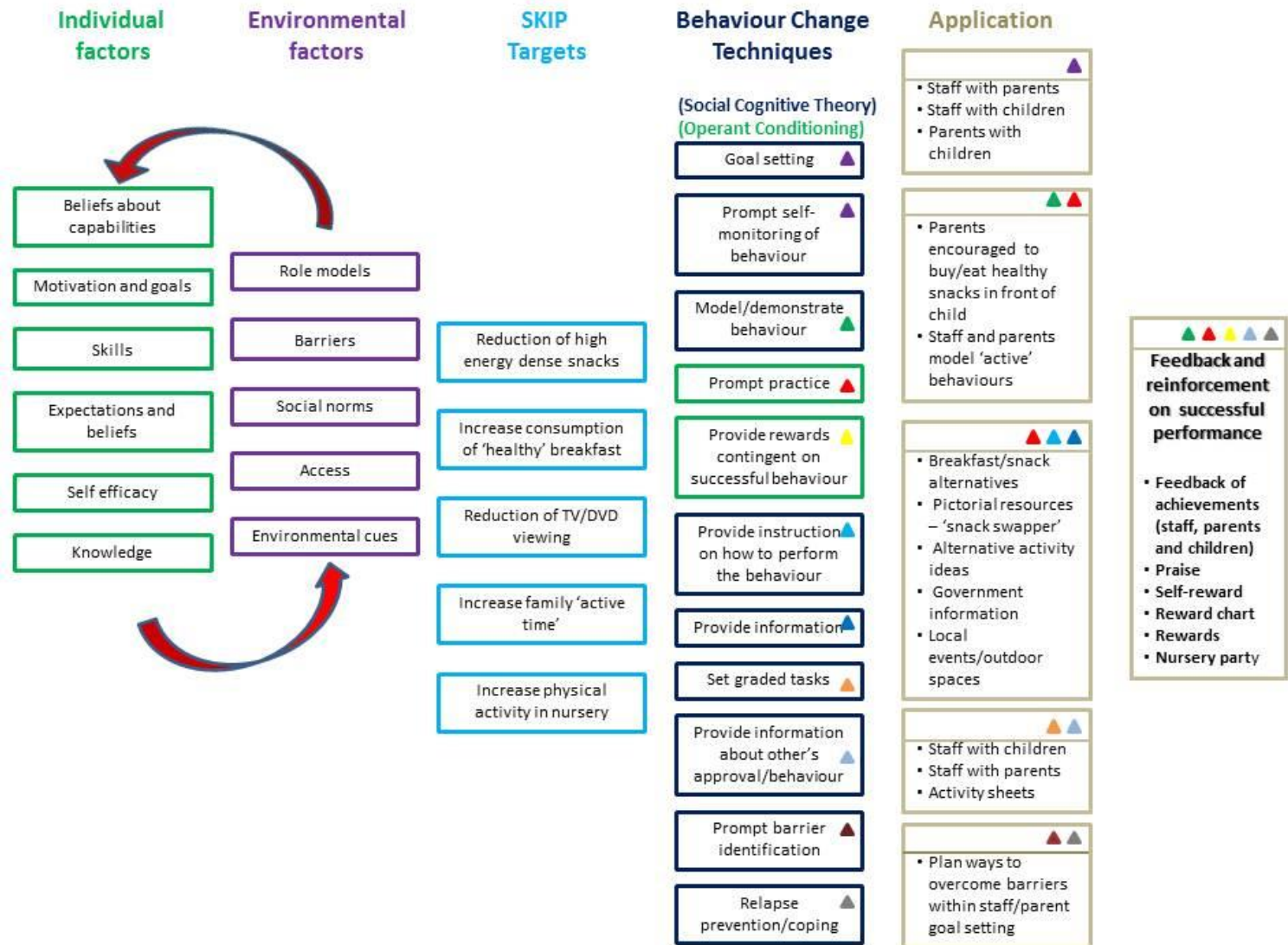


Figure 21 Behaviour change techniques and application

Table 14 SKIP application of behaviour change techniques- 1

Behaviour change techniques, target variables and procedures of the intervention (individual factors, environmental factors)

Behaviour change technique	Target Variables	Procedures, Materials and Providers
Goal setting	Belief about capabilities, motivation and goals, expectations and beliefs, self efficacy Environmental cues, barriers, access	Formulation of specific plans of how to reduce unhealthy snacking; increase healthy breakfast consumption, reduce TV viewing and increase family active time. Parents with staff, staff with children and parents with children. Sessions 2,3,4,5.
Prompt self-monitoring of behaviour	Belief about capabilities and expectations and beliefs Barriers and access.	After an introductory session with the practitioners, parents will be asked to keep a record of their behaviour related to goals set for behaviour change. Sessions 1,2,3,4,5,6.
Model/demonstrate behaviour	Skills, self efficacy, expectations and beliefs Role models	Parents will model/demonstrate 'healthy' behaviours, being active and being less sedentary. Staff will model/demonstrate to children, healthy eating behaviours and physical activity Sessions 3,4,5,6
Prompt practice	Skills and knowledge Environmental cues, access	Staff will encourage parents to rehearse and repeat behaviours around set goals. Parents will receive activity and information sheets to facilitate building new habits/routines. Sessions 3,4,5,6.
Provide rewards contingent on successful behaviour	Self efficacy, motivation and goals Environmental cues, social norms	Staff will praise and encourage positive behaviour changes in parents and children. Parents will be encouraged to praise their children. Children will receive periodic prizes. The Nursery will celebrate success with parties/ fun days. Throughout intervention period.

Table 15 SKIP application of behaviour change techniques- 2

Behaviour Change Technique	Target Variables	Procedures, Materials and Providers
Provide instruction on how to perform the behaviour	<p>Knowledge, skills</p> <p>Environmental cues, social norms</p>	<p>Parents will receive instruction from staff and via information sheets. Children will receive instruction from staff in relation to healthy eating and skipping skills. Throughout intervention.</p>
Provide information	<p>Knowledge, skills</p> <p>Environmental cues, access, social norms</p>	<p>Parents will receive general information about the programme and more detailed nutritional and physical activity information in the form of leaflets and activity sheets. Children will receive information from staff appropriate for their level of understanding. Introductory session and throughout intervention.</p>
Set graded tasks	<p>Self efficacy, beliefs about capabilities, expectations and beliefs</p> <p>Barriers, access</p>	<p>Within the goal setting sessions, staff will encourage parents to set small achievable behaviour change goals building on past successes. Staff will encourage children to build on their past successes. Throughout intervention.</p>
Provide information about other's approval/behaviour	<p>Belief about capabilities, motivation and goals, expectations and beliefs</p> <p>Role models, environmental cues, social norms</p>	<p>Parents will be encouraged to set up a peer group to support each other throughout the intervention. Parents will be invited to share ideas/ successes on the SKIP notice/information board. Children will be encouraged to display pictures and photos of their and their families' activities and behaviours. Children will be encouraged to comment positively on peers behaviours/achievements. Throughout intervention.</p>

Table 16 SKIP application of behaviour change techniques- 3

Behaviour Change Technique	Target Variables	Procedures, Materials and Providers
Prompt barrier identification	<p>Motivation and goals, expectations and beliefs</p> <p>Environmental cues, barriers, access</p>	<p>In their monthly meeting with staff; parents will be encouraged to think about personal potential barriers to behaviour change and to identify ways of overcoming them. Session 2.</p>
Relapse prevention/coping	<p>Beliefs about capabilities, motivation and goals.</p> <p>Environmental cues, barriers, access</p>	<p>Based on identification of barriers; parents and staff will work together to suggest strategies to overcome barriers. Session 5.</p>

6.7 SKIP programme design

6.7.1 Action research

As previously discussed (Chapter 1), this research project is a feasibility study to determine which nursery-based interventions, with the aim of preventing overweight and obesity in preschool children, would be acceptable to nursery practitioners, children and parents. Participating schools were randomised into intervention and delayed intervention/control schools. An adapted action research model was adopted to enable on-going analysis, evaluation and modification of the intervention methods and design in each school.

Action research is thought to have originated from the German- American psychologist Kurt Lewin; he maintained that there was 'no action without research and no research without action' (Adelman, 1993, p. 8). Action research is a reflective process that uses the components of inquiry and collaboration (Ferrance, 2000). It is known in many other forms including participatory research, collaborative inquiry, emancipatory research, action learning and contextual action research; all forms are a variation of a theme (O'Brien, 2001). Lewin's approach involves a series of steps which incorporates planning, action and fact-finding about the result of the action (Smith, 2012). Figure 22 illustrates these steps; the process is presented as a fairly sequential arrangement and is open to literal interpretation. It has been argued that the simplistic model implies that the 'problem' in question is easily remediable by following the steps (Smith, 2012). However, the overall aim is to make the best possible use of the 'tools' available within the constraints of the situation. Limitations may include, for example, the time the practitioners are able to devote to the research and their level of knowledge (Somekh, 2006).

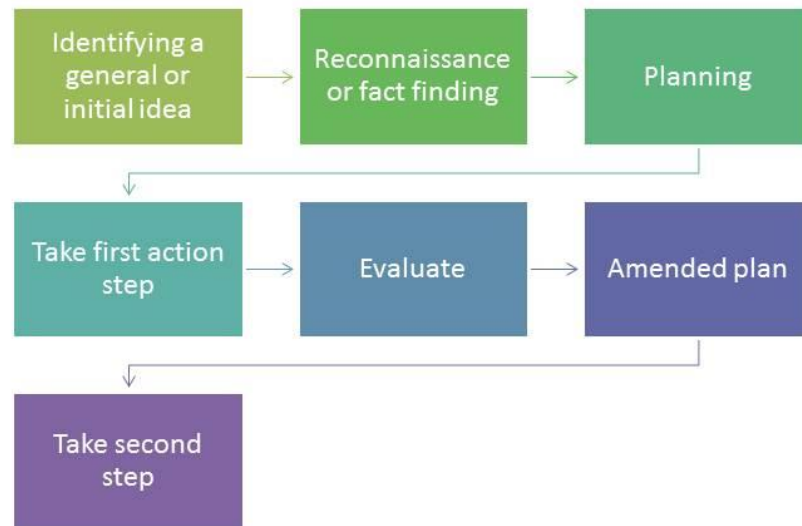


Figure 22 Lewin's action research process plan adapted from Smith (2012)

Action research takes place in 'real-world' situations and is informed by theoretical reflections. Ferrance (2000) believes that action research is not so much about why things are done, rather, how they can be done better. Much of the research process is concentrated on refining the methodological tools to suit the needs of the circumstances. Action research is generally unique to the situation being studied; however, there are aspects of the methodology that can be adopted by other researchers (O'Brien, 2001).

6.7.2 Development of intervention materials

In the second phase of this study, parents and nursery practitioners were invited to attend focus group discussions. As described in section 4.2.3 the participants were shown health promotion materials and information; this was to determine which methods would be acceptable and feasible for use in the SKIP intervention. The inclusion of the parents in the development of the intervention materials contributed to the consideration of inequalities in the intervention design. By including stakeholders' opinions the intervention would be more appropriate to the needs of those participating. Furthermore, it has been reported in social marketing literature that an activity is

classed as social marketing when it is based 'on a real understanding of the target audience: what they think and believe and what they need' (Department of Health, 2011a, p. 11). As previously discussed in section 3.11.1.3 social marketing strategies are recommended as a way to engage parents.

Table 17 illustrates which materials were liked and/or acceptable and how they would be used/adapted. Examples were taken from Change4life (The Department of Health, 2012), The Caroline Walker Trust (The Caroline Walker Trust, 2007-2012), Health, Exercise and Nutrition for the Really Young (HENRY) (HENRY, 2012) and The Nursery Food Book (Whiting and Lobstein, 1998).

Table 17 Acceptability of health promotion materials

Health Promotion Materials				
Resource	Type of material	Liked by group?	Use in SKIP?	Result
Change 4 Life	Snack Swapper	Advice and information were liked but not the format (too flimsy)	Yes	Ideas were presented in a different format
	Information posters	It was felt that these contained too much information and would not be used	No	
Caroline Walker Trust	Plate portion size information	The participants found this very informative and useful	Yes	Direct use of resources
	Recipes	These were liked as well laid out and colourful	Yes	Direct use of resources
HENRY	Reward Chart	Some of the group felt this would be useful to encourage good behaviour	Yes	A SKIP reward chart was designed
	Portion size guide	This was deemed not to be as informative as the CWT version	No	
	Balancing your plate	Some participants found this confusing to use/read	No	
Book	The Nursery Food Book	Although some of the parents liked some of the recipes it was felt to be not user friendly	No	

Other materials were developed using information from The Caroline Walker Trust: Eating well for under-5s in child care (Crawley, 2006), The Australian Government active recommendations (Australian Government Department of Health and Ageing, 2011), and personal experience gained working as a nursery practitioner for twenty years.

Further ideas were elicited from the nursery practitioner focus group discussion. These included, providing the parents with incentives, cooking challenges to be done at home as a family, providing a CD for learning new songs, and playground games which

included skipping activities (this contributed to the design of the SKIP logo and acronym).

Cheap individual items that promoted physical activity which could be provided to the nurseries or given to the children as gifts to link the nursery to the home environment were required. Following the ideas gathered from the NPs, skipping ropes and Frisbees were purchased. The skipping ropes were transportable, easy for the nurseries to store and could be used for multiple active games indoors and out. Ropes were also provided to the intervention children as part of a gift for taking part in the intervention. Furthermore, in order to promote the intervention brand and to encourage family activity, the Frisbees were branded with the SKIP logo and provided to each family (see section 8.5.5).

6.7.3 SKIP intervention material details

Parents received information on how best to improve their family's dietary habits, increase physical activity through family activities and healthy snack and breakfast ideas. The information provided the parents with practical strategies as social marketing strategies aim to achieve changes to resistant or persistent behaviours and not just provide information (Department of Health, 2011a). The parents were also issued with monthly challenges to be completed at home. Each month the children were provided with a bag of fruit or vegetables to take home and they were asked to cook or make something together as a family. This was to encourage full family participation and engagement, and acted as a bridge between home and nursery. Additionally, the families received 'No TV day' challenges; this was to encourage the reduction of sedentary behaviours and increase family active time. The use of practical strategies to engage participants in an intervention is an important part of social marketing.

The information sheets and challenges were issued to all the families in the nursery to encourage a holistic approach. Additional tasks were allocated to 'intervention families'; these were parents who volunteered to participate fully in the study at the time of recruitment. The additional tasks included meeting with nursery staff once a month to set and monitor family goals in relation to the intervention aims, parents were asked to complete a weekly 'family achievement sheet' see Figure 23 for an example sheet. It can be seen that the sheet is divided into three sections: Eating behaviours, Activity

behaviours and Sedentary behaviours. The parents were asked to record achievements in relation to their personal family goals, for example, if one family wished to reduce the amount of ‘unhealthy’ snacks they eat they may record under the ‘Eating behaviour’ heading that on Monday they bought a new fruit to try, or they only bought one packet of crisps when shopping instead of the usual three and so on. Nursery practitioners explained the procedure to the parents at the introduction meetings.



Our Family's Achievements



Child's Name: _____
Date: _____

Day	Eating behaviour	Activity behaviour	Sedentary behaviour
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

Figure 23 Example of SKIP intervention family achievement sheet

Each month NPs worked with the participating parents to set, monitor and achieve shared goals relevant to the aims of the programme. NPs were asked to set up and maintain a SKIP notice board; this advertised to parents, the information, goals, challenges, and family ‘Sharing tips’ of the month (see Figure 24). Additionally, it also served as a public space where parents and children could share photographs, drawings and ideas arising from the SKIP tasks. NPs had monthly activities to complete with all children including fruit and vegetable tasting sessions, art activities,

learning new songs and increasing physical activity through rope and playground activities. This enhanced the holistic approach to the intervention.



Sharing Tips

Have you discovered something you would like to share with other parents? It could be a way you got your child to try a new vegetable, a new healthy snack the family tried or a great park or walk the family enjoyed. Write your tip below and add to the sharing tips board



Our family tip is:





Our family tip is:



Figure 24 Example of family sharing tips sheet

6.7.3.1 Intervention songs

The nursery staff and children were asked to learn a new song each month which was related to the intervention activities; mainly about eating fruit and vegetables. The songs were sourced through freely available resources web-sites. It was arranged through a colleague's friend, who was a leader at a Brownie and Rainbow Girl Guiding group, to record the songs onto CDs. The Brownies and Rainbows were given the songs, five in total, in advance to learn and my colleague and I were invited to attend one of the Brownie meetings to record the girls singing. The girls were provided with gifts of fruit, skipping ropes and Frisbees to thank them for their time and effort. The recordings were digitally edited and transferred to a master CD by Newcastle University's Media department.

6.7.3.2 Example materials

Figure 25, Figure 26, Figure 27 and Figure 28 illustrates example information and 'worksheets' that were distributed to parents and staff during the intervention period. Appendix H contains copies of the Nursery practitioner's training manual and intervention materials for each month of the intervention.

Staying Active
Activity Tips!

Active PLAY is the best way for your child to be physically active

Fun Active Play Ideas!

- Play with different size balls
- Play with balloons – punch, kick or throw them to keep them off the ground
- Play games – try hide-and-seek, obstacle courses, follow the leader or tag games
- Take your new SKIP Frisbee to the park for some throw and catch fun!
- Move to music or try action songs like ‘Ring-a-Rosie’ or ‘Head, Shoulders, Knees and Toes’
- Twirl and run with streamers
- Blow bubbles and chase them through the air
- Pretend to move like animals

Sourced from www.healthyactive.gov.au

Figure 25 Example parent information sheet – Activity Tips

Module One Children's Information Sheet



SKIP loves to play with his friends at nursery. He is learning to skip, it is great fun and it makes his bones and muscles strong. You can learn to skip too if you don't already know how to. You and your friends will soon have some new ropes to learn with and your nursery teacher will have a new book that has lots of skipping games for you to try.

SKIP loves to eat fruit, it tastes really nice. Fruit has lots of things inside them called vitamins which help you stay healthy; gives you nice skin, shiny hair and helps you to grow strong.

This is SKIP's favourite fruit  do you know what it is called?

Here are some more to guess



What is your favourite fruit? Can you draw a picture of it?

Activities – fruit tasting sessions, art sessions involving fruit, fruity songs and rhymes

SKIP is going to help you, your family and your nursery teachers learn new ways to stay healthy. We are going to make a picture board which will have things for your mum and dad to read and a space where you can put your pictures or photographs. Don't forget to tell your mum and dad to have a look!

SKIP hopes you have fun trying new fruits and flavours!

Figure 26 Example children's nursery information sheet



Snack Ideas



SNACK Wholemeal toast fingers, yoghurt (for dipping) and banana slices

Suggested portion sizes	1-4 year olds As shown in the photo	1-2 year olds		3-4 year olds	
		1-2 year olds	3-4 year olds	1-2 year olds	3-4 year olds
Wholemeal toast fingers	20g	17g	25g	17g	25g
Yoghurt	30g	25g	35g	25g	35g
Banana slices	40g	40g	40g	40g	40g
Milk	100ml	100ml	100ml	100ml	100ml

These portion sizes are based on the nutritional needs of a typical 2½ year old.

Sourced from the CWT. (The Caroline Walker Trust, 2007-2012)

Figure 27 Example parent information sheet – Snack ideas

Family Challenge
Eating well

The Carrot Challenge!

This week you have been given some carrots. What can you do as a family with your carrots? You can be as imaginative as you like! Remember to encourage the children to help with the challenge.

Take home your carrots

Decide as a family what you are going to do

Cook or create something

Take a photograph or draw a picture of your creation

Don't forget to take your photo/picture to nursery!

Ideas

- Grate your carrots into a salad
- Make a carrot cake
- Add to soup
- Make a 'vegetable face'. Cut the carrots into circles to use for eyes

Figure 28 Example sheet of family cooking challenge – The Carrot Challenge

6.7.3.3 Intervention end

At completion of the final module session, the intervention children were presented with a certificate of achievement (Figure 29), a fruit or vegetable shaped character toy and a skipping rope. The nursery schools received a fifty pound gift voucher to purchase new school resources.



Figure 29 SKIP certificate of achievement

6.7.4 Rationale for intervention materials

As discussed in section 6.6.2, it is important that a behaviour change intervention has a theoretical underpinning. Behaviour change techniques were identified from Operant Conditioning and Social Cognitive Theory. Table 18 links the behaviour change technique and the application of the technique to the material/activity designed fulfil the specified application. For example it can be seen that to 'prompt self-monitoring of

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behaviour' the families were requested to complete monitoring sheets, 'Our family achievements' sheet, No TV challenges and to contribute the shared photo board.

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Table 18 Rationale for intervention materials and activities

Behaviour change technique	Application	Material/activity
Goal setting	Staff with parents Staff with children Parents with children	Goal setting meetings Goal setting and monitoring sheets 'Our family achievements' sheet
Prompt self-monitoring of behaviour	Staff with parents Staff with children Parents with children	Monitoring sheets 'Our family achievements' sheet No TV challenges Shared photo board
Model/demonstrate behaviour	Parents encouraged to buy/eat healthy snacks in front of child Staff and parents model 'active' behaviours	Healthy snacks and breakfast information sheets Diet and PA information sheets Goal setting activity
Prompt practice	Staff and parents model 'active' behaviours Breakfast/snack alternatives Pictorial resources Alternate activity ideas Government information Outdoor spaces Plan ways to overcome barriers	Diet and PA information sheets Nursery-led activities Healthy snacks and breakfast information sheets Self-reflection sheets 'Sharing tips' sheets Providing fruit and vegetables No TV challenges Frisbees
Provide rewards contingent on successful behaviour	Feedback of achievements Praise Self-reward Reward chart Nursery party	Monitoring sheets Family goals sheets Sharing of photographs Reward sticker chart Promotion of authoritative parenting Nursery celebration/activities
Provide instruction on how to perform the behaviour	Breakfast/snack alternatives Pictorial resources Alternative activity ideas Government information Outdoor spaces Plan ways to overcome barriers	Diet and PA information sheets Nursery-led activities Healthy snacks and breakfast information sheets Self-reflection sheets 'Sharing tips' sheets
Provide information	Breakfast/snack alternatives Pictorial resources Alternative activity ideas Government information Outdoor spaces Plan ways to overcome barriers	Diet and PA information sheets Nursery-led activities Healthy snacks and breakfast information sheets Self-reflection sheets 'Sharing tips' sheets
Set graded tasks	Staff with children Staff with parents Activity sheets	Goal setting activity No TV activities Cooking Challenges Sharing ideas/tips
Provide information about other's approval/behaviour	Staff with children Staff with parents Activity sheets	Shared notice board 'Sharing tips' sheets
Prompt barrier identification	Plan ways to overcome barriers within staff/parent goal setting	Self-monitoring sheets Parent/staff meetings
Relapse prevention/coping	Plan ways to overcome barriers	Self-monitoring sheets

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within staff/parent goal setting	Parent/staff meetings
Feedback of achievements	Shared notice board
Praise	Information sheets i.e. rainy day activities
Self-reward	Reward sticker chart
Reward chart	Nursery celebration/activities
Nursery party	

6.7.5 Intervention timeline

As discussed in Chapter 3, interventions which last between six months to one year are thought to be more effective than shorter or longer ones (Bautista-Castano *et al.*, 2004). The time limitation of the overall study and the school terms and timetable dictated that, for this study, a six month intervention would be the most feasible option.

6.8 Nursery practitioner training

As previously discussed in the project aims and objectives (section 3.13) the intention was that the intervention should be delivered by the NPs. This was partly to address the issue of sustainability as well as creating an environment for the families and children conducive for positive behaviour modelling. If the NPs are involved in the delivery of the intervention they are more likely to feel a connection with the project and may feel motivated to continue with the behaviour change activities and healthy practices.

The NPs were invited to attend a training session; this provided the NPs with the relevant information and skills to deliver the intervention.

Delivery of the intervention is underpinned by the Family Partnership Model; this implies a sharing of information, responsibility, skills, decision-making and accountability (Pugh *et al.*, 1987). The Family Partnership Model focuses on the process of 'helping', that is, 'helper qualities, helper skills and the helping process' (Davis *et al.*, 2002). Figure 30 illustrates the stages. Working through each stage of the process will aid the NPs 'working' relationship with the parents. Each stage of the process is explained below:

Relationship:

It is important, that a relationship with the parent is established and that trust and communication are built upon. Parents need to feel that the helper (practitioner) will not judge them. Some parents may view practitioners as someone who is superior to them and thus may find communication difficult. The overall experience of being respected, listened to and involved can aid the relationship process.

Exploration (Exploring the issues with parents):

The helper and parent work together to explore the issues of the SKIP programme. Are there any issues with eating behaviour, sedentary behaviour and activity that affect the parent/family? What do the parents think of their current situation/practices? Together the family 'picture' can be established, what is the context, what are the parent/family's strengths and weaknesses?

Model (Identifying and building on strengths of parents):

If the parent feels any change is necessary, the parent is encouraged to think about which techniques and skills they already have which may facilitate change. The helper will discuss the techniques and skills and if necessary may help to develop some alternative views and techniques. Sometimes simply talking about their situation may provide new insights that will enable change. For example the parent may present the 'model' that her child will not eat breakfast, the helper may challenge this statement and suggest alternative strategies (an alternative 'model'). The 'model' decided needs to be clarified by both parties.

Setting goals:

The parent is encouraged to set their aims and goals in relation to eating, sedentary and active behaviours. Aims are seen as more general outcomes and goals are more specific. It is important that the goals are discussed in detail as parents may have unrealistic expectations of what they can achieve.

If the parent feels there is more than one issue she/he would like to tackle, the goals can be broken down and prioritised; this may make any changes more manageable. Goal setting may strengthen a parent's self-esteem and build and enhance problem-solving skills which can be transferred to other areas in their life.

Planning action (coping, problem solving):

The parent and helper will evaluate the aims and goals and identify if any barriers exist for implementing the goals. Exploring and discussing possible solutions together will draw on the parents own experiences and resources.

Implementation:

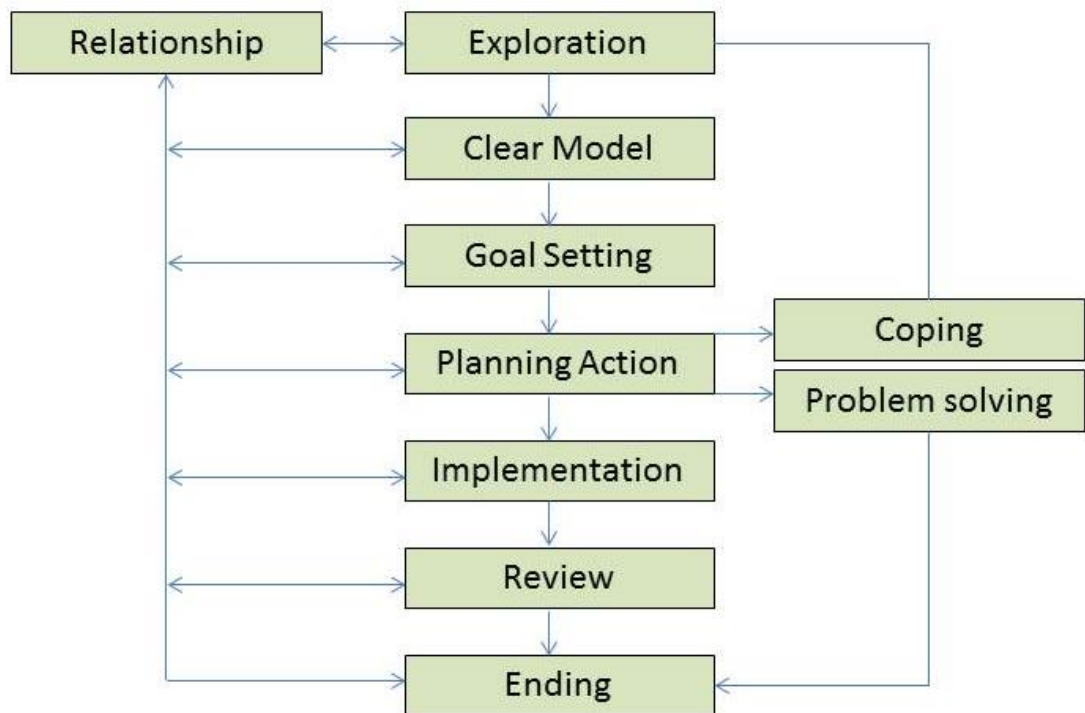
It is important the parent feels prepared to carry out the changes agreed. The helper can assist by supporting the parent emotionally and practically. It may be necessary to monitor and review practical issues if unforeseen difficulties arise.

Review (Evaluation):

The helper and parent discuss whether the parent felt the strategies to implement their goals were successful. Certain areas that the parent felt were difficult/ not successful may need to be revisited and the next steps agreed. It is important that the parent acknowledges theirs and their family's success and efforts.

Ending (next steps):

It is important that the parent knows when the monthly sessions will end. An agreed plan/next step strategy may help the parent to sustain any changes in their family's lifestyle.



Adapted from Davis, Day & Bidmead (2002), *Working in partnership with parents: the parent advisor model*, Harcourt Assessment

Figure 30 Stages of the working in partnership model

The NPs also received information about parenting styles, as discussed in section 2.5.2; an authoritative style of parenting was found to be instrumental in facilitating the development of a child's self-control and healthy eating habits (Vereecken *et al.*, 2004). Practical examples of authoritative feeding methods were given to the NPs enabling them to support parents in feeding methods and skills.

Furthermore, NPs received information about the nutritional needs of young children and the latest advice regarding physical activity and sedentary behaviours in preschool children was provided.

6.8.1.1 SKIP programme timeline

Table 19 illustrates the monthly information and activities for nursery staff, parents and children who participated in the SKIP programme. The practical aspect of the intervention lasted five months.

Table 19 SKIP programme timeline

Month	Module title	Staff activities	Parent activities	Children's activities
1	Information and recruitment	Staff training	Complete diaries	Wear activity monitor Photograph food intake
2	Introductory session	Meet with parents Activities with children Set up notice board	Reflection and goal setting Information sheets :Activity Tips and Eating well for 3-5 year olds Our family achievement monitoring sheets	Fruit tasting sessions SKIP's songs – Apples and Bananas
3	Five-a-day and portion sizes	Meet with parents Activities with children Update notice board	Reflection and monitoring of goals Information sheets: Snack tips, Five-a-day tips, portion size advice, snack and breakfast ideas, activity tips. The monthly challenges: The Carrot Challenge, No TV day. Our family achievement sheet. Our family reward chart. Sharing tips	Rope and playground games Make No TV signs Ideas instead of watching TV Activities with carrots SKIP's song- The Good Food Song
4	Active play	Meet with parents Activities with children Update notice board	Reflection and monitoring of goals Information sheets: Meal times and drink facts, Snack and breakfast ideas, Active play. Monthly challenges: The Apple Challenge, NO TV for 2 days, Family Active challenge. Our Family achievement sheet. Rewards. Sharing tips	Playground games and rope skills Importance of breakfast No TV signs and ideas Activities with apples

SKIP's song – Round the Apple Tree

Month	Module title	Staff activities	Parent activities	Children's activities
5	Vegetable tasters	Meet with parents	Reflection and monitoring of goals	Family activity ideas
		Activities with children	Relapse prevention and coping	No TV ideas
		Update notice board	Information sheets: My child doesn't like vegetables, Snack and breakfast ideas, Rainy day activities. Monthly challenges: The Broccoli Challenge, No TV for 3 days, Family Active challenge. Our Family achievement sheet. Rewards. Sharing tips	Activities with broccoli and vegetable tasting sessions and games SKIP's song – Oh do you eat your vegetables?
6	Go Bananas!	Meeting with parents	Reflection and monitoring of goals	Ideas for no TV
		Activities with children	Information sheets: Snack Swaps, Snack and breakfast ideas, Make walks interesting. Monthly challenges: The Banana Challenge, No TV for 5 days, Family activity challenge. Our Family achievement sheet. Rewards. Sharing tips	Activities with bananas
		Update notice board		No TV and end of programme party SKIP's song – Buy me a banana

6.9 Intervention sustainability

In any intervention it is important to address the issue of sustainability and to ensure that any new learned behaviours can be embedded into routine practices (May and Finch, 2009). As discussed in the literature review (Chapter 2), Lobstein (2006) highlights the importance of considering how an obesity prevention intervention will continue once the research team has left.

In this project the nursery practitioners received training to deliver the intervention, as it was discussed in 6.8, it was hoped that this would encourage ownership of the project leading to long-term interest and sustainment of the core messages and activities. Furthermore, as previously described, the use of branded resources with the study logo may remind and encourage NPs and parents to continue with positive learned behaviours.

Additionally, in order to develop longer-term sustainability and the embedding of such an intervention, future work following this feasibility study could be developed to address policy and practice. A pilot study based on the current work leading to an RCT may aid the development of a national resource which would include tested strategies for delivery to be implemented by nursery settings. This in turn could be subject to monitoring and inspection by Ofsted.

6.10 Recruitment to the intervention

Nursery schools in Newcastle and Gateshead were sent study information and letters of invitation to participate. The letters were followed up by a telephone invitation. Participating schools were asked to distribute study information to parents. 'Recruitment days' were held at each nursery to enable me to invite parents to sign up to the study in person. Baseline outcome measures were taken before the participating schools were randomised to 'intervention' or 'control/delayed intervention'. In order to reduce selection bias the nursery schools were allocated to intervention or control/delayed intervention by the Newcastle University Clinical Trials Unit. Figure 31 illustrates the process of how schools and parents were recruited to the intervention phase of the study. It can be seen that 3 months was allocated to the recruitment process; this included recruitment of schools and parents to the intervention. The figure

also shows how the schools were randomised and the process following randomisation.

