The Development and Evaluation of a novel health promotion intervention (Kitten’s First Tooth) to improve children’s oral health in a deprived area of North West England

Lucy O’Malley

School of Health Sciences
College of Health and Social Care
University of Salford, Salford, UK

Submitted in Partial Fulfilment of the Requirements of the Degree of Doctor of Philosophy, 2013
# Table of Contents

**ACKNOWLEDGEMENTS** ........................................................................................................................ XI

**ABBREVIATIONS** ................................................................................................................................. XII

**ABSTRACT** .............................................................................................................................................. 1

**CHAPTER 1** .............................................................................................................................................. 3

1.1 **INTRODUCTION** .............................................................................................................................. 4

1.2 **LITERATURE OVERVIEW** .............................................................................................................. 6

1.2.1 **HEALTH INEQUALITIES** ............................................................................................................. 6

1.2.2 **CHILDHOOD ORAL HEALTH** ................................................................................................. 10

1.2.3 **ORAL HEALTH BEHAVIOURS** ............................................................................................. 12

1.2.4 **ACCESS TO DENTAL HEALTH CARE FOR CHILDREN** ......................................................... 13

1.2.5 **DENTAL ATTENDANCE AND CHILD ORAL HEALTH** ........................................................... 16

1.2.6 **INTERVENTIONS TO IMPROVE CHILD DENTAL ATTENDANCE** ........................................ 22

1.2.7 **DENTAL HYGIENE AND CHILD ORAL HEALTH** ................................................................... 25

1.2.8 **INTERVENTIONS TO INCREASE CHILD TOOTH BRUSHING** .................................................. 27

1.2.9 **DIET AND CHILD ORAL HEALTH** ......................................................................................... 29

1.2.10 **CHILD DIET INTERVENTIONS** ............................................................................................... 34

1.2.11 **ORAL HEALTH PROMOTION TARGETING MULTIPLE HEALTH BEHAVIOURS** ............... 40

1.2.12 **FRAMEWORK AND THEORY FOR DEVELOPING ORAL HEALTH PROMOTION INTERVENTIONS** ......................................................... 42

1.2.13 **HEALTH BEHAVIOUR THEORY AND TECHNIQUES** ................................................................ 52

1.2.14 **BEHAVIOUR CHANGE TECHNIQUES** ....................................................................................... 63

1.3 **RESEARCH DIRECTION** .................................................................................................................. 66
1.3.1 Research Aim ................................................................................................................. 66
1.3.2 Objectives ...................................................................................................................... 66
1.3.3 Overall research question ............................................................................................... 67
1.3.4 Framework and structure of studies within thesis .......................................................... 67

Chapter 2 .................................................................................................................................. 71

2.1 Overview .......................................................................................................................... 72
2.1.1 Study focus .................................................................................................................... 77
2.2 Methodology ...................................................................................................................... 79
2.2.1 Design .......................................................................................................................... 79
2.2.2 Participants ................................................................................................................... 85
2.2.3 Procedure ..................................................................................................................... 85
2.2.4 Analysis ........................................................................................................................ 87
2.3 Results ................................................................................................................................ 90
2.3.1 Participants .................................................................................................................. 90
2.3.2 Barriers ........................................................................................................................ 91
2.3.3 Facilitators ................................................................................................................... 98
2.4 Discussion ......................................................................................................................... 105
2.5 Conclusions ...................................................................................................................... 113
2.6 Next steps ......................................................................................................................... 114

Chapter 3 .................................................................................................................................. 116

3.1 Overview ........................................................................................................................... 117
3.1.1 Study Focus .................................................................................................................. 130

3.2 Methodology .................................................................................................................. 132
  3.2.1 Design .......................................................................................................................... 132
  3.2.2 Procedure ..................................................................................................................... 134
  3.2.3 Analysis ......................................................................................................................... 136

3.3 Results .............................................................................................................................. 137
  3.3.1 Search Results ....................................................................................................... 137
  3.3.2 Dental Health Messages .............................................................................................. 141
  3.3.3 Behaviour Change Techniques .................................................................................... 149
  3.3.4 Preparation Techniques .............................................................................................. 153

3.4 Discussion ......................................................................................................................... 156

3.5 Conclusion ......................................................................................................................... 170

3.6 Next Steps ........................................................................................................................ 171

CHAPTER 4 ............................................................................................................................... 172

4.1 Overview ............................................................................................................................ 173
  4.1.1 Study Focus ............................................................................................................... 178

4.2 Methods ............................................................................................................................... 179
  4.2.1 Development Process ................................................................................................. 179
  4.2.2 Design of Visual Story and Characters ...................................................................... 182

4.3 Results ................................................................................................................................. 186
  4.3.1 The Intervention: ‘Kitten’s First Tooth’ ..................................................................... 186
  4.3.2 Targeted Behaviours and Behaviour Change Techniques ......................................... 189
4.3.3 OVERALL STORY AND THEMES ................................................................. 192
4.3.4 DIFFERENCES BETWEEN THE STORYBOOK AND ANIMATION .................. 193
4.3.5 ADDITIONAL MATERIALS ................................................................. 195

4.4 DISCUSSION ............................................................................................. 197

4.5 CONCLUSION .......................................................................................... 205

4.6 NEXT STEPS .......................................................................................... 206

CHAPTER 5 ...................................................................................................... 207

5.1 OVERVIEW ............................................................................................. 208
5.1.1 STUDY FOCUS ....................................................................................... 212

5.2 METHODS ............................................................................................... 214
5.2.1 DESIGN ................................................................................................ 214
5.2.2 PARTICIPANTS ....................................................................................... 216
5.2.3 PROCEDURE .......................................................................................... 217
5.2.4 MEASUREMENTS .................................................................................. 220
5.2.5 ANALYSIS ............................................................................................. 223

5.3 RESULTS .................................................................................................. 225
5.3.1 PARTICIPANT CHARACTERISTICS ....................................................... 227
5.3.2 RELIABILITY OF THE MEASURES ...................................................... 229
5.3.3 SUBSCALES OF THE OHBQ ................................................................. 229
5.3.4 ADDITIONAL QUESTIONS ..................................................................... 230
5.3.5 EVALUATION QUESTIONS .................................................................... 231
5.3.6 PARENTAL SELF-EFFICACY FOR CHILD ORAL HEALTH BEHAVIOURS ........ 231
5.3.7 **Behavioural Intention** ................................................................. 232

5.3.8 **Acceptability of Kitten's First Tooth to Parents** .................................................... 238

5.4 **Discussion** ................................................................................................. 239

5.5 **Conclusion** .................................................................................................. 247

5.6 **Next Steps** .................................................................................................. 248

**CHAPTER 6** ..................................................................................................... 249

6.1 **Overview** ................................................................................................... 250

6.1.1 **Study Focus** ............................................................................................. 254

6.2 **Methods** ..................................................................................................... 255

6.2.1 **Design** ...................................................................................................... 255

6.2.2 **Participants** ............................................................................................... 261

6.2.3 **Procedure** ................................................................................................. 262

6.2.4 **Measurements** .......................................................................................... 266

6.2.5 **Analysis** ..................................................................................................... 267

6.3 **Results** ....................................................................................................... 270

6.3.1 **Potential Usefulness** .................................................................................. 270

6.3.2 **Feasibility** ................................................................................................ 276

6.3.3 **Acceptability** ............................................................................................ 280

6.4 **Discussion** .................................................................................................. 289

6.5 **Conclusion** .................................................................................................. 299

**CHAPTER 7** ..................................................................................................... 300
List of tables

TABLE 1.1 STUDIES IDENTIFIED IN THE SYSTEMATIC REVIEW OF HARRIS ET AL. (2004) WHICH FOUND A SIGNIFICANT ASSOCIATION BETWEEN DENTAL ATTENDANCE AND DENTAL HEALTH ............................................. 17
TABLE 2.1 CHARACTERISTICS OF PARTICIPANTS IN THE FOCUS GROUPS ................................................................. 90
TABLE 2.2 SUMMARY OF BARRIERS TO CHILD DENTAL ATTENDANCE ..................................................................... 91
TABLE 2.3 SUMMARY OF FACILITATORS TO CHILD DENTAL ATTENDANCE ................................................................. 98
TABLE 3.1 CHARACTERISTICS OF INCLUDED BOOKS .................................................................................................. 139
TABLE 3.2 DENTAL HEALTH MESSAGE IDENTIFIED IN EACH BOOK ............................................................................. 144
TABLE 3.3 DENTAL HYGIENE MESSAGE IDENTIFIED IN EACH BOOK ............................................................................. 146
TABLE 3.4 SUGAR CONSUMPTION AND DENTAL ATTENDANCE MESSAGES IDENTIFIED IN EACH BOOK ................. 148
TABLE 3.5 ANALYSIS OF AGREEMENT BETWEEN RATERS ON BCTS ................................................................. 149
TABLE 3.6 BCTS IDENTIFIED IN EACH BOOK BY FOUR RATERS .................................................................................. 151
TABLE 4.1 DESIGN OF KITTEN’S FIRST TOOTH MAPPED ON TO THE SOCIAL MARKETING FRAMEWORK ............. 181
TABLE 4.2 CHARACTER KEY ........................................................................................................................................ 183
TABLE 4.3 DETAILS OF CHANGES MADE TO STORYBOARD 1 ...................................................................................... 187
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4</td>
<td>Details of changes made to storyboard 2 following feedback from the consultation group</td>
</tr>
<tr>
<td>4.5</td>
<td>Health messages in kitten's first tooth</td>
</tr>
<tr>
<td>4.6</td>
<td>Showing the BCTs in kitten's first tooth</td>
</tr>
<tr>
<td>4.7</td>
<td>BCTs featuring in kitten's first tooth by type and example from the text</td>
</tr>
<tr>
<td>4.8</td>
<td>Differences between narration in animation and text appearing alongside the relevant pictures in the storybook</td>
</tr>
<tr>
<td>4.9</td>
<td>Text appearing of the additional materials (bookmark and fridge magnet) and the rationale for each section of text</td>
</tr>
<tr>
<td>5.1</td>
<td>Population characteristics of areas chosen for study</td>
</tr>
<tr>
<td>5.2</td>
<td>Constructs to be measured using the modified OHBQ in relation to oral health behaviours</td>
</tr>
<tr>
<td>5.3</td>
<td>Items added to the OHBQ</td>
</tr>
<tr>
<td>5.4</td>
<td>Evaluation questions and related constructs used to develop them</td>
</tr>
<tr>
<td>5.5</td>
<td>Skewness and kurtosis of the subscales of the OHBQ</td>
</tr>
<tr>
<td>5.6</td>
<td>Characteristics of children recorded in the questionnaires at baseline</td>
</tr>
<tr>
<td>5.7</td>
<td>Characteristics of parents recorded in the questionnaires at baseline</td>
</tr>
<tr>
<td>5.8</td>
<td>Reliability for subscales of the OHBQ</td>
</tr>
<tr>
<td>5.9</td>
<td>Reliability for subscales of the additional questions</td>
</tr>
<tr>
<td>5.10</td>
<td>Reliability for evaluation questions</td>
</tr>
<tr>
<td>5.11</td>
<td>PSE for child oral health behaviours</td>
</tr>
<tr>
<td>5.12</td>
<td>Self-reported dental attendance behaviours for two items from the OHBQ</td>
</tr>
<tr>
<td>5.13</td>
<td>Parents' child oral health behavioural intention based on evaluation questions</td>
</tr>
<tr>
<td>5.14</td>
<td>Parental intention to enact child oral health behaviours</td>
</tr>
<tr>
<td>5.15</td>
<td>Parental attitudes towards prevention</td>
</tr>
<tr>
<td>5.16</td>
<td>Parental attitudes towards tooth decay</td>
</tr>
<tr>
<td>5.17</td>
<td>Parents' outcome expectancy for dental attendance</td>
</tr>
<tr>
<td>5.18</td>
<td>Mean scores for the evaluation items relating to practicalities</td>
</tr>
</tbody>
</table>
TABLE 6.1 PROCESS EVALUATION COMPONENTS IN THIS STUDY ................................................................. 258
TABLE 6.2 SKEWNESS AND KURTOSIS FOR OHBQ DATA ................................................................. 271
TABLE 6.3 RELIABILITY OF THE OHBQ AND FEQ SCALES .................................................................... 271
TABLE 6.4 CHARACTERISTICS AND REPORTED BEHAVIOUR FROM THE OHBQ (N=109) ....................... 273
TABLE 6.5 REPORTED BEHAVIOURS ................................................................................................. 275
TABLE 6.6 MEAN SCORES ON THE SUBSCALES OF THE OHBQ .......................................................... 276
TABLE 6.7 READING HABITS (N=109) .............................................................................................. 278
TABLE 6.8 MEAN SCORES FOR QUESTIONS ON THE KFT-EQ AROUND THE PRACTICAL USE OF KIT TEN’S FIRST TOOTH ................................................................................................................................. 279
TABLE 6.9 CHILDREN’S REPORTED FAVOURITE CHARACTER FROM KITTEN’S FIRST TOOTH ............... 280
TABLE 6.10 PARENT REPORTED MOST IMPORTANT MESSAGES FROM KITTEN’S FIRST TOOTH .......... 280
TABLE 6.11 CHARACTERISTICS OF FOCUS GROUP PARTICIPANTS ......................................................... 281
TABLE 6.12 THEMES ARISING FROM FRAMEWORK ANALYSIS .......................................................... 282

List of figures

FIGURE 1.1 UPSTREAM VERSES DOWNSTREAM INTERVENTIONS ............................................................... 8
FIGURE 1.2 MRC FRAMEWORK FOR THE DEVELOPMENT OF COMPLEX INTERVENTIONS ......................... 43
FIGURE 1.3 SOCIAL COGNITIVE THEORY .......................................................................................... 54
FIGURE 1.4 THE HEALTH ACTION PROCESS APPROACH (HAPA) ......................................................... 58
FIGURE 1.5 MRC FRAMEWORK FOR THE DEVELOPMENT OF COMPLEX INTERVENTIONS ADAPTED TO SHOW THE STUDIES PRESENTED IN THIS THESIS .................................................................................................................................................. 68
FIGURE 3.1 FLOWCHART SHOWING SEARCH AND SELECTION PROCESS ........................................... 138
FIGURE 3.2 FREQUENCY OF HEALTH MESSAGE BY TYPE ....................................................................... 142
FIGURE 3.3 NUMBER OF HEALTH MESSAGES PRESENT IN EACH BOOK ............................................. 142
FIGURE 3.4 NUMBER OF BCTS IDENTIFIED PER BOOK BY A MAJORITY OF RATERS .............................. 152
FIGURE 3.5 NUMBER OF BCTS IDENTIFIED ACROSS ALL BOOKS BY A MAJORITY OF RATERS ............... 152
FIGURE 4.1 HOW KITTEN’S FIRST TOOTH WAS INFORMED BY PREVIOUS STUDIES AND THEORY ........ 180
Acknowledgements

I am truly indebted to and thankful to my supervisors, Pauline Adair and Cynthia Pine. Without their dedication and kind attention this work would not have been possible. Both have supported me personally and academically throughout and I will remain grateful to them always. In addition, Margaret Coffey provided much supervisory support in the final months of this PhD for which I am extremely grateful.