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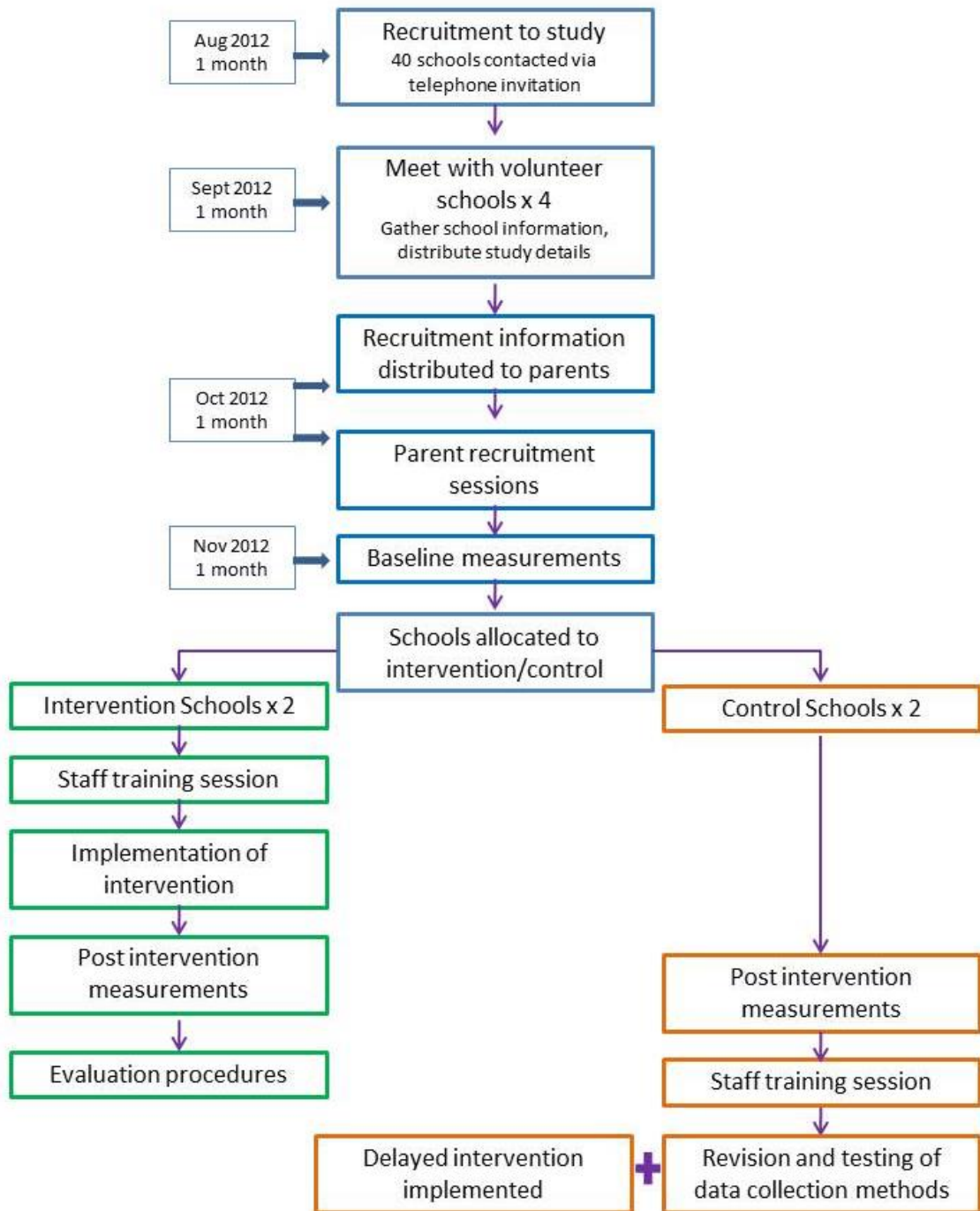


Figure 31 Recruitment and intervention process flowchart

6.11 Outcome measures

6.11.1 Introduction

Part of the feasibility study was to determine which data collection methods and tools would be acceptable to parents and children. Data collected in relation to the project aims at baseline and intervention end for four days (two week/ two weekend days) were:

- Parent-completed food diary of child's consumption
- Parent-completed TV/DVD viewing of child
- Family 'active time' (going for walks, swimming and so on)
- Child physical activity (measured by Actigraph accelerometer or pedometer)
- Photographs of food consumed taken by child

Children's anthropometric data were also collected in the form of height and weight to calculate BMI and BMI percentile score.

Table 20 summarises the outcome measures and the tools used to collect the data and provides a rationale for each method.

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Table 20 Summary of outcome measure methods

OUTCOME MEASURE	TOOL	RATIONALE	PROS/CONS
Sedentary behaviour	Parent completed 4 day TV/DVD record	Proxy measure for SB	Cheap. Prone to social desirability bias.
	Accelerometry	Robust measure – validated in preschool children	Expensive and needs specialist training for analysis.
Physical activity	Accelerometry	Robust measure - validated in preschool children	Expensive and needs specialist training for analysis.
	Pedometers	Reasonable estimation of moderate physical activity	Cheap. Provides a visual record to parents which may encourage compliance.
	Parent completed family 4 day activity diary	Provides context	Easy to record. Does not provide an accurate assessment of activity. Prone to social desirability bias.
Diet	Parent/researcher completed 4 day food diary	Validated measure for young children	Captures patterns in lifestyle habits Prone to desirability bias.
	Digital cameras	Involves children in the data collection process. Provides context to the food diaries	Experimental design. Added qualitative insight.
Anthropometric	BMI	Can be used to compare adiposity within and between populations	Cheap, easy to measure. Other methods are more reliable

6.11.2 Rationale for data collection schedule and methods

Diet

There are many methods used to collect dietary data from a specified population. These include bio-markers and doubly-labelled water; however, these methods are labour-intensive, expensive and can be intrusive for the participant. The most common method used in health research is self-completed questionnaires and include 24 hour recall, food frequency questionnaires and weighed diaries. Measurement of dietary intake is complex and the most appropriate method will depend on: the objectives of the surveillance; the type of data required; available resources and the population of interest (Roberts and Flaherty, 2010). Consequently, a number of tools have been developed in intervention studies with children and/or adults. Young children are unable to record their own dietary consumption; therefore, a tool that can be completed by a parent/guardian/care-giver is required. One such tool which was developed by Newcastle University (see 6.11.3.1) was selected as appropriate for the current study.

Sedentary behaviour

The recording of the child's TV/DVD viewing was intended as a proxy measure for sedentary behaviour. This is common practice in interventions with young children (see section 2.6.1) and is a self-reported measure completed by parents/care-givers.

Physical activity

As discussed in section 2.7.3, the most common method used, due to its ease of use and financial advantage, is 'self-report'; this may lead to recall bias and has limited validity and reliability among children (Trost *et al.*, 2001). Reilly *et al.* (2003a) found that the use of accelerometry was a practical way to measure PA activity even in young children. Although accelerometers have been validated for use in preschool children a lack of availability and resources in the current study meant they were not able to be used initially (see section 6.11.5.2).

6.11.3 Measurement methods

In line with the validated FAST diary (see next section), a 4-day diary (2 weekday, 2 weekend days in order to capture patterns in lifestyle habits) was developed (Appendix

l) to incorporate the child's food consumption, the TV/DVD viewing and the family's 'active time'. One single diary was developed in an attempt to simplify the process and ease participant burden. A validated tool to measure 'family active time' was not available in literature; therefore, the diary was developed to incorporate a section for parent's self-report. The adapted diary was piloted by a university staff member and one other, both of whom had young children. Following their comments, the diary was redrafted (page order re-arranged) to be more 'user-friendly'.

6.11.3.1 Food diary

The food diary section was adapted from the Food Assessment in School's Tool (FAST) (Adamson *et al.*, 2003). The FAST tool was developed and validated by Newcastle University in Collaboration with Dundee University to allow access to the diets of large groups of primary age school children. The tool incorporates elements of a food diary and a food frequency questionnaire. Each day in the diary is divided into six time slots:

- 6.00 am to 9.00 am
- 9.01 am to 11.00 am
- 11.01 am to 2.00 pm
- 2.01 pm to 4.00 pm
- 4.01 pm to 7.00 pm
- 7.01 pm to 11.00 pm

Each timeslot contains a pre-printed list of frequently consumed foods with a space for ticking; each timeslot also contains a section of blank lines for writing in other unlisted foods. The list of foods was determined from the National Diet and Nutrition Survey (NDNS) database (Gregory *et al.*, 1995; Gregory *et al.*, 2000); this enabled a selection of the foods most commonly eaten in each timeslot. The NDNS survey data for children aged 3 to 7 years was used to determine standard age and sex specific portion sizes (Griffiths *et al.*, 2002), therefore, it was suitable for use in children aged 3-5 years. Figure 32 shows an example of three time slots of the food diary page. The parent completes the diary whilst the child is at home and researchers observe and record the child's food consumption whilst at nursery.

Day 1

Home lunch
School lunch
Pack lunch



6.00am - 9.00am Time slot 1	<input type="checkbox"/> White bread or toast <input type="checkbox"/> Wholemeal bread or toast <input type="checkbox"/> Margarine <input type="checkbox"/> Butter <input type="checkbox"/> Jam or preserves <input type="checkbox"/> Weetabix <input type="checkbox"/> Cornflakes <input type="checkbox"/> Frosties	<input type="checkbox"/> Coco Pops <input type="checkbox"/> Rice Krispies <input type="checkbox"/> Milk full-fat with cereal <input type="checkbox"/> Milk, semi-skimmed with cereal <input type="checkbox"/> Banana <input type="checkbox"/> Egg <input type="checkbox"/> Yoghurt <input type="checkbox"/> Sugar	<input type="checkbox"/> Biscuits—not chocolate <input type="checkbox"/> Biscuits—chocolate <input type="checkbox"/> Orange juice, unsweetened <input type="checkbox"/> Apple juice, unsweetened <input type="checkbox"/> Milk, full-fat drink <input type="checkbox"/> Milk, semi-skimmed drink <input type="checkbox"/> Squash—reduced sugar	<input type="checkbox"/> Squash <input type="checkbox"/> Tea with milk <input type="checkbox"/> Water Others _____ _____ _____
9.01am - 11.00am Time slot 2	<input type="checkbox"/> White bread or toast <input type="checkbox"/> Wholemeal bread or toast <input type="checkbox"/> Margarine <input type="checkbox"/> Butter <input type="checkbox"/> Jam or preserves <input type="checkbox"/> Apple <input type="checkbox"/> Banana <input type="checkbox"/> Pear	<input type="checkbox"/> Tangerine, mandarin, satsuma <input type="checkbox"/> Crisps or savoury snacks <input type="checkbox"/> Biscuits—not chocolate <input type="checkbox"/> Biscuits—chocolate <input type="checkbox"/> Chocolate bar <input type="checkbox"/> Chocolate sweets <input type="checkbox"/> Sweets (not chocolate)	<input type="checkbox"/> Orange juice, unsweetened <input type="checkbox"/> Apple juice, unsweetened <input type="checkbox"/> Milk, full-fat drink <input type="checkbox"/> Milk, semi-skimmed drink <input type="checkbox"/> Squash—reduced sugar <input type="checkbox"/> Squash <input type="checkbox"/> Fizzy drink <input type="checkbox"/> Diet fizzy drink	<input type="checkbox"/> Water Others _____ _____ _____
11.01am - 2.00pm Time slot 3	<input type="checkbox"/> White bread or toast <input type="checkbox"/> Wholemeal bread or toast <input type="checkbox"/> Margarine <input type="checkbox"/> Butter <input type="checkbox"/> Cheese <input type="checkbox"/> Cheese spread / triangle <input type="checkbox"/> Baked beans <input type="checkbox"/> Fish fingers <input type="checkbox"/> Ham <input type="checkbox"/> Chicken or turkey (not nuggets) <input type="checkbox"/> Sausage roll <input type="checkbox"/> Tuna, tinned <input type="checkbox"/> Eggs, boiled <input type="checkbox"/> Pasta, tinned, in tomato sauce	<input type="checkbox"/> Oven chips <input type="checkbox"/> Chips—fried <input type="checkbox"/> Potatoes—other <input type="checkbox"/> Peas <input type="checkbox"/> Sweetcorn <input type="checkbox"/> Carrots <input type="checkbox"/> Cucumber <input type="checkbox"/> Tomato <input type="checkbox"/> Crisps or savoury snacks <input type="checkbox"/> Ketchup <input type="checkbox"/> Gravy <input type="checkbox"/> Apple <input type="checkbox"/> Banana <input type="checkbox"/> Tangerine, mandarin, satsuma	<input type="checkbox"/> Grapes <input type="checkbox"/> Strawberries <input type="checkbox"/> Raisins <input type="checkbox"/> Biscuits—not chocolate <input type="checkbox"/> Biscuits—chocolate <input type="checkbox"/> Yoghurt / fromage frais <input type="checkbox"/> Cake or sweet pastry <input type="checkbox"/> Custard <input type="checkbox"/> Chocolate bar <input type="checkbox"/> Sweets (not chocolate) <input type="checkbox"/> Orange juice, unsweetened <input type="checkbox"/> Squash—reduced sugar <input type="checkbox"/> Squash	<input type="checkbox"/> Fizzy drink <input type="checkbox"/> Diet fizzy drink <input type="checkbox"/> Water Others _____ _____ _____ _____ _____ _____ _____

Figure 32 Example page of food diary

6.11.3.2 Digital cameras

The use of recording dietary intake using digital cameras has been trialled in previous studies using adults and older children (8-16 years) (Wang *et al.*, 2006; Higgins *et al.*, 2009; Dahl Lassen *et al.*, 2010; Svensson *et al.*, 2012). A digital camera may provide documentation of what and how much is being eaten and the context of the eating occasion, be it, at home at a table, at a restaurant and so on (Svensson *et al.*, 2012). It has been suggested that the use of visual data methods may be appropriate for the study of 'everyday' occurrences, that is, seeing taken for granted routines in a new light. Furthermore, visual methods may be more acceptable to certain social groups such as children (O'Connell, 2013). In comparison with diet diaries, a photographic record does not offer any more accuracy, however, it is a tool that can be used by preschool children and involves them in the data collection process.

6.11.4 Sedentary behaviour

6.11.4.1 TV/DVD diary

The parents were asked to record how often and how long their child watched TV or DVDs over the four day period. Computer type games and consuls were not included in this record as this was shown in the physical activity mapping exercise to be an activity that very few children in this age group participated in. Moreover, most literature concerning preschool children's sedentary behaviour tends to focus on TV viewing (section 2.6.1).

6.11.4.2 Accelerometers

Some of the children were given accelerometers to wear. Accelerometers have been shown not only to be effective in measuring physical activity in preschool children but also sedentary behaviour (section 2.6.1).

6.11.5 Physical activity

6.11.5.1 Family 'active time'

Parents were asked to record how often the family participated in an activity together. Examples were given to aid completion of this section, these included: going for a walk on the beach, going swimming, or playing in the park.

6.11.5.2 Child's physical activity

Pedometers were used to measure the children's physical activity in the first instance as there were no Actigraph accelerometers available for use and the project budget did not allow for purchase of these items. However, this provided an opportunity to test pedometer use. As discussed in 2.6 the use of accelerometry is expensive and requires specialist knowledge and training. Previous research reports that the Japanese brand 'Yamax Digiwalker' is the most reliable pedometer to use for research purposes. However, there were no Yamax pedometers available to purchase in the UK in the required time; time constraints dictated that a lesser known model was purchased.

Accelerometers were made available for use later in the data collection process through the Gateshead Millennium Study, Table 21 illustrates how the activity monitors were allocated to each nursery. It was decided to go ahead with the accelerometer use as it would provide a more robust measurement of physical activity and sedentary behaviours. The 1-minute sampling interval which is typically used for accelerometry was changed to a 15-second sampling interval; this was to allow for the possible masking of the short intermittent bursts of activity that is typical of young children (Pate *et al.*, 2004). Furthermore, it would provide experience of young children’s acceptability of accelerometer use. Finally, it would serve as an interesting comparison with the pedometer use; a previous U.S study with 8-10-year-old children indicated that pedometers were a cheap reasonable estimation of moderate physical activity (Rowlands and Eston, 2005). Furthermore, a 2007 Belgian study comparing pedometer and accelerometer use in preschool children concluded that daily step counts in preschool children give valid information on physical activity levels. The average daily step count in preschool children in the Belgian study amounted to 9,980. A daily step count of 13,874 equates to 1 hour MVPA (moderate to vigorous physical activity) which was reached by only 8 per cent of children in the Belgian study (Cardon and De Bourdeaudhij, 2007).

Table 21 Pedometer and accelerometer allocation

School	Baseline (n)	Follow-up (n)
Intervention 1	Accelerometers (7)	Pedometers (5)
Intervention 2	Pedometers (7)	Pedometers (5)
Control/delayed int. 1	Accelerometers (11)	Pedometers (9)
Control/delayed int. 2	Pedometers (7)	Pedometers (7)

6.11.6 Anthropometric measures

The children’s height and weight was measured by myself and an accompanying undergraduate student whilst the child attended their normal nursery session. Weights were recorded using Tanita scales and heights using a Leicester Height Measure. Due to the short time-scale of the intervention, changes out-with the normal growth rates

are not expected. However, the process and the acceptability of the methods were being recorded.

The BMI calculation was made using an online NHS calculator tool (NHS, 2010a) and the results interpreted using the UK-WHO growth charts for children aged 0-4 years (Department of Health, 2009). In children over the age of 2 years, the BMI percentile is a better indicator of a child's thinness or fatness. A child whose weight is healthy for their height will have a BMI between the 25th and 75th percentiles. A BMI above the 91st percentile suggests that the child is overweight and a BMI above the 98th percentile is recorded as clinically obese.

6.12 Intervention recruitment methods

6.12.1 School recruitment

Forty schools across Gateshead and Newcastle were contacted via letter and follow-up telephone call inviting them to participate in the SKIP project. Half of the recruited schools would receive the intervention first whilst the second half, acting as control schools, would receive a delayed intervention; thus incorporating the 'action research' model.

6.12.2 Parent recruitment

Letters for parents were disseminated via staff members providing study information and inviting participation. It was felt that face-to-face recruitment may prove effective and would give parents the opportunity to ask questions therefore 'recruitment days' were organised for each school. I arranged with the school staff to be present, with an undergraduate placement student assisting, at the nursery session drop-off and collection times. The parents were approached and invited to sign-up to participate in the study.

6.12.3 Observations and field notes

As described in section 6.11.3.1, myself and a colleague (an undergraduate placement student) observed and recorded the children's dietary consumption whilst attending their normal nursery session. The plan was that the parent/child would transfer the diary between home and nursery for completion. However, as described in section 7.5,

the diaries were not always available for use. Therefore, observations were recorded separately and entered into the diary at a later date.

As part of the evaluation and process measures to record NP, children and parent engagement with intervention I wrote detailed field notes after visits to the nursery (the placement student who was not always present on subsequent visits was not obliged to do so). The notes also allowed me to consider the finer nuances of the data collection process and intervention participation. For example I was able to observe NP behaviour in relation to eating behaviour modelling and interactions between staff and/or parents which may have had an impact on the acceptance of the process.

6.13 Intervention costs

Assessing cost-effectiveness of an intervention is an integral part of the MRC framework – Developing and evaluating complex interventions (Craig *et al.*, 2008b). Estimated costs for the SKIP intervention implementation for four schools were calculated prior to implementation. This was also essential for application of funding for the project. Table 22 illustrates the break-down of estimated costs. The total estimated costs amounted to £4069 this equates to just over £1000 per school. The stated costs did not include the intervention co-ordinator time (LM) or the NP's time as this was expected to be part of the normal daily role.

Table 22 Estimated costs of SKIP intervention for 4 schools

Activity	Items	Cost
Data collection	Digital cameras	£500.00
	Food/TV/activity diaries	£546.32
	Focus groups and training sessions	£200.00
Printing	Consent forms	£1050
	Project information sheets	
	Staff training manuals	
	Rewards charts	
	Certificates of achievement	
	Information packs, activity sheets, goal setting sheets	
	Recipe sheets	
	Posters for nursery SKIP display boards	
Rewards and incentives	Branded Frisbees	£92.50
	Reward stickers	£66.60
Physical activities	Skipping ropes	£247.88
	Skipping games activity book	£71.80
Intervention activities	Vegetable/fruit packs	£560.00
	Vegetable/fruit bags	£25.10
Participant payments	Gifts for intervention children	£508.85
	Gift vouchers for school	£200.00
Total		£4069.05

6.14 Chapter summary

This chapter outlined the development of the methods for a behaviour-change intervention to be implemented by NPs in a nursery school setting with preschool children and their families. A review of the literature, analysis of the preliminary qualitative study and NPs and parent's involvement contributed to the design. The five aims of the project were identified as: reduce the consumption of high energy-dense

snacks; increase the consumption of and the awareness of the importance of a healthy breakfast; reduce TV viewing; increase physical activity in nursery; and increase family active time. It is important that an intervention design has a theoretical underpinning and the behaviour change models Social Cognitive Theory and Operant Conditioning were identified for this study. A modified Action Research model was adopted to enable on-going analysis, evaluation and modification of the intervention methods and design in each school. The intervention materials for this programme were developed from existing resources such as Change4Life, The Caroline Walker Trust, The Australian Government, and suggestions/ideas from the nursery practitioners' focus group session. A six-month intervention programme was outlined with detailed monthly activities for nursery staff, parents and children.

The outcome measures for the intervention included a four-day parent completed record of their child's dietary intake, the child's TV viewing and the family's 'active time'. The children's physical activity was recorded using Actigraph accelerometers or pedometers and the children were given digital cameras to record their dietary intake. This enabled the children to participate in the data collection process and provided context to the food diaries.

As endorsed by the MRC framework, estimated costs for the intervention were calculated and assessed prior to commencement.

The next part of this PhD thesis reports the results from the application of the outcome measures. The process of the intervention implementation and feedback from the nursery practitioners and participating parents about the intervention in three nursery schools is also reported.

Part Three

Intervention Implementation and Results

Chapter 7 – Recruitment and application of outcome measures

Chapter 8 - Intervention Implementation and Feedback

Chapter 9 - Delayed Intervention and Feedback

Chapter 7 Recruitment and application of outcome measures

7.1 Introduction

This chapter presents the results of recruitment for the intervention and the compliance with the data collection methods. The challenges of recruiting schools and parents to an intervention study are discussed. The data collection process is discussed and the outcome measure results are reported.

7.2 Sampling and school recruitment

As discussed in section 3.10, the main focus for this study was preschool children aged 3-5 years which local authority nursery schools and nursery classes specifically cater for. It has been reported that families from a disadvantaged background are more likely to access preschool provision in nursery classes or schools as described above.

Therefore, the key sampling criteria was any family with a preschool child (3-5 years) who attended a local authority nursery school or class attached to a primary school.

A convenience sampling strategy was employed to recruit nursery schools/classes to the intervention. As previously discussed, 40 nursery schools/classes in the Newcastle and Gateshead area of the North East of England were contacted. There are approximately 67 nursery classes and nursery schools within the catchment areas of Newcastle and Gateshead. Many schools had previously taken part in Newcastle University research and had expressed an interest to take part in further research. The remaining schools were sourced using the council schools websites. Ideally, if all the schools had responded, a small random sample of the 40 schools would have been selected based on the demographic profile of the whole sample such as employment status and location. However, only 4 schools responded, as this was a feasibility study and the recruitment methods were being tested, those schools who volunteered to participate in the study were recruited and the convenience sample was accepted. Therefore, the final sample may not necessarily be representative of the whole sample; if this was a full trial and not a feasibility study, this could be regarded as a limitation.

Figure 33 presents a map representing the location of the contacted schools; it can be seen that schools located over a wide area of Newcastle and Gateshead were contacted. The whole school provision (primary schools with classes attached) for

pupils ranged from 140 to 475 pupils per school (average 300). Nursery provision was mainly limited to one class (numbers were not all specified on school websites).

Following invitation by letter and follow-up telephone call to the 40 schools, four schools expressed an interest to participate in the SKIP project. The volition of the nurseries to participate in the intervention suggests that they have 'a reason to care and are ready to change' (Aras, 2011, p. 422) which social marketing literature reports should aid the delivery of the intervention. Face-to-face meetings were arranged to discuss the project further. Three of the schools were based in Gateshead and one in Newcastle (the participating schools are coloured with turquoise dots on the map). All four schools were classes attached to primary schools, as discussed in section 3.10 families from a disadvantaged background are more likely to access preschool provision in the form of nursery schools and nursery classes attached to primary schools. This enabled the convenience sample to match the targeted group.

In two schools a meeting was held with the primary school deputy head teacher and in the other two, with the nursery class teachers. After further liaison and information exchange, the school in Newcastle decided to withdraw from the study as they felt unable to commit the time required. Further communication with the schools from this point was done by email as it was difficult to speak to staff during class time.

Six months after the initial invitation letters had been distributed to the schools, an email was received from a community primary school with a preschool class in Newcastle. The head teacher expressed an interest to participate in the study and consented to take part, thus replacing the withdrawn school.

A sample size of four schools is considered to be sufficient for a feasibility study, the NHS (2012a) state that the sample size should be adequate to estimate the critical parameters for example, the recruitment rate. Lancaster *et al.* (2004) maintain that as a 'rule of thumb' 30 participants are required to estimate a parameter. Each recruited nursery class/ school catered for an average of 30 children (see section 7.3 for details), therefore approximately 120 families were potentially available for recruitment.

All four schools fell within the 10 per cent most deprived in the Index of Multiple Deprivation (IMD) 2007/2010 and within 10 per cent in the Health Deprivation and Disability domain (Gateshead Council, 2010; Newcastle City Council, 2011). IMD is a composite measure of deprivation including seven domains; income, employment,

health and disability, education, skills and training, barriers to housing and services, crime and living environment. This enables areas to be ranked by relative deprivation (GOV.UK, 2007).

As illustrated in Figure 33, three of the schools were in close proximity; two of which were situated only two streets apart. This raised the question of possible contamination between the two schools. One of the schools had been randomised to the intervention and the other to the control/delayed intervention, therefore there was a potential risk the staff members or parents in the control school may learn about the intervention before they were due to receive the delayed intervention. An article by Keogh-Brown *et al.* (2007) which discussed the contamination of trials of education interventions, stated that subjects from the same geographical area or social networks posed a high risk of intervention contamination. However, Torgersen (2001) maintained that consideration needed to be given to real potential threats and not theoretical ones. The risk of contamination in this case was high and in an RCT the sample size would have to be increased to address this. However, the present study is a feasibility study and does not evaluate the outcome of interest; that would be evaluated in a main study/trial.

Chapter Seven Recruitment and application of outcome measures

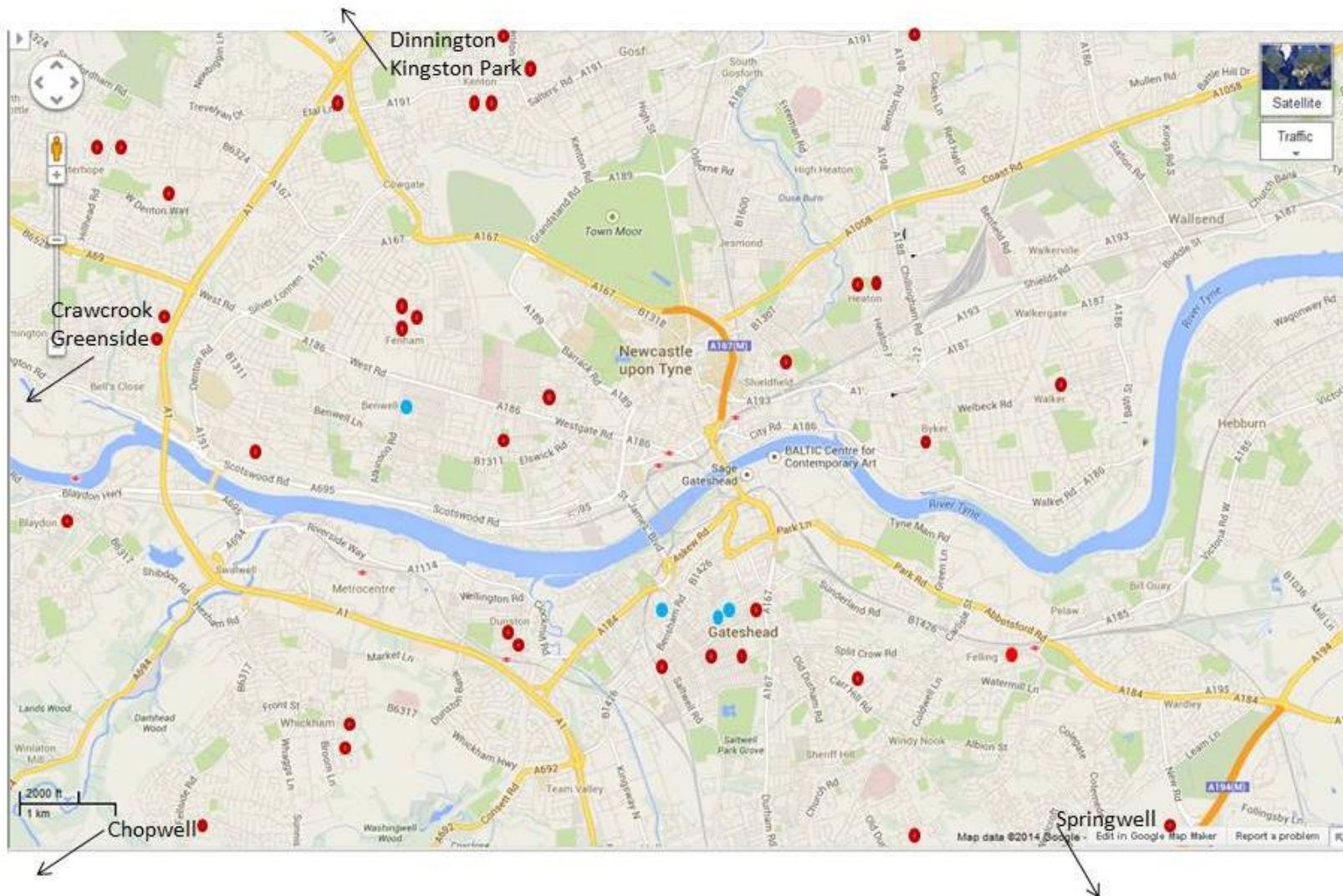


Figure 33 Location of contacted nurseries in Newcastle and Gateshead

7.3 Parent recruitment

An important aspect of phase three of the project was to ascertain likely parental recruitment to the intervention and retention rates. Study information and consent forms were disseminated via nursery staff members. Recruitment days were organised for each school; parents were approached by the researchers (myself and placement student) as they dropped off or collected their child from the nursery session. Table 23 illustrates the characteristics of the families who signed up to participate in the study. Information gathered included: parent gender; child gender; child age; whether the child attended their nursery place on a full-time or part-time basis; the parent's education level; and the parent's marital status. The parent's education level was regarded as a proxy measure for SES, however, it is acknowledged that a single proxy measure is unlikely to provide accurate information and ideally multiple proxy measures would be measured (Kolenikov and Angeles, 2009). Information regarding family size and nature of family (nuclear/blended) was not collected; this perhaps should be regarded as a limitation, as this type of information may have provided more insight into the different family situations and circumstances.

It can be seen that 36 parents out of 121 families in total consented to take part (30% response rate). The intervention schools had 43 children on their register and the delayed intervention 78 children; 15 families were recruited in the intervention schools (35%) and 21 in the delayed intervention (27%). 81 per cent of the parents were mothers and half the children were girls. Thirty-six per cent of parents had some additional training after leaving school and 19 per cent a university degree. The majority of parents reported being married or cohabiting (69%). The majority of the children were aged 3 years (81%). None of the children in the intervention schools attended a full-time session although some children in one nursery left or arrived after/before lunch and parents provided a pack-lunch. Just under half of the delayed intervention children (47%) attended a full-time nursery session; although some of the children in one of the schools attended nursery full-time for two and half days a week only.

Table 23 Study participants

	Intervention schools	Delayed intervention schools	Total
Families n (total number of families)	15 (43)	21 (78)	36 (121)
Parent gender M – F	3 – 12	4 – 17	7 – 29
Child gender M – F	5 – 10	13 – 8	18 – 18
Child age 3 years – 4 years	11 – 4	18 – 3	29 – 7
Child full time/part time (%)	0 – 15 (0 – 100)	17 – 4 (81 – 19)	17 – 19 (47 – 53)
Parent education (%)			
Some secondary school	1	3	4 (11)
Completed secondary school	6	5	11 (31)
Some additional training	5	8	13 (36)
Undergraduate education	2	1	3 (8)
Postgraduate education	1	3	4 (11)
Parent marital status (%)			
Single	4	7	11 (31)
Married/cohabiting	11	14	25 (69)

7.4 Recruitment challenges

The recruitment of parents relied on the passing on of information from the school staff in the first instance. After this the researchers attempted to approach parents whilst they were collecting or dropping off their child at their nursery session. Though this presented some challenges in one school where there was more than one door the parent could exit by, so if they were not approached when they entered the nursery, they may have been missed.

Previous studies have found that parents who feel that they have no association with the study in question will not take part in an intervention (Spoth *et al.*, 1996). That is, in the case of this intervention if the parent felt their family did not need to change or

review their eating and activity habits, they would be unlikely to want to participate. Many parents who declined to sign-up to the study cited a lack of time to be an issue; however, if the project/topic 'spoke' to them, this possibly would not have been a deterrent.

The completion of the parental consent and personal details forms took a few minutes. Additionally, part of the form layout, that is, the parent 'educational level' and 'marital status' sections required the parent to read a separate sheet before completing the sections; this required supervision by the researchers meaning that some parents may have 'slipped' past whilst we (the research team) was occupied with other families. This may have impacted on the final numbers of parents recruited.