I am obliged to many of my colleagues who have supported me in a whole variety of ways, in particular, Louise Robinson, Sarah Elison, Anna Cooper, Rosy Armstrong, Lucy Fish, Lindsey Dugdill, Penny Cook and Girvan Burnside. I would also like to thank Tony Long for his help and guidance during the first 18 months of this PhD. I am grateful also to Carin Schroder, Clair Robinson and Val Featherstone. Wagner Marcenes and Vanessa Muirhead at Barts and the London School of Medicine and Dentistry also provided valuable support and local knowledge in the London study. Additionally I am very grateful to all the parents and children who participated in this study.

Particular thanks must be paid to those at NHS Salford who have provided support, resources and expert knowledge for this project: Lindsey Bowes, Richard Freeman, Assumpta O’Connell and Lucy Szymkowiack. Many thanks must also go to Kate Corbin and to Bernie Steer as well as all those at Wakstudios, in particular Warren Fearn and Lewis Grimes.

I remain appreciative to my family and friends who although neglected have always been there for me. And of course to Daniel, thank you.
Abbreviations

BASCD - British Association of Community Dentistry

BCT - Behaviour Change Techniques

DMFT – decayed, missing, filled teeth permanent dentition

dmft – decayed, missing, filled teeth primary dentition

FSM – Free School meals

HAPA – Health action process approach

HTA – Health Technologies Assessment

IMD – Indices of multiple deprivation

OHBQ – Oral Health Behaviours Questionnaire

MRC – Medical research council

NHS – National Health Service

NICE – National Institute for Health and Care Excellence

NIH – National Institute of Health

RCT – Randomised control trial

SES – Socioeconomic status

WHO – The World Health Organisation
Abstract

This thesis describes the development and evaluation of a novel oral health promotion intervention developed using both empirical evidence and theory. **Study 1:** a qualitative, exploratory study involving 36 parents of young children living in a deprived area of North West England was undertaken. This study concluded that parents’ health behaviours might be motivated by their attachment to their child. Risk perception, outcome expectancy and self-efficacy for coping with child behaviours were identified as important psychosocial constructs. **Study 2:** nine children’s dental storybooks were identified and content analysed for the presence of health messages, behaviour change techniques and preparation techniques. This study demonstrated the possibility of using children’s stories to convey health and behavioural messages. **Study 3:** the intervention was developed based on evidence and theory and with an expert consultation group. It consisted of a story ‘Kitten’s First Tooth’. **Study 4:** a pilot evaluation of Kitten’s First Tooth was undertaken using a controlled before and after study design (n=149). Primary outcome data was measured using a validated questionnaire (OHBOQ; Adair, Pine, Burnside, & et al., 2004). The results showed Kitten’s First Tooth improved parental self-efficacy and intention for child tooth brushing but not for sugar control. **Study 5:** a further pilot study was set up to assess the feasibility of Kitten’s First Tooth in a culturally diverse environment (Inner East London) with a view to implement a randomised controlled trial in the future. Based on these pilot evaluations, improvements to Kitten’s First tooth are suggested. To date, no other story-based child oral health interventions have been developed using BCTs. Furthermore, few robustly developed or theory based interventions have been evaluated in the field of child oral health (Cooper et
al., 2013). Additionally, this study has shown that stories may be an effective means through which to communicate oral health promotion to parents and their children.
Chapter 1

Introduction and literature overview
1.1 Introduction

This PhD has been conducted at the University of Salford within the World Health Organisation (WHO) collaborating centre for oral health in deprived communities. It describes the development and pilot evaluation of a novel health promotion intervention (Kitten’s First Tooth) to promote oral health behaviours. The focus of the intervention is parents of young children (three to five years) and it targets three key behaviours: 1) accessing the dentist asymptotically, 2) twice daily tooth brushing with fluoride paste and 3) controlled sugar snacking. The intervention aims to improve parents’ attitudes towards these behaviours. Specifically, the focus is around improving intention to enact the key oral health behaviours, and to improve parents’ outcome expectations of child dental visits as well as their confidence (self-efficacy) to undertake tooth brushing for their children and to control sugar in their child’s diet. NHS Salford, the local primary care trust at the time the study was conducted, provided funding for the intervention developed within this thesis.

Given the background of the PhD student is sociology, the intervention has been developed using a broad approach to health promotion incorporating social marketing but guided by theory (social cognitive theory; Bandura, 1986; health action process approach (HAPA); Schwarzer, 1992) and utilises behaviour change techniques (BCTs) (Abraham & Michie, 2008a). This is in keeping with a psychology PhD in the topic area of oral health behaviour change. The social marketing framework emphasises the use of relevant empirical evidence (French, Blair-Stevens, McVey, & Merritt, 2009), to understand the ‘audience’ of the intervention. Additionally, the framework supports the use of varied communication formats to maximise ‘audience reach’. The theoretical constructs intention, outcome expectancies
and self-efficacy, routed in health behaviour theory, were used in addition to this framework.

Chapters 2-4 comprise the development of the oral health promotion intervention, a narration titled *Kitten’s First Tooth*. Chapters 5 and 6 describe the pilot evaluation of Kitten’s First Tooth using an interventional study and a further feasibility study to understand the acceptability of the intervention and its potential use in a culturally diverse community. Chapter 2 uses qualitative methods (focus groups) to explore parents’ perceptions of barriers and facilitators to child dental access. Chapter 3 investigates the possibility of communicating health messages and BCTs through the child friendly medium of storytelling. Chapter 4 goes on to present the design of the children’s story, Kitten’s First Tooth, as an oral health promotion intervention. The intervention takes the form of an animation (on a DVD) and a storybook.

Chapter 5 reports the results of a pilot evaluation of Kitten’s First Tooth, the focus of this evaluation is to understand whether Kitten’s First Tooth is effective at improving parents’ intentions to enact the three targeted oral health behaviours (dental access; tooth brushing with fluoride paste and sugar control) as well as parents’ outcome expectancies for dental visits, and parents’ self-efficacy for tooth brushing and sugar control. Outcome measurement was by means of a psychometric questionnaire, the Oral Health Behaviours Questionnaire (OHBQ; Adair et al., 2004). Chapter 6 describes a pilot study to assess feasibility for a randomised controlled trial (RCT) study. It explores the use of Kitten’s First Tooth in a culturally diverse environment where English was a second language for many of the participants. The purpose was to inform the development of a future RCT using a children’s story as a medium through which to deliver oral health promotion.
1.2 Literature overview

The following sections comprise a narrative review of the literature around child oral health with particular reference to socially and materially deprived populations. Child oral health covers a wide range of conditions however the scope of this thesis is confined to childhood dental decay or tooth decay. It is well established that tooth decay can be prevented through regular tooth brushing using fluoride toothpaste (Marinho, Higgins, Logan, & Sheiham, 2009; Walsh et al., 2010) and restricting the amount and frequency of sugar consumed (Harris, Nicoll, Adair, & Pine, 2004; Zero, Moynihan, Lingstrom, & Birkhed, 2008).

There is an association between dental attendance and better dental health (Lader et al., 2003; Nuttall et al., 2006). Accessing dental health care asymptomatically can mean an early diagnosis of tooth decay and prevention of further problems (Pierce, Rozier, & Vann, 2002). Additionally dental visits may serve as a platform through which to communicate health messages and provide support (Ramos-Gomez, Crystal, & Ng, 2010).

This literature overview will first look at inequalities and child oral health generally and will go on to explore the evidence for each of the three key behaviours listed with regard to their relationship with child oral health. The final part of this overview is a review of the frameworks and theory used within this thesis.

1.2.1 Health inequalities

Health inequalities mirror social and material inequalities as measured by various indices of deprivation (Macintyre, 1994; Mackenbach et al., 2008; Marmot & Wilkinson, 2006; Wilkinson, 1996). In further assessing barriers to dental care (and general health care),
socioeconomic status (SES), is one of the most significant. This can be attributed, in part, to the ways in which SES can impact upon almost every aspect of life (Marmot, 2010). A report commissioned by the UK Department of Health and chaired by Sir Michael Marmot (2010), sought to outline the social determinants of health and explain health inequalities. One of the central themes of the report was the dramatic association between SES and health outcomes existing in the UK today. This, Marmot and colleagues demonstrate by plotting life expectancy and disability-free life expectancy against deprivation (based on neighbourhood level income). The average difference in disability-free life expectancy between the highest and lowest deprivation levels was found to be 17 years (2010). Life expectancy has increased on average over time and the gap between that of the richest and the poorest has also increased (Marmot, 2010). Health inequalities are becoming more pertinent. While there are a variety of measures for collecting data pertaining to SES (arguably all proxy measures for a complex concept) the report outlines that inequalities in health exist and are consistent along every one of these measures (Marmot, 2010).

Richard Watt, has applied the theories of social determinants of health to the case of oral health (Watt, 2007). In a review, he points to what he terms a “substantial body of dental scientific literature” (p. 2) that demonstrates that those of lower SES have worse levels of dental health. Importantly, in putting forward as Marmot does, that it is inequality itself rather than absolute levels of wealth that influence health, Watt refers to Sweden as a country where there is less inequality in terms of SES and also in terms of health (2007).

In understanding oral health as a consequence of wider social and economic processes, a broader picture emerges. The determinants of oral health are multi-level, from the environmental level of health and social care policies, infrastructure and employment, to the
more local level of community and social norms down to family dynamics and individual level attitudes and beliefs (Watt, 2007). Watt sees these levels as either structural or individual and conceptualises approaches for tackling these as upstream or downstream. Figure 1.1 demonstrates the levels of interventions and situates them on a scale of downstream to upstream (Watt, 2007). Clinical intervention is shown to be at the lowest level, focusing on individuals, with community level interventions somewhere in the middle and large scale national interventions such as water fluoridation at the top, having the widest reach and an environmental level impact.

In focusing on the social determinants of oral health, structural level determinants are taken to be the most significant and Watt criticises the traditional ‘downstream’ approach to tackling oral health in the UK which centres on individual risk factors and behaviour. Attempting to impact psychosocial determinants to change health behaviour but not impacting on the environmental causes of these determinants creates challenges for the
maintenance of the behaviour. Moreover, such psychosocial interventions will be continually needed as new generations are exposed to an environment which does not encourage health for all.

While there is considerable evidence to support theories pertaining to the social determinants of health (Marmot, Adelstein, & Bulusu, 1984; Marmot & Wilkinson, 2006; Marmot, 2010) and while Watt’s overall argument is rational, the scale of change recommended by Watt in his review is likely to take a substantial amount of time to come about. Although changes to the structure of dental services are beginning to be commissioned, for example higher utilisation of the work force for screening for dental disease through Direct Access (Campbell & Tickle, 2013), wider scale changes to reduce social inequalities are not yet in place. It remains important therefore, in cases where individual behaviours may be linked to health outcomes, to continue to support individuals to be healthy by promoting behaviours that are likely to lead to health gain.

The research reported on within this PhD was carried out with socially and materially deprived populations in North West England and Inner East London. Socioeconomic status is well established as a factor strongly associated with childhood dental health (Marshall, 2007; Reisine & Psoter, 2001; Watt, 2007). The dental health status of children in deprived areas is much lower than average, for example, the mean number of decayed missing or filled teeth (dmft) in five year old children in England is just less than 1 at 0.94 and the prevalence of disease is 27.90% (Public Health England, 2012a). In areas of low SES, including various urban areas across North West England and Inner East London, dmft has been recorded as higher at around 1.3 for the average child and as having greater prevalence at around 34% (Public Health England, 2012a).
1.2.2 Childhood oral health

Oral health contributes to a person’s overall health. Recent studies for example, have provided links between periodontal health and coronary disease (de Oliveira, Watt, & Hamer, 2010; Humphrey, Fu, Buckley, Freeman, & Helfand, 2008; Khader, Albashaireh, & Alomari, 2004). Other studies have found evidence of associations with periodontal disease and diabetes (Saremi et al., 2005; Taylor, 2001) as well as with pneumonia (Saremi et al., 2005; Taylor, 2001; Teng et al., 2002). Although the mechanisms of association are not yet clear, the links demonstrate that oral health should be understood within the context of a person’s overall health and wellbeing.

It is important that good oral health habits are established as early in childhood as possible. There is an association between child and adult oral health whereby those who have good oral health in childhood tend to have good oral health as adults (Nunn, 2006). In addition to the potential long-term benefits of good oral health in childhood, it is important for the health and happiness of the child generally. As with other aspects of health, oral health can impact upon social and psychological wellbeing (Exley, 2009; Sheiham, 2005).

A child suffering from dental pain due to decayed teeth may be unable to eat or sleep normally and may miss time at school (Jackson, Vann, Kotch, Pahel, & Lee, 2011). The child may also miss out on social and recreational activities with friends and family (Casamassimo, Thikkurissy, Edelstein, et al., 2009). In very serious cases, untreated gum disease and severe decay may lead to infections which can have severe and even life threatening complications including sepsis (Pine, Harris, Burnside, & Merrett, 2006). In addition to pain which may be debilitating for children, particularly if it goes untreated (Edelstein, 2000), dental decay can affect ability to communicate and impact upon a child’s daily life (Sheiham, 2005).
Furthermore, Exley (2009), in a narrative review of the sociology of oral health, highlights some far reaching consequences of dental disease. Obvious missing or rotten teeth may negatively mark a child as poor or dirty (Exley, 2009). This may result in socially limiting judgements being made against them, possibly impacting upon their life chances (Gregory, Gibson, & Robinson, 2005).