As previously discussed (section 7.2), in two schools I met with the primary school head teachers and did not meet the with the nursery staff until the parent recruitment day. Some staff members seemed unsure of the reason for my presence and the purpose of the study. The nursery practitioners' lack of involvement in the beginning may have had a bearing on the nursery staff's knowledge and enthusiasm for the project, which may have been unwittingly transferred to the parents thus impacting the recruitment numbers (35% in intervention schools, 27% in delayed intervention schools).

7.4.1 How could parental recruitment be improved?

As discussed above, the initial involvement of the key 'ground' staff, that is, the class teachers and nursery practitioners in the project may have had a bearing on parental recruitment. It is not enough for the school head teacher to declare an interest in participating, it is essential that other staff members feel involved. The head teacher would not necessarily be the intervention leader. If the practitioners who will be delivering the intervention are enthusiastic, this perhaps will contribute to encouraging parents to take part. However, perceived benefits and threats of participation can vary greatly between individuals (Wanat, 2008), and the negativity of one member of staff may have undesirable consequences.

Secondly, the study information letter that was issued to the parents inviting participation was headed with the Newcastle University logo and signed by the researcher. The parents may be more willing to participate if they knew the project had been accepted and endorsed by the school/head teacher (Harrell *et al.*, 2000).

Finally, a joint meeting with staff, parents and the research team outlining the project and the procedures may remove some of the 'mystery' and uncertainty surrounding participation and build relationships. However, there remains the issue of persuading the staff and parents to attend the meeting at the outset.

7.5 Data collection process (baseline)

7.5.1 Introduction

As previously discussed (section 6.11), data were collected for four days, two week and two weekend days. Access to the nurseries for the two week days was arranged to enable observation. The data collection packs, which included the diary, digital camera, physical activity monitor and user instructions were given to nursery staff to distribute to the participating parents. The following sections highlight aspects of the process to provide contextual detail informing the acceptability.

7.5.2 Parental response

There were some initial technical problems with some of the digital cameras which caused some frustration with parents; however, this was quickly resolved with additional memory cards. A few parents had not brought in the food diaries to be completed at nursery this raised the question as to how many parents had actually started the recording process. One mother who had five children stated it had been a 'mad morning' and she hadn't had a chance to 'do that thing' [data collection]. In one school fewer parents fitted their children with the physical activity monitors and fewer diaries and cameras were sent in by parents on the second day. However, this may have been due to the annual 'Children in Need' fundraising day which saw many children dressed up and therefore took precedence over the data tasks.

7.5.3 Child response

Some children were reluctant to wear the physical activity monitors, however the majority complied with encouragement from the nursery staff or when they observed their peers wearing them. The children showed enthusiasm for having responsibility for the cameras. Some children were unsure about being weighed or measured; however, once they were accompanied and encouraged by staff members, they were happy to comply. Owing to the reluctance and age of the children, it was felt to be inappropriate

to ask them to do the measurements twice. Therefore, the children were only measured once so no average measurement could be taken. Only one child in the four schools refused to comply with the measurements.

7.5.4 Nursery practitioner response and observations

On the whole, the NPs were cooperative and tolerant of the researchers in the nursery and some assisted with the measurement process. However, a small number of practitioners appeared uncertain of the process and the reasons for observations. In one school where the children were provided with a pack-lunch from home, a staff member questioned the need to record the dietary consumption as the parents would '*know what the child had*' as it was school policy to send any un-eaten food home with the child; however, it was observed that, this was not always the case as some items were lost on the floor or binned. The same staff member also commented that she felt the children were too young to be participating in the data collection; it was uncertain whether she was commenting solely on the camera use or the whole process.

Three of the nursery schools had set 'snack' times whereby the children would eat together at a set time. However, the school which divided the children's weekly session into two full and one half day a week had an 'open snack' policy where food and drink was available for children to access during the day. Therefore, there was a requirement to observe the participating children for the full day's session, making the research team (myself and undergraduate student) a permanent fixture in the nursery for four days. The majority of nursery staff appeared happy with this arrangement; however, one staff member commented that she felt fewer children were eating snack than usual and implied that the team's presence was an influential factor.

7.6 Data collection process (follow-up)

The research team returned to the four schools to collect follow-up data and access to observe the children's dietary intake was arranged as before.

7.6.1 Parental response

Two families had moved away from the area and a further 4 families dropped out of the study (Table 24). One parent who had been very involved with the project completing all family tasks requested to withdraw from completing the follow-up data collection without giving a reason.

7.6.2 Child response

The children were more confident taking part with the anthropometric measures, this may have been due to them being familiar with the tasks or being slightly older.

7.6.3 Nursery practitioner response and observations

The second data collection sessions were accepted by the majority of staff members. However, in one nursery a NP who appeared to be a new member of staff and who perhaps had not been briefed by other staff members of the purpose for the observations was openly hostile. She suggested that the presence of the research team was very intimidating to the children and it was suggested that the observations should be made “through the window”.

However, in contrast, the perhaps now familiar presence of the research team with most staff members prompted some interesting behaviour observations. NPs were observed eating food items, which were ‘banned’ according to school food policies, in front of the children. Items included doughnuts, chocolate and cake; practitioners unprompted justified their consumption by stating that they ‘needed shots of caffeine and sugar to do their job’. Furthermore, two of the schools provided children with chocolate and sweets as a weekly reward for good attendance, behaviour or for completing a task. Practitioners reported ‘feeling guilty’ being observed providing the ‘treats’.

7.7 Data collection process personal reflections (both time points)

I found the data collection process stressful at times. As a ‘new’ researcher I found I was under pressure to ensure that that the process ran smoothly and nothing was omitted. Technical difficulties with equipment such as the cameras and physical activity monitors added to the pressure. I was conscious that my demeanour may affect the initial relationship with the parents and NPs; therefore, I was mindful of not letting the difficulties cloud my manner.

The majority of staff members appeared happy with our presence to observe the children and record their measurements. However, some NPs declined to become involved in the process, preferring to leave any communication to the class teacher.

It was interesting to note the nurseries' different relationships with food and their reported 'guilt' when eating or giving the children 'unhealthy' foods in front of the researchers. This revealed that despite the nurseries' policies for not providing the children with sweets, crisps and fizzy drinks, some practices still involved providing these types of foods, albeit for 'special' occasions or for a reward. I found one nursery's overt consumption of high sugar/ fat foods in front of the children troubling.

In the fourth school I detected some animosity from two of the NPs; one of the practitioners was pleasant and helpful but failed to understand the reasoning for our presence. This may have been remedied by an initial joint parent/staff meeting as discussed previously. The second practitioner who displayed hostile behaviour made our presence uncomfortable. As discussed, the timetabling schedule of this school required us to be present for four days; we strived to make our presence as unobtrusive as possible, however, for unknown reasons, this NP seemed to find our presence threatening. She perhaps did not like the thought that we might be observing not only the children's dietary intake but also the school and staff routines and procedures thus exposing a 'quasi-private world' (Heath *et al.*, 2007). I felt the class teacher, who had been enthusiastic and engaged with the process previously, felt obliged to act as a mediator between us and the NP. There may have been some underlying issues within the staff that had been unwittingly transferred to us.

These observations emphasise the need to have all the staff involved and for them to feel they are part of the process. Moreover, as previously discussed in section 7.4, the staff need to believe that the project has benefits and value for them to participate. Additionally, the findings from this study corroborates other studies in that despite having commitment to a project from 'gatekeepers' or head teachers, this does not necessarily transfer to those who are working at ground level (Heaven, 2008; Wanat, 2008).

7.8 Outcome measure results

7.8.1 Introduction

This section reports the results from the outcome measures, due to the small number of participants in the study (n=32), the following results are reported descriptively. An important element of a feasibility study is the acceptance and compliance with the

outcome measures and data collection tasks. Table 24 reports and summarises the parents' compliance of the tasks.

7.8.2 Compliance with outcome measures

As illustrated below, some parents were unable to complete certain baseline tasks. It was important to ascertain why some parents had been unable to do so. Parents were contacted before follow-up data collection commenced to discover more about barriers to compliance with measures and to determine if there were any parts of the process they would be willing to complete, for example the food diary only and so on. Five families were unable to complete any of the baseline measurements; three of whom returned the data packs untouched. Of these three families, one mother who had five children was reluctant to leave the camera unattended 'in case it got broken' and she stated that her child would not entertain wearing the physical activity monitor: '*she won't even wear hairbands or clips, so wouldn't wear that [the monitor] around her waist*' (BA13). A second mother reported that her child hadn't wanted to take part and the third parent had 'forgotten' to complete the tasks. All three parents stated they were willing complete the repeat measures, although the mother whose child would not wear the monitor said she would complete the food and activity diary only.

Two of the five families had not returned any sections of the baseline data packs. Despite asking the nursery staff to intervene and sending SAE to the parents, the packs with the cameras and monitors were not returned. On contacting the parents it discovered one mother had had a baby at the time of data collection and the second mother showed no recollection of receiving the data packs. However, both mothers stated they would be willing to complete the repeat measurement tasks.

Table 24 Compliance with outcome measures (n)

Outcome measure	Intervention schools		Delayed intervention schools		Overall	
	T1	T2	T1	T2	T1	T2
T1 –Baseline T2 – Follow up n	14	10	18	16	32	26
Food diary	13	6	13	9	26	15
TV record	13	6	12	9	25	15
Family activity diary	7	4	6	6	13	10
PA monitors P – Pedometers A – Accelerometers	11 P	6 P	8 A	9 P	19	15

It can be seen in Table 24 that parents were most likely to complete the food diaries and the TV records at baseline; the least likely to be completed was the family activity diary. More parents in the intervention schools completed the tasks. However, the compliance for all tasks, apart from the family activity diary in the delayed schools, reduced considerably at follow-up in all schools; most notable being the food diary (26 to 15 families).

7.8.2.1 Compliance discussion

The families who were unable to complete any tasks at baseline were not able to do so again for the repeat measurements, despite some parents indicating that they would be willing to do so. During the baseline measurement stage, 18 families did not complete any tasks or returned the data packs. For the repeat measurements, of the 26 families, 12 of the parents did not complete any tasks or return packs.

It is difficult to determine why the failure to comply with the outcome measurements increased considerably during the repeat phase. Some parents cited refusal of the child to take part as reasons and another mother felt unable to commit due to work pressures. Completion of the tasks may have held a novelty factor the first time round which waned during the repeated measurement phase. What is clear that the burden of data collection required of the parents was more than many families were able to comply.

7.8.3 Diet measures

As discussed in section 7.8.2 parents were most likely to complete this section of the diary at baseline. Parents completed the diary with their child at home, whilst at nursery the research team (myself and undergraduate student) observed the children's food consumption.

Table 25 presents the project children's nutrient intake in comparison with the Dietary Reference Values and the National Diet and Nutrition Surveys for children aged 1.5 to 3 years and young people aged 4-18 years. The older children's data were included as some children in the current study were aged four years. The T1 and T2 dietary data has been combined. Therefore the table presents 8 days dietary intake for the project children. This was presented in this way due to the insignificant findings between the time points and for ease of comparison with the other surveys.

Table 25 Dietary consumption: nutrient intakes in comparison with the Daily Reference Values and the National Diet and Nutrition Survey Data

Nutrient	Intervention n= 10		Delayed intervention n= 12		DRV Age 1-3yrs (Food Standards Agency, 2002)	NDNS rolling programme 2009/10 Age 1.5-3yrs (Gregory <i>et al.</i> , 1995)		NDNS Girls 2000 Age 4-18yrs (Gregory <i>et al.</i> , 2000)		NDNS Boys 2000 Age 4-18yrs	
		% of total energy		% of total energy			% of total energy		% of total energy		% of total energy
Kilocalories	1197		1268		1200(G) 1400 (B)	1127		1397		1520	
Fat (g)	44	33	47	33	41-58g	43.2	34	55.9	36	60.1	36
Saturated Fat (g)	19	14	20	14	Not more than 10%	18.7	14	23.8	15	25.1	14
Carbohydrate (g)	168	53	182	54		151	50	191	51	209	52
Non milk extrinsic sugars (g)	42	13	61	18	Not more than 10%	34.7	11	66	17	66	16
NSP (g)	7		7			8.1		8.0		9.1	
Protein (g)	43	14	41	13	14.5	42.6	15	44.5	13	49	13
Iron (mg)	5		5		6.9	6.9		7.4		8.3	
Calcium (mg)	652		626		350	350		657		706	
Vitamin A (µg)	328		322		400ug	545		502		535	
Vitamin C (mg)	71		84		30mg	67.3		69.1		74.2	
Sodium (mg)	84		76		280-700mg			1857		2069	
Vitamin D (µg)	0.96		1.1		Age 3 = 7ug Age 4 = none specified	1.9		2.2		2.5	

Chapter Seven Outcome measure results

It can be seen that the nutrient intake results from the project children were comparable with findings from the NDNS; suggesting that the FAST diary method was a suitable tool for collecting preschool children's dietary data. As with the NDNS results the children in this study consumed higher intakes of saturated fat and non-milk extrinsic sugars than the daily recommendations. The delayed intervention group had the highest intake of NMES (18%) which exceeded the other dietary surveys. Both intervention groups had lower levels of vitamin A, vitamin D, NSP and sodium than in NDNS.

Table 26 illustrates the consumption of selected foods by intervention group in comparison with 2009/10 NDNS data. Again the results were comparable with the NDNS data. The intervention group consumed more (grams) fruit in comparison with the delayed group and the NDNS data. The delayed intervention group had a higher consumption of fruit juice and squash/cordial, and both groups consumed more crisps and savoury snacks than the NDNS data.

Table 26 Selected food groups: consumers and non-consumers in comparison with NDNS data (The Department of Health and Food Standards Agency, 2008/2009 - 2009/2010)

Food item	Intervention schools (n=10)		Delayed intervention schools (n=12)		2009/10 NDNS
	Number of children consumed n= (%)	Mean consumption of consumers (g)	Number of children consumed n= (%)	Mean consumption of consumers (g)	Mean consumption (g) of consumers
White breads	10 (100)	52	12 (100)	39	31
Wholemeal breads	7 (70)	12	7 (58)	18	26
Other breads	0	0	0	0	13
Breakfast cereal, wholegrain, not high sugar	5 (50)	40	7 (58)	32	29
Breakfast cereal, wholegrain, high sugar	0	0	1 (8)	8	
Breakfast cereal, refined, low sugar	5 (50)	7	4 (33)	12	
Breakfast cereal, refined, high sugar	4 (40)	16	7 (58)	14	11 (All other cereals)
Biscuits	9 (90)	16	11 (92)	15	14
Confectionery, cakes and sweet puddings	10 (100)	43	12 (100)	51	40 of which: 17(Buns, cakes and pies) 13 (Sugar confectionery) 10 (Chocolate confectionery)
Fruit	10 (100)	141	12 (100)	95	111
Vegetables	9 (90)	46	9 (75)	45	51 (Including vegetable dishes)
Fruit juice	8 (80)	72	12 (100)	120	111
Crisps and savoury snacks	7 (70)	14	12 (100)	13	9

Food item	Intervention schools (n=10)		Delayed intervention schools (n=12)		2009/10 NDNS
Cordial or squash, reduced sugar	5 (50)	136	12 (100)	392	325 (All reduced sugar drinks)
Cordial or squash, full sugar	6 (60)	126	9 (75)	170	138 (All full sugar drinks)
Carbonated drink, reduced sugar	2 (20)	63	0	63	
Carbonated drink, full sugar	4 (40)	105	3 (25)	102	

7.8.3.1 Child photography

At baseline 25 of the children/families provided photographs of foods consumed over the four-day observation period; this gave context to the food diaries, providing information of portion size and eating environment. Some children photographed other items in the home such as siblings, the TV, toys and one child photographed his parent's bed.

Figure 34 shows some example photos taken by the children. It can be seen that the majority of photos provide a clear representation of the food given to the child. Not all of the foods recorded in the diary were photographed and children/parents were more likely to photograph set meals rather than snacks.

It was interesting to note that at follow-up 18 of the children/families provided photographs of dietary intake despite a reduction in diary completion; this included three families who did not complete the written diaries. As before the photographs were most likely to be photographs of meals as opposed to snacks and drinks.



Figure 34 Children's example food photography

Figure 35 shows a food diary example page from one child's diary and the corresponding photographs taken (Figure 36 and Figure 37).

Day 1 *Thursday*

Lunch at home
Lunch at nursery

6.00am - 9.00am Time slot 1	<input type="checkbox"/> White bread or toast <input type="checkbox"/> Wholemeal bread or toast <input type="checkbox"/> Margarine <input type="checkbox"/> Butter <input type="checkbox"/> Jam or preserves <input type="checkbox"/> Weetabix <input type="checkbox"/> Cornflakes <input checked="" type="checkbox"/> Frosties	<input type="checkbox"/> Coco Pops <input type="checkbox"/> Rice Krispies <input type="checkbox"/> Milk full-fat with cereal <input checked="" type="checkbox"/> Milk, semi-skimmed with cereal <input type="checkbox"/> Banana <input type="checkbox"/> Egg <input type="checkbox"/> Yoghurt <input type="checkbox"/> Sugar	<input checked="" type="checkbox"/> Biscuits—not chocolate <input type="checkbox"/> Biscuits—chocolate <input checked="" type="checkbox"/> Orange juice, unsweetened <input type="checkbox"/> Apple juice, unsweetened <input type="checkbox"/> Milk, full-fat drink <input type="checkbox"/> Milk, semi-skimmed drink <input type="checkbox"/> Squash—reduced sugar	<input type="checkbox"/> Squash <input type="checkbox"/> Tea with milk <input checked="" type="checkbox"/> Water Others <i>Innocent Smoothie (orange)</i>
9.01am - 11.00am Time slot 2	<input type="checkbox"/> White bread or toast <input type="checkbox"/> Wholemeal bread or toast <input type="checkbox"/> Margarine <input type="checkbox"/> Butter <input type="checkbox"/> Jam or preserves <input type="checkbox"/> Apple <input checked="" type="checkbox"/> Banana <input type="checkbox"/> Pear	<input type="checkbox"/> Tangerine, mandarin, satsuma <input type="checkbox"/> Crisps or savoury snacks <input checked="" type="checkbox"/> Biscuits—not chocolate <input type="checkbox"/> Biscuits—chocolate <input type="checkbox"/> Chocolate bar <input type="checkbox"/> Chocolate sweets <input type="checkbox"/> Sweets (not chocolate)	<input type="checkbox"/> Orange juice, unsweetened <input type="checkbox"/> Apple juice, unsweetened <input type="checkbox"/> Milk, full-fat drink <input type="checkbox"/> Milk, semi-skimmed drink <input type="checkbox"/> Squash—reduced sugar <input type="checkbox"/> Squash <input type="checkbox"/> Fizzy drink <input type="checkbox"/> Diet fizzy drink	<input checked="" type="checkbox"/> Water Others _____ _____ _____
11.01am - 2.00pm Time slot 3	<input type="checkbox"/> White bread or toast <input type="checkbox"/> Wholemeal bread or toast <input type="checkbox"/> Margarine <input type="checkbox"/> Butter <input type="checkbox"/> Cheese <input type="checkbox"/> Cheese spread / triangle <input type="checkbox"/> Baked beans <input type="checkbox"/> Fish fingers <input type="checkbox"/> Ham <input type="checkbox"/> Chicken or turkey (not nuggets) <input type="checkbox"/> Sausage roll <input type="checkbox"/> Tuna, tinned <input type="checkbox"/> Eggs, boiled <input type="checkbox"/> Pasta, tinned, in tomato sauce	<input type="checkbox"/> Oven chips <input checked="" type="checkbox"/> Chips—fried <input type="checkbox"/> Potatoes—other <input type="checkbox"/> Peas <input type="checkbox"/> Sweetcorn <input type="checkbox"/> Carrots <input type="checkbox"/> Cucumber <input type="checkbox"/> Tomato <input type="checkbox"/> Crisps or savoury snacks <input checked="" type="checkbox"/> Ketchup <input type="checkbox"/> Gravy <input type="checkbox"/> Apple <input type="checkbox"/> Banana <input type="checkbox"/> Tangerine, mandarin, satsuma	<input type="checkbox"/> Grapes <input type="checkbox"/> Strawberries <input type="checkbox"/> Raisins <input checked="" type="checkbox"/> Biscuits—not chocolate <input type="checkbox"/> Biscuits—chocolate <input type="checkbox"/> Yoghurt / fromage frais <input type="checkbox"/> Cake or sweet pastry <input type="checkbox"/> Custard <input type="checkbox"/> Chocolate bar <input type="checkbox"/> Sweets (not chocolate)	<input type="checkbox"/> Fizzy drink <input type="checkbox"/> Diet fizzy drink <input checked="" type="checkbox"/> Water Others <i>Fish in Batter</i>
2.01pm - 4.00pm Time slot 4	<input type="checkbox"/> White bread or toast <input type="checkbox"/> Margarine <input type="checkbox"/> Butter <input type="checkbox"/> Apple <input type="checkbox"/> Banana <input checked="" type="checkbox"/> Pear <input type="checkbox"/> Tangerine, mandarin, satsuma <input type="checkbox"/> Crisps or savoury snacks	<input checked="" type="checkbox"/> Biscuits—not chocolate <input type="checkbox"/> Biscuits—chocolate <input type="checkbox"/> Chocolate bar <input type="checkbox"/> Chocolate sweets <input type="checkbox"/> Sweets (not chocolate) <input type="checkbox"/> Ice lolly <input type="checkbox"/> Cheese <input type="checkbox"/> Tomato ketchup	<input checked="" type="checkbox"/> Yoghurt / Fromage frais <input checked="" type="checkbox"/> Orange juice, unsweetened <input type="checkbox"/> Milk, full-fat drink <input type="checkbox"/> Milk, semi-skimmed drink <input type="checkbox"/> Squash—reduced sugar <input type="checkbox"/> Squash <input type="checkbox"/> Fizzy drink	<input type="checkbox"/> Diet fizzy drink <input type="checkbox"/> Water Others <i>gingerbread man</i>
4.01pm - 7.00pm Time slot 5	<input type="checkbox"/> White bread or toast <input type="checkbox"/> Margarine <input type="checkbox"/> Butter <input type="checkbox"/> Apple <input type="checkbox"/> Banana <input type="checkbox"/> Grapes <input type="checkbox"/> Strawberries <input type="checkbox"/> Oven chips <input type="checkbox"/> Chips—fried <input checked="" type="checkbox"/> Boiled potatoes <input type="checkbox"/> Potatoes—other <input checked="" type="checkbox"/> Carrots <input type="checkbox"/> Peas <input type="checkbox"/> Sweetcorn <input type="checkbox"/> Cucumber	<input type="checkbox"/> Tomato <input checked="" type="checkbox"/> Broccoli <input type="checkbox"/> Sausages <input type="checkbox"/> Pasta, boiled <input type="checkbox"/> Pasta, tinned in tomato sauce <input type="checkbox"/> Fish fingers <input type="checkbox"/> Chicken or turkey nuggets <input type="checkbox"/> Chicken or turkey (not nuggets) <input type="checkbox"/> Pizza <input type="checkbox"/> Baked beans <input type="checkbox"/> Cheese <input type="checkbox"/> Boiled rice <input type="checkbox"/> Ham <input type="checkbox"/> Chapatti <input type="checkbox"/> Dhal	<input type="checkbox"/> Gravy <input type="checkbox"/> Tomato ketchup <input checked="" type="checkbox"/> Yoghurt / fromage frais <input type="checkbox"/> Crisps or savoury snacks <input type="checkbox"/> Biscuits—not chocolate <input type="checkbox"/> Biscuits—chocolate <input type="checkbox"/> Cake or sweet pastry <input type="checkbox"/> Chocolate bar <input type="checkbox"/> Chocolate sweets <input type="checkbox"/> Sweets (not chocolate) <input type="checkbox"/> Ice cream	<input type="checkbox"/> Milk, semi-skimmed drink <input type="checkbox"/> Squash—reduced sugar <input type="checkbox"/> Squash <input type="checkbox"/> Fizzy drink <input type="checkbox"/> Diet fizzy drink <input type="checkbox"/> Tea with milk <input checked="" type="checkbox"/> Water Others <i>Lamb chop</i> <i>Apple</i> <i>Yorkshire pudding</i> <i>Milk sauce</i> <i>cauliflower</i>
7.01pm - 11.00pm Time slot 6	<input type="checkbox"/> White bread or toast <input type="checkbox"/> Margarine <input type="checkbox"/> Butter <input type="checkbox"/> Jam <input type="checkbox"/> Apple <input type="checkbox"/> Banana <input type="checkbox"/> Tangerine, mandarin, satsuma <input type="checkbox"/> Oven chips <input type="checkbox"/> Chips—fried <input type="checkbox"/> Cheese	<input type="checkbox"/> Pasta, boiled <input type="checkbox"/> Boiled rice <input type="checkbox"/> Chapatti <input type="checkbox"/> Dhal <input type="checkbox"/> Tomato Ketchup <input type="checkbox"/> Crisps or savoury snacks <input type="checkbox"/> Biscuits—not chocolate <input type="checkbox"/> Biscuits—chocolate <input type="checkbox"/> Sugar <input type="checkbox"/> Chocolate bar	<input type="checkbox"/> Chocolate sweets <input checked="" type="checkbox"/> Sweets (not chocolate) <input type="checkbox"/> Ice lollies <input type="checkbox"/> Yoghurt / fromage frais <input type="checkbox"/> Orange juice, unsweetened <input type="checkbox"/> Milk, full-fat drink <input type="checkbox"/> Milk, semi-skimmed drink <input type="checkbox"/> Drinking chocolate powder <input type="checkbox"/> Milk shake powder	<input type="checkbox"/> Squash—reduced sugar <input type="checkbox"/> Squash <input type="checkbox"/> Fizzy drinks <input type="checkbox"/> Diet fizzy drinks <input type="checkbox"/> Tea with milk <input checked="" type="checkbox"/> Water Others _____ _____ _____

Figure 35 Example food diary page



Figure 36 Food photography timeslot 1 and 3



Figure 37 Food photography timeslot 4 and 5

It can be seen that the child/family photographed part of the child's breakfast, their lunch and evening meal. The only 'snack' photographed was the gingerbread man; other snacks, fruit and drinks were not photographed.

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In order to conduct an analysis of the photographs, the eating occasions were visually assessed and coded (Table 27). Two of the children were randomly selected and their range of photographs taken over the four days was included to provide full examples (see Child I.D BW48 and FP23). Table 28 summarises the findings from the codes which are discussed after the table.

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Table 27 Photo analysis content codes

Child Ref	Food	Drink	Context	Portion size	Other	Notes
BW43	Unknown	Unknown	Tray	Unclear		The child's meal appears to be served on a tray which suggests the child was not sitting at a table. The drink is finished and the food in the bowl which is not decipherable has been partly consumed.
CC32	<ul style="list-style-type: none"> • Breaded product • Boiled potatoes • Sauce/ketchup 	Unknown	Table	Clear		This child/family only took 3 photographs over the 4 day period. It is not known if they simply forgot or found the burden too onerous. The meal of what looks like breaded fish and potatoes is served on a table. The focus of the individual meal does not allow the viewer to determine whether the child ate alone or with other family members. The lack of vegetables is interesting – the child may simply refuse to eat/have them on their plate or the family does not routinely eat them. This was one of a few children who photographed a drink with the meal. Other children/parents may not have felt a drink was an important element of what the child consumed over the four day period.
BA14	<ul style="list-style-type: none"> • Sausage • Chips • Yorkshire pudding • Sauce/gravy 	None	Unknown	Unclear		It is difficult to determine whether the background of this picture is a tiled table or the surface of the floor. The meal is an unusual combination of sausages, chips and what looks like a Yorkshire pudding. Again there is a distinct lack of vegetables,

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						as before this may purely be the child's refusal to eat them or the family's usual practice.
BA17	None	None			Television	This child only took two photographs both of which were of a TV screen. This perhaps highlights the parent's lack of engagement with the task that is, reminding the child what the purpose of the camera was. Or the child elected to photograph something that they felt was an important aspect of their life i.e. their favourite TV programme.
BA12	<ul style="list-style-type: none"> • Bread • Cheese • Cucumber • Sauce/ketchup 	None	Table	Clear		This photograph shows a meal/snack of bread with cheese, cucumber and some kind of sauce. The background looks like a table cloth which suggests the child sat at the table to consume the meal. It is a clear photograph which provides information on portion size.
BA15	<ul style="list-style-type: none"> • Orange (segments) • Kiwi fruit (cut) • Pomegranate seeds 	None	Kitchen work-surface	Clear	<ul style="list-style-type: none"> • Fruit face • Fruit bowl in background 	The parents of this child have obviously engaged with the child to make the fruit face. The full fruit bowl in the background suggests that fruit consumption is important to the family. However, another way to interpret the scene is perhaps as a result of the intervention the family are attempting to encourage more fruit consumption as one of their personal family goals/targets and this is why they have engaged in the 'fun' fruit activity.

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BW11	<ul style="list-style-type: none"> • Sliced ham • Chips • Ketchup 	None	Unknown	Clear		The very dark background of this photograph makes it difficult to determine where the meal has been served. As is common with several other children's meal there are no vegetables served with the meal
BW43	<ul style="list-style-type: none"> • Sweets 	None	Unknown	Unknown	<ul style="list-style-type: none"> • Sweet packet 	This child has photographed the packet from some sweets. There appears to be some sweets left in the packet, the child may simply have remembered to photograph them whilst eating them or decided to leave some for later. Very few children recorded snacks or sweets and were more likely to record meals. This may be that the children/parents do not think of sweets or snacks as food per se or that it was more difficult to remember to photograph snacks – they may have been more likely to have been eaten away from home.
BW48	<ul style="list-style-type: none"> • Cereal 	None	Unknown	Unknown	<ul style="list-style-type: none"> • Packaging – Weetabix box only 	It is interesting that this child photographed the box containing the cereal rather than the cereal in the bowl itself. This type of photograph does not allow the observation of portion size or gives any context in which the meal was eaten. However, it may be that the child is allowed to eat the cereal directly from the box.
FP22	<ul style="list-style-type: none"> • Toast & jam • Apple (uncut) 	None	Unknown	Clear		This child's photograph includes toast and jam and an apple. It is interesting to note

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						that the toast has been prepared for the child (cut into slices) but not the apple. It may be the child is used to eating the apple whole. However, research has suggested that children are more likely to eat fruit and vegetables if they are accessible as well as available, that is pre-prepared.
BA16	<ul style="list-style-type: none"> • None 	Milk	Nursery carpet	Clear		The children were asked to photograph food and drink consumed in nursery also. However, not all children/parents remembered to bring their camera into nursery. This child photographed her individual bottle of milk which the children were served sitting on the carpet
BA14	<ul style="list-style-type: none"> • Sandwiches • Crisps • Yoghurt/dessert • Chocolate bar • Unknown 	Orange squash	Kitchen surface	Clear		This child attended a nursery where children were requested to provide a packed lunch. The child/parent must have photographed the lunch before leaving home. Despite nurseries stating they followed 'healthy eating' policies, this did not seem to extend to rules about food brought in from the home. The child has a chocolate bar, a packet of crisps and a dessert with no portions of fruit
BA12	<ul style="list-style-type: none"> • None 	None	Bedroom			This child was obviously 'experimenting' with his camera. Other photos included a white van, a picture of his dad, two food photos and many which were not decipherable

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BA17	<ul style="list-style-type: none"> Yorkshire puddings 	None	Unknown	Unknown	Yorkshire pudding wrapper	As with a previous child, this child photographed some food wrappings rather than the food/meal itself. The child was perhaps instrumental in helping to choose items and/or prepare for meals; this may be why the packaging was photographed
BA13	<ul style="list-style-type: none"> Carrot stick 	Milk	Nursery carpet	Clear		This child only photographed 3 photos, all within the nursery environment. It later emerged that the parent kept the camera out of her children's reach (she had 5) for fear of the camera being broken. Therefore, the child was not encouraged to use the camera at home
BA15	<ul style="list-style-type: none"> Tomatoes Lettuce 	None	Unknown	Not known		Many of the photos taken by the children were not clear enough for analysis. However, the 'fuzziness' of some of the photos provided evidence that some children were being given responsibility for taking the photographs which was the object of the activity, thus, gaining an insight of the child's perspective
BW49	<ul style="list-style-type: none"> Satsuma (peeled) Grapes 	None	Unknown	Unknown		It is not certain whether the fruit is being eaten as part of a meal or for a snack, however the fact it is prepared and served in a bowl suggests it is more of an 'eating occasion' than a random snack
BW43	<ul style="list-style-type: none"> Meat pie Mashed potatoes 	None	School lunch	Clear		Three of the photos taken by this child were of school lunches, the other three were taken at home, however they were not photographs of food. This suggests that the

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						child did not fully understand what the camera was for as he was encouraged by researchers/staff to use the camera at nursery
BW48 (Example of full four day photos)	<ul style="list-style-type: none"> • Unknown • Flapjack • Unknown • Roast potatoes • Peas • Yoghurt • Baked beans 	None	Home and garden	Clear for some	<ul style="list-style-type: none"> • Sweet packaging • Garden • Paving slab 	This example illustrates the diversity of child photography. For example the child has taken several photos of the same food item and the garden. What is also interesting is the close-up focus of several of the photographs as if he wanted to capture the detail, however, it does not allow for context of the eating occasion
CC37	<ul style="list-style-type: none"> • Toast 	Unknown	Floor at home	Clear		Some photographs included the child in the picture. It is not known whether the parent did not fully understand the activity instructions or perhaps they simply wanted to include their child in the photograph
CC34	<ul style="list-style-type: none"> • Toast • Cheese • Tomatoes 	None	Coffee table	Clear		This photograph shows a slice of toast with cheese and tomatoes which has not been cut. This seems unusual that the parent/carer has not prepared the toast for ease of eating especially since the meal/snack appears to be served in the living area
CC36	<ul style="list-style-type: none"> • Unknown • Half a banana 	Milk	Dining table	Clear	Toy animal	The meal in the bowl is unclear; however, the parent appears to be concerned with making sure the child has a healthy drink and some fruit with the meal
FP24	<ul style="list-style-type: none"> • Tinned spaghetti in tomato 	None	Unknown	Clear		This child only took one photograph which is

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	<ul style="list-style-type: none"> sauce • Sausages • Tomato ketchup 					<p>a clear representation of their meal. However, there are a number of reasons perhaps why they did not continue with the activity. The camera may have been put out of reach and forgotten about, or the child may have refused to continue</p>
FP23 (Example of full four day photos)	<ul style="list-style-type: none"> • cereal hoops • Food – banana • Food – pasta with tomato and cheese • Satsuma • Fish and chips • Banana • Ham sandwich portion • Slice of pork and egg pie • Potato wedges • Crisps • Peanuts, raisins and sultanas • Unclear 	None	Café/fish shop Kitchen table	Clear		<p>This child's example shows a mixture of photographs taken by the child and the parent/carer. This is the only child who has been photographed eating a take-away meal in which looks like a café/fish shop, which means the parent/carer remembered to take the camera with them for other eating occasions. It is interesting that several portions of fruit have been photographed but in line with several of the other children, no vegetables or salad</p>
FP22	<ul style="list-style-type: none"> • Soup • Wrap sandwiches 	None	Kitchen table	Clear		<p>It may be a coincidence but the parent/carer has served the soup in a portion size bowl that was recommended by the intervention. The parent/carer may have already been aware of appropriate child portion sizes or the intervention may have had an impact</p>
FP25	<ul style="list-style-type: none"> • Fish fingers • Tomato ketchup 	Orange squash	Tray/child's table	Unknown		<p>The photograph shows the meal partially consumed. It does not provide a clear picture of the food eaten but does provide</p>

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						some information about the eating context
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Table 28 Photo analysis summary

Food		Context		Portion size		Other (including food wrappers)
Unknown	5	Unknown	9	Unclear	8	10
Breaded product	3	Table	5	Able to ascertain	18	
Potatoes non-fried	3	Kitchen surface	2			
Potatoes fried	4	Nursery carpet	2			
Sauce/ ketchup	6	Tray	2			
Sausages/ ham	3	Bedroom	1			
Yorkshire pudding	2	Floor at home	1			
Bread/ toast	4	Home and garden	1			
Sandwich/ wrap	3	Café/fish shop	1			
Cheese	3	Nursery lunch	1			
Salad items	4	Coffee table	1			
Fruit	10					
Sweets/ chocolate	2					
Cereal	2					
Crisps/ savoury snacks	2					
Yoghurt	2					
Vegetables	2					
Meat pie/ product	2					
Tinned beans/ spaghetti	2					
Pasta	1					
Flapjack/ cake	1					
Nuts and raisins	1					
soup	1					

As can be seen in Table 27 and Table 28, the children's photograph activity provided additional information and gave context to the food diaries. Although many children engaged with the task, it was apparent that the activity instructions were not always followed; for example children took photographs of other objects such as the TV or the

garden. Moreover, some parents photographed their child with the meal/food. However, despite this apparent 'lack of adherence', the activity demonstrated that the children and parents were able to engage with the task in a way that was meaningful for them.