Research carried out across Sweden (Källestål, Dahlgren, & Stenlund, 2006), analysed self-report data from 3,370 children. Logistic regression was conducted to calculate odds ratios, which found that self-esteem was significantly associated with child oral health behaviours. This relationship appeared to change, as the children got older, whereby emotional rather than cognitive factors had a greater impact on behaviour. As children reach adolescence, emotional factors may become more important for directing oral health behaviours. Cognitive factors may therefore be of greater importance for directing behaviour in younger children. Similar data collected from the same cohort at two and four year intervals showed non-significant odds ratios for self-esteem in relation to tooth brushing behaviours. This may have been due to modifications of measurement tools over time and the fact that the constructs may be considered ‘context dependant’ (Källestål et al., 2006). Due to cultural variance, it is difficult to be certain about the extent to which these findings are applicable to UK populations, the findings do however, illustrate an association between psychosocial factors and oral health behaviours for young European children.

Child oral health is important for overall health and wellbeing (Casamassimo et al., 2009; Edelstein, 2006; Jackson et al., 2011; Sheiham, 2005). Socioeconomic conditions are known to impact upon child oral health (Locker, 2000). Children of low SES are less likely to be engaged in oral health behaviours that help to prevent tooth decay and maintain oral health
Promoting oral health behaviours in deprived communities may therefore help to alleviate oral health inequalities.

In many ways, primary schools represent an ideal way in which to reach children in order to promote healthy behaviours. Primary schools are universal, encompassing a wide range of children and they are a place of education where health promotion can fit in well. However, by the time the child is at primary school, they may already be suffering with tooth decay, thus, targeting children while they are in nurseries has the advantage of catching them while family routines are perhaps still being established, so that any existing disease will be caught and managed and health promotion initiated to reduce the likelihood of further disease. Additionally, this strategy still has the advantage of access to a wide range of children. Furthermore, it is recommended that children at this age should be attending the dentist (Department of Health, 2009; NICE, 2004). The ages of three to five years represents a good opportunity to promote the three key oral health behaviours in children.

1.2.3 Oral health behaviours

Strikingly, while dental disease can be debilitating, having profound biological and psychosocial effects, it is for the most part completely preventable (Edelstein, 2006). In an otherwise healthy child, tooth decay can be controlled through the restriction of cariogenic foods and drinks (principally those with high sugar contents) and the maintenance of a daily tooth hygiene routine (Harris et al., 2004; Marinho et al., 2009; Walsh et al., 2010). Regular dental check-ups act as a platform through which professional, tailored advice can be given
to children and their families and can allow for the diagnosis and control of initial problems before they develop into secondary stages (Ramos-Gomez et al., 2010). The sections that follow consider the evidence for three behaviours (dental attendance, tooth brushing sugar snacking) with regard to the relationship they have with child oral health.

1.2.4 Access to dental health care for children

For children to attend dental appointments, they must be able to access dental services. Crucially, when considering young children, it is not they themselves who must access services, but their parents/caregivers who must access services on their behalf.

Just over 70% of children in England were seen by an NHS dentist over the two year period June 2010 - June 2012 (Public Health England, 2012b). While this figure cannot account for children seen by dentists working outside the NHS, it also may not accurately indicate asymptomatic attendance, that is to say regular routine attendance. Official data in England does not currently record a patient’s reason for attending the dentist; therefore it is very difficult to truly understand the rate of regular attendance (Gibson, 2003). This figure is at best an indication of regular dental attendance among children in England but at the very least shows that not all children are in receipt of routine dental care.

The recent equity audit carried out by NHS Salford (unpublished internal report, 2010) reported that 67.04% of 0-19 year olds have been accessing regular dental treatment (this figure is lower than the national average of 70.70% (Public Health England, 2012b)), however, access rates are disproportionally skewed mirroring the social inequality across the
city with a significant difference of 45.89% lying between the two extreme quintiles in the three to five year olds (NHS Salford, 2010).

Dental care is free for all children in England; presumably this removes a large potential barrier to care, particularly for lower SES families. However, truly providing access to care for children can be more complicated. Not only must the service be available for use, people must want to use it (Steele, 2009). The service must be perceived as of sufficient quality and delivered in such a way as to meet the needs of its patients.

That said there has been concern around the availability of dental services in England in recent years, a topic which has been much publicised in the national media. This media coverage followed a change to the dental contracts which affected the way in which dentists were paid for their work (Milsom et al., 2008). Media attention focused on fears that many dentists would leave the NHS for private sector work and access would become limited. Headlines at the time read:

“2000 dentists quit NHS rather than sign new contracts” (cited in Gaber, 2007, p. 244)
And
“3 million patients left without NHS dentists” (cited in Gaber, 2007, p. 244)

Dominant discourse and some reports have continued to carry on the idea that accessing NHS dental care in England is difficult (Nuttall, Freeman, Beavan, & Hill, 2011). This may be exacerbated by public uncertainty of how to go about finding an NHS dentist, rather than an insufficient number of available dental places (Steele, 2009).

In addition to the perceived lack of available service, other factors may affect individual behaviours with regard to accessing dental care. Access to dental care, like access to health
care services more generally is not a simple concept to delineate. Traditional understandings emphasise structural factors that are often service based (Guay, 2004). These are clearly an important part of the picture but are not the whole story. Rogers and colleagues (1999) define optimum access to health care as “the right service at the right time in the right place” (p. 866). Chapman and colleagues (2004) comment that this definition recognises that access to care is not merely dictated by the existence of a service, rather access is a concept made up of a variety of complicated issues. “Equal access for equal need requires conditions whereby those with equal needs have equal opportunities to access health care” (Oliver & Mossialos, 2004, p. 655). However, even with such opportunities in place, families may still not seek care (Kelly, Binkley, Neace, & Gale, 2005). Psychosocial factors, such as illness perception may inhibit patients’ access (Guay, 2004) almost entirely independently of service provision. These types of barriers cannot be solved merely by extending existing services.

Access can be considered to have two distinct facets – physical and psychosocial. Firstly, physical access for patients in terms of the availability of service provision which could be limited by a lack or perceived lack of NHS dentists or difficulties associated with paying for treatment or costs associated with travelling to surgery locations. This is directed by Service availability, measured by the extent to which a patient can obtain care when it is wanted or needed. Secondly, psychosocial access is a more complex issue characterised by a variety of barriers to care which may include an unwillingness or reluctance to attend dental appointments for a variety of reasons such as dental phobia, poor perception of need, apathy and low self-worth. An individual may be affected by one single barrier or by a combination. Such effects often depend on individual circumstances and are therefore
difficult to predict on a general level. Measuring the extent to which access is negotiated by these sorts of barriers can be very difficult. However in consideration of the correlation between poor levels of dental health and SES deprivation, it can be postulated that the existing barriers have a greater impact on populations falling within the lower SES categories. Barriers and facilitators to dental care will be covered in further detail in Chapter 2.

It has been considered that public health services should not only be expected to provide appropriate care for patients but that they should also be actively advising the public about the best ways and means to access health care (Hamer, 2004; Rogers et al., 1999). This would not only represent a system that effectively leads its patients through the health care process but one which may potentially work more efficiently, having the ability to plan for influxes of patients that it should, in theory, be more aware of. Social marketing is one method by which health services could improve communications with patients (Gordon, McDermott, Stead, & Angus, 2006). Although communications would remain dominantly one-way, the research aspect of social marketing allows for input from the public and potential target audiences (Grier & Bryant, 2005).

1.2.5 Dental attendance and child oral health

As stated, accessing dental care relates to both the availability of services and individuals’ behaviours with regards to using the services. Dental attendance is a health seeking behaviour that constitutes making an appointment (in the case of asymptomatic attendance) and visiting the dental practice. While there is no strong evidence to suggest that
asymptomatic dental attendance leads to better dental health for children, there is an abundance of data suggesting an association (Gibson, 2003; Lader et al., 2003; Lopez & Baelum, 2007; Nicolau, Marcenes, Bartley, & Sheiham, 2003; Nuttall & Harker, 2004; Nuttall et al., 2006; Watt & Sheiham, 1999). However, this association is nested in the opportunity to access preventative advice while visiting the dentist.

A systematic review of risk factors for child tooth decay by Harris and colleagues (2004) identified only one paper by Holt et al. (1996), which found the regularity of children’s dental attendance was significantly associated with tooth decay. This was a cross sectional study, assessed to be of moderate quality by Harris and colleagues (2004) and can be seen in Table 1.1. It was carried out with an ethnically mixed group of pre-school children (n=406) living in London in the early 1990s. A case control study by Al Ghanim et al. (1998), also described in Table 1.1, and judged to be of moderate quality in the review by Harris and colleagues (2004), found that a child’s age at their first dental visit was a significant risk factor for tooth decay development; the younger the child’s age at their first visit, the greater their chance of remaining free of tooth decay. This study was carried out with 446 pre-school aged children in Saudi-Arabia. Due to the cultural context, this study may have limited applicability to UK populations.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Study design and location</th>
<th>Participants</th>
<th>Risk factors found to be significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holt et al. 1996</td>
<td>Cross sectional (n=406); UK</td>
<td>3 years</td>
<td>Irregular dental attendance; use of sweetened comforter; ethnicity</td>
</tr>
<tr>
<td>Al Ghanim et al. 1998</td>
<td>Case control (n=446); Saudi-Arabia</td>
<td>3-5 years</td>
<td>Age at first dental visit; consumption of sweetened milk in a bottle; frequency of soft drink consumption and frequency of drink consumption</td>
</tr>
</tbody>
</table>
The review carried out by Harris and colleagues (2004) sought risk factors that predicted tooth decay as defined by children who remained decay free versus children who developed decay. Based on the review, dental hygiene and control of sugar consumption are the most significant predictors of whether young children will remain free of decay or not. Keeping children free of tooth decay is certainly preferable but it remains important that those children who develop disease are able to access care to arrest it and prevent reoccurrence. Dental attendance may be an important factor in terms of the progress and severity of dental disease and management of tooth decay. This is because the dentist can halt decay, repair teeth and provide tailored advice to the child’s parents around how to avoid further disease (Pierce et al., 2002; Ramos-Gomez et al., 2010).

Analysis of national UK child dental health surveys from the 1980s and 1990s has shown that dental attendance is independently associated with the number of decayed, missing or filled teeth in children (Watt & Sheiham, 1999). It must however be remembered that this is a relationship of association and no causal claims can be made based on the current evidence. Further, in a large survey (n=9,203) of Chilean adolescents, Lopez and Baelum (2007) demonstrated an independent association between poor dental health and dental attendance. Another survey conducted in Brazil found a similar significant association (Nicolau et al., 2003).

In terms of the UK, ‘Children’s Dental Health in the UK’ is a national survey which has been carried out at 10 year intervals since 1973. The most recent report available at the time of writing (Lader et al., 2003) showed a clear association between dental attendance and oral health outcomes. In children aged 8, 12 and 15 years, regular attendees (six month intervals) were less likely to have reported oral health problems in the previous year. The association.
was less pronounced for the five year old population in which occasional attendees rather
than regular ones were less likely to have reported problems than symptomatic attendees.
The survey revealed that of the symptomatic attendees, 23% of five year olds, 31% of eight
year olds, 38% of 12 year olds and 29% of 15 year olds experienced dental pain over the
previous year (Nuttall & Harker, 2004).

A more recent cross sectional study of three and five year old children (n=1,057) in Belgium
(Leroy et al., 2013) reported some interesting findings. Of the five year olds surveyed,
regular attendees had a higher dmft score than those who had never attended. While this
may indicate that dental attendance does not improve child dental health, this is not certain.
The regularly attending five year olds scored high due to the incidence of filled teeth. This
could mean that parents were able to gauge the need for treatment upon observing a
decayed tooth or it could mean that these children had received unnecessary treatment. A
larger U.S. survey, ‘the National Survey of Children’s Health’, studied a representative
sample of children (n=86,764) aged up to 17 years and found that preventive dental services
were most likely to be received by children with the best dental health (Bell, Huebner, &
Reed, 2012).

Looking at the evidence for child dental attendance, Gibson (2003) reports on the national
Analysis conducted on this data by Nadanovski and Sheiham (1994) revealed that access to
dental services accounted for 28%, 43% and 34% of variance of decay respectively. In
contrast, brushing with fluoride toothpaste accounted for 53%, 62% and 57% respectively.
Dental attendance therefore would appear to be less efficacious than topical fluoride
application for preventing decay. This finding is in agreement with the review by Harris and
colleagues (2004) and the international study by Adair and colleagues (2004) showing that
dental hygiene is a significant risk factor for tooth decay in children.

Although Nadanovski and Sheiham (1994) found that dental attendance accounted for some
variance in oral health status, a systematic review conducted by Davenport and colleagues
(2003), found that there was little difference in oral health outcomes based on patterns of
dental attendance. This review included 25 studies looking at tooth decay outcomes,
however the quality of the evidence is questionable. The included studies were cross
sectional in nature and found to be subject to “selection bias and confounding” (Davenport
et al., 2003, p. 94). Furthermore, only seven of the included studies were carried out with
children on deciduous teeth. These seven studies were conducted in Australia, Finland and
Norway; none were conducted in the UK. Based on this review, there is inconsistent
evidence to recommend any particular recall frequency for children with regard to their
optimum oral health. The applicability of this finding for UK children may also be questioned
considering that none of the data on deciduous teeth comes from UK populations. While the
average level of decay differs between Australia, Finland, Norway and the UK (OECD, 2009),
there are some cultural similarities including oral health risk factors such as sugar
consumption which are comparable (Helgi Library, 2009) which may suggest that oral health
risk factors for children may be comparable.