In 17 of the 26 eating occasions it was possible to determine the context of the eating occasion, that is, whether the food was consumed at a table and so on. Portion sizes too could be determined in several of the photographs. It could be seen that several children photographed portions of fruit over the 4-day period, however, very few provided evidence of consuming vegetables. This type of information would prove useful for future dietary interventions and the findings could be used as a point of discussion in focus groups and so on.

As this was a feasibility study to determine if young children and their families were willing and able to capture data using digital cameras, no further analysis of the photographs was conducted. However, in future research, with more time and resources, it would prove beneficial to be able to discuss the photographs taken with the children and parents to gather their perspectives and to ascertain more in-depth data about the child's home life and the family lifestyle. A visual methods study conducted with street children in Kampala reported that although some children were less technically adept with the provided cameras, the activity was still particularly useful for stimulating discussion with the children (Young and Barrett, 2001).

7.8.4 TV/DVD record

As described in section 6.11.4.1, the parents were asked to record their child's TV and DVD viewing over the four day period. At baseline, 25 parents completed the TV/DVD record this fell to 15 parents at follow-up. Table 29 illustrates the overall duration of the child's viewing. The length of viewing times ranged from an average of 42 minutes per day to over 7 hours per day. However, some parents reported that the TV was left on all day and the child may have been doing other activities at the same time. On average the children in all schools (overall in Table 22) watched more than 3 hours of TV a day. The children in the delayed intervention schools watched on average more than four hours a day. Overall the length of duration did not differ between the two data collection periods. Only one parent gave a reason for not completing the TV section of the diary; the TV had not been available to the family whilst decorating was taking place.

Table 29 Duration of children's TV/DVD viewing

	Intervention schools		Delayed intervention schools		Overall	
	T1	T2	T1	T2	T1	T2
T1 Baseline T2 Follow-up n	13	6	12	9	25	15
Daily average hours/ minutes of TV/DVD viewing	2h.56m	2h.57m	4h.11m	4h.14m	3h.33m	3h.35m

7.8.5 Physical activity measures

As previously discussed (section 6.11.4.2), the children in two schools had their physical activity measured using pedometers and the other two schools at baseline, accelerometers. Accelerometers were not available for use at follow-up. There were varying degrees of success for compliance of this task. Some parents forgot to put on the monitors on their child on certain days or in some cases the child was reluctant to wear the monitor. Table 30 illustrates the average daily step count and average minutes of moderate to vigorous physical activity for accelerometer users. The parents were asked to record how many steps their child's pedometer recorded each day and the duration of time worn. The individual daily steps were calculated; as previously discussed (section 6.11.4.2), the daily step count that equates to 1 hour of MVPA is 13,874 steps (using a 15-s sampling interval). It can be seen that the daily activity levels were very low with none of the average counts/MPVA reaching an hour of activity. Activity levels fell by approximately 5 minutes or by 1000 steps at follow-up.

Table 30 Physical activity measures

	Intervention schools		Delayed intervention schools		Overall	
	T1	T2	T1	T2	T1	T2
T1 Baseline T2 Follow-up n	11	6	10	8	21	14
Average daily step counts (with pedometer)	8679	7117	5990	5382	7335	6249
Average minutes of MVPA (accelerometers)	20.02	N/A	15.34	N/A	18.08	N/A

7.8.6 Anthropometric measures

As previously discussed (section 6.11.6), the heights and weights of the participating children were taken. Due to the short-time scale of the intervention, changes out-with normal growth rates were not expected. However, the process and acceptability of the methods are being recorded.

The BMI calculation was made using an online NHS calculation tool (NHS, 2010a) and the results interpreted using the UK-WHO growth charts for children aged 0-4 years (Department of Health, 2009). In children over the age of 2-years, the BMI percentile is a better indicator of a child's thinness or fatness. A child whose weight is average for their height (a healthy weight) will have a BMI between the 25th and 75th percentiles. A BMI above the 91st percentile suggests that the child is overweight and a BMI above the 98th percentile is clinically obese (Department of Health, 2009).

Table 31 Anthropometric measures for children with data available at both time points

	Intervention schools		Delayed intervention schools		Overall	
	T1	T2	T1	T2	T1	T2
T1 Baseline T2 Follow-up n	13	13	13	13	26	26
Underweight (under 5th percentile)	0	0	0	1	0	1
Healthy weight (5 – 91st percentile)	9	7	11	10	20	17
Overweight (over 91st percentile)	2	3	1	2	3	5
Obese (over 98th percentile)	2	3	1	0	3	3
Total % overweight/obese	30	46	15	15	23	31

It can be seen in Table 31 that at baseline the majority of the children (20 children) from the four schools were classified as 'average weight/healthy weight'. None of the children were classified as 'underweight' (a child whose weight is less than the 5th percentile is underweight). One child reduced their BMI percentile to 'underweight' at follow-up. 6 children were classified as overweight or obese; this increased to 8 children. The national percentage of overweight and obesity in reception age children (4/5 year-olds) from the 2010/11 NCMP data was 22.6% (The Health and Social Care Centre *et al.*, 2011).

7.9 Discussion

Of the 32 parents in the four schools who agreed to complete the outcome measures at baseline only 4 parents were able to complete all the tasks over the four day period. Six parents did not complete any tasks at all; 2 families did not return any components of the data packs at all, despite continued attempts from myself and school staff to retrieve the cameras and physical activity monitors. However, 26 of the parents did complete at least some of the outcome measures. As previously discussed, the parents were more likely to complete the food and TV diaries. Some parents had issues with their child not wanting to wear the physical activity monitors. Some practitioners reported that they found the parents lack of authority over their child vexing, however, they were able to persuade the reluctant child to wear the monitor whilst at nursery. As reported above, one practitioner gave the impression she felt the children were too young to fulfil the study expectations. This was surprising as practitioners who have

worked with preschool children for many years usually (in my experience) have high expectations of a child's capabilities. This highlights the individual perceptions of what is considered and is not considered an acceptable task for a preschool child.

Reasons for non-completion of the tasks and diaries may have differed for different families. One mother commented that she kept the camera and physical activity monitor out of her children's reach (she had 5 children) for fear of them being damaged. Other unexpected reasons such as the 'Children in Need' dress-up day may have had an impact. The families who did not return the data packs may have been unaware of what was expected of them when they signed up to participate or they may have busy lives which pushed the priority of completing the tasks to the bottom of their list.

At follow-up there was an increase in completion of all tasks (4 to 5 families). However, there was also an increase in the number of families failing to complete any tasks; 6 at baseline, 12 at follow-up. As previously discussed, no specific reasons for failing to complete the baseline measurements were given; therefore it is difficult to determine why the repeat measurements induced further levels of attrition. It simply may have been a decline in the novelty factor of taking part.

7.9.1 Improving compliance with outcome measures

Of the parents who did not complete any data collection tasks at baseline (n=6); three had completed secondary school, two had 'some additional training' and one had a post-graduate degree. While numbers are small, this does not suggest any differences in level of education in those who did complete the tasks and those who did not. As previously discussed, no specific reasons for failing to complete the baseline measurements were given; therefore it is difficult to determine why the repeat measurements induced further levels of attrition. It simply may have been a decline in the novelty factor of taking part.

7.9.2 Development and recommendations

An initial meeting with parents promoting the benefits of the project to the child and family may have increased compliance. Furthermore, a researcher-led meeting with nursery staff and parents to provide an explanation of expectations and tasks may have facilitated a better understanding of the purpose of the data collection. Showing

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and letting the children handle the physical activity monitors, diaries and cameras in the nursery environment before data collection may have prompted enthusiasm for the tasks which may have been conveyed home to the parents.

However, as previously discussed it may be that the study demanded too much time from busy families with young children.

The following chapter discusses how the intervention was delivered and received by the NPs and parents in the intervention schools.

Chapter 8 Intervention implementation and feedback

8.1 Introduction

This chapter describes the process of the implementation of the intervention in the first two schools (intervention schools). As described in section 6.7, each month of the six month intervention period the parents, practitioners and children were given activities and tasks to complete at home or in nursery. Parents were asked to meet with a staff member once a month to set goals and to monitor progress. During the intervention, feedback and results were collected in the form of monthly evaluation sheets from staff members; photographs of home cooking challenges and nursery activities taken by families and NPs; worksheets collected from parents and children; and informal observations and verbal communication with staff members. Table 32 summarises and clarifies the rationale for the design of the feasibility study and Table 33 recaps the practical elements of the intervention monthly activities and tasks issued to the practitioners, parents and children.

Only one class teacher from each nursery (n=2) attended the training session in month one. The teachers reported the other staff members were not able to attend as they were not paid to work after 3.30 p.m.; therefore it would have been on an entirely voluntary basis for them to attend. The class teachers who did attend were enthusiastic and engaged well with the tasks designed to consolidate the training. The full practitioner's training manual is available in Appendix H. Twice-monthly visits to the nurseries served as an on-going presence and promotion of the project.

Table 32 Rationale for design of feasibility study

Design element	Details	Rationale
Feasibility study	To test all elements such as, recruitment on multiple levels; outcome measures compliance; appropriateness of staff training; intervention materials; intervention implementation and delivery; monthly monitoring and feedback; engagement of staff, parents and children; repeat measures; and feedback methods	Feasibility studies are pieces of research conducted before a main study in order to answer the question ‘Can this study be done?’
Aims	Reduce the consumption of high energy dense snacks in nursery and at home. Increase the consumption and the awareness of the importance of a ‘healthy’ breakfast. Reduce TV viewing. Increase physical activity in nursery. Increase family ‘active time’	See table 12 (section 6.5) for aims rationale
Stakeholder involvement	Nursery practitioners/teachers Parents of preschool children	Before a behaviour change intervention can be designed and implemented, it is important to gain insights, views and knowledge of everyday practices from the study population in question as reported in the MRC complex intervention guidelines
Action research	Action research is generally unique to the situation being studied; however, there are aspects of the methodology that can be adopted by other researchers	To enable on-going analysis, evaluation and modification of the intervention methods and design in each school
Intervention programme	A six-month behaviour-change programme with detailed monthly activities for nursery staff, parents and children	Interventions that last between six months and one year are likely to be more effective
Activities	See Table 19 (section 6.8.11)	Designed with NPs and parents with the aim of improving dietary and physical activity behaviours and reducing sedentary behaviours
Implementation	The intervention was underpinned by behaviour-change theory focusing on Social Cognitive Theory and Operant Conditioning	Interventions which have a theoretical grounding have been shown to be more effective in producing longer-term behavioural change than those without

Table 33 Summary of monthly intervention tasks and activities

Month & session title	Tasks and activities
One – Information and recruitment	<ul style="list-style-type: none"> • Recruitment and baseline outcome measures • NP training session
Two – Introductory session	<ul style="list-style-type: none"> • NP meetings with parents (aims and goal-setting) • Setting up nursery notice board • Children: fruit tasting session & fruit related song
Three – Five-a-day and portion sizes	<ul style="list-style-type: none"> • Parents: information about increasing children’s fruit and vegetable intake, portion size control and increasing physical activity • Home cooking challenge (1) and NO TV challenge • Children: skipping and playground games and ideas for non-TV activities & fruit related song
Four – Active play session	<ul style="list-style-type: none"> • Parents: information about healthy meal and snack ideas • Home cooking challenge (2) and No TV challenge • Family-completed ‘active’ diary • Children: mini Frisbees and eating a healthy breakfast, rope and playground games & vegetable related song
Five – Vegetable tasters	<ul style="list-style-type: none"> • Parents: ideas for encouraging vegetable consumption, rainy day activities • Cooking challenge (3) and NO TV challenge • Children: vegetable tasting sessions & vegetable related song, on-going playground games
Six – Go bananas!	<ul style="list-style-type: none"> • Parents: information about engaging children on walks and outings • Cooking challenge (4) No TV challenge • Children: informational activities on the origins of bananas and making fruit kebabs, end of programme party

8.2 Implementation of the intervention

8.2.1 Relationships with nursery staff

The acceptance of my presence and the relationship with the class teachers differed immensely. As previously described, both intervention schools were visited twice a month; once to deliver the intervention materials and secondly to deliver the ‘cooking challenge of the month’ materials. The teacher in school one actively encouraged interaction with the children and spending time in the nursery setting which aided observation. The teacher was enthusiastic and very welcoming each visit. The nursery co-worker, a nursery nurse, although friendly did not usually become involved in discussions or activities. However, on one occasion, the class teacher was away on a training course and the nursery nurse assumed the role of the teacher providing project updates. The change in this staff member was quite striking, as normally she would

play a discreet role in the background. There was a supply teacher covering for the class teacher, but the nursery nurse, as the permanent member of staff took on the role of main 'organiser' and 'communicator' and appeared to be enjoying her temporary role. This raised the question as to how involved she would normally be in the SKIP project, as the impression given was that the class teacher was responsible for the whole aspect of communication and delivery of the intervention.

School two did not encourage participation which made informal observation impossible. Despite being friendly and welcoming, it was apparent that the teacher expected delivery of the materials only. Attempts were made to engage with the teacher on several occasions, however, after several attempts this was not pursued further. Reasons for her reticence may include a reluctance to disturb the children's routine, a lack of confidence in having an observer present, or it may have been that she believed that my role was to simply deliver the project materials. The other staff members, of whom there were normally two or three present, did not engage in communication in relation to the project.

It is interesting to note that in both schools, the class teacher appeared to be solely responsible for the implementation of the intervention and there was no interaction with other staff members except for greetings. However, as described above, when the class teacher was absent on one of the visits, the nursery practitioner was very enthusiastic and animated when talking about the project. The extent of the nursery practitioners' daily involvement of the intervention is not known; however, there may be underlying issues whereby the nursery practitioners do not feel that it is part of their role or duties. This was apparent at the time of the staff training session that was held out-with contracted hours. Moreover, as previously discussed, there may have been issues with 'gatekeeper' control, that is, the school head-teacher or class teacher agreeing to participate in the project with little consultation with those working at 'ground level'. This may have contributed to any issues with lack of engagement.

8.2.1.1 Intervention process feedback

The teachers in both nurseries were efficient in providing feedback about the intervention process. In one nursery this was mostly in an informal manner through discussions and both teachers completed the monthly evaluation sheets and provided completed activity sheets from parents and children. The class information boards and

photographs (section 8.2.2.1) of class activities demonstrated engagement with aspects of the intervention programme.

8.2.2 Parental engagement with the project

Overall, the initial observations and feedback about project engagement were positive. The class teachers communicated some issues about parents whose first language was not English. Furthermore, there were some difficulties with parents not attending meetings with the class teacher to discuss family goal-setting tasks. Those who did attend were said to be 'enthusiastic and engaged'. One nursery teacher stated that a lack of attendance was a common occurrence with other activities involving parents the school had tried in the past:

'Some parents are happy to meet on an informal basis such as a coffee morning and so on, but once they are asked to do something more specific they don't want to participate'. (School one field notes, April 2012)

However, a number of parents (n=8/13) did engage with the goal-setting tasks by completing the tasks at home and some parents from both schools returned their goal-setting worksheets to the class teacher. This enabled me to determine the parents' understanding of the tasks and to observe any progress. Table 34 shows an example of one parent's reflection of the outcome measures and goal-setting intentions sheet; it is not known whether the sheet was completed with the nursery teacher or self-completed at home. Other parents reported that completing the food diary had made them more aware of what their child/family was eating. Some parents reported that they found the process enjoyable. A few parents reported that they felt their child/family watched too much TV, however, they reported participating in 'healthy' activities such as walking to school. Some parents wanted to change their family's TV viewing habits, and reduce their child's sweet consumption. Similarly, the majority of parents reported wanting to do more physical activities together as a family. Reported barriers to achieving goals included, parents working shifts, time, money, competing commitments and inclement weather.

Table 34 Parent example of session one goal-setting task

Question	Parent response
How did you feel about filling in the food/TV and activity diary?	‘The process was interesting and made us think through our usual routines and diet’
From the diary what activities/behaviours would you describe as healthy/unhealthy?	‘We do actively try to encourage [child] to vary her food and also to engage in exercise. We probably identified that we need to work more on this’
What, if any, things you would like your child/family to improve?	‘More varied diet and some trips to restaurants. More active time during the week where possible’
What goals would you like to set for your family?	‘To eat more freshly prepared meals and a bigger variety of fruit and veg. At least 1 active trip per weekend. Eat 10 different F&V a week’
What might stop you and/or your family achieving these goals?	‘Lack of time and commitments that make it difficult but not impossible to achieve this’
What do you think would help you and your family achieve your goals?	‘Better organisation of time and more motivation to achieve’

Despite many parents declining to attend a formal meeting with the class teacher, it was evident they were willing to engage with the task and demonstrated definitive proposed behaviour changes. The reluctance to attend meetings may have been due to practical issues such as working parents or difficulties in co-ordinating a suitable time with the class teacher. Moreover, many children were brought to the nursery by grandparents and child-minders, so the parents did not make regular face-face contact with nursery staff. However, the discussion of family behaviours and lifestyles with a ‘professional’ in a semi-formal manner may have been perceived as too personal by some parents with the potential fear of being judged or criticised; a fear of being judged was an issue raised by parents in the focus group sessions (section 5.3). Parents may not have felt comfortable discussing such matters with nursery staff preferring to hand in completed sheets in a more anonymous fashion. One NT reported that she thought some parents felt ‘vulnerable’ and were unsure about the goal setting (see section 8.3.4). However, comments received from the teachers suggested that some informal discussion with the parents about family progress also took place. Parents may have

felt more comfortable with the informal day-to-day sharing of information which possibly included discussions involving the child; for example, 'tell Mrs [name of teacher] what we did at the weekend'.

8.2.2.1 Cooking challenges

One aspect of the intervention that appeared to engage parents including non-intervention families in a significant way was the monthly cooking challenges. The engagement of non-intervention parents demonstrates the success of the task to reach out to all families. The nursery teachers in both schools emphasised the 'success' of the challenges: *'the carrot challenge went particularly well, the families really participated in this'* (School two: evaluation form, month two).

Figure 38 and Figure 39 demonstrate the level of participation by some of the families. The information boards were reported to be highly favoured by the parents and children alike: *'apple challenge, big uptake, lots of photos, parents happy to see photos displayed'* (School one: evaluation sheet, month three). The sharing of photos had the intention of contributing to peer modelling (Bandura, 1977) and positive reinforcement of behaviour through operant conditioning (Baranowski *et al.*, 2003) as discussed in section 6.6.2.

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Figure 38 School information board with cooking challenge contributions



Figure 39 School information board: child's step-by-step photos of broccoli bake preparation

In Figure 39, it can be seen that one parent went further than simply providing a photograph and presented a step-by-step account of their child's participation in the cooking challenge.

In one of the nurseries it had become apparent that one family was having difficulties with the cooking challenges; the teacher explained that the family were from Eritrea, a country that had been suffering from drought for more than 10 years and this had had an impact on the available food. Consequently, the family were unfamiliar with the fruit

and vegetables being presented to them and did not know how to cook them. The teacher reported that the SKIP intervention had revealed many aspects of family and children's health behaviours and barriers which may be impeding their health, such as financial difficulties, which would not otherwise have come to light. This was an interesting disclosure and highlighted the complexity and diversity of implementing such an intervention.

8.2.3 Children's engagement with the project

As previously discussed one of the nursery school teachers encouraged interaction with the children during visits; it was evident the nursery was engaging the children in the intervention. The children spoke about the cooking challenges and were keen to show their photographs they had displayed on the information board. In addition, both schools, provided photographs of activities that had taken place in the nursery such as fruit tasting sessions (Figure 40) and playground games (Figure 41). Also received were completed activity sheets such as 'No TV' activity sheets (Figure 42) and 'my favourite breakfast'. As previously discussed the purpose of the current study was 'feasibility testing'; the completion of the 'No TV' and 'my favourite breakfast' nursery-led activities not only demonstrated the children's ability and willingness to comply with the tasks but also provided additional in-depth data about the children's family and home-lives. One of the teachers commented how illuminating it was hearing the children talking about aspects of their lives she was not aware of. A few examples of the activity sheets were returned by the parents and/or nurseries. However, in future studies with children, the collection and analysis of this kind of data would add to the richness of the child focused methods. Darbyshire *et al.* (2005), found in their study with children aged 4-12 years that various child-orientated data collection approaches complimented rather than duplicated their final interpretations.



Figure 40 Fruit tasting activity



Figure 41 Child using skipping ropes

Name: Olivia.....

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This is what I like to do at home instead of watching TV. Ride my bike. I like to ride it everywhere.


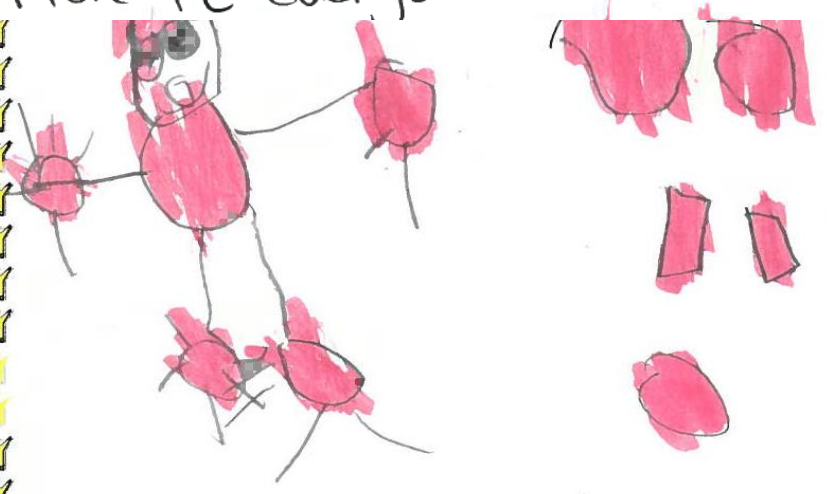


Figure 42 Example of 'No TV' activity sheet

As validated by the photographs and feedback, the nurseries demonstrated engagement with the intervention tasks. Furthermore, it was apparent that the children were exposed to all the nursery intervention elements designed for positive healthy behaviour reinforcement.

In accordance with the parents, the children appeared to find the family cooking challenges the most appealing. The children were visibly excited on the fruit or vegetable delivery days and were keen to be involved in the distribution of the items (Figure 43). The teachers commented on the children's enthusiasm each month:

'The children liked taking their broccoli home, they are very disappointed and quite indignant if they don't get to do something good with it...they talk about their photos in the cloakroom, they show real pride in their achievements. The children then start talking about each other's homes etc. comparing and contrasting' (School one: evaluation sheet, month 4).

I believe one of the strengths of the cooking challenges was the capacity of the task to link the school and home environment. There was an element of peer pressure with the children and competitiveness among the parents which perhaps inspired many families to take part. However, a potential negative aspect of this; is the risk of increasing discrimination and inequalities between families of those who participate and those who do not. The teachers were sensitive to this and were careful to include children, whose families did not take part in the home challenges, in school activities.



Figure 43 Child helping with cooking challenge fruit distribution

The following section reports the feedback received about intervention. The results from the two intervention schools have been collated.

8.3 End of intervention feedback (intervention schools one and two)

8.3.1 Introduction

An important component of a feasibility study is to determine the follow-up rates, attrition and response rates to questionnaires and other measures, adherence/compliance rates and fidelity of the intervention (NHS, 2012a). The evaluation of an intervention can be undermined by complications with recruitment, acceptability, compliance, delivery of the intervention and retention (Craig *et al.*, 2008b). It is important that pilot/feasibility studies are evaluated appropriately (Science and Technology Committee, 2010-12); the feasibility study is used to determine how the above issues can be minimised.

8.3.2 Evaluation methods

As described previously, on-going process measures and evaluation throughout the intervention took place in the form of monthly feedback forms completed by the teachers; photographic evidence (information boards; evidence of material use); goal-setting and monitoring sheets completed by parents; and informal communication and observations. Table 35 summarises which group of participants participated in each data collection activity and intervention activities and how each was analysed.

Table 35 Phase three analysis summary

Data	Who?	Analysis
Food diary	Intervention parents	Dietary analysis: Food groups and nutrients by intervention/control groups
TV/DVD record	Intervention parents	Comparison by intervention/control groups of hours recorded
Family 'active time' record	Intervention parents	Thematic analysis
Child physical activity measures	Intervention children	MVPA and step count comparison by intervention/control groups
Food photographs record	Intervention children/parents	Visual content analysis
Anthropometric measures	Intervention children	BMI comparison by intervention/control groups
Information sheets (PA, diet and SB)	All parents Staff	Feedback by questionnaire and/or interview (thematic analysis)
Fruit/veg and cooking challenges	All children/parents	Informal feedback from staff/parents and children Photographic evidence on notice boards Questionnaire and/or interview (thematic analysis)
No TV day challenges	All children/parents	Informal feedback from staff/parents Questionnaire and/or interview (thematic analysis)
Goal-setting meetings and monitoring sheets	Intervention parents Staff	Informal feedback from staff/parents Questionnaire and/or interview (thematic analysis)
'Sharing Tips' sheets	All parents	Evidence of use on notice boards Questionnaire and/or interview (thematic analysis)

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Shared notice board	All children/parents Staff	Evidence of use (photos) Questionnaire and/or interview (thematic analysis)
Nursery-led activities	All children Staff	Staff feedback by interview (thematic analysis)

8.3.3 Field notes and informal analysis

As described in section 6.12.3, I used field notes, photographs and informal observations to contribute to the evaluation of the process of and the engagement of the intervention. These observations provided rich detailed data which highlighted issues such as the contravening of nursery healthy eating policies. Table 36 provides an example of how these observations were analysed and how they contributed to the final conclusions.

Table 36 Example of field note and informal observation analysis

Format	Occasion	Analysis	Example findings	Contribution to interpretation/conclusions
Hand-written notes after nursery visit	Anthropometric measures and observations of children's dietary consumption	Thematic analysis	Some NPs declined to become involved in the data collection process, preferring to leave any communication to the class teacher.	These observations emphasise the need to have all the staff involved and for them to feel they are part of the process. The staff need to believe that the project has benefits and value for them to participate
Hand-written notes after nursery visit	Observation of children's dietary consumption	Thematic analysis	The nurseries' demonstrated different relationships with food and reported 'guilt' when eating or giving the children 'unhealthy' foods in front of the researchers. This revealed that despite the nurseries' policies for not providing the children with sweets, crisps and fizzy drinks, some practices still involved providing these types of foods, albeit for 'special' occasions or for a reward	The embedding of food policies which promote healthier food being brought into the nursery setting from home was a key area for change.
Photographs (researcher taken)	Observation of children participating in nursery-led activities	Visual content analysis	Children helping with fruit and vegetable distribution	The practical aspects of the intervention were instrumental in engaging the child's interest

At the completion of the intervention the class teachers and parents were invited to provide intervention feedback in the form of a one-to-one interview; both teachers consented to do so. The parents (n=13) who had participated in the intervention were telephoned, however, only one parent consented to an interview. The remaining parents were sent questionnaires with a SAE to complete; five out of thirteen parents

from both schools completed and returned questionnaires, a 46% completion rate (including interviewed parent).

8.3.4 Nursery teacher's feedback

The nursery teachers (NT) were both interviewed in their place of work; the interviews were digitally recorded and transcribed.⁴

Overall both NTs were satisfied with the intervention and provided positive feedback about many aspects; however, they also reported some challenges in implementing some of tasks. The materials and communication methods were considered to be acceptable; however, one NT stated that receiving the intervention materials a few weeks prior to the intervention period may have been beneficial:

'I think everything was really good, probably took me a while just to get my head around what the whole project was going to be like and to understand sort of the timescales, understand what we were going to be asked to do' (NS1).

The NTs felt there were some issues with the recruitment of the parents to the intervention. The timing of the recruitment days caused some difficulties with parents being in a rush to drop off/collect their child. Other children were dropped off by child-minders or grandparents. One NT was surprised that some parents whom she thought would be interested in the project did not sign up to participate:

'We felt that if we'd made it more of a joint meeting between ourselves and invited the parents in, made sure all the parents came in and were fully aware of what was going to happen, so have the staff's involvement as well and saying that we're going to have these meetings and can you come and make sure that you sign up, that you are willing to come to these meetings' (NS2).

It is interesting to note that the NT spoke about 'the staff's involvement'; this statement could be interpreted in two ways. Firstly, it may be that she felt that the nursery staff, as they were known to the parents, may have been more successful in recruiting parents to the study. Secondly, the NT may have felt that the other staff members (nursery nurses) were not as involved as they could have been; this was evident when no other

⁴ Intervention nursery school one teacher = NS1
Intervention nursery school two teacher = NS2

staff members (nursery nurses) attended the project training session which was held at the university.

The suggestion of a meeting prior to recruitment was echoed by the other NT, who felt an informal coffee morning would have been beneficial giving parents more of an opportunity to learn about the intervention and ask questions before the recruitment day.

The NTs reported that some children were reluctant to wear the physical activity monitors unless encouraged by a staff member and one parent had reported that she was unable to complete the food diary 'because her child did not want her to'. One NT felt that the parents did not appreciate the importance of completing the data collection tasks:

'It gave us a bit of an eye opener when we had parents coming in and saying they [the child] won't do this and they won't do that and you think [laughter] they will you know! It helped us see things that were nothing to do with the project' (NS1).

These observations suggest that perhaps the children should be involved prior to the data collection period to introduce them to the tasks and any equipment such as the monitors and cameras to be used.

Once parents had been recruited to the intervention, the NTs spoke of the difficulty of engaging some in certain tasks. One task reported to be challenging was arranging meetings with parents to set behaviour change goals for the family.

'It was the same parents every time that would come in and those parents wouldn't need to come in, the ones that were doing it weren't the ones that we really wanted to target' (NS2).

As discussed in section 8.2.2, one NT felt it was the formal aspects of the goal-setting meetings were off-putting for some parents. However, as previously reported, this reticence to participate with other nursery parent activities was common. Many parents were happy to complete the work sheets at home and send them in with the child but not meet on a one-to-one basis with the teacher. One NT was keen to emphasise that the parents did want to 'help' their child:

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'I think they feel vulnerable, some said they really didn't have time for things like that or they thought they might have to drop out of the project and I said no, no you don't need to drop out of the project, just take part in whichever level is suitable for you. They said they wanted the information; they wanted to help their child. That was really clear that they wanted to help their children. They were very happy; they just didn't like the goal setting'.

This statement demonstrates that the practitioners were adapting parts of the intervention to suit the circumstances of their situation. This emphasises the importance of developing interventions that are tailored to specific groups of people (Ells *et al.*, 2005) and learning from what works in the 'real world' (Finegood *et al.*, 2010).

The intervention materials the nursery staff were given to present to the parents were received with enthusiasm by the NT.

'I thought that was all fantastic and really loved handing them out, the head teacher loved them, looked at them through the school and think that was something we would really like to develop and with older children as well. I think it's something that everybody learned from. It was something that the ideas were suitable for everybody and were very easy to carry out; it was presented in a friendly way. Everything about it was fab, I really liked that' (NS1).

The teacher in the second nursery reiterated the benefit of the materials being accessed by all the parents, she stated that some parents who had not initially signed up to participate in the programme were engaging more than the intervention parents with the activity sheets and feeding back to the staff. This highlights the importance of perhaps providing more information in the form of parent/staff meetings, as previously suggested, to the parents before recruitment begins. The engagement of parents not taking an active part in the research project was most evident with the home cooking challenges and the shared notice board. This was deemed to be a highly successful element of the intervention and was said to encourage parental engagement.

'I think the parents really like looking at what the other parents have done for the challenges and things I think it spurred a few of them onto the later challenges when they had seen those kind of things up on there' (NS2).

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Other methods of feedback for the goal setting were discussed, one NT felt face-to-face meetings were best for their personal situation; the other NT felt email could be a possibility. However, she stated that the shared information boards were the best form of feedback for her nursery:

'The photos were their feedback, that was the way that they and so many took part in that it just seemed as if that was their way of saying what they've done and actually that's early years right through. You know if you take photos of what they've done because early years you don't have a lot written, so you know it just fits' (NS1).

One NT felt that the intervention had enabled the staff to learn more about the home lives of the children and that the parents were more forthcoming in discussing with the nursery staff activities they had done with their children at home. The NT in the second nursery reported that due to curriculum demands of the primary school (of which they were a part of) they sometimes found it difficult to fulfil all the intervention tasks. She went on to recommend that future schools taking part should plan the intervention into the curriculum.

Observed changes in parents and children were reported as a raised awareness in the parents of the importance of healthy lifestyles at an early age, families doing more activities together and the children talking about staying healthy:

'The children have been talking about SKIP as a person, he's brought us skipping ropes and things like that and they've been talking a lot more about keeping healthy and what's healthy and what's not healthy, so definitely must have been talking about it at home as well as here' (NS2).

Furthermore, the NT reported that an important strength of the intervention was the capacity to encourage parents to do more at home with their children and get involved in nursery activities:

'It got families involved, it got families together doing things in the kitchen, challenges and things like that and the activities and parents were talking about it in the cloakroom what they'd been doing and sharing their ideas and sharing their pictures and things that they'd brought in' (NS2).

This was echoed by the other teacher:

'It's been really lovely to see in the children that they've been so excited bringing and showing what they've done and so it means that it has had a real impact. They've [the parents] gone home and they've done things with their children that I don't necessarily think they would have done at all and that's important' (NS1).

For both NT, this appeared to be the most significant aspect of the whole intervention. In the next section I discuss the feedback received from the parents.

8.3.5 Parent feedback

As previously reported only a small number of parents (5/13) agreed to provide feedback; the attrition rate from the baseline measures to follow-up was high (19 to 45% dependent on measure); this reduced the number of parents available to provide feedback. However, one parent who declined to complete the follow-up measures did consent to an interview to provide feedback. Although pertinent, the evaluation data are insufficient to be representative of the wider population. The results from the both nurseries have been collated.⁵

Recruitment of parents to participate in the intervention proved to be challenging. Some parents who were not prepared to take part cited reasons as 'lack of time', 'disabled siblings' and 'imminent new baby arrival'. It would have been useful to determine if there was anything about the actual subject or process of the intervention that had dissuaded them.

As discussed in section 3.13.5, one aspect of a feasibility study is to determine whether the data collection methods are acceptable to the target population. The majority of parents were happy to complete the food and activity diary. A couple of parents commented that they sometimes struggled to find time to complete the diary every day. Completing the diary highlighted family habits: *'...very good, it was interesting and made us more aware of the family and child eating. I enjoyed it'* (CC32)

None of the parents who had completed the questionnaires reported felt 'unable' to complete any parts of the diary. When asked if there were any problems with the child wearing the physical activity monitor, only one parent had an issue with her child not

⁵ Parent I.D - School one: CC (number)
School two: FP (number)

wanting to wear it. Most were enthusiastic about the process: *'Fantastic, my child loved it and kept checking it'* (CC34)

There were mixed reviews about the use of the children's digital cameras. Some had technical problems with the camera such as low battery and full memory which caused some frustration. Others would forget to give the child the camera. However, other comments received were positive: *'Good idea, my child loves taking photos and it enabled her to feel part of the project'* (CC34).

Three out of the five parents reported attending goal-setting meetings with the NT; those who did not attend cited work commitments as a constraint. Two parents attended one meeting over the six months and one parent did not specify how many meetings she attended but reported she did meet with other parents. Only one parent reported meeting with a staff member on an individual basis. Reasons for not attending further meetings were not given.

The parents who attended meetings with the NT were asked how the NT encouraged them to set goals for the family. Examples included: *'giving examples; giving some tips; and new ideas'*. Two parents reported that they worked through the process themselves: *'It was when I read the information over and over and got thinking we [the family] can do this together'* (FP24). This statement is key, as previously demonstrated by the feedback received during the intervention; many parents opted to complete the goal-setting tasks as a family at home without further discussion with the NT.

The parents were asked how they found the goal setting activities. The comments received were mostly positive with many finding the process *'helpful; easy; ok; and really good'*. One parent found it difficult to implement some of the family goals.

'It was hard to do, especially outdoor activities due to weather. The No TV challenges were hard as [child] likes to watch TV and it gives the parent time to get on with other things' (CC32).

Support from 'other family members' for the goal setting activities were mostly positive. Some families felt it brought the family together. Only one family expressed the father finding it difficult due to work commitments.

The families were asked to describe what changes they had made, if any, due to the goal setting activities.

'We made an effort to do more as a family' (FP22).

'We didn't feel we had a great deal to change. We changed some aspects of [child] diet such as less sweets' (CC32).

'We watched less TV and took part in more physical activities' (CC34).

In accordance with the NT feedback, the most positive and enthusiastic comments received were related to the family cooking challenges. All the families took part and most reported enjoyment and fun in taking part and highlighted their child's enjoyment and involvement *'it was funny and enjoyable'* (CC34), *'We enjoyed creating the new recipes'* (FP22).

The parents reported that their children spoke about the project with them and were most likely to talk about the cooking and TV challenges and the skipping activities. Two parents reported that their child related to the SKIP character. *'He thought it was him'* (FP24), *'She understood it was all about activity/exercise and eating well'* (FP22).

The majority of the families reported that they enjoyed taking part in the intervention. Some felt they had gained new ideas. Some parents stated that they were more aware of trying to eat more healthily and doing more together as a family. Another felt that their family now watched less TV and did more exercise as a result of the intervention.

One mother stated she would have liked less paperwork:

'It was quite time-consuming when working all day; I spent more time doing the activities rather than the reading' (CC32).

Three parents reported that they would have liked to try email as a mechanism for sharing the goal-setting tasks.

8.3.6 Child feedback

In order to include children's views of the intervention, 'draw and talk' sessions were conducted. Drawing methods have been used as a way of prompting visual and spoken narratives about children's perspectives of food (O'Connell, 2013). This method was adapted from the child-centred 'draw and write' method which was developed as a technique of discovering primary school-aged children's perceptions of health-related issues (Collins, 1998). In a further study researching preschool children's awareness

for the need of sun protection the 'draw and write' technique was adapted so that it was appropriate for the skills of the pre-schoolers (Collins, 1998). Drawing allows children to freely express themselves and provides a focus for spontaneous narratives. Moreover, (Young and Barrett, 2001) believe that younger (and illiterate) children are not inhibited about their drawing capabilities.

The children whose families participated in the intervention were shown a picture of the SKIP character and asked if they knew who it was and to describe what SKIP 'liked to do'. Most of the children in nursery school two were able to recognise the SKIP character; it was evident by their knowledge and discussion with each other that the character had been used as communication tool with the children either at nursery or at home.

Figure 44 and Figure 45 show two of the children's drawings.



Figure 44 Child example one of SKIP character

The child (a four-year-old girl) who drew the picture in Figure 44 was able to recognise the character instantly, she told me that he liked to skip and that *'he likes to eat healthy food such as melon'* (FP22).



Figure 45 Child example two of SKIP character

The child (a three-year-old girl) who drew the picture in Figure 45 was fairly quiet and shy. She was able to name the character and went on to say that he liked to jump, but was reluctant to provide any further information. Fewer children in nursery school one were able to name the character. This may be due to a different teaching style by the nursery staff.

As reported in the parent feedback section (8.3.5), two out of the five parents felt their child identified personally with the SKIP character and believed him to be a 'real person'. Although the draw and talk sessions demonstrated the children's knowledge of the character and some of the health messages, it is difficult to ascertain whether this facilitated the child's engagement with the intervention. In a larger scale project with

more time and resources, it would be beneficial to complete this task with a larger group of children to enable analysis (see Table 37).

8.3.7 Intervention fidelity and quality

Fidelity refers to the extent to which core components of interventions are delivered as intended by the protocols (Gearing *et al.*, 2011). A complex intervention with many elements may not have high fidelity due to the many tasks being requested of the participants and all elements may not be completed. However, the individual elements that have been implemented or delivered may have been delivered well (high quality). Conversely, an intervention with high fidelity; all the tasks attempted but not completed to the desired effect, that is, they are not feasible in the 'real world' may be considered as having low quality assurance. In a main RCT trial, an evaluation tool such as the Consolidated Standards of Reporting Trials (CONSORT) (CONSORT, 2010) would be used to aid assessment and reporting of the validity of an intervention.

In order to increase fidelity adherence, the nursery staff in the current study received training to implement the intervention and each nursery received the same resources and instructions. However, as discussed in section 3.13.4, when implementing a complex intervention, ensuring strict fidelity to a protocol may be inappropriate and adaptation to the local setting may enhance an intervention. This was evident with the goal-setting meetings and activities; initially the NP was requested to meet with the parents to discuss and set behaviour-change goals. One nursery found this to be more successful as a group activity, whilst one other nursery met with parents individually, see section 8.5.2 for more about the goal-setting findings.

The current study provided some evidence of intervention fidelity through observations (field notes), photographs taken by NPs, parents and myself on nursery visits. Examples of photographs included those displayed on the shared notice boards and children participating in nursery intervention activities. It was also evident that the intervention resources were implemented through the completion and collection of child nursery worksheets, family achievement sheets, goal-setting sheet, and no TV sheets and so on.

8.3.8 Visual data analysis and interpretations

In the research community it has become more accepted that children should be included in data collection and given a 'voice' and this is where visual methods are wholly apt. The use of visual data methods is considered to be especially appropriate in studies relating to diet and PA. As previously discussed, everyday activities such as eating are often carried out without reflection; asking participants to visually record their dietary consumption enables a different way of 'seeing'. In addition it is thought that the sensory and visual nature of food may be better captured via visual methods (O'Connell, 2013). Photographs can provide additional insight and context into the population being studied.

As previously discussed, although some children may be less technically adept with a camera even visually unclear snapshots can be a useful method for stimulating discussion with children (Young and Barrett, 2001). As the current feasibility study demonstrates, young children are able to contribute valuable data using this method.

The acceptance and the use of the cameras as evidenced by the photographs taken by the children, parents and NPs suggest that the use of technical equipment (cameras, camera phones, printers and so on) is common place. Moreover, the sharing of photographic information has become more widespread, especially in digital media with tools and apps such as Facebook, Twitter, Instagram, and so on. This suggests that visual methods have a significant role to play in future research methods. Future studies should consider the use of an intervention webpage or Facebook page where the participants can share photos and ideas in an acceptable and accessible format.

The shared notice boards were considered to be one of the most successful aspects of the intervention. The boards were initially intended to be used to give visual prominence to the project; to provide a focal point of discussion for the NPs, parents and children; and to encourage participation, inclusion and practice. However, the data generated by the boards had the additional benefit of providing a measure of process. The notice boards provided evidence of the parents' and children's level of engagement with the cooking challenges, as discussed in section 8.2.2.1; photographs were shared of children cooking with the given fruit and vegetables. This shows that not only were the families demonstrating that they were cooking (which may have been their everyday normal routine) but they were using the given ingredients and thus engaging with the intervention and sharing ideas. Moreover, the notice boards provided

a measure of the intervention, that is, the NPs, parents and children 'did' the notice boards. In future research the evidence generated by the boards could be used further; for example, how many families shared photographs, of those families, how many used the given ingredients, how many families shared other ideas and so on. Therefore, the notice boards have potential in providing additional data and process measures.

However, it has been questioned whether collecting visual data such as photographs and drawings just 'adds' more data and it has been acknowledged that the organisation, storage, sharing of images, and time needed to analyse multiple visual data can be challenging (O'Connell, 2013). Despite the challenges, O'Connell (2013) believes that visual data can do more than just corroborate other qualitative data such as interviews; it can complement the data providing a fuller picture which helps to bring the research 'alive' for policy makers and practitioners.

Table 37 summarises the analysis of the food photographs, shared notice boards, photographs contributed by the nurseries, and the children's draw and talk pictures. The rationale for the use of these methods and the contribution to the study interpretations are also presented. For example it can be seen that the use of the shared notice boards which were designed to provide multiple benefits and incentives, may aid future study recruitment strategies.

Table 37 Visual data and contribution to interpretation

Visual data: analysis	Rationale	Contribution to interpretation
Food photographs: Content analysis	Providing the children with digital cameras to record their dietary intake allowed them to be part of the data collection process. It also tested the use of digital cameras as a tool in this age group. Analysis of the photographs provided some context of the eating occasions, portion size, child’s perspective of their world and allowed comparison with the food diaries	This study demonstrates that digital cameras can be used by this age group for data collection. The photographs provided some context and insight into the children’s eating occasions. In future research it would be beneficial to discuss the photographs taken with the children and parents to gain a more in-depth view of the family habits and lifestyle.
Shared notice board: Evidence of use (photos) Questionnaire and/or interview (thematic analysis)	The activities associated with the notice boards were designed to provide multiple benefits and incentives. Displaying the intervention information on the board gave prominence to the project. The act of sharing ideas and achievements prompted inclusion and practice. It provided a focal point of discussion for staff, parents and children highlighting the positive messages being delivered. In addition the use of the boards and the volume of information shared provided a process measure of engagement with the intervention	The practical aspect of the cooking challenges and ensuing contributions to the notice boards were deemed to be the most successful element of the intervention. The activity was instrumental in engaging many parents who had not signed up to the intervention. This demonstrated the holistic aspects of the intervention. In future research the process measures generated by the notice boards could be used for further intervention evidence and analysis. Moreover, engaging parents/families in ‘fun’ activities such as the cooking challenges before future formal recruitment may enhance interest and recruitment rates
Nursery activity photos: Content analysis	Two of the nursery schools provided photographs of the children participating in nursery-based intervention activities. This provided a record and evidence of intervention compliance and fidelity	This evidence added to the interpretation/conclusions that the nursery-based activities were found to be feasible and acceptable by staff members
Draw and talk pictures: Content analysis	This method is used to determine the children’s perception of and engagement with the project. Typically this method would be	The children who did participate in this activity were able to demonstrate their knowledge of the

analysed using content analysis, however, only a small number of children were able to take part (n=6)

intervention. In a larger scale study this activity would provide valuable in-depth data from the children's perspective

8.3.9 Comparison of data streams

It is important to consider the data streams, that is, the completion of each family's data set which in turn provides a 'persona' of each family. In multimedia research it is believed that by 'detecting events in data streams and correlating and reasoning among them it is possible to create a chronicle of personal life' (Jalali and Jain, 2013, p. 19). In a similar vein, the analysis of data from each family in the present study may contribute to building a picture of the type of family participating in a behaviour change intervention.

It was evident from the collected data that the families were more likely to participate in the 'fun' activities such as the cooking challenges, taking photographs and sharing of information. In contrast the No TV challenges did not appear to generate such enthusiasm and no photographs of the family's alternative TV activities were shared. Although, there was evidence, in the form of completed sheets and parental feedback of some of the families taking part in the No TV challenges. The NPs reported the parents 'not liking' the No TV challenge, however as discussed further in section 8.4.1, this may have been the perception of the nursery staff. Nonetheless, if this was the case, it may have been that the No TV did not align with their values, habits or routines.

Five individual families' data were randomly selected and examined to determine the importance of each data stream and to conclude whether the known family circumstances had an effect. It can be seen in Table 38 that one family had a full data set, one had a nearly complete set, and one had completed everything but did not repeat the follow-up measures. The fourth family only completed the food and TV diary in T1 only and the fifth family did not complete any tasks (the child only took food photographs in nursery when reminded to do so by the nursery staff and/or researcher.

The first family which completed all the data activities did so quite comprehensively. It was evident that the family was enthusiastic about taking part in the study. It was revealed in their goal-setting sheets and family achievements sheet that both parents were shift workers who were often 'on call' and had one child. Due to the shift work

each parent spent a lot of individual time with the child taking her to parks, swimming, dance classes and a drama group. However, the family wanted to prioritise more time spent doing activities 'together as a family' and this was stated in their personal behaviour change goals. The family were also keen to ensure that they achieved a daily fruit and vegetable 'five-a-day target'. Moreover, the child's grandparents were involved in the child's care and were being included in the behaviour change goals.

In contrast, in the case of the fifth family who did not complete any outcome measures or intervention tasks; no information or 'persona' can be gathered about the family. However, I was informed by the nursery staff that the child had four siblings which may go some way to explaining, that possibly due to competing demands, why no tasks and activities were completed by the family.

The example data stream provided by the first family with the full data set suggests that they were highly motivated, active and had additional family support in the form of grandparents. Much of the information provided by this family was done so voluntarily. If more specific details about each family set-up such as siblings, grandparent/family support and parental occupation and so on were asked of all the families participating, a much more detailed data stream of each family may have been available. This may have provided a comprehensive over-view of the participating families' lifestyles, home circumstances and support networks which may have given some indication of the types of families likely to complete a behaviour-change intervention and the nature of support which may facilitate completion. This type of information is highly relevant for future work.

Table 38 Data streams: comparison by families

Family	1	2	3	4	5
Marital status	Married for the first time	Living with partner	Married for the first time	Married for the first time	Living with a partner
Education	Completed secondary school	Some additional training	Completed secondary school	Post Graduate University	Completed secondary school
Food diary	Yes – both times	Yes – both times	T1 only	T1 only	No
TV diary	Yes – both times	Yes – both times	T1 only	T1 only	No
Activity diary	Yes – both times	Yes –both times	T1 only	No	No
Food photos	Yes – both times	T1 only	T1 only	No	At nursery only
Activity monitor	Yes – both times	Yes – both times	T1 only	No	No
Family Achievement sheets	Yes	Yes	Yes	No	No
No TV challenge	Yes	Yes	Yes	No	No
Reflection and goal setting	Yes	Yes	Yes	No	No

8.4 Discussion

8.4.1 Intervention feedback

Trying to gain feedback from parents proved challenging; the final number (4 questionnaires, 1 interview from 13 parents) was obtained by a combination of, asking nursery staff to disseminate the questionnaires, posting the questionnaires directly to the parent's home and finally, by offering a shopping voucher incentive for return of the completed questionnaire. It was frustrating to know that many parents had engaged with most aspects of the intervention but felt unable to provide feedback, they perhaps saw the intervention as part of the normal nursery activities and not a separate entity. Moreover, it would have been valuable to receive the opinions of the other staff members.

It can be seen from the feedback that was obtained, both staff and parents reported finding the cooking challenges; the use of the shared information board; and the home information and resources acceptable and engaging.

Organising staff and parent meetings was reported to be challenging. Staff members were inclined to blame this on the parent's lack of commitment, confidence, language barriers and work commitments. The only comments received from parents for lack of meeting attendance were concerned with work commitments. However, 3 of 5 parents attended at least one meeting and reported that they found the meetings 'useful' or 'very 'useful'. It is not known whether a different approach to the meetings would have yielded a better response; as suggested by one NT, a more informal format. Furthermore, the NT from the second nursery felt that a group parent meeting with staff members before the commencement of the intervention may have produced better commitment to the project.

The NT felt that the lack of meeting success negatively impacted on the parent's engagement and commitment to the goal setting tasks. However, the responses received from the parents suggested otherwise. It was evident that all the parents, who returned the questionnaires, did set goals for their family. Moreover, the majority of parents, at intervention end, indicated that positive health behaviour changes within the family setting had been made. This raises the question of why the parents were happy to engage in the tasks but not share their plans and progress. This relates to data from the preliminary studies in section 5.3 of this thesis, were parents worried about being

thought of as 'bad' parents? However, this perhaps emphasises the need to explore other feedback methods such as web/email (some parents indicated they would be willing to feedback goal-setting tasks in this way). These may prove more effective, especially as the use of technology and sharing information online has become commonplace and acceptable. The use of sharing information through the media of photography was deemed to be a success by both staff and parents. This also led to peer engagement and encouragement.

Some comments were received from both staff and parents about the volume of paperwork/information received. However, this will be a challenging aspect to remedy and balance with differing education levels, language barriers and the need to provide enough information. However, this identified barrier would need to be addressed; a long-term solution may be to provide basic information with web-links to those who would like more information and possibly in different formats and languages; however, this does assume parents have web access. Additionally, exploring differing feedback methods such as email may reduce the perceived burden and volume of paperwork for the parents.

The teachers felt that although the parents engaged wholeheartedly in the cooking challenges, they were less likely to engage in the other tasks such as the No TV challenges and increasing family active time. However, whether this was just the teacher's perception due to lack of communication or feedback, this did not seem to be the case. Many parents, despite commenting some of the challenges were 'hard', reported attempting them with their families.

8.4.2 Staff engagement

It was reassuring to learn that despite the second school practitioner's apparent lack of willingness to communicate during the intervention period; she was very enthusiastic, informative and direct during the interview. It is difficult to determine why she demonstrated reticence during the intervention; she perhaps felt that the researcher's role was to purely deliver the intervention materials and gather feedback and did not expect any further engagement. Conversely, the NT in the first intervention school was very open and positively encouraged interaction with the children. However, although this was useful for observation and relationship building (Blanton *et al.*, 2006) for the feasibility study, the practicalities of the researcher being so involved during a large scale intervention roll-out would prevent this.

8.4.3 Parental engagement

As described in section 8.3.4, the NT felt that the initial parental engagement could have been improved. There was a suggestion that this might have been enhanced by an initial parent/staff/researcher meeting, however, the NT also disclosed that encouraging parents to participate was challenging in all aspects of nursery activities. Whether an initial meeting would have had an additional impact is not known but should be explored further.

As described in section 5.5.3, the sensitivity of the subject may have contributed to the lack of one-to-one feedback from the parents. It perhaps is a case of the parent being reluctant to discuss their private lives face-to-face with nursery staff; especially in the moral and sensitive areas of child feeding and health. Although parents in the focus group sessions in the current study previously reported that they would be willing to receive health promotion advice from nursery staff; the task of setting goals and monitoring family behaviour with the practitioners may have felt too personal with the fear of being judged. Moreover, some parents may question the practitioner's qualifications and knowledge of the subject matter.

The parents were reported as engaging more with the practical tasks, such as the cooking challenges, this may have been driven by their children, peer pressure or it simply may have been the challenges were more fun and practical.

Some parents did indicate that they would have liked the option of feeding back by email; this may have reduced the perceived burden for the parents and introduced a more practical and less intimate method of sharing sensitive information. However, this may introduce additional tasks for the NTs; as one NT reported that email was not practical for their particular school and set-up.

8.4.4 Research verses 'real' world

Although the intervention schools were given the same training, information and tasks to complete, it was apparent that each school tailored the implementation to suit their own setting. Craig *et al.* (2008b) believes this to be significant, as it is essential that the intervention can function in a 'real' world situation and is capable of being integrated into the daily routine (Finegood *et al.*, 2010).

8.4.5 Great expectations?

As previously described, the purpose of the feasibility study was to test all elements such as, recruitment on multiple levels; outcome measures compliance; appropriateness of staff training; intervention materials; intervention implementation and delivery; monthly monitoring and feedback; engagement of staff, parents and children; repeat measures; and feedback methods.

It is evident that the practitioners did attempt to deliver all the elements of the intervention, however, how much time and commitment was given to each was not measured. The NTs did report that they sometimes struggled to complete some intervention tasks that were competing with other aspects of the nursery curriculum. One teacher suggested that schools taking part in such an intervention in the future may want to formally incorporate the intervention tasks into the school planning and curriculum. This would require careful timing and planning with the school/nursery staff to incorporate the intervention elements, however, it may promote ownership of the project.

Following analysis of the intervention in the first two nursery schools (intervention schools) the sections below highlight areas of the intervention that may be amenable to change and the proposed modifications for future implementation.

8.5 Evaluation of intervention and changes

This section highlights and discusses issues which arose from the evaluation of the intervention schools. Recommendations for change in the delayed intervention schools are also reported (a summary is reported in Figure 49).

8.5.1 Parent recruitment

Feedback from the NT suggested that some parents were not fully aware of what was expected of them for participation in the project:

'Think we could have used a different approach to get parents involved from the start. Maybe a meeting with all parents to talk about the project and what is involved with yourselves [researchers] and nursery staff. Not sure parents that have signed up are committed so makes it very difficult. Then some parents are

great/need no support and attend every meeting' (School two: evaluation sheet, month 2).

This links with the issues the NTs discussed previously about parental engagement, in which some parents are reluctant to engage in school activities and may require extra encouragement to participate. However, it is evident that some parents did participate; therefore, several approaches to parent engagement may be required. Previous preschool intervention studies have not detailed the key elements for successful parental engagement. However, this emphasises the need for further research in this area. A recent study conducted in Australia (De Silva-Sanigorski *et al.*, 2012), as discussed in Chapter 3, recommend strategies for intervention recruitment. The possibility of different recruitment/engagement/information sessions with parents should be explored. The authors advocate the use of social marketing, such as newsletters and promotional materials, and parent engagement strategies. Furthermore, De Silva-Sanigorski *et al.* (2012) highlight the potential importance of an project co-ordinator/support person; this could be an advocate within the school such as a school nurse or a link with other organisations such as the Healthy Schools co-ordinator, or other health professionals. The advocate would act as an 'interventionalist' and they would be responsible for the intervention delivery and supporting school staff and/or parents.

As discussed, (section 3.4) social marketing strategies may be advantageous in intervention studies. Strategies can be used to emphasise and promote the 'value' and profile of the intervention in relevance to the target audience (Brilliant Futures *et al.*, 2009), which in turn, may make the intervention programme meaningful and have more of an impact. Orth *et al.* (2004) report that the perceived benefits of a 'brand' include functional benefit, social benefit and emotional benefit; the potential benefits of the intervention in respect for the nursery, practitioners, parents and children should be made clear from the outset. However, as discussed in Chapter 7, perceived benefits and threats of participation can vary greatly between individuals (Wanat, 2008).

Recommendations for delayed intervention

The families in the delayed intervention schools had previously been recruited as control schools for the outcome measures; therefore the above recommendations for recruitment strategies could not be explored. However, a preliminary meeting with

parents prior to the commencement of the delayed intervention, as recommended by the NTs in the intervention schools, would be arranged.

8.5.2 Goal setting

It was evident from both schools that this was proving difficult. Staff not only found it difficult to allocate time in an already busy schedule to organise meetings with parents, but parents too, conveyed to staff that it was difficult to attend such meetings. One school reported that some parents were happy to complete the monitoring and goal sheets at home but were reluctant to talk to staff about the issues, as previously discussed (Chapter 7). In both schools the responsibility of meeting with the parents was undertaken solely by the class teacher.

The parents who did attend such meetings reported finding them enjoyable and useful. Moreover, the participating parents (8 out of 13, 62 %) who shared their goal-setting and monitoring activities, reported positive behaviour changes. Parents reported achieving the goals they had set for themselves as a family such as eating more vegetables, eating less sweets and being more active as a family.

As demonstrated, more than half of the parents did engage in the activity albeit in a less formal manner than originally intended; other methods of feedback or information sharing may encourage more parents to participate. A study conducted in Australia researching the support preferences of parents to prevent childhood overweight, reported that parents preferred personalised mailed print materials, specialist appointments and emailed information (Wolfenden *et al.*, 2010). A further US study, reported that an internet-based programme had the potential to engage parents in a prevention intervention, however they conceded that internet use was lower among parents with less education (Hohman *et al.*, 2012) and therefore may not be accessible to all parents.

As previously discussed, a school advocate or 'interventionalist' could have the role to support and communicate with the parents in a personalised manner, be it in person or by email/internet-based method.

Recommendations for delayed intervention

To enable the parents to self- complete the goal setting sheets if preferred, the sheets were to be modified, see section 9.3.1.3. Skipping activities (not reported).

One school reported that the younger children were finding the skipping activities difficult. However, it is not known how much time and effort has been put into teaching children this skill. Other commitments and lack of staff numbers may impact this activity. The importance of developing a range of physical activity skills in the preschool years has been already been discussed in the literature review (2.6.2) (Wang, 2004).

Recommendations for delayed intervention

In order to emphasise the continuing importance of incorporating physical activity skills into the daily curriculum, more specific physical activities and playground games ideas were to be introduced to the project along with specific ideas for using ropes as a vehicle for play and activity both indoors and out.

8.5.3 Cooking challenges

Feedback from both schools was very positive and this is something that the parents and children seemed to have embraced enthusiastically including parents not actively participating in the intervention. The photos provided by parents and displayed on school one's information board (page 264) illustrate this. There was some feedback from a parent from a different culture who was unsure of how to cook the vegetables and the teacher suggested that recipes with the challenges may prove beneficial.

Recommendations for delayed intervention

To provide more specific recipes with each cooking challenge.

8.5.4 Sticker reward charts

There was a small but positive response to this.

Recommendations for delayed intervention

The reward charts were to be continued.

8.5.5 Frisbees

The gift of a mini Frisbee for each child received an enthusiastic response; however, it is not known whether this encouraged families to be more active at home. Although the impact of the Frisbee to encourage family activity is not known, being branded with the

intervention logo may serve as a tangible reminder to the parents of the intervention aims.

Recommendations for delayed intervention

To add to the potential value of the product, an information sheet to highlight the positive aspects of such active play and play ideas was to be provided to the parents.

8.5.6 No TV challenges

Despite the teacher's view that the parents did not like this challenge, it was evident that some of the participating parents took part in this challenge and one parent reported that they watched less TV as a result of the intervention.

Recommendations for delayed intervention

To continue with the challenges but reduce the duration (see section 9.3.1.5)

8.6 Situational factors

As discussed above, factors which contribute to the success of an intervention may be modifiable such as the recruitment method of the parents, being more explicit of what is expected of the practitioners and tangible changes to the intervention materials and delivery. However, as identified from the data, some factors are not so easy to modify such as the ethos of the school, the involvement and commitment of the staff and parents and issues around time. This section identifies factors which may influence the success and acceptance of an intervention that are unique to a particular setting.

Figure 46 illustrates factors of a nursery school intervention which may not be amenable to change but are likely to impact the success and acceptability. These are discussed in turn below. Some of the factors were not explicitly apparent from the data; however, they arose from personal experiences of working in a preschool environment and informal observations in the current study.



Figure 46 Factors which may impact a nursery school intervention

8.6.1 School ethos

The ethos or fundamental values inherent in the school (or nursery) may impact the acceptance of an intervention. If the staff and children are happy with their surrounding environment and daily interactions they may be positive with other aspects associated with the school.

8.6.2 Teacher enthusiasm/personal subject interest

If the person delivering the intervention is enthusiastic, this may influence other staff members, the parents and the children. To remain enthusiastic and interested requires a belief in what they are doing or confidence in the materials being delivered/

implemented. However, some staff members may require additional encouragement and information before they are able to share their belief in and acceptance of the intervention. Participants who have a personal interest in a topic are more likely to volunteer to take part in a study. This was illustrated by the staff members who attended the training session out-with work hours. The feedback received from the teacher in school one indicated that a healthy lifestyle for children is something she is passionate about.

8.6.3 Staff/parent relationship

If nursery staff already have a rapport with the parents, the parents are likely to trust information coming from the nursery and parents may be more willing to interact and participate in nursery events. However, as reported above, parents are more likely to participate in informal events; as discussed in Chapter 3, Van Lippevelde *et al.* (2011) reported in their study, that parents prefer personal contact with their child's school to be on an informal basis.

8.6.4 Teacher/researcher relationship

This is difficult to substantiate as the good teacher/researcher relationship in one school is not necessarily contributing to the apparent acceptance of the intervention. It perhaps just makes the whole process feel smoother and accomplished; furthermore, it enables better feedback and observation. Despite the perceived reticence of the second school teacher to engage, it was apparent that the intervention had been delivered and executed appropriately engaging both parents and children.

8.6.5 Support from other staff and head teacher

The teacher in school one had obvious support from the head teacher as this was fed back to me on a regular basis, furthermore, the head teacher further requested the possibility of extending the intervention to children in key stages 1 and 2 in the primary school (this was later implemented by a Newcastle University Food, Health and Nutrition undergraduate student (Appendix J)). Moreover, the nursery nurse in the same school had started to express enthusiasm for what the children were doing as a part of the SKIP project. To have support from others in a project is likely to encourage the key player and validate that something is worthwhile. Feedback was not received from the second school as to what level of support the nursery received from the

school head teacher. Furthermore, because of lack of access and observation in the second school, there was no indication of how the other nursery staff embraced and supported the project.

8.6.6 Layout of school premises

This may contribute to the ethos of the school, thus creating a feeling of calm, wellbeing and acceptance. If the parents feel they have enough space to spend time getting their child organised whilst chatting with staff and other parents, this may contribute to a feeling of inclusiveness thus enhancing relationships. In both schools the parents were greeted by the teacher in the cloakroom area and chatted with other parents.

8.6.7 Staff resources/time/expertise

The size and available resources of a nursery school may impact on the success of an intervention. Despite receiving training for the intervention some practitioners may not have the confidence to deliver certain aspects. The nursery nurses in the intervention schools did not attend the training session so would have relied on the nursery teacher for the passing on of information. It was apparent in one nursery, which only had two staff members, that some activities such as the skipping activities and skills were not feasible within the constraints of the nursery setting.