A Cochrane review looking at the length of dental recall periods (Riley, Worthington,
Clarkson, & Beirne, 2013) found only one relevant RCT (Wang, Marstrander, Holst, Ovrum, &
Dahle, 1992) conducted in Norway with children aged three, 15 and 18 years. No statistically
significant difference could be found in terms of tooth decay between those attending at
either 12 or 24 month periods over the two year study although a trend towards lower
decayed, missing or filled teeth was observed for those visiting more frequently. The study was considered to be of low methodological quality and caution advised interpreting the results. Despite substantial debate in the literature and changes in health policy, there is currently insufficient evidence to suggest an optimal recall period for dental attendance. It may be the case that an optimum recall period applicable across the entire population does not exist, instead some sections of the population may require more frequent dental assessments than others.

Another systematic review authored by Patel, Bay, & Glick (2010) further highlights the lack of evidence for dental recall periods but points toward the idea that a single recall period for all (only altered by age) may not be appropriate. Instead, a risk-based tailored approach may be most beneficial. Further research is however needed to underpin this with empirical evidence. A National Institute of Health Research (NIHR) and Health Technology Assessment (HTA) funded three arm RCT into optimum dental recall period (six month recall; risk assessed; 24 month) is currently in progress and results are expected by mid-2018 (Clarkson & Pitts, 2013). Presently the National Institute for Health and Care Excellence (NICE) are considering the need to undertake a subsequent review on the issue of dental recall to update the current guidance (NICE, 2004) which advises 12 months for children and 24 months for adults.

With regard to non-clinical outcomes of regular dental attendance for children, data from the 2003 national UK children’s dental health survey (Nuttall et al., 2006) showed that children with more regular patterns of dental attendance were less likely to experience pain due to dental disease. For adolescents in this survey, symptomatic attendees experienced
problems that impacted upon their social functioning and younger children felt impacts on their health and life in general.

While there is no agreement in the literature in terms of optimum length for dental recall and limited evidence for basing recommendations on, the direction of research would suggest that tailored recall periods might be most beneficial. Although debate continues on the particulars of dental attendance, the intervention in itself is not in question in terms of its health benefits. While it is unlikely that regular dental attendance can prevent tooth decay in children altogether, attendance is important for halting disease, repairing teeth (Deep, 2000), monitoring and for disseminating tailored up to date advice and information from a trusted source (Tickle, Milsom, King, & Blinkhorn, 2003).

1.2.6 Interventions to improve child dental attendance

In terms of interventions to improve access, Chapman et al. (2004) suggest there are four ways: increase workforce numbers; maximise the capacity of the existing workforce through skill mix; introduce new services in underserved areas; improve specific areas of access such as waiting times. These four areas are all based around structural change and can be summed up by a single term, ‘expansion of service’. This however does not address all facets of access. This is because not only must the services exist for people to use them, people must also want to and be motivated to use them and overcome any barriers that may be in their way. The psychosocial factors that potential patients face will be expanded upon in Chapter 2.
Looking now to ways in which dental attendance behaviours have been promoted, dental screening in schools in the UK was perhaps the longest running intervention. Despite its long history (almost 100 years), there was little research around dental screening in schools as to its efficacy in terms of improving attendance and dental health at the population level. It was thought that if a parent received a letter home from school informing them that their child had a dental need, that this would prompt a visit to the dentist. A large cluster RCT was carried out to test school screening for its efficacy in improving child dental attendance in recent years (Milsom et al., 2006). The study tested four groups; the first arm (n=4087/ 43 schools) consisted of a proposed new model based on the expert opinion of clinicians. An agreed set of conditions (generally the most severe including advanced decay and sepsis) were determined, based upon what was most likely to result in action on the part of the parent, i.e. taking their child to the dentist, and advice for referrals was written accordingly. The second arm (n=4418 / 42 schools) was the traditional model in which a referral letter was sent home to the child’s parent if the screening dentists judged there was a need. Children in the third arm (n=4367 / 42 schools) were not screened, instead their parents received leaflets which detailed how and encouraged parents to check their children’s mouths themselves and take their child to the dentist if they identified any concerns. The final arm (n=4226 / 42 schools) served as a control and participants received no intervention during the course of the study.

Outcome measures were dental attendance and tooth decay. The study showed there to be no significant difference between the groups based on these outcomes. As a direct result of the evidence gathered by this study, school-screening programmes ceased in the UK. In spite of the fact that four months is a short period of time in which to measure tooth decay, this
study was able to demonstrate that school screening was ineffective for increasing dental attendance. Reflecting on this however, it is perhaps not surprising that school screening was an ineffective intervention for this outcome. If the components of the intervention are broken down, it can be seen that the only aspect which the parent receives, is the letter detailing the outcome of their child’s screening exam. This is intended to improve the parent’s perception of the dental need of their child. Therefore, it can be said that the only psychosocial construct which school screening works upon is need perception. If it were the case that a parent experienced no other barriers to dental care for their child, other than the fact that they were unaware that their child required dental care, then receiving a referral letter home would likely have the desired effect. Theoretical models of social cognition accept perception of need as one of a number of important constructs, for example in the HAPA (Schwarzer, 1992, 2008). These theories and their application will be further expanded upon in section 2.13 of this Chapter.

Looking toward the U.S., Reiss and Bailey (1982) carried out an RCT in which they tested a behavioural intervention (aimed at parents, n=125) for improving rates of dental attendance among children. The children did not suffer from poor dental health or dental anxiety and all had a dental exam at baseline. The trial had four treatment groups (multiple contact; problem solving; incentive; incentive & problem solving). Parents in the ‘multiple contact’ group received a postal prompt and two phone calls as reminders to attend the dentist with their child. The ‘problem solving’ intervention was characterised by a 15 minute meeting with a social worker aide. The meeting was standardised by working through a checklist of common potential barriers to attendance and the parent was encouraged to attend the dentist with their child. In the ‘incentive group’, parents received a $5 coupon for the cash
equivalent or a voucher redeemable upon the child’s first visit to the dentist. The control
group received standard care.

Analysis revealed that the incentive group had the highest rate of first appointments being
made (76%) and the majority (55%) completed treatment. This was significantly higher than
for the control group. Findings for the ‘multiple contact’ group were promising and replicate
an earlier study (Reiss, Piotrowski, & Bailey, 1976). Interestingly, the ‘problem solving &
incentive’ group had a lower attendance rate than the ‘incentive’ group alone. The ‘problem
solving’ group was not reported to be underpinned by theory, in fact the principle driving
factor in its design appeared that it was to be “brief, simple, and easily replicated” (p354). A
single 15 minute session is an extremely brief behavioural intervention. This study may not
provide an accurate comparison of a behavioural intervention for improving rates of
attendance in children. Furthermore, providing financial incentives for attendance is not a
long-term solution.

The interventions described here have attempted to improve attendance behaviour without
the use of behavioural theory or empirical evidence. Without understanding the barriers to
and facilitators for parents around taking their child to visit the dentist, it is difficult to
accurately design an effective intervention. More work is needed to establish what these
barriers and facilitators are and how best to target them.

1.2.7 Dental hygiene and child oral health

Having considered child dental attendance as a behaviour that supports oral health, this
section will look at how tooth brushing can help to prevent tooth decay. Evidence indicates
that parents who start twice daily brushing of their child’s teeth before 12 months, double the chances that their child will remain free of tooth decay, irrespective of socioeconomic disadvantage (Nunn, 2006). Tooth brushing allows for the manual removal of dental plaque. Dental plaque is a collection of bacteria, the composition of which is thought to be affected by sugar consumption (Nobre dos Santos, Melo dos Santos, Francisco, & Cury, 2002). Plaque is thought to play a significant role in the development of tooth decay, however the causal pathway is not clear (Robinson et al., 2005) and it is difficult to distinguish the effects of tooth brushing alone from the effects of fluoride toothpaste which is often applied through the brushing process.

The efficacy of fluoride toothpaste has been demonstrated in the literature and summarised in a Cochrane review that included 74 studies of more than 42,300 children (Marinho et al., 2009). The included studies were a mix of supervised and unsupervised tooth brushing programmes, with most using a paste of 1000 parts per million (ppm). The pooled results from these studies provided clear evidence for the efficacy of fluoride toothpaste for preventing tooth decay in children showing, on average a 24% reduction in disease development. However, only one of the studies reported on tooth decay in primary teeth. This was a large study of 2,008 children, which showed a significant disease reduction of 37%. The evidence indicates that fluoride toothpaste applied via tooth brushing is effective for the prevention of tooth decay in both primary and permanent teeth.

A further Cochrane review examined the tooth decay preventive effects of fluoride toothpastes of different concentrations (Walsh et al., 2010). Based on the 75 included studies a clear dose response relationship between fluoride concentration and tooth decay prevention could be observed. Toothpastes containing more than 1000ppm of fluoride were
found to be effective at preventing tooth decay and this preventive effect increased with the concentration of fluoride. Pastes containing 440-550ppm showed no significant preventive improvement from control. The current recommendation for the fluoride concentration of toothpastes is around 1500ppm in the UK and 1000ppm internationally (Walsh et al., 2010) and these concentrations represent those of the toothpastes that are widely available.

Tooth brushing using fluoride toothpaste of adequate concentration (>1000ppm) is an evidenced based intervention for the prevention of tooth decay in children. The rationale for promoting this behaviour in children is clear.

### 1.2.8 Interventions to increase child tooth brushing

Tooth brushing however, is a complicated set of behaviours that can be difficult to set in place and to maintain especially in young children. Barriers to tooth brushing may be around the availability of toothpaste and brushes (Curnow et al., 2002), parents’ beliefs about tooth brushing (Pine et al., 2000), brushing skills and confidence (Adair et al., 2004; Huebner & Riedy, 2010) or dealing with difficult child behaviours (Amin & Harrison, 2009; Huebner & Riedy, 2010). While some interventions have targeted the home (Davies, Duxbury, Boothman, Davies, & Blinkhorn, 2005), others have introduced brushing at school (Curnow et al., 2002; Jackson et al., 2005; Pine et al., 2000) in order to increase compliance and reach. Interventions tend to implement tooth brushing programmes (Jackson et al., 2005; Macpherson, Anopa, Conway, & McMahon, 2013) with or without an educational component (Davies et al., 2005).
A RCT conducted in schools in Scotland in the late 1990s describes an intervention with two components. An in-school tooth brushing programme which used fluoride paste (1000ppm) and a school and home incentives scheme that encouraged twice daily brushing (Pine et al., 2000). While the evidence indicates that once daily brushing is likely sufficient, twice daily brushing is recommended to account for common ineffective brushing techniques (Attin & Horneck, 2005). The findings of the school-based study confirmed the benefits of twice-daily brushing, showing up to a 50% decay reduction in newly erupted teeth. Parents’ beliefs about tooth brushing, measured using constructs of the health belief model (Rosenstock, 1966), appeared to mediate child brushing behaviours. The incentive scheme aided by brushing charts was thought to be helpful by parents. This intervention was found to be successful in improving child oral health among those at high risk of disease (Curnow et al., 2002). Studies of similar school-based tooth brushing programmes have tended to find an improvement in child dental health following programme implementation (Al-Jundi, Hammad, & Alwaeli, 2006; Jackson et al., 2005; Macpherson et al., 2013).

However, despite the overall success of this school-based tooth brushing programme, no reduction in decay of the primary teeth was found. The authors note that due to the high levels of decay in the primary teeth of the children at the start of the study, it would have been difficult to improve the dental health of their primary teeth at all (Curnow et al., 2002). To improve health in primary teeth then, interventions should be targeted at children younger than primary school age.

Ways to target younger children may be through nurseries or through contact with the health service. A study conducted in North West England for example, targeted children aged between eight and 32 months through dental and medical practices (Davies et al.,
Participating parents were provided with toothbrushes, toothpaste and training cups as well as advice when attending practice and received further brushes and paste through the post. The intervention proved successful with a significant improvement in the dental health of children in the intervention cluster of this study (6.1% difference in prevalence). This study shows that providing parents with toothpaste and toothbrushes can help to improve their oral health behaviours for their children. However, little is known about whether the behaviours will be maintained once the intervention ended and the paste and brushes are no longer sent out.

Both the study by Pine et al. (2000) and an international study by Adair et al. (2004) found that psychosocial factors were important in predicting tooth brushing behaviours for children. Parents’ beliefs and attitudes towards these behaviours as well as parental confidence in their ability (or self-efficacy) to carry out and maintain brushing and healthy eating routines and habits (Adair et al., 2004) are significant. Additionally the parent must also be able to balance potentially resistant behaviours from the child and manage their time appropriately to fit this practice into daily routines (Pine et al., 2000).

1.2.9 Diet and child oral health

In addition to tooth brushing, decay may be prevented by a controlled diet. Diets high in sugar have been linked to the development of tooth decay in children (Zero et al., 2008). Sugars, when ingested either as solid food or drink are broken down by the oral bacteria present in the mouth (Marshall, 2013; Touger-Decker & van Loveren, 2003). This fermentation process leads to the production of acids that diffuse into the teeth and
encourage mineral to diffuse out resulting in decay (Featherstone, 2004). Early evidence linking dietary sugars and dental decay came from the Vipeholme Study (Gustafsson, 1954). This study was made up of a series of smaller studies conducted in Sweden in the 1940s and 50s in Vipeholme Hospital, a mental health institution at that time. Although the ethics of the study, by today’s standards, are certainly questionable (Ahlberg, 1981; Krasse, 2001), the highly controlled environment in which this study was conducted strengthened the validity of the findings (Krasse, 2001). Patients who received a diet high in sugar developed significantly more tooth decay than patients who received a modest amount of sugar in their diet (Gustafsson, 1954).

Since fluoride became widespread through the use of toothpaste, it was hypothesised that the findings of the Vipeholme study may be less applicable to modern populations (Duggal, Toumba, Amaechi, Kowash, & Higham, 2001). This would appear to be supported by epidemiological data which shows a substantial reduction of tooth decay since the 1970s (Touger-Decker et al., 2003).