8.6.8 Involvement and consultation of children

It was evident through observations and nursery display boards in school one that the children were consulted and involved in everyday nursery activities; this will undoubtedly increase the children's confidence and knowledge. Enthusiasm and knowledge of a topic may be transmitted to the child's family members; this appeared to be true with the cooking challenges.

8.6.9 Current practices/conflicting priorities

If the nursery currently practises activities such as parental involvement, child consultation, health promotion and so on, this should facilitate the implementation of an intervention that contains some of these core elements. However, as demonstrated in this study, nursery schools which are part of a primary school often have curriculum requirements to fulfil which may conflict with additional activities.

8.6.10 Parent-parent relationships

In phase two of this PhD study (section 5.4.4) it was highlighted by nursery practitioners, who attended a focus group session, that parental ‘gossip’ and ‘school gate friendships’ were an essential method of spreading information about nursery activities. Furthermore, it created a sense of competition among parents when they were asked to contribute to certain nursery activities. This appeared to be the case with the family cooking challenges; it was evident that parents were just as keen as the children to share photographs and ideas of their cooking ‘creations’.

8.6.11 SES of parents

Although this is not evident from the current study, previous research indicates that the social economic status of the parents is likely to impact on the success of a healthy lifestyle intervention and it is pertinent for this research. It has been reported that people from a lower SES have limited healthy lifestyle choices and a lower uptake of healthy messages and are therefore less likely to embrace a lifestyle change (Langnase *et al.*, 2004). Furthermore, as discussed in section 2.3.9, some public health interventions may unintentionally increase inequalities (University of Bristol, 2009; Lorenc *et al.*, 2013). It is important to ensure an intervention is accessible across differing SES and that interventions do not have unintended consequences which contribute to widening of inequalities.

The following chapter discusses amendments made to the intervention following analysis and feedback. Implementation of the intervention in the delayed intervention nurseries is also described and discussed.

Chapter 9 Delayed intervention and feedback

9.1 Introduction

As previously described, four nursery schools, two intervention, two control/delayed intervention, participated in the feasibility study. Figure 47 illustrates the steps of the final phase of this PhD study which include the delivery of the amended intervention to two schools.

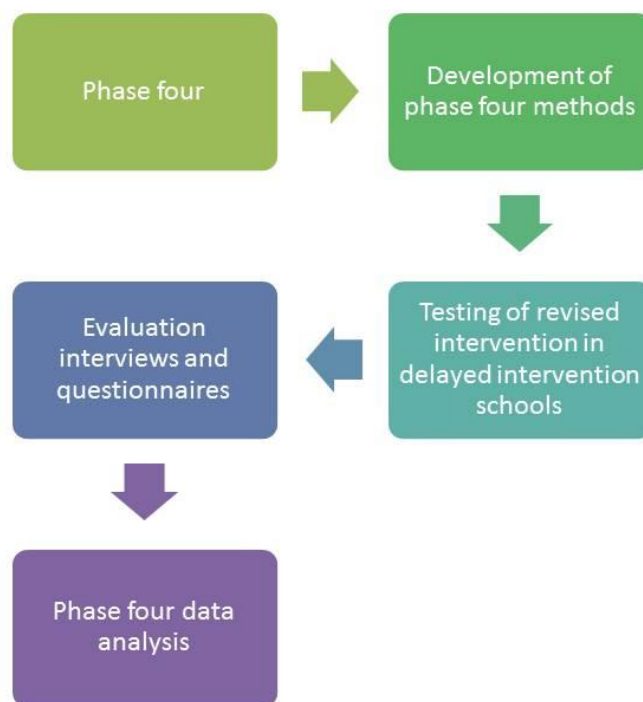


Figure 47 Flowchart of phase four

Following completion and evaluation of the intervention by the first two schools, the adapted 'action research' model was utilised. As illustrated in Figure 48 the 'amended plan' and 'take second step' phases were implemented.

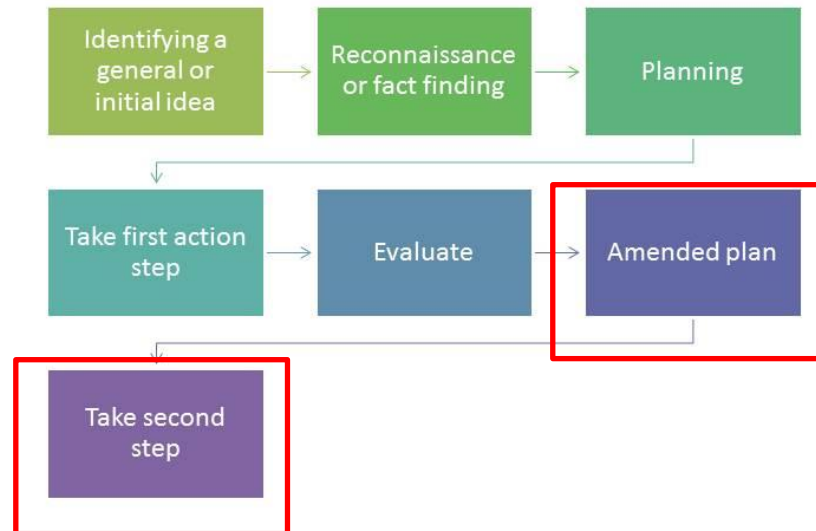


Figure 48 Lewin's action research process plan adapted from (Smith, 2012)

As discussed in section 6.7.1, action research takes place in 'real world' situations and most of the process is concentrated on refining the methodological tools to suit the needs of the circumstances (O'Brien, 2001). Due to the timing of implementation of the delayed intervention (June 2012), the two delayed schools were given the option of implementing a condensed intervention (six weeks) with the families that were already participating or, delaying the full intervention until the new school term in September with new families. One school opted for the condensed intervention to be completed before the summer break and the other elected to delay until September 2012.

This was considered fortuitous as it would enable further refinement of the methods to be tested in the fourth school. Furthermore, as the fourth school would require new families to become involved, it presented the opportunity to modify and test revised recruitment methods.

9.2 The amended plan for school three

Figure 49 summarises the elements of the intervention which were amended for the delayed intervention school. The relevant chapter section is highlighted for further information.

Chapter Nine Delayed intervention and feedback

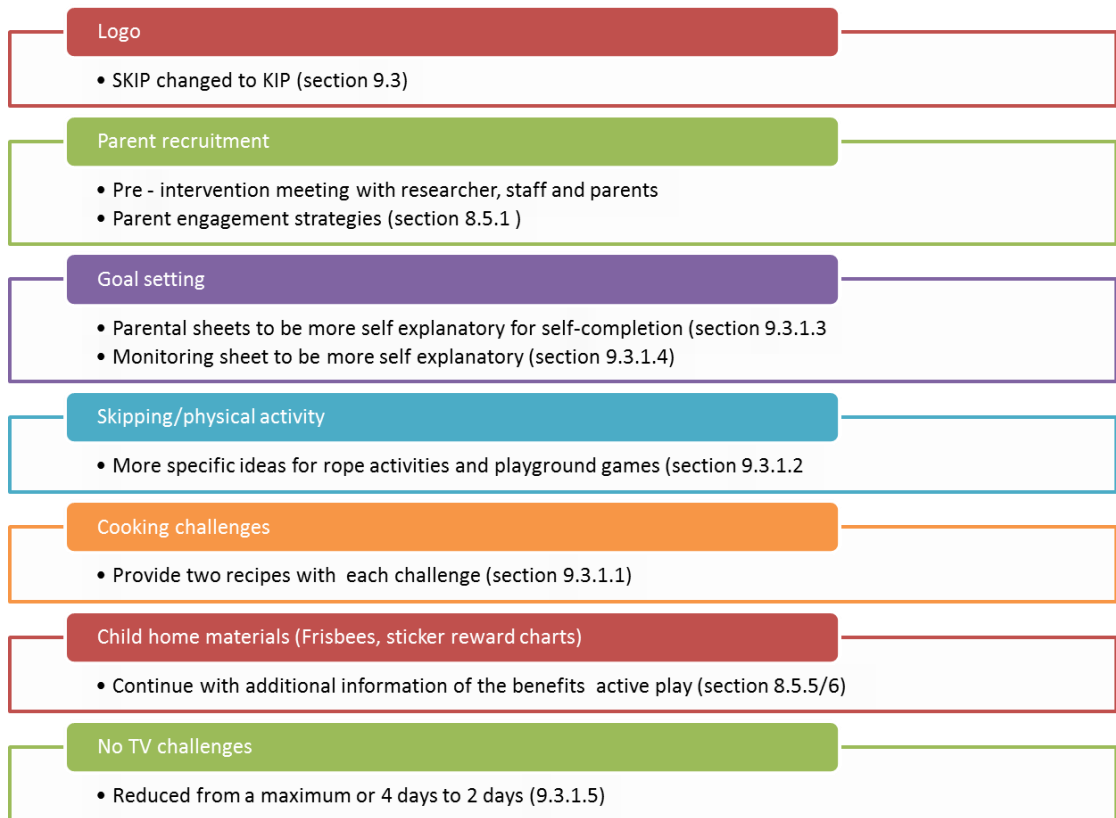


Figure 49 Summary of intervention amendments for delayed intervention

9.3 SKIP logo

Following the evaluation and analysis of the SKIP intervention, the appropriateness of the SKIP acronym and logo was raised by my research supervisory team. Despite the enthusiasm the schools had exhibited on receiving skipping ropes to encourage activity with the children; feedback received from the teachers implied that the younger children were finding the more formal skipping activities too challenging. The supervisory team advised that the SKIP logo depicting a child skipping independently may inadvertently send the message to a parent that if their 3-year-old child was unable to do so, then their child had failed in some way. Therefore, it was decided that the logo should be amended to appear less misleading.

In order to retain the original character of the logo, a slight amendment was made; the rope was removed and the character was given an apple to hold. The acronym was shortened to KIP (Kids in Preschool); the new character therefore, was renamed as KIP (Figure 50).



Figure 50 Revised intervention logo: KIP

9.3.1 Intervention material changes

At the time of modification of the intervention materials for the condensed intervention (school three); formal feedback had only been received from the nursery teachers (NT). Therefore, the changes for school three only reflect the nursery teacher views.

9.3.1.1 *Cooking challenges*

Feedback from NTs reported that some parents, especially immigrant families, had some difficulties with knowing what to cook with the ingredients provided. Therefore, as a guide, two different recipes were provided with each cooking challenge (Appendix K).

9.3.1.2 *Nursery activities*

As discussed above, the effectiveness of skipping ropes for preschool children was questioned. However, rather than discard the resources already purchased, detailed instructions for how the ropes could be used for other games and activities to develop gross motor skills, as discussed in the literature review were provided. Additionally, other playground game ideas to encourage increased activity were developed as part of the intervention materials. (Appendix L).

9.3.1.3 Family goal-setting sheets

It was evident that despite the NTs stating that they had difficulties organising meetings with parents to set and monitor goals, many parents had completed and returned their family's sheets. It seemed, therefore, that many parents were happy to complete the sheets but not participate in meetings. The goal-setting sheets were adapted to be more self-explanatory with example goals, so that they could be completed without meetings if so wished (Appendix M). The timing of the first delayed intervention did not allow time to develop and implement a web-based/email feedback system.

9.3.1.4 Family monitoring sheets

It was observed that some families had misunderstood the purpose of the 'family achievements' monitoring sheets that they were asked to complete once a week. For example, some families when asked to record 'eating behaviour' attempted to record everything the child had eaten for the day. Therefore, the sheet was adapted to be more self-explanatory reducing the need for a detailed explanation from the NPs, see Figure 51 for example.



Our Family's Achievements



Child's Name: _____ Date: _____

Day	Healthy foods we tried	Active things we did	How we sat around less
Example	We bought and tried 3 new vegetables when we went shopping	We walked to the park and played ball for 1 hour	We set a 30 minute limit for watching TV
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

Figure 51 Adapted family achievements sheet

9.3.1.5 TV challenges

The NTs reported that the No TV challenges appeared to be unpopular with the parents and they were unsure as to how many were attempting the challenges as very few parents had returned their family No TV pledge sheets. It was decided, therefore, to reduce the number of No TV challenges from a maximum of four days to two days.

9.3.1.6 Frisbees

Although the NTs reported that the children had been very excited and enthused about receiving a SKIP Frisbee to take home, they stated that no feedback about them had been received from the parents. Therefore, it was uncertain whether the Frisbees had contributed to the encouragement of family 'active time'. To add to the potential value of the product, an information sheet to highlight the positive aspects of such active play and play ideas was provided to the parents (Appendix N).

9.4 Condensed intervention

9.4.1 Timeline

Following the adaptation of the SKIP intervention for the condensed intervention, a new programme timetable was devised. Table 39 illustrates the weekly information and activities for nursery staff, parents and children in the KIP programme.

9.5 KIP intervention implementation

The following sections report the process, implementation and feedback of the delayed intervention in school three. The recruitment process for this school and evaluation of the outcome measures tools for was described in Chapter 7.

9.5.1 School three communication

The initial contact with school three had been with the primary school assistant head teacher; I did not meet any of the nursery staff until the day of the parent recruitment sessions for the outcome measures. During the data collection process and observation period there was a brief meeting with one class teacher who worked part-time Monday to Wednesday lunch-time. I met the other part-time teacher and the nursery nurse on several occasions. As described in section 7.6.3, the NP was friendly and welcoming on these occasions, although some negativity was detected concerning the children's ability to take part in the process.

When I returned for a further meeting to organise the implementation of the intervention; the class teacher who worked the second half of the week, the nursery nurse and a new classroom assistant displayed enthusiasm about starting the intervention.

Table 39 KIP programme timeline (* highlights where changes were made)

Week	Module Title	Staff Activities	Parent Activities	Children's Activities
1	Training and Introduction	Staff training and information session Meet with parents *	Introduction to programme and goal setting (meeting with researcher and staff) * Meet with staff or self-complete goal-setting activities *	
2	Staying active	Set up KIP notice board Activities with children * Informal discussion with parents	Reflection and monitoring of goals * Information sheets: Activity Tips and Eating well for 3-5 year olds; snack and breakfast ideas Family achievement sheet and reward chart	Help with notice board KIP's songs – Apples and Bananas Playground activities *
3	The Carrot Challenge	Activities with children * Informal discussion with parents Update notice board	Reflection and monitoring of goals * Information sheets: Make walks interesting; Drink facts and meal times; snack and breakfast ideas Family sharing tips Family achievement sheet * The Carrot challenge *	Activities with carrots Playground games * KIP's songs – The Good Food Song

Week	Module Title	Staff Activities	Parent Activities	Children's Activities
4	My child doesn't like vegetables	Activities with children * Informal discussion with parents Update notice board	Reflection and monitoring of goals * Information sheets: Active play; My child doesn't like vegetables; snack and breakfast ideas; No TV challenge *; Relapse and coping strategies Family achievement sheet *	Importance of breakfast No TV signs/ideas Playground games * Frisbees *
5	The Broccoli Challenge	Activities with children * Informal discussion with parents Update notice board	Reflection and monitoring of goals * Information sheets: Rainy day activities, Snack swaps; Snack and breakfast ideas The Broccoli challenge * Family achievement sheet *	Vegetable tasters Playground games * KIP's songs- Oh do you eat your vegetables?
6	Reflection and party time	Activities with children * Informal discussion with parents Update notice board	Reflection sheets * Family achievement sheets *	Party time

9.5.2 Staff training session

One of the issues that arose from the evaluation of the first intervention was that the nursery practitioners (not the class teachers) did not appear to fully engage with the intervention and tended to leave all the practical aspects to the class teacher; in the delayed intervention there was an attempt to improve this. A convenient time to meet with *all* the staff to go through the intervention implementation procedures was requested. The nursery nurse and class assistant stated they would be willing to stay behind for an additional thirty minutes to attend the meeting.

The original training session had to be adapted not only to shorten the duration but also due to the lack of PowerPoint facilities. One of the part-time teachers was unable to attend the meeting. Although interested the staff members appeared tired and lethargic at the end of the day; therefore the session was adapted and the training manual was delivered and explained in a more informal manner.

9.5.3 Parent meeting

The NPs were informed that following evaluation of the first intervention it was suggested that perhaps a joint meeting with the parents, staff and researcher might facilitate a better understanding of and concordance with the intervention. The NPs agreed to this and suggested a meeting with the parents after they dropped off their child for the morning session.

On the planned morning, the class teacher sent the intervention parents to meet with me in an area of the classroom as they arrived. However, I realised that although the parents had been forewarned of my presence, a meeting per se had not been organised. The materials were distributed to the parents and a brief explanation of the tasks given, whilst giving them the opportunity to ask any questions. All the parents took the materials and confirmed that they understood what was being asked of them. However, it was frustrating that a more formal meeting including a staff member had not been arranged. Although this approach may have been sufficient; the value of a joint meeting as recommended by the NTs previously was not able to be explored.

9.5.4 Weekly evaluation and feedback

It was arranged that I would attend the nursery once a week to deliver the intervention materials. As described previously the first two schools had completed a monthly feedback sheet, however, due the timing (summer term, a busy term for schools) and the duration of this shorter intervention it was decided that formal feedback at the end of the intervention period would suffice. Informal feedback would be gathered during the weekly visits. I was attending academic conferences during the final two weeks of the intervention period, so it was arranged that a colleague would deliver the materials and collect any parent sheets during this time. My absence impacted on the ability to conduct one-to-one feedback interviews at the end of the intervention. It was accepted that the NPs could not be interviewed during their summer break; therefore, the end of intervention feedback was by questionnaire only.

9.6 KIP intervention feedback

9.6.1 Introduction

As previously described, the nursery was visited on four occasions to deliver the intervention materials. The visits, which were very brief, basically entailed enquiry about the previous week's activities, explaining the materials for the following week and collecting any worksheets the parents had handed in.

During the first visit the nursery nurse presented the notice board which had been set up. She reported that staff had met with some of the parents to discuss goals but had been unable to arrange a meeting with the others. She reported the difficulty of trying to get their parents to engage in any nursery activities.



Figure 52 School three KIP notice board

The staff on most visits displayed limited enthusiasm, the impression I gathered was that the staff were either finding it too challenging to complete the tasks or had not attempted some tasks. The class teacher did not provide feedback; this was from the nursery nurse. The only visit that elicited some enthusiasm was the week following the cooking challenge, the NP presented the photographs that some parents had provided for the notice board (Figure 52) and she reported that the parents had been ‘*very enthusiastic about receiving free vegetables*’.

9.6.2 Nursery practitioners’ feedback

The nursery was provided with four questionnaires, one for each member of staff including the classroom assistant as it was hoped to ascertain the views of different roles. In the first week of the summer holidays one questionnaire was returned by post, it was assumed that this was from one staff member. No other questionnaires were returned. At the beginning of the new school year I emailed the class teacher to enquire about other staff members’ views. It was reported that the questionnaire had been completed jointly by all the staff members; this was disappointing, as the questionnaire was not completed in great detail. It was difficult to ascertain whether the

lack of feedback was due to a lack of engagement with the intervention or the timing of the request (end of summer term).

The staff feedback contrasted greatly with the first two nurseries (intervention schools). Negative views of the intervention methods and engagement of the parents was evident. The NPs felt that the children were too young to participate in the tasks such as using the cameras and activity monitors. They reported that they would not be willing to implement the intervention again with children of nursery age and that it was probably more suitable for Key Stage 1 age children (5-7 years).

A lack of parental engagement was reported. The NPs felt that the organising of meetings with parents and the goal-setting methods had prompted a *'limited response from parents'*. The NPs were asked if it would be possible for the parents to feedback their goals and progress via email or text; they reported that this would not be possible for them. One thing the NPs reported they had learned as a result of the intervention was a *'reinforced lack of commitment from our parents'*.

Some positive comments were given in relation to the materials, communication and training session and the NPs reported that the cooking challenges were an aspect that engaged all the parents:

'Positive feedback from parents with the food given to make recipes. Lots of photos of what they had made... and the parents loved to cook with the free ingredients'.

It was also noted that the recipes provided with the challenges were liked. The NPs reported that they did not do anything differently as a result of the intervention because *'they already promoted healthy eating every day'*. They reported not noticing any differences in the parents' or children's behaviour.

9.6.3 Parent feedback

Only two out of seven parents returned the questionnaires (29%).

In relation to the data collection methods both parents reported finding the diary *'a chore'* however it was reported that this became easier with time. One child was reported to be reluctant to wear the activity monitor; however, she enjoyed taking photos with the camera. The other family was frustrated with technical difficulties with

the camera. Both parents did not find receiving a delayed intervention problematic, one parent reported this to be beneficial as her child was six months older and perhaps understood more about the intervention.

One parent attended a goal-setting meeting with a staff member and found it to be 'useful'. The parent reflected to finding the goal setting hard at first. However, the activity appeared to have influenced the father: *'My husband was the most reluctant – yet he achieved the most from it'*. This suggests that, if family engagement can be achieved, the intervention can have a positive effect on the whole family. When asked what they did differently as a result of the goal setting activities; one family said they tried to increase physical activity and the other reported that they tried to have at least one car-free day a week where they tried a new family activity.

Both families took part in the cooking challenges, one parent reported: *'We enjoyed it. We made different and unusual recipes together and then took them into school to try'*.

It was evident from the KIP information board (Figure 52) that other families, some non-intervention, had engaged with the cooking challenges.

Both parents reported that they liked the written information and one felt it was *'clear and well produced'*.

In response to a question about the use of the web as a means of providing goal-setting feedback, one parent reported this to be *'the way forward'*.

9.6.4 Summary

The first control/delayed intervention school opted for a six-week condensed intervention to enable them to work with the parents who had already agreed to participate.

All of the NPs except one were able to attend the staff training session and appeared enthusiastic about participating. The parent meeting did not go as initially planned, however, I was able to distribute and explain the intervention materials in person. It was felt to be impractical to expect written weekly feedback from the staff, therefore informal observations were collected. Despite the parents' engagement with the cooking challenges and the shared notice board, which echoed the previous

intervention schools, the NPs enthusiasm for the intervention appeared to wane as the weeks progressed.

Only two parents returned the feedback questionnaire and the NPs completed a joint questionnaire. Both the NPs and the parents found the intervention materials and activities acceptable. However, there were some discrepancies concerning the data collection methods; the NPs felt that the children were too young to engage in such activities. The parents who responded, did not report any difficulties with the child data activities apart from technical difficulties with one camera, however, they did report finding the food and activity diary completion onerous.

The NPs highlighted the parents 'lack of engagement' and felt the intervention was not suitable for preschool children. The parents who gave feedback demonstrated evidence of engagement and trying to change aspects of their family's health behaviours; however this is only feedback from two parents.

9.6.5 Chapter discussion

As reported above, the enthusiasm from the staff to implement the condensed intervention waned as the weeks progressed. It is difficult to ascertain whether the timing of the intervention (the weeks running up to the end of the school year) or the duration, they perhaps felt too much was expected in such a short time. Furthermore, the NPs perception of the children's ability to participate may have contributed to the diminishing enthusiasm.

The NPs written feedback conflicted somewhat with observations. Firstly, the NPs were very much focussed on the parent's 'lack of engagement'. The number of parents who signed up to participate, although low, was in accordance with the other schools. The two parents who did return questionnaires provided evidence of engagement and the nursery nurse communicated that many parents had been enthusiastic about taking part in the cooking challenges. There was also evidence of non-intervention parents taking part via the shared information board, which again, is in accordance with the other schools.

Secondly, it was interesting to note that the NPs felt that they did not need to make any changes following the intervention as they '*already promoted healthy eating every day*'. The observations gathered during the data collection phase contradicted this belief;

although the children were offered a 'healthy' snack daily, the staff were seemingly unaware of their own modelling behaviours by eating cakes and chocolate in the children's presence. As observed by Davidson, teachers and NPs have the potential to transfer negative values as well as positive ones (Davidson, 2007). Furthermore, the children were given chocolate bars to take home weekly for 'good attendance'. This highlights the precedence that cultural/group norms may hold over practices. This issue was discussed in section 5.5.1; the NPs may be duty bound to adhere to school policies concerned with healthy eating, however, as was found in the nursery schools who participated in phase one and two of this PhD study (section 5.4.5), the reality is often very different. A survey conducted by the School Foods Trust (Nicholas *et al.*, 2013) concluded that the embedding of food policies which promote healthier food being brought into the nursery setting from home was a key area for change.

In comparison to the other two nurseries who took part, the belief that the intervention was not age appropriate to the children in the nursery was a new phenomenon. This was an unexpected finding as during previous visits to the school, observations demonstrated that the children were encouraged to be independent learners and age appropriate activities were taking place. However, the questioning of the children's ability to participate may have been a rationalisation for any difficulties the NPs experienced in introducing and incorporating activities out-with their normal routine and practices. This perhaps reiterates the point that despite access for an intervention being granted by 'gatekeepers' it does not guarantee the cooperation of other participants (Heaven, 2008; Wanat, 2008).

The length of the intervention (six weeks) may have impacted the acceptability and success. As reported previously, interventions that last between six months and one year, (Bautista-Castano *et al.*, 2004) are likely to be more effective. However, despite this finding from previous research, this particular nursery appeared to have issues with several factors of the intervention such as motivation, age appropriateness of tasks and views of parental engagement. These issues may not have improved with additional time.

9.7 Evaluation of delayed intervention

Response about the intervention from this school was very limited which ultimately impacted the final analysis and evaluation. Therefore, the implemented changes made to the delayed intervention following evaluation of the intervention schools could not be

assessed. Moreover, as described previously (section 9.5.3) the planned parent meeting did not evolve as intended; therefore the potential value of such a meeting could not be analysed. However, the feedback that was received, albeit limited, did provide further endorsement of the success of the home cooking challenges as was the acceptability of the format of the information and worksheets. Despite the limitations, the evaluation of the first delayed intervention school provided useful learning about the challenges of intervention implementation.

The modifications for the final (delayed intervention) school would continue as for the first delayed school (section 9.2). However, as the final delayed intervention school required the recruitment of new families, the modification of recruitment methods and initial parent information meetings was to be implemented and tested.

9.8 Final intervention phase (school four)

As previously discussed, the fourth and final school to implement the intervention requested the full six-month version to commence in September 2012. The nursery class teacher was emailed at the beginning of term to request a meeting to discuss the development and implementation of the intervention. Not receiving a reply, telephone calls were made, after three failed attempts of being told the nursery class teacher would telephone back, an email was received which simply stated that unfortunately they would not be able to take part after all.

9.8.1 Possible reasons for project exit

9.8.1.1 Staff reticence

As discussed in section 6.9, I initially met with the primary school head teacher to discuss the project and organise the nursery school's participation. There was no contact with any of the nursery staff prior to the parent recruitment sessions. The relationship with some of the staff members, during the data collection periods, was strained and they regarded the purpose of my presence with some suspicion. As reported in section 7.5.4 during the second phase of data collection, a new member of staff openly displayed her disapproval for the observation methods. At the completion of the data collection period, it was reported that the part-time teacher who had shown the most interest and enthusiasm for the project was retiring in the summer. This

teacher may have acted as an advocate for the project; her leaving may have removed any positive commitment to encourage intervention completion.

9.8.1.2 School ethos

Having extensive experience of working in nursery school environments, I inevitably compared my own experiences with those in which I was working. This particular nursery school was found, in my view, to be quite chaotic. The children were well looked after and engaged, however I felt that the school ethos was negatively influencing practices within the nursery. In the short time I was present, underlying tensions between staff members were felt and communication sometimes appeared erratic. This impacted on requests that were made of staff such as handing out data packs to parents on a certain day and trying to regain forgotten/lost data packs. However, the lack of acquiescence with the requests may run deeper than lack of basic communication. The NPs may be frustrated by a lack of involvement for decision making in certain aspects of the curriculum. The request for their compliance with the intervention was possibly an unwelcome additional pressure. Once more, the issue of gaining the ‘gatekeepers’ compliance but not automatically guaranteeing the cooperation of others at lower levels is highlighted (Heaven, 2008; Wanat, 2008).

9.8.2 What next?

The study completion time limited the possibility of recruiting a new nursery school to participate in the final implementation of the intervention. As previously reported, useful information for modification of the intervention materials, tasks and delivery for the final school was minimal. The main focus for modification was centred on recruitment methods and engagement.

The next section links the findings from the implementation of the intervention with the conceptual model as discussed in section 6.5.

9.9 Linking theory with study findings

It is important to demonstrate how theoretical concepts developed in a study apply in a ‘real’ world setting. Figure 53 revisits the conceptual model as discussed in section 6.5. This now discusses the links with the current study in more detail. As previously reported there is a paucity of preschool interventions in the UK and 98 per cent of preschool children now attend some form of childcare. The current intervention aimed

to reach a high proportion of families through childcare (nursery schools) promoting healthy behaviours which will add to the current body of evidence. As discussed in Chapter 2, the pathways leading to obesity are indeterminate. However, much of the literature reports of the rise of an 'obesogenic' environment which has led to negative impacts on energy balance. Also highlighted is the growing concern of the widening of socio-economic inequalities especially in the under-fives, which the current study aimed to address. In order to halt the increasing prevalence of childhood obesity preschool preventative strategies are required (Campbell and Hesketh, 2007; Osei-Assibey *et al.*, 2012). Such strategies include behaviour-change interventions which have a theoretical underpinning incorporating authoritative parenting styles as developed for this study.

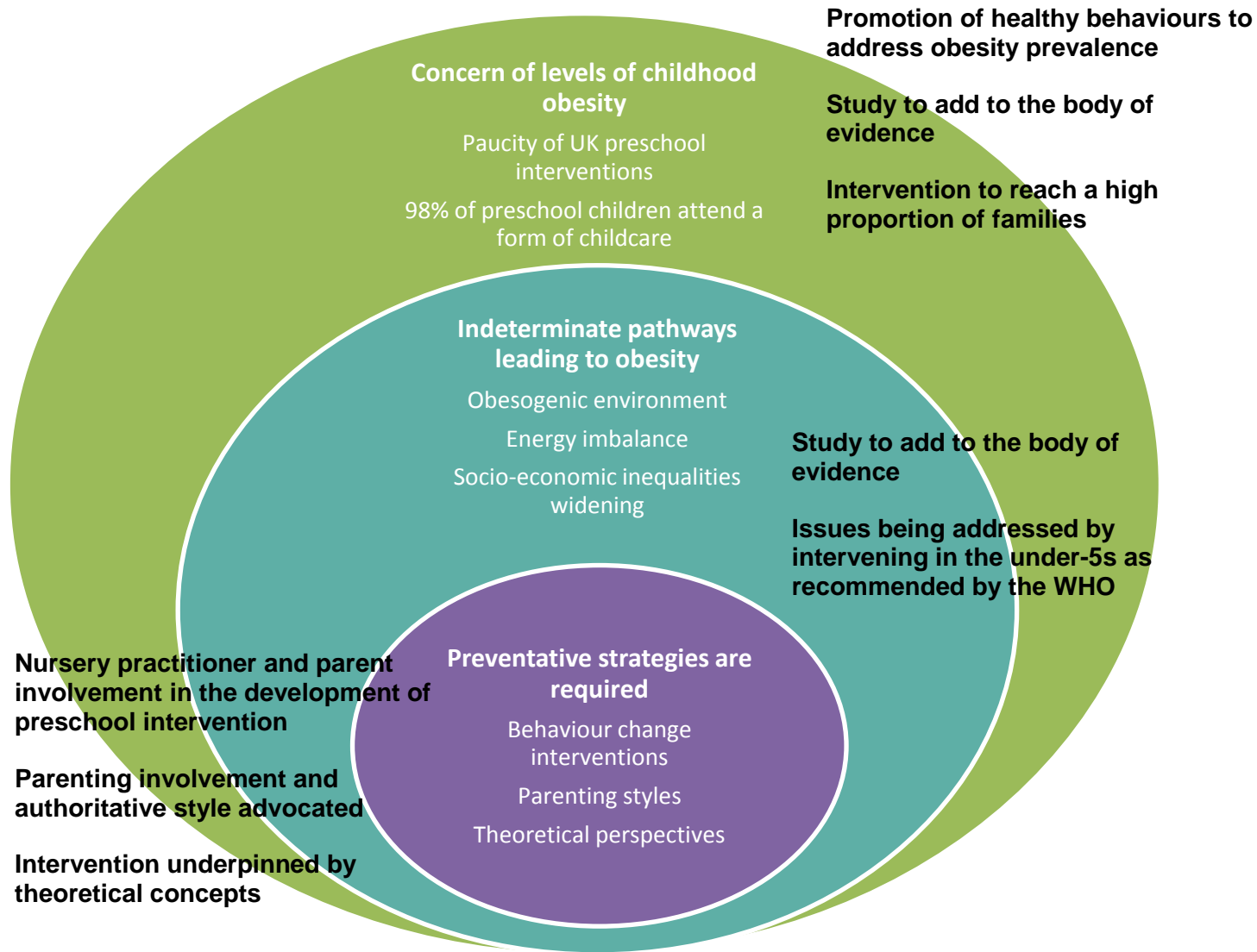


Figure 53 Study conceptual model with study application links

Much of the literature related to the prevention of childhood obesity focuses on parents as the primary agent of change and the importance of parental involvement and the promotion of optimum parenting styles is advocated. Indeed both parents and NPs in the current study agreed that parents were the main driver of children's health. Furthermore, strategies that provide parents with practical advice to 'improve' their family's health are advocated. However, as discussed in Chapter 2, the prevention of obesity is complex and other factors such as environmental (the obesogenic environment) and social economic inequalities need to be considered. As discussed in section 1.4, due to the high number of families that can be accessed in nursery settings, preventative strategies that can be implemented in these settings are thought to be beneficial. Such strategies include, targeting a reduction in sedentary behaviours (Reilly *et al.*, 2003a); increasing physical activity (Steinbeck, 2001; Trost *et al.*, 2001; Reilly, 2008); giving families 'homework' activities for physical activity (National Institute for Health and Clinical Excellence, 2009); and promoting the use of an authoritative parenting style (Scaglioni *et al.*, 2008; Gerards *et al.*, 2011). Moreover, such interventions have the potential to address the concerns of the widening of SES inequalities in the under-fives. As demonstrated in this study NPs were generally, in principle, open to initiating health promotion strategies within the nursery setting and believe that (some) parents need 'help' and 'education' to improve their family's health. However, how this 'help' and 'education' would be delivered and by whom was less clear and many nurseries which participated in the preliminary studies and the intervention phase revealed a lack of ability or willingness to deliver or fulfil already established school policies and 'rules'. Moreover, one nursery (school four), was unwilling to engage with the intervention. Furthermore, many NPs seemed unaware of negative health modelling practices - which were reported or observed. This identified that the embedding of policies which promote healthier food in the nursery was a key area for change.