A systematic review conducted by Burt and Pai (2001) looked at 36 studies published between the years 1980 and 2000 and found there to be a fairly consistent association of tooth decay and higher sugar intakes. Of the 36 identified studies, two indicated a strong association of sugar and tooth decay, 16 a moderate association and eight, a weak or no association. The authors note that the level of tooth decay attributable to sugar rich diets, although significant, was less pronounced compared to the Vipeholme study. This appears to have, in part, challenged the applicability of the Vipeholme study among populations widely exposed to fluoride. However based on the studies included in the review of Burt et al, the
general direction of the association can be considered to indicate that sugar consumption and tooth decay remain linked.

However, neither of these studies specifically looked at children. The systematic review conducted by Harris and colleagues (2004) investigated risk factors associated with the development of tooth decay in children aged up to six years and found a significant association between dietary sugar intake and the development of tooth decay in young children. It was however found that in studies conducted in developed countries, compared to other factors such as measures of SES and oral hygiene habits, sugar consumption appeared to be less important. Harris and colleagues report that a number of the included studies hypothesised that this could be explained by the widespread use of sugar across populations in developed countries, the lack of variation in sugar consumption making it more difficult to isolate as a factor.

While Harris and colleagues found that sugar consumption could be related to dental decay determined by either amount of sugar or the time of day it was consumed or frequency of consumption, a more recent review found there to be no reliable relationship between the amount of sugar consumed and tooth decay, however a significant relationship was found for frequency of sugar consumption. Anderson et al. (2009) compared the literature of three time periods (1856-1940; 1940-1966; 1966-2007). The subtle differences in the findings of these systematic reviews reflect the variation in inclusion criteria and the quality assessments used. Interestingly however, many of these studies were carried out with children and of the 19 identified papers; nine were with young children, ranging from one to five years. This demonstrates the relevance of these findings to the current population of study in this thesis.
More recently, a large survey of children was carried out in Australia (Armfield, Spencer, Roberts-Thomson, & Plastow, 2013). Self-report questionnaire responses were matched with the clinical examination data of 16,857 children. Controlling for SES, tooth brushing behaviours and exposure to water fluoridation, the analysis showed evidence of a dose-response relationship between consumption of sugar based soft drinks and tooth decay. Children aged 5 to ten years reportedly drinking one or two sweetened drinks each day had a higher dmft score (0.34 higher) than children who were reported not to drink any and children drinking three or more sweetened drinks had a higher dmft score again (0.46 higher than those children who did not drink sweetened drinks).

However it was also true that children deemed to be of lower SES had higher sweetened drink consumption patterns than higher SES children, meaning that these two factors were found to be co-related. Water fluoridation seemed to be a protective factor, with less decay present in children living in water fluoridated areas drinking equivalent quantities of sweetened drinks as children in non-fluoridated areas. This supports the conclusions of Burt et al.’s review (2000) that exposure to fluoride mediates the impact of sugar on tooth decay.

A survey of Children aged between one and five years (n=1,260) recruited from clinical sites in Boston, U.S. found similar evidence of a dose response relationship between sugars and decay (Johansson, Holgerson, Kressin, Nunn, & Tanner, 2010). Again, snacking behaviours reported by parents correlated with observed levels of tooth decay whereby those children having more snacks had greater amounts of dental decay than children reported to be having fewer snacks. However it is important to note that this study not only looked at sugar from sweet food but from other fermentable carbohydrates including potato crisps, crackers
and fruit and the dose response relationship included a wider range of food than many other studies in this area.

Further evidence for a dose response relationship can be found in the findings of a survey conducted in the U.S. (Whitney Evans et al., 2013). Children aged two to six years (n=454) were recruited from clinical settings and information pertaining to the quantity and frequency of sweetened drink consumption was collected using 24-hour recall and a standardised instrument. The findings indicated that for each extra sweetened drink consumed, there was an associated increase in the risk of severe tooth decay. Based on the 24-hour recall the risk increased by 14%, using the standardised instrument the risk was 139%. It is possible that this difference is due to the unreliability of self-report responses. However, the fact that using either of these measures, an association could be found indicates that for the study participants, this association is a true one. Indeed, it could be hypothesised, based on this study, that other studies using non-standardised self-report instruments to collect dietary information consistently underestimate the true amount or frequency of sugar consumed by children.

Based on current evidence it remains difficult to understand the precise diet behaviours which most contribute to dental decay. There appears to be more consistent evidence, looking at the review of Anderson and colleagues (Anderson et al., 2009), that it is the frequency with which sugary foods and drinks are consumed which is most significantly associated with decay. However, it is likely that frequency and amount will be difficult to separate as variables considering that large amounts could be consumed frequently and depending on the frequency, even small amounts could add up to large ones.
Further, there are a number of substantial difficulties in researching the nature of the relationship between sugar and tooth decay. Dietary information for example is almost always collected using self-report measures, a potential source of bias (van de Mortel, 2008). In particular, Whitney-Evans’s study (2013) highlights methodological issues involved in research of this nature. As noted by Anderson et al. (2009), sugar is rarely consumed in isolation and usually as part of another product. It is almost impossible to tease apart the combined effects of consuming sugar with other simple carbohydrates such as white flour based products (Anderson et al., 2009).

While the exact nature of the relationship between sugar and decay remains unclear, what can be said is that sugar-laden diets have been shown to have a consistent association with tooth decay. Amount consumed, frequency of consumption and time of day consumed along with type of sugar are variables that may affect this relationship.

### 1.2.10 Child diet interventions

As discussed previously, sugar is present in a wide variety of foods and drinks and has implications for both oral health and general health. Interventions to reduce sugar consumption in children therefore focus on a variety of areas, for example reduction of snacking, reduction of sweetened drinks, reduction of frequency of consumption, uptake of healthy foods and drinks as a substitute and also to improve nutrition. These interventions span oral health and child nutrition and also vary in terms of who is targeted and how, some targeting children and others targeting caregivers. Interventions may be at the
environmental level, for example changing school policy so that sugary foods provided for children or at the individual level, for example, education.

Environmental level interventions to change children’s eating behaviours tend to take place in schools. Freeman and Oliver (2009) tested a school break-time policy to reduce the availability of sugar laden food and drinks to five year old children in Northern Ireland. Milk, water and fresh fruit were provided at break-times and no other snacks were made available to the children either through tuck shops or in classrooms. The policy was evaluated over a two year period using a cluster controlled design in which schools were matched by SES. The policy did not however prove to be successful. Collection of the food wrappers thrown away by children showed that they consumed comparable amounts of sugary snacks irrespective of whether they had attended an intervention or control school. Moreover, this policy could not however have any impact on the foods and drinks they received outside of school. Indeed, it was the variable representing sugar snacking outside of school which predicted the tooth decay.

While environmental interventions have the advantage of removing food and drink harmful to teeth, thereby removing choice, they cannot protect for effects outside the environment in which they are in place. In this case, the school-based intervention did not extend into the home and because of this limitation the study was not successful in its aim (Freeman & Oliver, 2009). This challenge has been recognised by the Centres for Disease Control and Prevention (CDC) in the U.S. and communicated in their guidance around reducing the consumption of sugar-sweetened beverages (2010).

In attempting to reduce sugar consumption in the home, it would seem sensible to target either the children individually, their parents or both. This has tended to be done through
educational interventions. A systematic review commissioned by the Health Education Authority considered interventions targeted at pre-school children to encourage healthy eating (Tedstone, Aviles, Shetty, & Davies, 1998). The specific health benefit targeted in this review was general child nutrition, including child dental health. The review excluded all studies with a specific focus on a minority population seeking only to review more general programmes targeted at the general population of pre-schoolers. Although 28 studies met inclusion criteria, only 14 were included in the final review, 16 having been excluded due to poor quality study designs. All included interventions were described as educational programmes. Eight of the studies educated participants through knowledge giving either delivered by parents, teachers or through media such as computers or videos. Six of these studies used knowledge as the main outcome measure and all found some increase or improvement in the children’s nutrition related knowledge. Of the studies collecting behavioural outcome data, no change was found. Half of the remaining eight studies targeted children and half targeted parents or carers. Those targeting parents or carers used a mix of information, advice and counselling to change behaviours with mixed results. Those behavioural or attitudinal studies targeting children used different techniques including instruction, incentive and breaking down the barriers associated with trying new foods. One of these studies communicated perceived benefit and threat through children’s storybooks. This study was conducted in the U.S. by Lawatsch (1990).

The study by Lawatsch (1990) is interesting in that it used a novel, child friendly approach to communicate, not only, health messages but also a specific technique aimed at affecting behaviour, namely ‘fear appeal’. Fear appeal involves the linking of unhealthy behaviours with negative, sometimes frightening consequences. Generally, fear appeal does not have
positive behavioural consequences when used alone but can be effective when used in conjunction with techniques to boost task specific self-efficacy (Cho & Salmon, 2006; Witte & Allen, 2000).

In Lawatsch’s (1990) study, well-known children’s storybooks (Little red riding hood; Goldilocks; the three little pigs) were re-written, once to include messages around the threats associated with unhealthy eating and again to include messages around the benefits of healthy eating. The first test group (test group 1) were exposed to the version of the book in which the health messages were positively framed and the second test group (test group 2) to the book that contained negatively framed messages. The books were read to the children in the classroom. The study thus comprised two test groups and a control group who were not exposed to the storybooks. Outcome was measured using knowledge and attitude scales as well as a behavioural ‘food choice’ test. In terms of knowledge and attitudes, both test groups scored significantly higher than the control groups. There was no difference between the test groups in terms of attitude however the benefit appeal test group scored significantly higher that the threat appeal group for knowledge. Looking at the behavioural measure used, which was the children’s choice of snack from two different trays (the trays differed only in that they contained different varieties of healthy snacks), for the first tray, the benefit appeal test group scored significantly higher than both the threat appeal and control groups. For the second tray, both test groups scored significantly higher than control, with no difference between them.

It is clear to see that both the threat appeal and benefit appeal appeared to have a measurable effect in terms of knowledge, attitudes and behaviours. The improvement in knowledge in both groups can be compared to the educational interventions included in
Tedstones’s (1998) review which also showed similar findings. However, both the knowledge and attitude scales were presented to the children in a test type format, taking place in the classroom, questions being read aloud by the researcher and the children marking down their answers. Setting this data collection up as a test may have encouraged the children to give what they perceived to be the correct answers rather than their true answer, biasing the results. It is therefore possible that the attitude measures may in fact reflect knowledge increase. The difference in knowledge increase between the two test groups may indicate that positively framed messages are more successful at imparting health information that negatively framed messages. Using a control group that received standard nutrition education rather than nothing may have improved the design of this study. A more recent study also used storybooks as a format through which to communicate health messages (Byrne & Nitzke, 2002). This study however, was not related to oral health or even to general healthy eating, being quite specific about the food focused on. Stories were designed with either positive or negative messages about kohlrabi. Results tended to favour positive messages.

Both studies (Byrne & Nitzke, 2002; Lawatsch, 1990) however focused on improving the child’s acceptance of new healthy foods and not on the attitudes or behaviours of their parents or carers who would be likely to control what food and drink the children have to choose from. A recent paper explored the use of storybooks to reach the mothers as well as children to influence food choices (Bellows, Spaeth, Lee, & Anderson, 2013). Following a series of focus groups and interviews with mothers, a storybook was designed containing messages about healthy eating; unfortunately there is no evaluation of the efficacy of this book at present. However, the authors were able to conclude that storybooks were a
practical way in which to reach mothers and young children in order to deliver information about nutrition.

No interventions using storybook delivery have been found for improving child oral health as such. Few oral health interventions target diet alone, instead including oral hygiene alongside (e.g. Davies, Duxbury, Boothman, & Davies, 2007; Peng, Petersen, Bian, Tai, & Jiang, 2004; Vanobbergen, Declerek, Mwalili, & Martens, 2004; Whittle, Whitehead, & Bishop, 2008). Of the educational interventions, a high proportion aim to increase knowledge alone and measure the success of the intervention by measuring change in knowledge. While knowledge improvement is certainly a worthy pursuit in its own right, in relation to oral health improvement, increases in knowledge does not necessarily lead to lasting behavioural change and objective health gain (Adair, Pine, & Burnside, 2013; Brown, 1994; Cooper et al., 2013; Kay & Locker, 1996, 1998).

An international study examined the attitudes and beliefs of parents as well as the dental health of their children (Adair et al., 2004; Pine et al., 2004). It was found that parental intention to control the sugar snacking behaviour of their child as well as parental self-efficacy (PSE) for this task were significant predictors of child oral health. Education-based interventions to reduce child sugar consumption, either in amount or frequency, must therefore target mechanisms of behavioural change rather than knowledge alone (Adair et al., 2013; Cooper et al., 2013).

Interventions to improve child nutrition have used stories to convey health messages (Bellows et al., 2013; Byrne & Nitzke, 2002; Lawatsch, 1990), some of which have adapted stories to include elements aimed at attitude rather than knowledge improvement alone (Lawatsch, 1990). Using a child friendly medium, such as a story, through which to convey
not only health messages but also to target attitude could offer a novel idea for the development of an intervention aimed at child oral health improvement.

1.2.11 Oral health promotion targeting multiple health behaviours

While some of the interventions already discussed have tended to focus on single oral health behaviours, the evidence linking the three behaviours (dental attendance, tooth brushing, sugar snacking) with dental health would indicate that interventions attempting to affect all three behaviours might be advantageous. The interventions to improve tooth brushing in children have shown some positive affects (Al-Jundi et al., 2006; Curnow et al., 2002; Jackson et al., 2005; Macpherson et al., 2013; Pine et al., 2000). However, diet and dental attendance behaviours are also important for optimum dental health in children. Interventions that have attempted to target multiple oral health behaviours often include an educational or health promotion component.

Health promotion has for a number of years attempted to improve dental health related behaviours and consequently childhood dental health outcomes. A systematic review (Kay & Locker, 1998), examined 164 experimental studies (including 36 RCTs and 80 controlled studies) testing oral health promotion for improvements in dental hygiene or dental health outcomes. This review found that oral health promotion generally resulted in improvements in knowledge but not in associated behaviours and dental health outcomes. A recent Cochrane review of primary school-based promotion programmes for the prevention of tooth decay (Cooper et al., 2013) has confirmed Kay and Locker’s findings. This review of
four RCTs found insufficient evidence to show that such programmes were able to impact upon children’s behaviour in the long term.