There is a paucity of studies which focus on nursery practices and compliance of school policies with regards to health promotion. As discussed in Chapter 1, early years providers in England must follow the mandatory framework for the Early Years Foundation Stage (Department for Education, 2012) which includes the importance of providing children with opportunities for physical activity and teaching them how to make healthy choices in relation to food.

Findings from previous research suggest that nursery settings may be a promising avenue in which to implement strategies to improve children's health behaviours ultimately leading to a reduction in childhood obesity. As revealed in the current study, a behaviour-change intervention implemented in a nursery setting is feasible and many aspects of the intervention such as the cooking challenges, shared notice board and nursery-led activities were deemed to be 'successful'. These activities were instrumental in engaging many parents who had not signed up to participate in the intervention which demonstrated the holistic nature of the intervention. However, other aspects of the intervention such as the joint staff and parent goal-setting meetings were reported to be not so acceptable.

Moreover, this study has also demonstrated the importance of not only seeking to address parental modelling and health practices in an attempt to prevent childhood obesity but also those of the carers and educators looking after children away from the home environment. If nursery settings are to be involved in health promotion strategies, it is important not only to gain the involvement and engagement of the nursery staff to develop and deliver the intervention as previously discussed but also to develop a holistic approach which links the home and nursery environment, such as the cooking challenges. Nursery staff need to be aware of their own health behaviours and the messages the nursery environment is presenting to the children and parents. Furthermore, there needs to be regulation and monitoring of school healthy policies. In order to change and/or improve health behaviours in preschool children, their immediate environment needs to be as obesogenic-free as possible in order to establish positive life-long habits. As discussed in section 3.1, what is learned in one environment is used in another only if it proves useful in both. Therefore, it is important that behaviour change interventions with children promote a holistic, consistent message across the child's environments i.e. home, nursery, and extended family and so on (Harris, 1995).

The fourth and final part of this thesis draws together and discusses each phase of this PhD study. The findings are summarised, reflections of the research process are discussed, and implications for policy and practice and how the results of this thesis will inform future work are also discussed.

Part Four

The Final Chapter

Chapter 10 – Discussion, Reflections and Conclusions

Chapter 10 Discussion

10.1 Introduction

This fourth and final part of this thesis draws together each phase of this PhD study. The findings are summarised, reflections of the research process are discussed, and implications for policy and practice and how the results of this thesis will inform future work are also considered.

The aim of this study was to develop and test the feasibility and acceptability of an intervention for the prevention of overweight and obesity in childhood, with a particular focus on early childhood. The objectives were:

- to identify and evaluate current and past community, school and family based dietary, physical activity and lifestyle change interventions, with a particular focus on preschool aged children
- to elicit theoretical evidence from literature; to collect data from key stakeholders to inform decision making for intervention development; to determine from available evidence, which intervention strategies may be considered acceptable, viable and appropriate for families and children in various preschool settings
- to develop and test potential interventions
- To test the feasibility of the evaluation tools
- to train nursery practitioners to deliver a preschool-based behaviour-change intervention

Using a mixed methods approach, the study aimed to understand and explain the complex social phenomena of preschool settings (Pyett, 2003) and opportunities for change.

As described in Chapter 2, the recent rise of childhood obesity is a complicated issue with myriad factors being implicated. Due to the paucity of previous research in the area of preschool obesity prevention interventions in the UK, much of the research evidence was drawn from elsewhere. The evidence as reviewed in Chapter 3 highlighted the need for further robust studies to determine which interventions have the potential to reduce the prevalence of childhood overweight and obesity. Any such intervention is likely to be complex and what constitutes a 'complex intervention' and

the MRC Framework (Craig *et al.*, 2008b) which underpins the study is also described in Chapter 3. The methods for the preliminary qualitative study to determine the views and attitudes of nursery practitioners (NP) and parents with regards to childhood overweight and obesity prevention interventions, and to determine which lifestyle behaviours in the targeted population may be amenable to change are described in Chapter 4. The qualitative study results were coded and analysed using thematic analysis and are described in Chapter 5. Analysis and evaluation of the preliminary qualitative study results informed the development of a behaviour-change intervention, this, and the theoretical models underpinning the intervention are described in Chapter 6. The outcome measure results and compliance with data collection tasks are reported in Chapter 7. Details of intervention implementation and study findings are presented in Chapter 8 and Chapter 9.

The purpose of this final chapter is to draw together and interpret the study findings in relation to previous work and to highlight the methodological strengths and weaknesses. The implications for theory, practice and further research are also discussed. The chapter begins with a summary of key findings that have been presented in detail in the previous chapters.

10.2 Summary of key findings

In this section I present the key findings from each stage of the study, these findings are linked to the study aim and objectives and discussed in context with existing literature and theoretical concepts. The barriers and challenges at each phase are considered. This is essential information: as ‘when designing and implementing interventions in real-life situations this will provide important information on feasibility and sustainability and identify if failure or modest success of the intervention was due to a problem with the intervention’s development, content or implementation’ (Khambalia *et al.*, 2012 , p. 230).

10.2.1 The literature

In the ‘development’ phase of the MRC framework: Developing and Evaluating Complex Interventions, Craig *et al.* (2008b) report that ‘identifying the literature base’ is an essential primary process. As illustrated in Chapter 3 of this thesis most obesity research with preschool children has been conducted outside the UK. Owing to the increase of childhood obesity in the UK, strategies which aim to halt this trend are

imperative and interventions that focus on the prevention of obesity are considered to be the most feasible option (Lobstein *et al.*, 2004). However, due to the myriad factors implicated with the development of obesity, determining which strategies should be applied to whom and in which circumstances is still in its infancy. It is posited that the environment in which we now live has become more 'obesogenic' in the past two decades (Reidpath *et al.*, 2002; Swinburn and Egger, 2002; Reilly, 2008) which has given rise to 'obesogenic families' (Moreno *et al.*, 2004). Overweight and obesity has become more prevalent in families of a low SES and the inequality between high and low SES are widening (Law *et al.*, 2007). The 2010 Marmot Review and The World Health Organisation (2010) emphasise the need for reducing the effects of inequalities especially in children under the age of five years (Marmot *et al.*, 2010).

Having reviewed the literature, there is strong evidence that obesity prevention strategies should be targeted at preschool age children and their families. This coupled with the high percentage of children aged 3-4 years attending some form of childcare, suggests that the development of appropriate interventions in these settings could prove to be an ideal environment in which families' health behaviours potentially could be modified. As previously stated in section 3.10, families from a disadvantaged background are more likely to access preschool provision in the form of nursery schools and nursery classes attached to primary schools. Furthermore, as discussed in section 2.3.9, children from low SES backgrounds are more likely to be overweight or obese than their less disadvantaged counterparts. Targeting local authority nursery schools/classes should provide access to families who are susceptible to health inequalities, an area which has been identified as needing more targeted intervention (see section 2.3.9).

To date, generalisation of preschool intervention findings has been found to be problematic due to the diversity of methodologies, strategies, definitions of obesity and outcome measures (Bluford *et al.*, 2007; Hesketh and Campbell, 2010). Furthermore, most studies lack evidence and/ or reporting of underpinning theory which needs to be addressed. The most commonly used theories which have been reported in intervention studies are generally behaviour change theories from the field of social science. Many studies have reported positive behaviour changes such as reducing sedentary behaviours but few have been able to demonstrate significant changes in weight status (Dennison *et al.*, 2004); methodological limitations may be a contributing factor (Skouteris *et al.*, 2010b). Social marketing theories and strategies have been

reported as demonstrating some success in the areas of preventing tobacco use, promoting diet and physical activity and preventing aids and HIV. Social marketing nutrition interventions have been shown to influence nutrition related psychosocial variables such as attitudes towards healthy eating (Gordon *et al.*, 2006). It is believed that social marketing strategies can be used 'to take the message into the heart of communities' (Jackson, 2009) and the Government paper Choosing Health 2004 (see section 3.4) emphasised how individuals and communities would be supported in taking more control of their health while maintaining pressure on the social and economic determinants of health. Furthermore, the ways in which people feed their families is very complex, and sociological theory states that they occur in a network of social relationships which include and *go beyond* the individual and the household (Delormier *et al.*, 2009).

Although this research specifically targeted nursery classes and nursery schools it can be argued that a preschool environment is a community in itself. The impact of an intervention has the potential to reach the wider community and environment through the wider family (grandparents, aunts, uncles etc.), siblings' school, mother's groups, child play centres, and religious institutions and so on.

While this study was based on behaviour-change theory many elements of social marketing theory were incorporated into the design and more recent preschool intervention work advocate the use of social marketing strategies to engage parents (De Silva-Sanigorski *et al.*, 2012).

Furthermore, the importance of developing 'real world' strategies (Bluford *et al.*, 2007; Rudolf, 2009), that is, practice-based evidence (Finegood *et al.*, 2010) has been emphasised. Before a behaviour-change intervention can be designed and implemented, it is important to gain insights, views and knowledge of everyday practices from the study population in question as recommended in the MRC complex intervention guidelines (Craig *et al.*, 2008b).

10.2.2 Preliminary qualitative studies

The objective of this phase of the study was to obtain the views and attitudes of nursery practitioners with regards to childhood overweight and obesity prevention interventions, and to determine which lifestyle behaviours in the targeted population may be amenable to change. The interviews, mapping activities and focus groups each

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presented their own challenges and analysis revealed some unexpected findings such as uncertainty of roles and responsibilities. Table 40 and Table 41 summarise the literature and study identified barriers, the process and data findings, developments for the next phase of the study and development for future work. The key issues are discussed in turn following the tables.

Table 40: Preliminary qualitative study – NP interviews and parent mapping activity key points

Key points and development – Phase one						
PHASE ONE: INTERVIEWS/ MAPPING	Literature identified barriers	Study identified barriers	Process and data findings	Development for next phase	How could it be repeated?	Development for future work
Schools →	Gatekeepers Recruitment difficulties	Difficulty in accessing head teachers. School admin staff will not always grant access	The inability to access head teachers may have affected school recruitment	Ascertain current participants for interest/willingness to participate in focus groups		Ensure initial recruitment letter promotes the value of participation
Nursery Practitioners (NP) →	Recruitment difficulties Do NPs believe it is not their job/role to participate in health promotion?	Admin staff and HTs act as gatekeepers. Permission to participate is granted by gatekeepers Workplace practices Personal beliefs	It is not known how many nursery practitioners declined to participate or whether refusal was a result of gatekeepers NPs are open to promoting health however, they feel parents need 'help and education' Previous difficulties in engaging parents Conflicting dietary 'rules'. Confusing for parents?	Explore issues further		More in-depth discussion and planning concerning dietary policies and 'rules'
Parents →	Recruitment difficulties	Were participating parents 'hand-picked' by nursery staff?	Response to questions subject to social desirability bias Uncertainty of what child eats/does in nursery Acceptance that what child eats in nursery is healthy	Explore issues further	Promote the benefits of participation Reinforce anonymity and confidentiality	Letter of invite for parent participation should come from school/HT and not researcher

Table 41: Preliminary qualitative study – NP and parent focus groups key points

Preschool feasibility study – Key points and development – Phase two						
PHASE TWO: FOCUS GROUPS	Literature identified barriers	Study identified barriers	Process and data findings	Development for next phase	How could it be repeated?	Development for future work
Recruitment →	Sensitivity of subject Lack of identity with subject	NPs reluctant to attend out-with work hours	Some previous interview participants reluctant to attend Difficulty in recruiting additional parents Established groups easier to access		Research more established groups Hold NP focus groups in schools to facilitate attendance	Build brand/value/ benefits
Nursery Practitioners (NP) →	Do NPs believe it is their job/role to participate in health research?		Lack of confidence/ training to promote health Keen to promote health but believe parents are difficult to engage Discussions elicited practical ideas for intervention application	Use NP ideas for intervention design Develop comprehensive training package for NPs Explore activities that might engage parents		
Parents →	Recruitment difficulties Reluctance to disclose personal health behaviours/ information	Accessing parents	Parents are open to nurseries promoting health, however, they are worried about being thought of as bad parents Do parents think NPs qualified to 'tell' them what to do at home? Participants felt that 'other' parents need guidance and help	Develop materials/ tasks that are sensitive to parent anxieties	Research more established parent groups Reassure parents of anonymity and confidentiality	Promote the brand/ value and emphasise potential benefits for taking part

PHASE TWO: FOCUS GROUPS	Literature identified barriers	Study identified barriers	Process and data findings	Development for next phase	How could it be repeated?	Development for future work
Non-attendees →	A common phenomena in research studies	How do you motivate non-attenders?	Despite reminder phone-calls, many parents did not attend Two NPs did not attend		Allow extra time within study to over-recruit participants	Promote the brand/ value and emphasise potential benefits for taking part

10.2.2.1 Research with schools and parents

As previously described, the school environment is widely promoted as a suitable setting for promoting healthy lifestyles (Warren *et al.*, 2003; Lobstein, 2006; Van Lippevelde *et al.*, 2011) and both school staff and parents have been reported to believe it to be a suitable conduit for health promotion (Sahota *et al.*, 2001a). However, as demonstrated in this study, conducting research to measure the impact of health promotion in school environments is not without its complications and recruitment at each stage of this study presented challenges. In my initial contact with the nursery schools to recruit practitioners and parents to the preliminary qualitative study, contact was constrained by 'gatekeepers' mainly in the form of administrative staff. The gatekeepers had the power to grant access to the head teachers which may have impacted on the number of nurseries taking part. The access process could be described as working down a hierarchal scale; those at the top are the 'gatekeepers' for those at a lower level, that is in this instance, the administrative staff for head teachers, head teachers for teachers, teachers for nursery practitioners and finally nursery practitioners for parents. However, as discussed previously, although official gatekeepers may grant permission for access to those further down the scale, it does not guarantee the cooperation of those at lower levels (Heaven, 2008; Wanat, 2008). The findings emphasise the importance of the initial information letter and invitation to participate in the study. The whole staff need be aware of the 'value' of taking part in such a project; not only for themselves but for the parents and children also – what can the project/intervention contribute? Is it worth the time and effort to take part? Does the project promote a strong enough positive 'brand'/ image? Will the school/staff be portrayed in a positive light?

The focus groups were hampered by recruitment difficulties and 'no-shows' on the day; this is a common phenomenon in health research (MacDougall and Fudge, 2001). I believe the practitioner's lack of attendance was due to the timing of the sessions (they were held in the early evening to allow them to attend after the working day). This belief was compounded by the practitioners' lack of attendance for the intervention training sessions, the reasons given as 'not being paid to attend after work hours sessions'. This perhaps suggests that for some, the project did not promote the 'benefits and values' of taking part. Those practitioners that did attend the focus group session all worked in the same nursery and their enthusiasm for the project was evident; subjects who are interested in a study subject are more likely to volunteer to participate. Again

for the parents, it was those who knew each other in an established group that attended a session. Although recruiting participants from established groups may promote attendance, it is likely to affect the diversity of the narratives and discussion. The literature highlights ways in which focus group recruitment and attendance can be optimised such as providing incentives; however other studies have reported many people participate for purely altruistic reasons (Gabbay and Thomas, 2004). The parents in the present study were offered vouchers for attending and a crèche was made available. However, it may have been the subject matter that parents found difficult or irrelevant (Spoth *et al.*, 1996; Heinrichs *et al.*, 2005). Discussing family behaviours, especially how you choose to care for your child, with strangers may be deemed too sensitive or personal and reticence to do so could be due to a fear of being judged. Indeed, some parents in the present study appeared to provide answers that may have been influenced by social desirability bias. As previously discussed, building the brand and profile of a project may encourage participation and parents may be more inclined to take part in a project if they believe it to be endorsed by the head teacher/nursery staff. Moreover, a different approach/message for each group (gatekeepers, NPs and parents etc.) may improve uptake and engagement.

10.2.2.2 Are nursery schools and the home complimentary environments?

The qualitative data collected contributed to the development of the behaviour change intervention. However, this was not a straightforward fact-finding process to determine which intervention methods would be feasible and acceptable in a preschool setting. Each staff member and parent presented complex attitudes, beliefs and preconceived ideas. There was an overarching consensus that health promotion in preschool settings was a good thing and should be part of everyday life. However, opinions of what constituted 'good health' and the practical application of recommendations produced interesting findings. Some NPs blamed parents for behaviours they believed to be 'unhealthy' such as providing their child with crisps and sweets before nursery. They stated that parents needed 'help' and 'education' to improve the family's health. Conversely, the parents who participated in the focus group sessions also discussed the need for 'other parents' to receive help and practical strategies in the areas of health.

The topics of role models and responsibilities were significant areas of discussion in both the NPs and parents. The NPs and parents expressed the belief that parents were

the main role model in a child's life, nevertheless it was agreed that nursery staff were also responsible for being good role models and promoting good health behaviours within the nursery setting. However, despite this assertion, the belief that appropriate role modelling was taking place in each setting was uncertain. Nursery staff in a previous study (Dwyer *et al.*, 2008) reported that despite parents emphasising the importance of parental modelling, the inferred role modelling was not evident by the staff. Parents in the present study were unsure of the types of foods being given to their child whilst at nursery and they were 'stunned' by the evidence presented in the focus groups that preschool children despite attending a nursery place were not meeting the recommended daily physical activity requirements. This perhaps accentuates a separateness of the home and preschool environment with each setting following their own norms and continuing beliefs about the other setting. However, there were occasions where the norms or 'rules' clashed somewhat. The interviewed NPs all emphasised the importance of school health policies which did not allow the consumption of 'junk' foods such as high energy dense snacks and sugary drinks. However, as demonstrated previously, the NPs appeared to have difficulties in enforcing the school policies; parents provided cakes and sweets for special occasions such as birthdays and nurseries too often gave the children chocolate or party bags. These conflicting practices and messages may be due to the difficulty in enforcing an 'all out ban' in the 'real' world where food and 'treats' are so abundant, available and integrated in daily contemporary life and part of food culture. Parents in a study conducted in Australia all believed that children should be provided with 'treats' - which they perceived to be food items considered to be 'unhealthy' (Noble, 2007). The findings of the present study suggest that more qualitative research with nursery practitioners and parents of preschool children is required as there is a paucity of literature in this area. It would be of interest to determine why NPs have difficulties in enforcing health policies, how they are communicated to parents and what prevents their application.

10.2.3 Development of a behaviour-change intervention

As previously discussed, the development of the intervention for this current study was informed by the preliminary qualitative studies and evidence from the literature. As described in Table 11, it was important to demonstrate why some identified factors should be included in the intervention and others were omitted. The PhD study was constrained by time and resources, therefore, factors which did not have a strong

evidence base were not included. Following the identification of factors to be included in the intervention the following aims of the intervention were developed:

- Reduce the consumption of high energy dense snacks
- Increase the consumption and the awareness of the importance of a 'healthy' breakfast
- Reduce TV viewing
- Increase physical activity in nursery
- Increase family 'active time'

Table 12 provided the rationale for the development of the aims.

It was identified in the literature review that interventions which have a theoretical grounding have been shown to be more effective in producing long-term behaviour change and may help explain why or how an intervention had an effect (Powell and Thurston, 2008; Barker and Swift, 2009). Furthermore, 'identifying and developing theory' is a key part of the development stage of the MRC Framework (Craig *et al.*, 2008b). Moreover, an identified gap was the number of intervention studies which failed to report or use a theoretical underpinning in the development of their design. Therefore, extensive enquiry and consultation with a health psychologist was conducted to ensure that an appropriate theory was applied and incorporated into the design. Two behaviour-change models were identified as being applicable for the current study and for being a suitable match for the target population. Michie *et al.* (2011) highlight the importance of the requirement for matching a behaviour model with the target population and the context in which it will be delivered.

The selected models were Social Cognitive Theory and Operant Conditioning. However, as discussed in section 3.1 and 3.12, it was important to consider the wider environmental and sociological influences. For example in the current study, the nursery school setting, and how the micro-environment and embedded practices could be adapted to support positive behaviour change.

Figure 21 and Table 14, Table 15 and Table 16 in Chapter 6 illustrate how the behaviour-change techniques were applied. It was important to provide a detailed

account of the application at each stage of the intervention so that weak links in the chain can be identified and strengthened (Craig *et al.*, 2008b).

The intervention materials for this programme were developed from existing resources such as Change4Life (Department of Health, 2012), The Caroline Walker Trust (The Caroline Walker Trust, 2011), The Australian Government (Australian Government Department of Health and Ageing, 2011), and suggestions/ideas from the nursery practitioners' focus group session. The importance of tailoring interventions to specific groups of people has been highlighted (Ells *et al.*, 2005), therefore the opinions and ideas of the NPs and parents were employed to inform the design.

10.2.4 Recruitment to the intervention

As previously discussed four schools volunteered to participate in the intervention - and - all four schools were within the 10 per cent most deprived in the Index of Multiple Deprivation 2007/2010 and within 10 per cent in the Health Deprivation and Disability domain (Gateshead Council, 2010; Newcastle City Council, 2011).

Parents received information letters about the study and it was felt that face-to-face recruitment days held in the nursery would give parents the opportunity to ask questions and would encourage participation. Parental recruitment to the intervention ranged from 21 per cent to 37 per cent per nursery. The recruitment process proved difficult in some nurseries, in two of the nurseries I did not get the opportunity to meet with the staff members until the recruitment day. Some staff members appeared unsure of our presence and left us to our own devices. I believe this wariness transferred to the parents and may have impacted on the final participation numbers. As previously discussed, recruitment to future interventions may be improved by involvement of the key 'ground staff'. As identified in Social Marketing literature, it is important that potential participants in an intervention have a 'reason to care' and feel ready for change (Aras, 2011). An initial joint meeting which involves research staff, all nursery staff members and parents may remove some of the uncertainty and mystery of participation. However, as identified by Wanat (2008) the perceived threats and benefits of participating in such an intervention vary from person to person. Moreover, convincing staff and parents to attend a meeting in the first place may prove problematic and would require persuasive strategies. Previous intervention studies may report difficulties with recruitment but do not detail how problems can be resolved. However, recent work conducted by De Silva-Sanigorski *et al.* (2012) recommend the

use of social marketing strategies such as newsletters and promotional materials, parent engagement strategies and stakeholder involvement to enhance recruitment and participation.

10.2.5 Outcome measures data collection

Part of the feasibility study was to determine which data collection methods and tools would be acceptable to parents and children. Data collected in relation to the project aims at baseline and intervention end for four days (two week days) were:

- Parent-completed food diary of child's consumption
- Parent-completed TV/DVD viewing of child
- Family 'active time' (going for walks, swimming and so on)
- Child physical activity (measured by Actigraph accelerometer or pedometer)
- Photographs of food consumed taken by child

Children's anthropometric data were also collected in the form of height and weight to calculate BMI and BMI percentile score.

The data collection process required myself and a colleague to record the children's weight and height and observe the children's dietary consumption whilst they attended their normal nursery session. The parents recorded their child's intake whilst they were at home. Our presence in the nursery schools produced mixed reactions from the staff members. In the nurseries where I had met and liaised with the class teacher prior to the parent recruitment days, we were made to feel welcome and completed our tasks with ease despite the nursery practitioners leaving all the interaction and communication to the class teachers. However, in the schools where I had only liaised with the head-teachers prior to the recruitment days, we experienced some negativity. One NP questioned our methods and the suitability of their use with preschool children. This finding was unforeseen; as in my own experiences as a nursery practitioner I was used to preschool staff having high expectations of a young child's capabilities. However, this NPs comment may have been due to feeling lack of inclusion and ownership of the project. This also appeared to be the case in the other nursery where a staff member asked 'what is it you are actually doing?' A second NP appeared to be threatened by our presence and was openly hostile suggesting that we were upsetting the children. This perhaps reiterates the need for joint meeting/meetings prior to the commencement of the project not only to provide information and aid recruitment but to

also allay any fears or uncertainties and enable people to see the value in the project. It is not enough to have the permission of the 'gatekeepers', indeed, Wanat (2008) reports that intermediate gatekeepers, such as classroom teachers, are resentful if expectations of the top gatekeeper (head teachers) are imposed upon them.

The majority of the parents were compliant with, at least part; some of the data collection tasks, however only a small proportion, 4 at baseline and 5 at follow-up completed all the tasks. Six families did not complete any of the tasks and two families at baseline and three at follow-up did not return any part of the data packs. The parents were most likely to complete the TV and food diaries and least likely to complete the family activity section. There were no differences in the demographic characteristics of parents who were most likely and least likely to complete the tasks. Reasons given by the parents for lack of completion included the child's reluctance to take part and the arrival of a new baby. The parents who were unable to complete any tasks at baseline were asked which tasks, if any, they would be prepared to complete at follow-up. All the parents, except one reported that they would be happy to complete the tasks at follow-up; one parent agreed to complete the food diary only. However, at follow-up, once again none of the parents completed any tasks. Those that were unable to return any elements of the data packs at baseline failed to do so once again at follow-up. It is difficult to ascertain why some parents agreed to participate in the study but were unable to complete any of the data collection tasks. They may have been keen in theory but I acknowledge the reality and practicality of completing such tasks may not correspond with their lifestyle and daily demands on their time. The following table (Table 42) summarises the key findings, challenges and recommendations for future work in relation to the intervention recruitment and data collection.

Table 42: Intervention recruitment and data collection – key findings

Preschool feasibility study – Key points and development – Phase three						
PHASE THREE: INTERVENTION RECRUITMENT AND DATA COLLECTION	Literature identified barriers	Study identified barriers	Process and data findings	Development for next phase	How could it be repeated?	Development for future work
Schools →	Gatekeepers Recruitment difficulties	Difficulty in accessing Head teachers. School admin staff will not always grant access	Some HTs make decision to participate in study without consultation of nursery staff No initial contact with all staff may cause adverse feelings, lack of understanding and commitment		Involve organisations that may act as an advocate to recruitment such as the National Association of Head Teachers	Involve organisations to act as potential advocates Promote the brand/ value and benefits for taking part
Nursery Practitioners (NP) →	Lack of compliance despite gatekeeper's consent NPs feel it is not their role/job	Feelings of suspicion/ resentment of being told by superiors to participate	No contact with some NPs until the parent recruitment day Only class teachers (in 2 schools) attended training out-with work hours Some NPs lacked understanding of project purpose	Try to build relationship with staff members	Involve all nursery staff from the beginning	Organise introduction presentation sessions with the whole school prior to recruitment and project implementation
Parents →	Failure to recruit/complete tasks due to misunderstanding of study requirements Parents less likely to participate in research with which they do not associate	Lack of understanding of tasks/expectations	Difficulty with recruitment due to lack of backing/support from NPs Most parents attempted to complete some data tasks	Find out which aspects of the data collection methods were not acceptable and why	Involve nursery staff in recruitment of parents	Organise an initial meeting with nursery staff and parents to provide explanation of expectations and tasks Promote the benefits to the child/family for participating

PHASE THREE: INTERVENTION RECRUITMENT AND DATA COLLECTION	Literature identified barriers	Study identified barriers	Process and data findings	Development for next phase	How could it be repeated	Development for future work
Children →		Some children reluctant to wear the physical activity monitor	Most children would comply with encouragement from staff and peers		Explore different 'child-friendly' monitors	Organise child-friendly meetings to introduce equipment and explain reasons for use

10.2.6 Outcome measure results

As discussed in Chapter 3, feasibility studies do not evaluate the outcome of interest but test the acceptability of the methods, adherence/compliance rates, the usefulness or limitations of a particular database and the time needed to collect and analyse the data (NHS, 2012a). The primary aim of obesity prevention programmes with children should be the reduced incidence of overweight and obesity new cases per year (Matusik and Malecka-Tendera, 2011). The outcome measures from the present study were reported for interest and to compare the findings with other studies.

The nutrient intake results from the children in the current study were comparable with findings from the NDNS; this validates the FAST diary method (Adamson *et al.*, 2003) as a suitable tool for collecting preschool children's dietary data. The results were presented by intervention groups rather than baseline and follow-up as no significant differences were reported between time points. As with the NDNS results, the children consumed higher intakes of saturated fat and non-milk extrinsic sugars than daily recommendations, with the delayed intervention group consuming the highest intake of NMES (18%). Both intervention groups had lower levels of vitamin A, vitamin D, NSP and sodium than the other surveys. The consumption of selected foods by children in the current study again was comparable with the NDNS data, although the intervention children ate less wholemeal bread. The delayed intervention group had a higher consumption of fruit juice and squash/cordial, and both groups consumed more crisps and savoury snacks than the NDNS data. As previously reported the parents were most likely to complete the dietary element of the data collection tasks.

The provision of cameras to the children to record dietary intake and to include them in the data collection process proved to be popular with many families; 25 at baseline and 18 at follow-up provided photographic evidence which gave context to the diaries, albeit some children also snapped shots of household objects such as the TV, their parent's bed and toys. Analysis of the photographs revealed eating occasions, portion sizes and types of foods consumed. It was apparent that fruit was consumed on several occasions, however, vegetables were rarely photographed; this type of information would prove beneficial for future studies and could be used as a discussion tool in interviews and focus groups. The use of digital cameras to record dietary intake has been trialled in several studies with older children (Wang *et al.*, 2006; Higgins *et al.*, 2009; Dahl Lassen *et al.*, 2010; Svensson *et al.*, 2012); this study demonstrates

that photography may be a tool suitable for use in younger children also. In future research, with more time and resources, it would prove beneficial to be able to discuss the photographs taken with the children and parents to gather their perspectives and to ascertain more in-depth data about the child's home life and the family lifestyle.

The children's TV/DVD viewing habits were used as a proxy measure for sedentary behaviours. The length of viewing times ranged from an average of 42 minutes per day to over 7 hours per day (there were no significant differences between the two time-points). However, some parents did report that the TV was left on all day and the child may have been doing other activities at the same time. On average children watched more than 2 hours of TV per day; This finding is of concern as it has been reported that children who watch more than two hours per day of TV consume less fruit and vegetables, more high energy drinks (Granich *et al.*, 2010) and consume a higher consumption of calorie rich 'unhealthy' food (Jago *et al.*, 2005; Rey-López *et al.*, 2007; Temple *et al.*, 2007). However, BMI and TV viewing may not be associated until the child is 7 years of age. This emphasises the importance of reducing sedentary behaviours in young children because although the impact on weight status may not be apparent until they are older, the behaviours are being learned and may become habitual. There are currently no UK recommendations for TV viewing, however, the US and Australia have adopted guidelines that recommend no more than 2 hours viewing a day. It is of great importance that parents and nursery practitioners are made aware of the current viewing habits of young children and the possible long-term impact.

As previously discussed some of the children had their physical activity levels measured by an Actigraph accelerometer and some were provided with pedometers. However, accelerometers were not available for use in data collection T2. Accelerometers have demonstrated more accuracy and robustness in previous studies. Nonetheless, the cost of the equipment and the technical expertise required to analyse the data, may restrict the use of accelerometers for a lot of studies (Lubans *et al.*, 2011) and pedometers have been reported as a cheap reasonable estimation of moderate physical activity (Rowlands and Eston, 2005). The children averaged 6792 steps per day or 18 minutes of MVPA; this was in accordance with other studies who have reported very low levels of physical activity in preschool children (Reilly *et al.*, 2004; Timmons *et al.*, 2007; Brown *et al.*, 2009).

The parents were least likely to complete the 'family active' section of the diary however; more families in the delayed intervention group completed this section at follow-up despite an overall reduction of completion of all tasks.

Six children were classified as overweight or obese; this increased to 8 children at follow-up. The national percentage of overweight and obesity in reception age children (4/5 year-olds) from the 2010/11 NCMP data was 22.6% (The Health and Social Care Centre *et al.*, 2011). At follow-up the majority of children (17) remained in the healthy weight category (BMI between the 25th and 75th percentiles (Department of Health, 2009)).

10.2.7 Intervention implementation

As previously described two nursery schools were allocated to intervention and received a six-month intervention. The plan for the two control nursery schools was for them to receive a modified delayed intervention succeeding the follow-up data collection. Due to the timing of the term-times, the impending new school year and subsequently a new intake of children, one school opted for a condensed six week intervention; this is in line with the recommendation of tailoring interventions to specific groups of people (Ells *et al.*, 2005). The fourth school opted for a full intervention in the new school year. However, as previously reported the fourth and final school decided to exit from the study as discussed further below.

The first two schools (intervention) implemented and completed the six-month intervention. I visited each school twice a month, to deliver materials, collect feedback forms and to oversee the vegetable and fruit deliveries. The nursery staff, parents and children received monthly activities to be completed at home or nursery. The staff were also asked to meet with the intervention parents once a month to set and monitor family goals in line with the intervention aims. On-going evaluation throughout the intervention took place in the form of monthly feedback forms completed by the teachers; photographic evidence (information boards; evidence of material use); goal-setting and monitoring sheets completed by parents; and informal communication and observations. The evidence gathered also demonstrated fidelity to the interventions tasks and activities. Table 43 summarises the main points and findings from the implementation of the intervention. Each section is discussed below the table.