One of the RCTs included in Cooper et al.’s (2013) review (Worthington, Hill, Mooney, Hamilton, & Blinkhorn, 2001), measured children’s knowledge about dental hygiene, attendance and diet. This showed an increase across the course of the study, which was higher in the intervention group than the control. While plaque scores showed a significant decrease in the intervention group also, indicating improved oral hygiene, evaluation was limited to only four months and meant there was no evidence to support the efficacy of the intervention in the long term. Promotional programmes thus may deliver education effectively and improve knowledge around dental health prevention; they may even have behavioural impacts, in the short term at least.

A large international study (n=2822) utilised a theory based psychometric assessment measuring parents’ attitudes towards oral health related behaviours for their three to four year old children including dental hygiene, sugar snacking and dental attendance. Dental examination of the children was also carried out. Logistic regression showed that parents’ attitudes towards the behaviours themselves rather than attitudes towards prevention as well as PSE related to dental hygiene and sugar snacking were significant predictors of the development of tooth decay in children (Adair et al., 2004). This international study collected data from 17 countries and findings were consistent across ethnic groups.

This provides an explanation as to why education based promotion programmes result in limited impact. Education is not likely to affect knowledge which may work on attitudes towards prevention but not necessarily on attitudes towards the behaviours themselves, nor is it likely to have much impact on PSE for carrying out these behaviours (Adair et al., 2004).
Therefore to improve the effectiveness of health promotion for children’s oral health, these factors should be incorporated into future programmes. This calls for a theory based approach to health promotion that is delivered using techniques that can impact on oral health preventive behaviours.

1.2.12 Framework and theory for developing oral health promotion interventions

Frameworks and theories can be helpful in the development of health interventions. Theory in particular is thought to not only affect the efficacy of interventions but their potential usefulness for future research directions. Michie and colleagues (2008), have stated three major reasons for the use of theory in the design of interventions,

“First, interventions are likely to be more effective if they target causal determinants of behaviour and behaviour change; this requires understanding these causal determinants, i.e., theoretical mechanisms of change. Second, theory can be tested and developed by evaluations of interventions only if those interventions and evaluations are theoretically informed. Third, theory-based interventions facilitate an understanding of what works and thus a basis for developing better theory across different contexts, populations and behaviours” (p662)

Theory is therefore important for both the design and evaluation of interventions. The value of using frameworks for developing interventions, particularly complex interventions has been emphasised in recent years. The Medical Research Council (MRC) guidance on the development of complex interventions for health (MRC, 2008), recommends that interventions be systematically developed with attention paid to the existing evidence as well as relevant theory. This guidance stipulates a framework for the development and evaluation of interventions as shown in Figure 1.2.
Figure 1.2 MRC framework for the development of complex interventions.

Figure 1.2 demonstrates the MRC recommended process for the development and evaluation of complex interventions. The arrows represent the main interaction between each of the steps but do not necessarily dictate the only interaction between them (2008). This guidance updates earlier recommendations in which this flow diagram was represented as a stepped process (MRC, 2000). The updated flow diagram was intended to emphasise the iterative nature of intervention development and evaluation as well as to remove the notion in the previous model (MRC, 2000) that the steps needed to be completed in a pre-specified order. Instead the guidance offers a systematic yet adaptable guide to development and evaluation of complex interventions.

While this guidance provides an overview of process, when thinking about health promotion campaigns in particular, it can be helpful to break down the steps further in order to operationalise them. In this respect, social marketing is helpful as it borrows from traditional marketing methods and puts forward criteria for promotional interventions.
Social Marketing

Social marketing has played a dominant role in health promotion since the Department of Health advocated its use in Choosing Health (2004). As a result of this government white paper, the National Social Marketing Centre (www.thensmc.com) was set up to increase the use of social marketing. This national drive resulted in a surge of social marketing campaigns in the late 2000s (examples can be seen on the website of the National Social Marketing Centre).

Social marketing is simply an approach to health promotion. It is based on the concept that traditional (commercial) marketing can successfully sell products through advertising (thus having a behavioural outcome). Social marketing therefore attempts to adapt these practices to achieve a predefined social good by instilling a measurable behavioural change in the targeted population (Andreasen, 2002). The rationale for utilising ideas from the commercial sector lies simply in the reasoning that they have been so successful (Evans & McCormack, 2008). It logically follows that some of these strategies could be borrowed and developed to encourage behavioural change that works towards a social good (Holme, MacAskill, & Eadie, 2009).

Although not a theory in itself, social marketing is based on the concept of ‘exchange’ (Raluca Luca & Suggs, 2013). That is to say, in the same way that an individual parts with money in order to receive a product or service (an exchange), through social marketing an individual is encourage to adapt a behaviour in order to receive a health benefit. This concept originates in economic exchange theory which asserts that decisions are influenced by cost-benefit analysis and comparison of alternatives (Raluca Luca & Suggs, 2013).
While the concept of exchange may be the most straightforward comparison to be made between commercial and social marketing, social marketing consists of a framework of a number of criteria that define it. Andreasen (1995) determined there to be six key concepts which define and mark the process; 1) a strong customer orientation and focus, 2) a clear aim of achieving a specified behavioural change, 3) application of the concept of exchange, 4) audience segmentation, 5) a marketing mix and 6) application of the concept of competition.

In terms of the potential advantages of a social marketing approach to health promotion, it relies on voluntary compliance (Kotler, Roberto, & Lee, 2002), which appears to sit in contrast to more traditional forms of health promotion which have tended to be more directive in style and have in some cases worked to alienate individuals by portraying lifestyles that seem difficult to achieve or that have little relevance to the most in need populations (Grace, 1991; Nettleton & Bunton, 1995). Further to this the ‘consumer orientation’ criteria encourages the approach to be centred around the target audience (Andreasen, 1995). As a result social marketing campaigns are strongly routed in and centred on the audience they were designed for and therefore highly relevant to their population.

However, there have been some questions raised around social marketing, in particular around its comparison to commercial marketing and its ethics (Hill, 2004). Through the concept of ‘exchange’ social marketing attempts to sell to individuals, convincing them that the endorsed outcome is well worth the shift in their pattern of behaviour (Grier & Bryant, 2005). However, starting and maintaining new behaviours like tooth brushing are considerably more complicated than buying a product in a shop. Tooth brushing may be subject to child behaviours (Huebner & Riedy, 2010) and self-efficacy (de Silva-Sanigorski et
al., 2013) as well as cost and availability of the necessary equipment (Curnow et al., 2002), whereas buying a single product is a much simpler behaviour. Additionally while social marketing attempts to ‘sell’ healthy behaviours, commercial marketing continues to sell unhealthy products such as sugar-laden food and drink. It is for these reasons that the comparison between social and commercial marketing has been questioned (Brenkert, 2002; Buchanan, Reddy, & Hossain, 1994). It follows then, that if the concept exchange in the context of social marketing is potentially flawed, the use of behavioural theory is all the more important. Indeed, without the addition of theory, there may be no component which truly targets behaviour.

With regard to ethics, it is established that through health related social marketing campaigns, a particular health behaviour (or behaviours) is being ‘sold’ to audiences (Grier & Bryant, 2005). Commercial marketing sells through convincing audiences that they need or want a particular product, however, in social marketing, audiences must be convinced by the truth alone (Hill, 2004). For example, within a social marketing campaign it would be unfair to attempt to convince individuals to brush their teeth by communicating that tooth brushing would cause their teeth to appear whiter because there is no evidence to suggest that this is a true outcome of tooth brushing. Therefore a social marketing approach to health promotion should be taken only with an understanding of its limitations, the necessity for behavioural theory and an appreciation that for ethical reasons, only evidenced based information should be used within its health communications.
Social marketing campaigns

Evidence for the effectiveness of social marketing as a method for achieving behavioural change has been found in the existing literature reporting on examples of campaigns showing social marketing to be a ‘promising intervention’ (Stead, McDermott et al. 2007). Social marketing has been used to improve child health with some measurable success, principally in the field of food and nutrition to encourage healthy weight and lifestyles (Foerster, Gregson, & Beall, 1998) but also in the field of physical activity for the same ends (Gordon et al., 2006).

There are a variety of examples of social marketing campaigns which have focused on child health such as the 'Be a Star' campaign taking place in Lancashire SHA which has made an attempt to re-brand breast feeding to encourage young mothers to change their behaviour. The idea for the campaign came out of formative research which labelled the negative connotations of breastfeeding as barriers to younger mothers enacting the behaviour. The campaign aimed to address this through rebranding breastfeeding as something that young mothers do and a series of photographs of young mothers breastfeeding while looking glamorous. It has been commented on that the campaign ‘works’ by targeting emotion (Tapp & Spotswood, 2011). The campaign began in 2007 and is ongoing, supported by a website (www.beastar.org.uk). No formal evaluation of this campaign has been identified, however, the National Social Marketing Centre, who promote the use of social marketing generally have provided a case study of the campaign which claims that between March and May 2008, rates of breastfeeding among mothers aged 18-25 years in Central Lancashire increased from 52% to 63% (National Social Marketing Centre for Excellence, 2014). No
detail was provided about how this data was collected or what confounding factors should be considered.

Other campaigns have focused on the nutrition of older children and on physical exercise, the most well-known example of this being the UK nationwide 'Change4Life' campaign launched in 2009. The campaign was overhauled by the Coalition Government in 2011, its funding was changed from public money to corporate sponsorship (Pykett, Jones, Welsh, & Whitehead, 2014). There has been much more analysis of this campaign, perhaps reflecting its large-scale national presence. This includes criticism about the way in which the campaign explicitly avoids the use of the medical term ‘obesity’ thought to be overtly negative and off putting to the public. Piggin and Lee (2011) however note that this appears to contradict the research that initially informed the development of the campaign. In terms of evaluation, a cluster randomised trial testing the Change4Life materials was conducted (Croker, Lucas, & Wardle, 2012). The trial recruited 3,774 families from 40 schools across England. The participating families were sent the campaign materials in the post and awareness of the campaign as well as attitudes and behaviour were assessed before and after using a variety of validated and non-validated measures. The evaluation found that while awareness of the campaign improved as a result of being exposed to it, the campaign did not appear to affect attitudes or behaviours. The authors suggest that future promotion programmes should be more specific in focus (both in terms of who is targeted and the behaviours promoted) and use behaviour change theory to inform the intervention (Croker et al., 2012).

More specifically for this thesis, there have been a number of campaigns globally which have focused on improving child oral health by affecting behaviour. One example of such a campaign is ‘Healthy teeth, Happy children’ which was based in Vancouver, Canada and
began in 1994 (Harrison & Wong, 2003). This campaign was focused on Vietnamese immigrants and was designed following an ‘information gathering’ stage. This comprised a survey to establish the state of oral health among Vietnamese child immigrants and associated oral health behaviours. Following this a steering group made up of relevant stakeholders (for example dentists and health workers with experience of serving the population of interest including Vietnamese community health workers) developed a community-wide initiative. The initiative consisted of one-to-one counselling with follow-up telephone calls and health information videos and magazines which were given to parents by local community centres. Evaluation of this initiative showed positive results both in terms of child oral health status and acceptability of a counselling intervention in this setting. This evaluation however was concentrated on the impact of the one-to-one counselling and only briefly touched on the health communications community-wide initiative, as such little can be said about the effectiveness of these.

Looking back to the UK, campaigns aimed at improving child oral health have been few consisting primarily of short-lived initiatives run by local PCTs such as ‘Beakers for Bottles’ based in Huddersfield in 2002. This consisted of a programme in which beakers, toothbrushes and paste were provided to families free of change in exchange for bottles. The campaign aimed to raise awareness of child oral health among the community and to offer an incentive to replace children’s bottles with a beaker which is better for oral health. No formal evaluation of the programme was carried out, other than to report upon attendance to the programme (135) and that attendees were predominantly made up of British and South Asian families (Andrew, 2004).
A much larger scale campaign was launched in Scotland in 2009. ‘ChildSmile’ is a national multi-level initiative which aimed to improve child oral health in Scotland by shifting the focus onto prevention rather than treatment and promoting health from infancy (Macpherson et al., 2010). Towards this end, ChildSmile intended to establish formal links between dental services and general health services raise parents’ awareness of child oral health issues and to promote child oral health and prevent disease through primary care services. Additionally, children are provided with toothbrushes, paste (on multiple occasions) and a beaker as well as supervised brushing sessions in schools and nurseries. A fifth of children (those of lower SES) are treated with fluoride varnish in non-dental settings (schools and nurseries).

ChildSmile is a large and costly programme and being multilevel has to potentially to impact on individual as well as organisational behaviour (Trickett, 2009). However, this being a national initiative, there is no control group so although initial findings look promising (Macpherson et al., 2013), it is difficult to attribute these positive outcomes to the programme. To date no child dental health oriented social marketing campaigns run in England have been effectively evaluated.

Social marketing is a relatively new strategy, the term only having being coined by Kotler and Zaltman in 1971 and the vast majority of its development as a field occurring since the 1990s with the launch of the Stirling Institute in 1992 and the more recent launch of the National Social Marketing Institute in 1996. As such many of these campaigns have rather recently been deployed and there is little evidence for their long-term success.

The 'Verb' campaign in the USA was a national social marketing campaign which took place predominantly in schools to encourage increased physical activity in children. This campaign
has been accredited with much success (Bauman, 2004; Berkowitz et al., 2008; Bretthauer-Mueller et al., 2008; Grier & Bryant, 2005; Huhman et al., 2005), including specific praise for its capacity to cause sustainable behavioural change (Bretthauer-Mueller et al., 2008). However control of these effects will be difficult to hold once the campaign has entirely disappeared. Social marketing is not generally a long-term strategy; its need for continuous funding often limits the life span of individual campaigns therefore limiting it in its capacity to achieve long-term behavioural change.

Social marketing is a framework and while it may incorporate theory it is itself not a theory based intervention. Instead it simply provides a strategy in which to frame health promotion and highlights that theory is an important part of this approach. A greater and more careful implementation of relevant theories may be required within the body of the messages as well as in the overall design of an intervention. Social marketing has the potential to successfully affect awareness; its behavioural impacts may however be more limited. This is due to its failure to affect the mechanisms of behaviour.

In summary therefore, social marketing may be helpful for planning and formulating a health promotion initiative. This is because the framework highlights that formative research with the potential ‘audience’ of the campaign should be undertaken, relevant theory should be incorporated and that behaviour change rather than awareness should be targeted. The framework however should be used with caution considering that there is no evidence to suggest that it can have a long-term impact on health behaviour and subsequent outcomes.
1.2.13 Health behaviour theory and techniques

While frameworks can be helpful for the development of interventions, they are not necessarily theory based. It is therefore important to maximise the potential efficacy of health promotion interventions by integrating theory into their design (Michie, 2008). Theories of behaviour aim to unpick the psychosocial constructs which determine the health behaviour of an individual and offer a systematic way in which to target the mechanisms of change.

Health behaviours are those (seemingly voluntary) behaviours and lifestyle choices of an individual, which in some way impact upon their health. Health behaviour change may relate to the stopping of a harmful behaviour, for example bedtime sugar snacking, starting of a new behaviour, for example tooth brushing or the alteration of an existing behaviour such as diet.

Previous evidence has indicated that PSE may be significant for at least two (tooth brushing, sugar snacking) of the three key health behaviours that are the focus of this thesis (Adair et al., 2004). Two theories which emphasise the role of self-efficacy are reflected upon here namely, social cognitive theory (Bandura, 1986) and the HAPA approach (Schwarzer, 1992) as they offer a potential basis for developing and evaluating behaviour change interventions.

Social cognitive theory has its roots in social learning theory (Miller & Dollard, 1941; Rotter, 1954). Social learning theory in contrast to theories of behaviourism put forward that human behaviour is the result of ‘reciprocal determinism’ in that behaviour both influences and is influenced by the environment in which it occurs. As Bandura writes, “psychological functioning is best understood in terms of a continuous reciprocal interaction between behaviour and its controlling conditions” (Bandura, 1977a, p. 2). A person’s behaviour,
therefore may affect the environment in which the behaviour occurs and the subsequent changes in the environment may have an impact on the person and their behaviour. For example in a dental practice, difficult behaviours on the part of an anxious patient may affect the way in which dental staff deal with that patient which may in turn cause the patient to behave differently in that environment.

Central to social learning theory is that people learn through observing the behaviour of others around them. This concept was termed ‘modelling’ by Bandura who asserted that most human behaviours were learned through direct observation and influenced by the example set (Bandura, 1977). Individuals are surrounded by ‘Models’ in everyday situations and these include parents, peers and characters on television (Bandura, 1977a, 1977b).

In the early 1960s, Albert Bandura expanded on social learning theory to incorporate constructs from cognitive psychology (Bandura, 2005). Continued work resulted in social cognitive theory (Bandura, 1986), through which Bandura put forward a theoretical explanation of human behaviour based on information processing and learning from social observation, experience and communication (McAlister, Perry, & Parcel, 2008) in which the role of self-efficacy was emphasised. Social cognitive theory has since come to be thought of as a comprehensive theory of behaviour due to the multifaceted nature of the theory and emphasis on the construct of self-efficacy (Munro, Lewin, Swart, & Volmink, 2007). The model is shown in Figure 1.3.
Self-efficacy may, in some respects, be difficult to separate from the construct ‘perceived behavioural control’ seen in the theory of planned behaviour (Ajzen, 1991). Both constructs refer to the individual’s perceived ability to enact behaviour. Behavioural control is focused around the level of control the individual feels they have over that behaviour whereas self-efficacy is focussed on the level of confidence the individual feels they have in their ability to enact the behaviour. While knowledge of risk and of the benefits of change is necessary for action to take place, self-efficacy in social cognitive theory is thought to be an essential component of behavioural change.

Model adapted from (Munro et al., 2007)
Belief in personal ability to carry out and maintain a particular behaviour directly impact on the levels of stress a person is likely to experience when attempting to undertake the behaviour or even to prepare for it. This stress acts as a ‘threat’ and is made up of perceived coping ability internally and environmental barriers or facilitators externally (Bandura, 1989). Feelings of control and ability to cope with such a threat impacts upon the cognitive processes and thus influences behaviour. In illustrating this phenomenon, Bandura (1989) referred to some of his own lab based experimental studies (Bandura, Reese, & Adams, 1982; Bandura & Taylor, 1985) showing that in situations where people have low confidence in their coping abilities, they experience greater levels of anxiety and stress and are less able to cope with tasks; conversely the opposite is true.

Perceived self-efficacy may additionally by a key component in understanding avoidant behaviours. Bandura writes,

“In short people avoid potentially threatening situations and activities, not because they are beset with anxiety, but because they believe they will be unable to cope with situations they regard as risky” (1989, p. 1178).

Therefore, in designing behaviour change interventions for people who may suffer from milder forms of anxiety around a particular behaviour or situation, bolstering their self-efficacy for coping could be fundamental.

Critically, self-efficacy focuses not just on the internal processes but incorporates environmental level impacts. The way in which the environment is set up through public policies, provisions and structures is likely to influence behaviours because they may contribute to environmental stressors and thus impact upon confidence in coping ability. These factors may act to modify behaviour via ‘incentive motivation’ (McAlister et al., 2008),
whereby individuals are immediately rewarded or punished for their actions. For example, an adult may receive reward through financial savings if they were to skip a dental check-up or avoid purchasing a toothbrush or paste. Similarly, a person’s SES status may levy further constraints making such a financial saving even more appealing.

It is this ability of social cognitive theory to explain behaviour, while understanding the determinants of the behaviours perhaps from multiple sources at a variety of levels that sets it apart from many of the other dominant theories of health behaviour. Social cognitive theory however, as a whole theory has little evidence to support its efficacy in predicting or changing behaviour. It is reasoned that this is due to it being a difficult theory to operationalise fully which may lead to concern around usability (Munro et al., 2007). A large scale (n=2822) international study of parental beliefs and attitudes demonstrated self-efficacy to be a consistent predictor of parent’s dental health related behaviours for their children (Adair et al., 2004).

Further to this, there have been a number of studies which have found oral health specific self-efficacy to be related to oral health behaviours and oral health status. A cross sectional study for example, looking at the oral health of African American children aged from one to five years found that maternal self-efficacy was related to child tooth brushing behaviours (Finlayson, Siefert, Ismail, & Sohn, 2007). A more recent study looking at children aged between five and 12 years in Australia concluded that high self-efficacy meant that twice daily tooth brushing was three times more likely and regular dental visits, four times more likely (de Silva-Sanigorski et al., 2013). Additionally a Finish study of Turkish children and their parents found that children’s own self-efficacy as well as their parents was related to their brushing behaviours (A. B. Cinar, Tseveenjav, & Murtomaa, 2009).
Another useful theory is the HAPA (Schwarzer, 1992), a hybrid theory developed from social cognitive theory and the theory of planned behaviour (Ajzen, 1991), arguably two of the most comprehensive and evidenced theories of behaviour. The HAPA conceptualises behaviour change very much as a process, having no set order, as demonstrated in Figure 1.4. It is considered comprehensive in terms of its explanatory properties (Schwarzer, 2008) and recent empirical evidence would suggest that it is robust in terms of its predictive validity (Schwarzer & Renner, 2000). The model places strong emphasis on the significance of perceived self-efficacy throughout the behaviour change process in addition to facilitating within its framework, examination of the factors and variables which affect motivation, initiation and maintenance of health related behaviours. There is recognition that motivation, intention and behaviour may become challenged throughout the process and therefore this should be supported by the design of relevant interventions.
Many health problems are the result of risk behaviours (Schwarzer & Luszczynska, 2008), however child dental decay is considered the result of the absence of positive dental health related behaviours. As previously stated, it is a combination of a set of behaviours that help a child to maintain good oral health: dental attendance (Gibson, 2003; Lader et al., 2003; Lopez & Baelum, 2007; Nicolau et al., 2003; Nuttall & Harker, 2004; Nuttall et al., 2006; Watt & Sheiham, 1999); tooth brushing with fluoride paste (Harris et al., 2004; Marinho et al., 2009; Walsh et al., 2010) and controlled sugar snacking (Burt & Pai, 2001; Harris et al., 2004; Zero et al., 2008).

The parent must introduce these three behaviours to the child at the relevant stages in his or her life. To do this the parent must be equipped with the knowledge of how to keep their
child’s mouth disease free and the ability to carry out the required tasks. Factors affecting knowledge exist predominantly in the motivational phase outlined by the HAPA model as outcome expectancy and risk perception. Perceived self-efficacy relates to believing that the tasks are achievable at a familial level and having confidence that the parental skills are sufficient to enact these behaviours. These are the factors which may act to persuade the parent of the need to change behaviours pushing them into the volitional phase. Once the decision to change has been reached, the factors of greatest importance are those which relate to operationalising the intention. At this point in the intervention, parents may be provided with help in planning the behavioural changes, for example, goal setting. Again self-efficacy comes into play, affecting belief in the ability to carry out these goals. Following the initiation of the behaviour, nearly all the cognitions of the HAPA model are relevant and if set backs are faced recovery self-efficacy also comes into play. According to the HAPA, self-efficacy, in its various stages, is a key concept throughout the behaviour change process.

More than initiation is necessary for the adoption of positive dental health related behaviour. A complex set of behaviours must recur regularly in order for a child to have optimum oral health. Therefore, while the initiation of the behaviours is fundamental in the first instance, the behaviours must be maintained until habituation for a notable health benefit to be realised. In this respect, it may be considered that the maintenance and recovery self-efficacy aspects of the HAPA model could have a greater prominence in relation to this particular set of behaviours.

The HAPA like the trans-theoretical model (Prochaska & DiClemente, 1986), a stage theory of change, distinguishes between actors in the motivational phase, pre-intenders having yet to be persuaded to change and those in the volitional phase, intenders having already been
motivated to change (Abraham, 2008). The HAPA however, goes on to describe a third phase in the process – the action phase in which maintaining the behaviour is the focus. The premise behind the divisions being that there are distinct cognitive processes occurring in the motivational phase which lead to behavioural intentions as well as in the volitional phase which lead to action and also the upkeep of this action (Schwarzer, 2008). Thus actors should be persuaded to change (or keep up) their behaviour using tailored techniques according to which phase they are in. In order to target those in the motivational phase, it is necessary to understand and focus on the factors which affect intention to change; these may include risk perception and positive versus negative outcomes. Targeting those in the volitional phase should focus much more on finding ways to help actors convert intention into action, for example through increasing perceived self-efficacy (Abraham, 2008). Actors in the action phase may benefit from continued support to ensure that motivation is retained and that setbacks can be managed. Abraham (2008) refers to research carried out by Weinstein and colleagues (1998) which concerned encouraging an increase in the purchasing of radon gas testing kits, which supported this two phases of readiness to change.

Continuum models may be considered preferable to stage models on the premise that the stages presented by such models are arbitrary (Sutton, 2001; West, 2005). However searching for ‘natural stages’ is redundant due to the fact the stages are scientifically defined (Schwarzer, 2008). Hence it may be argued that the imposition of stages upon human behaviour is unhelpful to the science of behaviour change. Nevertheless, if the empirical evidence supports stage models over continuum then endorsing the use of stage models for interventions can be warranted (Schwarzer, 2008).
Another way in which the HAPA sets itself apart from previous theories of health related behaviour change is the detail in which it considers self-efficacy as domain and process specific (Leventhal & Mora, 2008). The perceived self-efficacy which a parent has for effectively brushing their child’s teeth twice a day can be distinguished from the self-efficacy they have for controlling their child’s sugar intake or for taking the child to visit a dentist on a regular basis. Each of these parental self-efficacies will provide greater predictive validity for each of the behaviours (Bandura, 2006; Coleman & Karraker, 2003) giving a more accurate understanding of the impact of various cognitions throughout the change process. Moreover, differentiating self-efficacy as process specific allows for a more holistic comprehension of behaviour change as it happens.

Perceived self-efficacy in the motivational phase will be based on knowledge and assumptions of the specific behaviour and may or may not be supplemented by first-hand experience of carrying the behaviour out. Specific self-efficacy in this phase will also be impacted upon by more general feelings of efficacy. Coping self-efficacy comes in at the volitional phase, relating to beliefs in the ability to realise the intention fully, this may also relate to planning as well as the idea that the parent will be able to cope well with initiating the behaviour. Once action has been taken and the intention operationalised, it is maintaining the behaviour which is key in the action phase. If the behaviour is not maintained, recovery self-efficacy is necessary to provide the parent with the aptitude to initiate additional attempts.

Recovery self-efficacy is defined within the HAPA model as having confidence in personal ability to overcome setbacks (Abraham, 2008). Recovery self-efficacy is a cognition that may be necessary for a long time after the behaviour change has been initiated. This process
however, is not one that can be considered linear, motivation may wane at either the volitional phase or the action phase taking the parent back to the start of the process or it even may cause them to disengage all together.

Particularly in the volitional phase but also in the action phase, practical factors may arise making the behaviour seem more difficult to achieve thus creating barriers to either the initiation of change or to its perceived or actual maintenance. For this reason the HAPA model can be considered to provide a comprehensive insight into the process of behaviour change. Within this phase style model, an understanding of why intentions fail to be realised becomes possible, the HAPA, in particular breaks the temporal process down to such an extent that there can be room within the model to allow for unperceived volitional variables or even factors out of the actor’s control which cause the behaviour to become too difficult to carry out and may play a part in the disruption between intention and behaviour (Conner, 2008). It is for this reason that the HAPA is considered to go a significant way towards filling the ‘intention-behaviour gap’ (Sutton, 2008). Though this may be the case in a theoretical sense alone, unexplainable variation in behaviour may still occur between intention and action.