Table 43: Intervention implementation – key findings

Preschool feasibility study – Key points and development – Phase Three/Four						
PHASE THREE/FOUR INTERVENTION IMPLEMENTATION	Literature identified barriers	Study identified barriers	Process and data findings	Development for next phase (N/A)	How could it be repeated?	Development for future work
Schools →		Curriculum demands Time of year	Implementation in the summer term may not be appropriate Pressure from HT/ primary school to complete other tasks		Consider timing	Plan with nursery staff how best to integrate intervention into daily curriculum
Nursery Practitioners (NP) →	Lack of commitment/ interest NPs feel it is not their role/job	New members of staff Key member of staff retired	Main tasks such as goal-setting left to class teachers NPs tended to blame parents for any lack of success		Involvement of staff from beginning may aid commitment	All members of staff encouraged to be involved in meetings and planning from onset
Parents →	Lack of commitment Unable to identify with tasks	Lack of engagement with some tasks Lack of encouragement to engage with staff	Many parents did not attend monthly feedback meetings, however there was some evidence of family goal-setting activities Practical tasks such as the cooking challenges engaged most families, including non-intervention ones		Other communication modes for feedback	Explore other methods of feedback such as text, email and so on Focus more on practical family orientated tasks
Children →	Lack of staff commitment/time to complete nursery tasks and activities	Staff obligation to comply with curriculum demands may have impacted time allowed for study child activities	Some NPs felt preschool aged children were too young to engage with some of the tasks		Plan intervention activities into curriculum	Emphasise the benefits of completing the tasks for the children and families

10.2.8 Working with schools

Although the intervention schools were given the same training, information and tasks to complete, it was apparent that each school tailored the implementation to suit their own setting. This is significant (Craig *et al.*, 2008b), as the feasibility study is testing; it is essential that the intervention can function in a 'real' world situation and is capable of being integrated into the daily routine (Finegood *et al.*, 2010). However, it was reported that there was some difficulty with completing all the intervention tasks due to curriculum demands and obligation to comply with primary school demands (all the nurseries were based within a primary school setting). One teacher suggested that future nurseries taking part in the intervention may want to plan the intervention into the curriculum in advance. This would not only benefit the implementation of the intervention but may also provide staff involvement and ownership of the project. Furthermore, it was evident in one nursery, that interest in and support for the project was being filtered down from the primary head teacher. There was a request of the possibility of extending the intervention to children in key stages 1 and 2 in the primary school. This was later completed by a Newcastle University Food, Health and Nutrition undergraduate. Having the support of other staff members is likely to further motivate the 'key' player.

10.2.9 Nursery practitioners

The class teachers of the intervention schools displayed enthusiasm for and compliance with the intervention. The materials and activities were liked and reported as suitable. Both nursery teachers reported that a significant strength of the intervention was the capacity to encourage parents to become involved with their children, especially in the practical home tasks. However, it was difficult to determine how much time had been spent on the nursery-based activities and whether aims such as increasing physical activity within the nursery setting had been achieved. This could be regarded as a limitation of the study. In future work this perhaps should be included as a recorded outcome measure.

Apart from one in the delayed intervention school, the NPs were prone to leave any communication about the intervention to the class teachers. This made it difficult to ascertain how involved the NPs were in the intervention. However, as discussed in Chapter 8 when the class teacher was absent on one visit, the NP demonstrated

enthusiasm about the materials and activities. Once again this begs the question, would the NPs feel part of the project if they were more involved from the beginning? The NPs were invited to attend the intervention training session but only one NP in the delayed intervention school attended. Reasons given for the lack of attendance were that the NPs did not get paid to work extra hours. This perhaps demonstrates a lack of interest for the project, possible resentment due to lack of ownership/involvement, or being unable to commit own time. However, although the preliminary qualitative findings of the current study suggested that NPs were open to promoting health to families, what they believe their role to be or what advice they realistically feel they can give to parents is not known. Perhaps a perceived lack of knowledge or confidence impacted on the NPs involvement. As demonstrated by this study the NPs displayed difficulty in fulfilling or complying with already established school policies and 'rules' in relation to health. More research is required to determine which strategies will engage and empower the practitioners; this includes further exploring practitioners' own practices and health behaviours in nursery settings and within working hours and/or paid time. As recommended by the recent work of De Silva-Sanigorski *et al.* (2012), capacity building of early years educators and care providers should be a priority. Furthermore, Goldfield *et al.* (2012), advocate the positive and consistent reinforcement for preschool practitioners as this may enhance morale and increase the likelihood of concordance.

10.2.10 Parents

The engagement of parents who took part in the intervention was mostly positive. The teachers felt that more parents might have signed up to participate in the intervention had there been an initial joint meeting with the researcher, staff and parents. However, they did concede that the nursery often had difficulties engaging parents in other nursery activities. The teachers reported that many parents were reluctant to attend the goal-setting meetings; they cited 'work commitments' as a reason for not attending. However, through the feedback received from the parents in the form of goal-setting and monitoring sheets and the final evaluation questionnaires, it was evident that at least 20 of the intervention parents took part in the goal-setting activities at home and family behaviour-changes such as eating more vegetables, doing more activities as a family were reported. Goal setting is one of the primary concepts in Social Cognitive Theory which has demonstrated some success in adults (Baranowski *et al.*, 2003) and was therefore considered appropriate for this study. Furthermore, other elements of the

SCT, modelling (positive behaviours) and availability (providing vegetables) are potential influencing factors of a child's dietary intake. The findings suggest it was not the goal-setting tasks per se that parents were opposed to, as suggested by the NTs, but the actual meeting and discussing of the goals with staff members. The parents may have found discussing family behaviours with the teacher too personal or overly intrusive fearing judgement. Moreover, the parents may have questioned the teacher's qualifications to discuss such matters. It was evident from the preliminary qualitative studies that parents were worried about 'being told what to do' and being thought of as 'bad parents'. This highlights the importance of exploring other methods of feedback such as email, or a website.

Results from a telephone survey conducted in Australia in 2010, suggested that when trying to engage parents in interventions to prevent obesity in childhood, support services such as personalised mail/email support would be the most acceptable method to parents (Wolfenden *et al.*, 2010). However NPs in two of the nursery schools in the present study reported that email would not be a suitable method for their setting. Nevertheless, some parents expressed an interest in using a web-based method.

As suggested above, parents appear to be open to the use of computer/web-based support and De Silva-Sanigorski *et al.* (2012) suggest that a trained 'interventionalist' in the form of a school champion, school nurse or a healthy school's coordinator could be a strategy in which both parents and NPs could communicate intervention feedback and receive support. This would remove any 'burden' from the NPs and parents may feel more confident communicating with a specifically trained individual. The 'interventionalist' would also be responsible for coordinating tasks and activities and disseminating materials and information.

It was evident from all forms of feedback, including photographic and verbal, that the practical tasks such as the cooking challenges engaged the families in a significant manner. Importantly this included many non-intervention families. The parents were keen to share photographs and ideas with others on the nursery notice board. The tasks were designed to 'prompt practice' and 'provide rewards contingent on successful behaviour' which are elements of the theory of Operant Conditioning. There also appeared to be an element of peer pressure among the parents and children which may have encouraged further participation. NPs in the focus group identified the occasional 'one-upmanship' among the parents especially if they felt their child might

be 'missing out on something'. The ability of these tasks to engage parents, including those not signed up to the intervention, is significant and should perhaps form the basis of future preschool behaviour change interventions. The family cooking tasks could be used to engage parents before any formal recruitment strategies are implemented. Once engaged in the 'fun' practical activities, parents may be more open to participating in additional tasks.

There was also evidence of parents attempting other intervention tasks such as increasing 'family active time', the 'No TV challenges' and trying new recipes. Therefore the findings indicate an acceptability of the methods and materials by the parents; however, this is demonstrated mostly by informal observations and collected task sheets as very few parents returned the evaluation questionnaires. This proved to be very frustrating knowing that many parents had engaged with the intervention but were reluctant to provide feedback. Despite providing a SAE and the offer of a gift voucher on return of the questionnaire, only 8 parents out of 18 responded (44%). Emphasis needs to be provided not only of the benefits of the intervention but also the importance of the evaluation and research aspect of the study. However, the analysis of individual family's data streams (data gathered from outcome measures and intervention activities and tasks) proved to be very insightful – see section 8.3.9. It allowed a snap-shot or 'persona' of the family's home life and circumstances. In comparing the data stream of a family with 'full data' to one with none, it facilitates analysis to determine the type of family who may complete a behaviour change intervention and highlights the barriers which may deter other families.

10.2.11 Children

Evidence of the children's participation and engagement was demonstrated by photographic, verbal and parental feedback. Moreover, when visiting the nurseries many children recognised me and were keen to show me their photographs or tell me what they had been doing. However, I felt it was important to ascertain the children's views of the intervention in a more structured manner. Therefore the adapted child-centred 'draw and write' method was utilised (Collins, 1998) (section 8.3.6). Six intervention children were asked to draw a picture of the SKIP character and to explain who he was and what he liked. Many children associated the character with 'being healthy', 'being active' and 'eating healthy food'. Although the draw and talk sessions demonstrated the children's knowledge of the character and some of the health

messages, the number of children who completed the task was small and it was difficult to ascertain whether this facilitated the child's engagement with the intervention. However, the use of the intervention character contributed to the building of an intervention identity and a 'healthy lifestyle' brand as recommended by Evans (2008). In a larger scale project with more time and resources, it would be beneficial to complete this task with a larger group of children to enable analysis.

10.3 Delayed intervention and exit school

As previously discussed in Chapter 9, the third and fourth schools, which acted as control schools, were offered a delayed intervention. Following completion and evaluation of the intervention by the first two schools, the adapted 'action research' model was utilised thus refining the methodological tools to suit the needs of the circumstances (O'Brien, 2001). The modifications included: a change of character logo, providing recipes with the cooking challenges, extended physical activity ideas and games for nursery, simplification of the goal-setting and monitoring sheets to accommodate parent's self-completion at home, reduction in the duration of 'No TV challenges' and additional physical activity information for parents. Furthermore, the opportunity would be taken to organise a joint parent/staff/researcher meeting prior to the intervention to evaluate the practicability of arranging such a meeting. An important aspect of the feasibility study was to determine the views of the NPs and parents in receiving a delayed intervention. The NPs did not feel the delay had any impact on the effectiveness of the intervention and the parents reported that they were 'happy to wait'.

It was interesting to note the differences in enthusiasm and engagement in the two control schools in comparison with the intervention schools. The nursery staff appeared more suspicious of the study methods and demonstrated reticence in compliance of some tasks. One reason for this difference could be due to the initial contact method. In the intervention schools I was contacted by and corresponded with the nursery class teachers who then were the on-going key person for the intervention. However, in the third and fourth schools I was initially contacted by and met the primary school assistant head teacher and primary school head teacher respectively. I did not meet with the nursery staff until the parent recruitment days and had no further contact with the head teachers. As previously discussed although official gatekeepers may grant permission for access to those further down the scale, it does not guarantee the

cooperation of those at lower levels (Heaven, 2008; Wanat, 2008) and this I believe may have contributed to the lack of amenability. This once again suggests that all staff need to be involved from the very beginning to provide inclusiveness and ownership. Furthermore, it would appear important to have a key person/advocate to ensure the on-going momentum of the intervention. This, I believe was one of the reasons the fourth and final school decided to exit from the study. One of the class teachers (there were two part-time who shared a post) retired at the end of the summer term. This particular teacher had demonstrated the most enthusiasm and interest for the study. However, as previously discussed, this nursery had a generally negative ethos with underlying tensions between some staff members. Therefore, there may have been a culmination of reasons for the school to exit the study.

Due to the timing of the school term I was unable to interview the staff from the third school to receive intervention feedback and one joint completed questionnaire from the five staff members was received. The feedback was quite limited and mainly focussed on the parent's 'lack of engagement' and the 'unsuitability of the tasks' for the age of the children. However, this appeared to be a perception of the NPs as the feedback from the parents, albeit only two of them, contradicted these views. The parents demonstrated engagement with the tasks and reported positive health behaviour changes in the families. Furthermore, the NPs did report that many parents, again including non-intervention parents, participated in the cooking challenges, sharing photographs and recipes.

As this thesis has demonstrated, the development, implementation and evaluation of a complex intervention presents many challenges at every stage. Not only the practical and tangible aspects of executing such a project but also having to accommodate and take account of participant perceptions, beliefs, prior knowledge, opinions and values. In the following section I reflect on the process of completing this PhD.

10.4 Reflections of the research process

This section includes my reflections and feelings about the whole research process. I discuss the challenges faced, insights gained, the limitations of my work, and recommendations for future work. As I discussed briefly in Chapter 1, throughout the progression of my work I have been aware of my 'positionality' and the potential influence on my research. Reflexivity has been identified as an important process which may help to alleviate this (Hesse-Biber and Leavy, 2011).

10.4.1 The study sample

A particular challenge of the study was the recruitment of participants, although this has been identified as common in health and educational research (Wanat, 2008), I found the time and level of negotiation needed quite unexpected. It took quite some time to gain access to the school head teachers via the administrative gatekeepers. In retrospect I appreciate that more time needs to be dedicated to this aspect of a study. As identified by Craig *et al.* (2008b) the evaluation of an intervention can be undermined by complications with recruitment and many studies can be irretrievably delayed with recruitment difficulties (Gabbay and Thomas, 2004; Nasser *et al.*, 2011). Moreover, as has been identified throughout this thesis, stakeholder involvement may aid recruitment. In future work I would try to gain the support of bodies such as the National Association of Head Teachers or the local schools advisor who would possibly act as an advocate. Furthermore, schools which are recruited to the study should then be involved with the parental recruitment. I had felt that in my role of researcher this was my task, however, I now appreciate from the comments received from the nursery teachers that staff involvement may have promoted confidence in the parents to participate in the study and improved uptake.

Another unexpected outcome was the differing relationships that developed between myself and the staff members. As I explained in Chapter 1 I decided not to reveal my previous status as a nursery practitioner to the participants as I wanted them to consider me as a health researcher and not someone who had experience working in a nursery setting. I perhaps naively thought that my 'anonymity' would render me impartial thus having an equal standing in each nursery. I would perhaps, in future studies, disclose my past status as the knowledge that I had common experiences and an understanding of the nursery environment may enhance relationship building. However, relationship building is a two-way process and is influenced by a number of factors. In one intervention school I developed an immediate rapport with the teacher who was very enthusiastic and keen for me to interact with the children on my visits. However, in the second intervention school, as previously discussed, the class teacher although compliant and enthusiastic about the intervention did not seem to want to communicate any further than the passing of materials and information at the nursery door. However, although at the time I felt the positive relationship I had with the first school was beneficial, the final findings between the two schools did not differ. Conversely, I believe any opportunity to develop a rapport with the staff members in the

third and fourth schools was hindered by the lack of interaction prior the intervention with the key staff members and their perceived lack of ownership and understanding of the project. Despite the disappointing lack of rapport with some of the staff members due to various circumstances in the current study, I appreciate in future work, relationship building with study participants is still of utmost importance. Blanton *et al.* (2006) believe that building rapport with study participants will encourage continuing participation thus aiding retention.

10.4.2 Data collection

This PhD project was my first experience of conducting interviews with participants. I found as the project progressed my confidence increased and I enjoyed the one-to-one interaction with the NPs and parents in the preliminary qualitative studies. More challenging was the steering of the focus group sessions with NPs and parents and I was glad to have the opportunity to pilot test the parent session with colleagues, this helped to smooth out any technical issues and practice my technique as facilitator. Moreover, I found the NPs and parents to be willing and communicative and they appeared to enjoy sharing their views, this perhaps was aided by the fact that they were participating by their own volition.

Conversely, observations within the nursery setting presented challenges. On the whole most nursery staff were accepting of our presence whilst we observed the children's dietary intake. I was conscious of the importance of being an unobtrusive observer. Nonetheless, I did interact with the children, as most young children will naturally approach and question a visitor in the nursery. Furthermore, my background experiences meant that I found these interactions normal and enjoyable. However, as described in Chapter 7, some NPs appeared to be uncomfortable with our presence and questioned what we were doing, even suggesting that our presence was intimidating to the children. As discussed in Chapter 7, some NPs may have felt uncomfortable with the exposure of their 'quasi-private world' (Heath *et al.*, 2007). In future work the involvement of all staff members from the outset may allay any reservations and misunderstandings. However, I found some of my observations of the staff members' behavioural norms which they exhibited in front of the children somewhat disturbing. Some NPs openly consumed chocolate or cake in front of the children whilst they were given a 'healthy' snack such as fruit. The NPs did not seem aware of their negative modelling behaviours and I appreciate that I may be imposing

my values on their 'norms'. However, the NPs would comment on their own behaviour in relation to us, saying how they 'felt guilty' eating such foods in front of us. Furthermore, two of the nurseries were observed giving the children chocolate as a weekly reward for good behaviour; again expressions of guilt were indicated. I found the admissions of 'guilt' interesting; what led them to feeling guilty? Was it the contravening of nursery policies or was it because like the nurseries and parents taking part in the preliminary qualitative studies and the mothers in a recent Australian study (Noble, 2007) 'treats' are considered an essential part of a child's life. In future work I believe NPs own health behaviours and opinions should be explored further to determine how they can be reconciled with the implementation of school policies and practices.

10.4.3 Intervention design

The decisions required for the design and practical aspects of a behaviour-change intervention were complex and challenging. However, it was also one of the most enjoyable aspects of the project. I found the process of 'weaving' the recommendations from previous studies, the theory, current health and dietary recommendations, and the findings from the preliminary qualitative studies together into a tangible intervention fascinating and enlightening. I felt fortunate that I was able to draw on my own experiences of working in a preschool setting; having previous knowledge of the capabilities of children aged 3-5 years was highly beneficial. However, ensuring the intervention had a sound theoretical underpinning which was appropriate for the target population was challenging and I was privileged to be able to draw on the knowledge and experience of Health Psychologist Dr Vera Araujo-Soares. Of equal importance was being able to draw on the knowledge, opinions and skills of the stakeholders, that is, the nursery practitioners and the parents, this ensured a 'bottom-up' approach to the design. The inclusion of the parents in the development of the intervention materials contributed to the consideration of inequalities in the intervention design. It was hoped that by including stakeholders' opinions the intervention would be more appropriate to the needs of those participating.

Whereby it was appropriate to focus on a specific theory suited to the population, which for this study was behaviour-change theory; it was important to acknowledge theories derived from other disciplines such as a sociological approach and social marketing theory. However as discussed in section 3.1, due to the nature of the current study

which included families and the wider society, many aspects of sociological theory and social marketing strategies were inevitably intertwined into the design. Furthermore, more recent work by (De Silva-Sanigorski *et al.*, 2012) highlights the benefits of incorporating social marketing strategies as a way to engage parents. This would be an important consideration for future work.

In order to aid the analysis and development of the intervention an adapted Action Research model was adopted (see section 6.7.1). This helped guide the implementation process of the intervention in each school and provided a basis for evaluation and subsequent modification as the project progressed – how could the next phase be ‘done better’? (Ferrance, 2000). However, a ‘true’ use of the model would include the participants in the evaluation and analysis of the intervention. Time and resources in the current study did not allow for this, however, it would be a beneficial addition to future work to determine the feasibility and acceptability of undertaking such a method.

10.4.4 Data analysis and theory construction

Analysing qualitative data on this scale was a new experience for me. I found the ‘Analytic Hierarchy’ by Ritchie and Lewis (2003) (Chapter 4) a useful tool and it helped to organise my thoughts and analysis process. The process of delving into people’s narratives and trying to organise their feelings, behaviours and opinions into themes and theoretical concepts (Aronson, 1994) was a fascinating and often challenging journey. The attendance of courses to become acquainted with the NVivo data management software proved useful as despite mixed opinions of my colleagues of the use of such programmes, it facilitated the organisation of my transcripts, notes and annotations enabling me to generate themes and develop explanations. I felt at first that I was coding too rigorously building up numerous themes and sub-themes; I was concerned about leaving out ‘vital’ aspects and ‘important’ quotes from individuals. However, as I progressed, I found I was able to interpret the data in a more systematic way without losing the essence of individual contributions. Thus, I was able to build up theoretical concepts that addressed the main concerns of the study linking the findings from literature and how they could be addressed by the study.

For the evaluation purposes of the intervention it was beneficial to have several modes of feedback, these included, monthly feedback forms from the NPs, completed monitoring and activity sheets from parents, photographic evidence of cooking challenges and nursery activities and informal verbal communication. The shared notice boards were initially intended to be used to give visual prominence to the project; to provide a focal point of discussion for the NPs, parents and children; and to encourage participation, inclusion and practice. However, the data generated by the boards had the additional benefit of providing a measure of process. The notice boards provided evidence of the parents' and children's level of engagement with the cooking challenges, as discussed in section 8.2.2.1. Moreover, the notice boards provided a measure of the intervention, that is, the NPs, parents and children 'did' the notice boards. In future research the evidence generated by the boards could be used further; for example, how many families shared photographs, of those families, how many used the given ingredients, how many families shared other ideas and so on. However, as discussed in section 8.3.8, the value of collecting additional visual data has been questioned, despite the challenges O'Connell (2013) believes it can complement the data providing a fuller picture which helps to bring the research 'alive' for policy makers and practitioners.

These methods coupled with the more structured interview and questionnaire data provided a holistic overview. However, it is recognised that the parents who returned sheets or provided feedback were likely to be those who were interested in the subject matter, some families provided complete data sets, whilst others provided very little or none. Moreover, the analysis of families with full data sets ('data streams' – see section 8.3.9) enabled a persona or snapshot of the family to be constructed. The data streams provided an overview of the family's lifestyle circumstances which in future work may give some indication of the types of families likely to complete a behaviour-change intervention and the nature of support needed to facilitate compliance. As the number of families who provided full data sets or feedback about the intervention was low; a percentage of the studied population has not contributed to the evaluation which may have biased the results.

10.5 Implications for theory

In this section I discuss the gaps in knowledge in the evidence-base which this PhD study has sought to address, the results of which add a modest contribution to the body of research evidence.

A review of the literature identified a need for further 'practice-based' evidence (Finegood *et al.*, 2010) and interventions which target strategies and techniques which aid parents in modifying their child's diet and physical activity patterns (Skouteris *et al.*, 2010b). Furthermore, a lack of interventions which have or report a theoretical underpinning was identified. Inductive analysis (Trafford and Leshem, 2008) of the data revealed a need for further studies to include nursery staff on a more personal and pragmatic level.

'Practice-based' evidence

As previously discussed, a review of the literature identified the need for more practice-based evidence which is acceptable in 'real' world settings. To test which methods may be acceptable to parents and NPs, the current feasibility study was conducted. It is important to ascertain if a study can be done and Sahota *et al.* (2001b) advocate the benefit of a feasibility trial before a main trial/study of a behaviour change intervention. Also identified in the literature was the need to tailor behaviour change interventions to the studied population (Ells *et al.*, 2005), therefore NPs and parents in the current study were involved in the design of the intervention. Additionally, practical strategies to facilitate positive modification of children's dietary and physical activity patterns were trialled. This adds to the body of evidence of behaviour change intervention methods which may be acceptable in the studied population.

Theoretical underpinning

To address the need for a theoretical underpinning, two behaviour change models were selected for this study; Social Cognitive Theory (SCT) and Operant Conditioning (OC). One of the primary concepts of SCT which has demonstrated some success in adults is goal setting (Baranowski *et al.*, 2003), this behavioural change technique is also recommended by Golley *et al.* (2011) as a possible target for intervention effectiveness in obesity prevention interventions. Despite the NPs in the current study reporting difficulty in implementing the goal setting meetings with the parents; there

was evidence that 20 of the intervention parents completed aspects of this task with their families and some families reported implementing positive health changes. This suggests that the goal setting method is an acceptable method for parents; however other methods of monitoring and feedback need to be further explored to reduce the NPs perceived burden and/or lack of success.

One behaviour change technique of OC is 'prompt practice' which was initiated by providing families with items of fruits and vegetables and issuing them with a cooking challenge the results of which were shared on a nursery notice board in the form of photographs, recipes and children's drawings. This aspect of the intervention was reported to be one of most successful by the nursery teachers. It was believed that the task was instrumental in engaging parents in the intervention and 'it got families together'. Strategies in which to engage parents in obesity prevention interventions have been emphasised as critical for the overall success of an intervention (Lobstein *et al.*, 2004; Brown *et al.*, 2007; De Silva-Sanigorski *et al.*, 2012). Although the key element of the success of the cooking challenge in the present study may lie in the families 'cooking together' as opposed to just 'being together', other practical strategies in which the whole family can be involved warrants more exploration to facilitate parental engagement.

Nursery staff involvement

As it has been identified throughout each stage of this study, the importance of engaging nursery staff members is paramount. Not only does this facilitate inclusiveness and project ownership possibly enhancing the success of an intervention but it may also assist with recruitment of parents. However, as demonstrated in this study, it is not sufficient to have the permission of 'gatekeepers' to implement a study but all members of staff need to feel included in the development and implementation (Wanat, 2008). Recent work by De Silva-Sanigorski *et al.* (2012) in Australia reports the significance of capacity building of early years educators and care providers. Moreover, a Canadian review (Goldfield *et al.*, 2012) advocate that positive and consistent reinforcement for preschool practitioners may enhance morale and increase the likelihood of concordance. As previously discussed, there was evidence in the present study of intervention compliance in the two intervention nurseries. However, it was not known how involved NPs were as most communication was with the nursery teachers who appeared to be the key enablers of the intervention. An unexpected

finding from the study was the apparent difficulty or intentional lack of compliance with nursery health policies such as the permitting of high energy dense snacks and foods. Moreover, some NPs appeared to be unaware of negative modelling behaviour in the children's presence. These findings highlight the importance of initial nursery staff recruitment and involvement. Moreover, there is a need to further explore NPs personal perceptions of health and how the embedding of food policies which promote healthier food being brought into the nursery setting from home can be implemented (Nicholas *et al.*, 2013).

10.6 Future intervention development

Recommendations from the findings of the present study have been discussed throughout this thesis. This section summarises the main points considered important for future work and intervention development.

In phases one and two of the study, that is, the preliminary qualitative studies; recruitment for the focus groups proved to be challenging – this is a common phenomenon in health research. In future work an online forum chat group may encourage more participants, however, this may affect the dynamics of a 'live' discussion and discriminate against parents with low levels of literacy or who lack internet access.

In order to increase the initial recruitment of schools, external organisations such as the Head Teachers Association or other 'interventionalists' such as the school health officer or local school's advisor could be requested to act as an advocate to promote the benefits of taking part in such an intervention. In addition, the involvement of key ground school/nursery staff should be encouraged from the outset; as it was found in the current study, staff members who had less knowledge and understanding of the study sometimes appeared to be disinclined to complete tasks. It may be beneficial to present information sessions of a proposed study to the whole staff and parents in order to provide an explanation of expectations and tasks and to enable promotion of the potential benefits of taking part.

Moreover, in an attempt to further encourage parental recruitment, any letters of invitation for parents to participate in a study/intervention should come from the school/head teacher not the researcher. This may validate the study as a holistic school/nursery activity and not an external research activity. In addition, as reported in

the current study, the success of the family cooking challenges which engaged many families (including non-intervention families) could be used as a fun activity to promote the study and encourage participation before any parent recruitment efforts.

It was reported by one of the teachers that she felt future nurseries participating in such a study may want to incorporate the design into the school curriculum; this would perhaps foster further staff engagement and present an opportunity to determine how NPs own health behaviours and opinions can be reconciled with the implementation of school health policies and practices.

The initial promotion of the benefits of participating in such a study may encourage further concordance with data collection tasks and completion of intervention activities. This would hopefully not only be of benefit to families but would also provide further evidence of full 'data streams' (i.e. family personas), intervention implementation processes and an indication that behaviour change strategies were being implemented by NPs and families alike.

The acceptance and the use of the cameras as evidenced by the photographs taken by the children, parents and NPs suggest that the use of technical equipment (cameras, camera phones, printers and so on) is common place. Moreover, the sharing of photographic information has become more widespread, especially in digital media with tools and apps such as Facebook, Twitter, Instagram, and so on. This suggests that visual methods have a significant role to play in future research methods. Future studies should consider the use of an intervention webpage or Facebook page where the participants can share photos and ideas in an acceptable and accessible format.

Moreover, the success of the shared photographs and notice board provides an opportunity for future studies. The evidence provided by the use of the photographs and boards can be utilised as a process measure (see section 8.3.8). In addition, although time and resources in the current study did not allow further analysis, discussions with the children and parents of the photographs may provide further in-depth data. For example, it was observed that very few children were recorded as eating vegetables and this was echoed in the children's photographic dietary record; further discussion of such findings would prove useful for future dietary interventions and could be used as a point of discussion in focus groups. The next section discusses how the findings from the current study may impact on policy and practice.

10.7 Implications for policy and practice

The findings from the current study have implications for nursery practitioners, nursery settings, Local Educational Authorities and policy makers.

Efforts which improve the health behaviours of preschool children and their families have the potential to contribute to the Government's aim of reducing childhood obesity to 2000 levels by 2020. Future policy should focus on the long-term population-wide health effects of obesity prevention as opposed to treatment strategies in order to reach a wider population which encompasses social economic inequalities and reduces future NHS financial burden.

As demonstrated in this study and previous studies (Hesketh and Campbell, 2010), nursery settings have the potential to positively influence the lifestyle behaviours of preschool children and their families, thus intervening at a critical point of a young child's life. However, several barriers to successful intervention implementation have been identified and the following points should be considered. Local Education Authorities need to be aware of the consequences of the obesity situation and the role nursery settings may contribute in linking families with the nursery setting. Health promotion interventions and strategies should be mandatory with clear definitions, regulations, guidance and communication. Monitoring and evaluation should be part of routine inspections. Strategies should be integrated into school policies and embedded and planned into the everyday curriculum. However, policies should not create additional barriers and opportunities to 'tailor' interventions should also be practicable. Policies should be written with an understanding of the context in which they are to be implemented to allow for flexibility. An example may be the way in which support is provided, for instance, as previously discussed, an 'interventionalist' such as school nurse, healthy schools officer or other designated key person. A key person trained for the specific role may promote confidence with engagement of and interaction with parents. Furthermore, nursery settings should be provided with additional 'tools' to reduce intervention burden such as options to use electronic communication/feedback and interactive web-based parent information sites. Adequate training and support should be given to all NPs to increase confidence, knowledge and morale.

10.8 Intervention fidelity and quality

As discussed in section 8.3.7, in order to increase fidelity adherence, the nursery staff received training to implement the intervention and each nursery received the same resources and instructions. However, as discussed in the next section the time allocated for training was insufficient for complexity of the intervention, which may impacted on the fidelity of the intervention. Despite this limitation, the study provided some evidence of intervention fidelity through observations (field notes), photographs taken by NPs, parents and myself on nursery visits. Examples of photographs included those displayed on the shared notice boards and children participating in nursery intervention activities. It was also evident that the intervention resources were implemented through the completion and collection of child nursery worksheets, family achievement sheets, goal-setting sheet, and no TV sheets and so on.

10.9 Strengths and limitations

Several strengths of this work can be reported; despite the low recruitment of parents in the study, those that did take part were from a varied SES thus reaching a wide range of the population. The study was able to demonstrate the acceptability of the intervention tasks and materials and it was evident that non-intervention families were engaging with aspects of the intervention validating the holistic approach. Furthermore, the intervention was underpinned by two theoretical models which aided the development of and implementation of the intervention and adds to the body of evidence.

As is often the case with PhD work, the study was restricted by time, finances and resources which limited some aspects of implementation and evaluation.

The difficulties with recruitment at each phase of the study may have restricted the number of nursery schools and parents participating, thus the final sample of four schools may not necessarily be representative of the whole sample; in a full trial this would be regarded as a limitation of the study. Additionally, the proportion of parents providing formal feedback about the intervention was very low which may have introduced bias to the findings.

Ideally, more time would have been allocated to the nursery practitioner training; one hour of training for the complexity of the intervention was insufficient. However, time

was a rare commodity for the NPs; especially those who were not willing to attend sessions out with work hours. As previously described, some NPs were unwilling or critical about certain data collection tasks; this will have undoubtedly impacted on the study.

In retrospect, it may have been beneficial to gather additional information about the families such as home circumstances, number of siblings, and relationship with grandparents and so on. This type of information may have contributed to the family 'data streams' helping to provide a persona of the types of families likely to complete a behaviour change intervention.

Finally, following the success of the use of photographs and visual data, the result of having so much rich data 'without a voice', that is, not having time to talk to the parents and children about their photographs unquestionably limited the study.

10.10 Future work

Large scale studies are needed to further explore the suitability and effectiveness of the role of nursery settings for childhood obesity prevention. The university department in which I am based, the Human Nutrition Research Centre, is part of the collaboration the Public Health Research Consortium (PHRC). Funding has been acquired to further work from this PhD study. The findings from this feasibility study will inform a three-arm pilot trial to be implemented in nursery settings. Two arms will act as intervention arms, arm one – a preschool based intervention, arm two – a preschool and family based intervention. The third arm will act as a control group and will receive normal care.

10.11 Concluding remarks

The aim of this study was to develop and test the feasibility and acceptability of an intervention for the prevention of overweight and obesity in childhood, with a particular focus on early childhood. A review of the literature revealed a paucity of research in the area of preschool obesity prevention, especially in the UK; this led to the development of the current feasibility study.

Much of the literature focuses on behaviour change strategies for parents and children and NPs in the current study expressed strong beliefs for the need of parents to receive 'help' and 'education' to improve families' health. However, an unexpected

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finding of the study was the current practices of some nursery settings and practitioners which contradicted reported nursery health policies. The findings highlight the need to not only focus on individual behaviours but to address the whole 'obesogenic' environment to which a child is exposed.

The study findings will be utilised to inform the aforementioned pilot trial and disseminated widely in order to impact on policy at a local and national level. It is hoped that expansion of research in this area will contribute to the government aim of reducing childhood obesity to 2000 levels by 2020 and lessen the widening inequalities in children under the age of five years.

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