The HAPA may offer a promising theoretical approach for the development and evaluation of behavioural interventions due to its emphasis on self-efficacy, a construct known to be important for parent’s dental health related behaviours for their children throughout the change process. Critically, self-efficacy acts a bridging construct allowing for behaviour to be theoretically determined by both structure and agency.
1.2.14 Behaviour change techniques

Theory is clearly important for the more systematic development of interventions to affect behaviour. However, some theories have been on occasion criticised for being difficult to operationalise in practical settings (McGuire, McCabe, & Priebe, 2001; Munro et al., 2007). There has been a substantial body of work developed in recent years to enhance the translation of theoretical constructs into practical techniques directed at changing health behaviour. Much of this work has been carried out by Susan Michie and Charles Abraham who developed the first taxonomy of BCTs (Abraham & Michie, 2008a) and have continued work to develop the taxonomy since (Michie, Ashford, Sniehotta, et al., 2011; Michie, Richardson, Johnston, et al., 2013).

Behaviour change techniques are theory linked and target a social cognitive mechanism of change to affect behaviour. They have been defined as,

“an observable, replicable, and irreducible component of an intervention designed to alter or redirect causal processes that regulate behaviour” (Michie et al., 2013, p. 82)

In developing their original taxonomy, Abraham and Michie (2008a), collated previous studies that had attempted to categorise behaviour change methods as well as the trans-theoretical model (Prochaska, DiClemente, & Norcross, 1992) which detailed 10 behaviour change processes. A list of 26 BCTs were drafted to reflect common methods of change applicable across a range of health behaviours and this taxonomy was piloted, by using it to categorise components of interventions aimed at promoting physical activity.

Definitions of each BCT were developed into a coding manual (Abraham & Michie, 2008b). In the pilot, two reviewers independently coded the interventions allowing for the reliability of the taxonomy to be tested. The majority of tests (>70%) provided Cohen’s kappa statistics of
greater than 0.70 which can be interpreted as substantial (Landis & Koch, 1977), showing that the taxonomy can be used to code the techniques used in interventions reliably.

However, three of the techniques provided cause for concern, technique 6 (provide general encouragement) had low levels of agreement between the coders indicating that it may be too vague to reliably interpret. Technique 17 (prompt practice) was not commonly identified meaning it may not be as applicable as some other BCTs, a concern because the taxonomy was intended to have broad applicability. Technique 2 (Prompt information on consequences) had consistently lower than average kappa scores of 0.53-0.61. While these scores can be interpreted as moderately reliable, the fact that they were consistently lower than those of other techniques may cause concern. However, this may have been due to the fact that BCT1 (information on the link between behaviour and health) and BCT2 (provide information on consequences) suffer some overlap in that the link between behaviour and health may be interpreted as including consequences. This is potentially problematic because a taxonomy, by its nature must contain mutually exclusive categories.

It must be remembered however, that this taxonomy was the first of its kind and is a still a work in progress. It has provided a scientific theory linked framework for categorising interventions towards an understanding of the specific techniques that work in specific settings and the pilot study demonstrated its feasibility and good reliability. It has been applied in a wide range of studies since its publication both in terms of categorisation (Adair et al., 2013; Cooper et al., 2013; Golley, Hendrie, Slater, & Corsini, 2011; Michie, Abraham, Whittington, McAteer, & Gupta, 2009; Michie, Jochelson, Markham, & Bridle, 2009) and intervention design (Smith et al., 2010; Wyse et al., 2010).
Since the development of this first taxonomy, a further two have been published, a 40-item taxonomy (Michie, Ashford, Sniehotta, et al., 2011) and a larger 93-item one, these are grouped as 16 sets (Michie et al., 2013). The 40-item taxonomy was intended to clarify definitions and improve reliability. The largest and most recent taxonomy was intended to have greater reach and applicability, having been developed internationally and with reference to a wider range of behavioural domains. In relation to the work reported on in this thesis, the planning and development stages took place before the publication of the more recent taxonomies, for this reason, the original 26-item taxonomy has been used in these studies. The 26-item taxonomy has been shown to have good reliability and provides a systematic way in which to develop interventions aimed at affecting and understanding health behaviours.
1.3 Research direction

1.3.1 Research aim

To develop and evaluate a health promotion intervention (Kitten’s First Tooth), based on theory, aimed at improving parent’s attitudes (self-efficacy for tooth brushing and sugar snacking, outcome expectancy for dental attendance and intention for all three behaviours) towards their child’s oral health behaviours (tooth brushing; sugar control; dental attendance).

1.3.2 Objectives

1. To explore the barriers and facilitators to child oral health behaviours (namely dental attendance) among parents in the population of study.

2. To assess the potential for conveying a behavioural intervention through children’s stories.

3. To develop a theory and evidence based oral health promotion intervention.

4. To evaluate the oral health promotion intervention using a non-randomised comparative study design.

5. To assess the potential usefulness, feasibility and acceptability of the oral health promotion intervention in a culturally diverse population with a view to implement a future RCT.
1.3.3 Overall research question

Is an evidence based and theory driven oral health promotion intervention in the form of a children’s story effective at improving parent’s attitudes towards their child’s oral health behaviours?

1.3.4 Framework and structure of studies within thesis

The design of the series of studies reported on in this thesis maps onto an adapted version of the MRC framework for the development of complex interventions (2008). This is shown diagrammatically in Figure 1.5. As previously discussed, the framework is iterative and flexible. It has been adapted here to show that full implementation of the intervention has not fallen within the scope of this thesis. This is because further development work that would be required for a full implementation could not be carried out within the specified time frame.
Social marketing was used as an approach to health promotion to provide guidance around the development and implementation of the behaviour change intervention. The approach was taken as a result of the intention of the local NHS authority (who provided funds for the development of the intervention), to develop a social marketing campaign to improve child oral health. Social marketing provides a useful framework to aid the design of a health communication intervention because it highlights behaviour change, formative research, using varied materials to deliver messages as well as gaining an understanding of competing messages.
However, social marketing must be used with caution, as discussed in section 1.2.12, the concept of ‘exchange’ in the social marketing context is potentially flawed, for this reason health behaviour theory was used to develop the intervention. A further concern is ensuring that social marketing is used in an ethical way and that falsehoods are not employed to ‘convince’ participants to change their behaviour. For this reason, there is a strong emphasis on the use of evidence based health messages within the intervention.

With regard to the social marketing criteria, the first (a strong customer orientation and focus) is employed within the qualitative study reported on in Chapter 2 whereby empirical evidence is gathered around parents’ perceived barriers and facilitators to child dental attendance. This step is repeated in Chapter 6 in which empirical evidence is again gathered from parents representing a new demographic.

The second criterion (a clear aim of achieving a specified behavioural change) is demonstrated within the aims of the thesis stated previously, however, in terms of outcome it is attitude and intention which is used to measure change rather than an objective measure of behaviour itself.

The third criterion, (application of the concept of exchange) is operationalised within the intervention (Kitten’s First Tooth), using BCT1 (linking behaviour and health) and only with regard evidenced based health messages. The fifth criterion is applied through the use of two different formats to convey Kitten’s First Tooth (animation on DVD and storybook). The sixth criterion, investigating the concept of ‘competition’ is considered through the review of children’s storybooks reported on in Chapter 3. The forth criterion, audience segmentation, has not been applied in this study due to limitations around resources. This may be
something that could be applied in future research should the social marketing approach prove useful.

As previously stated, social marketing is an approach to health promotion and not a theory in its own right. For this reason it is important to use behavioural theory. Within this Chapter the role of self-efficacy has been emphasised as a construct that is important for child oral health behaviours (Adair et al., 2004; de Silva-Sanigorski et al., 2013; Pine et al., 2004). This construct has been contextualised theoretically within social cognitive theory (Bandura, 1986) and the HAPA (Schwarzer, 1992). Modelling, a concept from social learning theory (Bandura, 1977a) is one way in which to help bolster self-efficacy (Luszczynska & Schwarzer, 2005) and this technique is employed within the intervention developed within this thesis.
Chapter 2

Parental Perceptions of factors affecting young children’s dental attendance in a deprived area
2.1 Overview

An exploratory study was conducted into the barriers and facilitators to child dental attendance for parents living in Salford. The study design was qualitative and explored parents’ perceptions of dental care for their children. The study took place across seven primary schools across three separate boroughs within Salford. These localities exhibited a range of socioeconomic strata and rates of dental decay in children (Index of Multiple Deprivation ranged from 30.1-59.9). A national clinical survey of five year old children’s teeth conducted by the British Association for Community Dentistry (BASCD) in 2011-12 revealed that child oral health in Salford is poorer than national rates with the average number of decayed missing or filled teeth (dmft) being 1.96 compared to the national average for England of 0.94 (Public Health England, 2012a).

Dental attendance is recommended for optimum oral health (NICE, 2004). The most recent NICE guidance states that children should visit their dentist for a routine check-up every 12 months (NICE, 2004). According to this guidance children who are not recorded to attend a dental appointment on a yearly basis are counted as non-attenders or symptomatic attenders, who may attend only when a tooth problem prompts a visit. Attending the dentist for a check-up when there are no obvious dental problems (asymptomatic or preventative dental care) is important because individuals with this type of regular dental attendance tend to have better oral health and less dental disease (Abelsen, 2008; Kay, 1999; Lader et al., 2003).

A prospective cohort study of preschool aged children (n=1057) in Belgium used a pre-validated questionnaire to collect data on socio-demographics and oral health behaviour (Leroy et al., 2013). The study recruited children into the study at birth and followed up at
ages three and five years. Although retention was poor up to three years (<80%), likely introducing attrition bias, it was high between three and five years. Logistic regression showed that at age three years children of more highly educated parents had almost twice the likelihood of attending the dentist (OR 1.89 95% CI 1.27-2.80). This odds ratio increased by age five to 2.33 (95% CI 1.5-3.63). It appeared too that other oral health behaviours were associated with dental attendance. At age five, dental attendance was significantly more likely if the child also had their teeth brushed at least once per day with an odds ratio of 2.23 (95% CI 1.34-3.70). Children in this study who visited the dentist earlier were recorded to have more fillings than those who visited at an older age and these later visitors were not found to have significantly worse levels of dental health. It is possible then that parental perception of need prompted dental visits or that unnecessary dental work was carried out. The authors also note that a remarkably high number of children attended due to dental trauma rather than disease.

This study by Leroy and colleagues (2013) highlights that dental attendance from a young age may be important for other oral health behaviours and that SES is associated with attendance behaviours. However the study also demonstrates the dearth of evidence currently available for explaining the processes involved in child dental attendance.

Utilisation of dental services is a health seeking behaviour. Health seeking behaviours are known to be complex involving several levels of decision making (MacKian, 2003; Olenja, 2003). This behaviour, gains another layer of complexity in the case of the child, as it is not the individual but their parent who makes these decisions and enacts the behaviour since children are too young to visit the dentist alone. Studies have indicated that parent’s encouragement and support is important for child attendance (Al-Omiri, Al-Wahadni, &
Saeed, 2006; Leroy et al., 2013). That is not to ignore the role of the child completely, as child attitudes and behaviours may play a significant part in utilisation behaviours. Ultimately however, it is the way in which the parent copes (through PSE) with these behaviours together with their own knowledge, attitudes and beliefs that will determine behavioural outcomes (Amin & Harrison, 2009; Huebner & Riedy, 2010).

A variety of factors related to barriers to dental health care have already been identified in the literature, these include, cost and fear of cost (Freeman, 1999; Goddard & Smith, 2001; Gulliford et al., 2002; Harrison, Li, Pearce, & Wyman, 2003; Kelly et al., 2005; Kim & Telleen, 2004; Pahel, Rozier, & Slade, 2007; Seale & Casamassimo, 2003; Talekar, Rozier, Slade, & Ennett, 2005); dental anxiety of either the parent or child (Buchanan & Niven, 2002; Freeman, 1999; Gregory, Gibson, & Robinson, 2007; Themessl-Huber, Freeman, Humphris, MacGillivray, & Terzi, 2010; Townend, Dimigen, & Fung, 2000; Wigen, Skaret, & Wang, 2009); low perception of need (Baker, 2009; Freeman, 1999; Guay, 2004; Gulliford et al., 2002) which may be particularly complex in the case of children as it often the parent’s perception of the child’s need that affects behaviour (Talekar et al., 2005; Vargas & Ronzio, 2002) and lack of motivation is apparent when it comes to their own or their family’s health (Downer, Drugan, & Blinkhorn, 2005; Leroy et al., 2013). Overall, it can be seen that in terms of accessing dental care, it is now recognised in the literature that barriers are not only service based (Guay, 2004).

As the key decision makers on matters affecting their children’s health, it is parents who are critical when understanding the family’s health behaviours associated with the child’s health outcomes (Talekar et al., 2005). A qualitative study conducted in the U.S. with low-income immigrant mothers reported that barriers to care may arise as a result of low levels of
education, low level of English language spoken, low family income as well as individual parental health beliefs (Kim & Telleen, 2004). While participants emphasised health beliefs as a barrier to dental care for their children, the study concluded that structural factors related to availability of service and ability to pay were the dominating barriers.

Talekar and colleagues (2005), found in a large-scale quantitative analysis of reported behaviour and parental perceptions of their child’s dental health that the correlates of barriers to access and parent’s poor perception of their child’s dental health overlap. Parents who perceive their child’s dental health to be poor are also less likely to be able to access appropriate dental care for their children (Edelstein, 2000; Talekar et al., 2005; Vargas & Ronzio, 2002). Parents with poorer perceptions of their child’s dental health were also most likely to be of low income and educational status. This study concluded that barriers other than parent’s perceived need for care must be negatively affecting access for these children.

In a qualitative focus group study of barriers to dental care for children in low-income families, Kelly et al (2005) found that a major factor for care seeking behaviour was a belief in the importance of oral health for overall health. Parents who used dental services described dental care as important for monitoring dental problems, monitoring dental growth, and developing and maintaining good dental habits. In contrast, parents who did not take their children to dental appointments regularly, communicated that dental care was less important than other medical care; oral health being predominantly important for appearance, self-esteem and hygiene.

Belief about responsibility was also found to divide symptomatic and asymptomatic attendees (Kelly et al., 2005). While asymptomatic attendees did not associate regular dental attendance as a normative responsibility, parents who regularly utilised dental services for
their children felt that it was part of being a ‘good parent’ and important for the child’s overall health. Psychosocial factors found to characterise this group were feeling in control of their child’s dental experiences, providing their children with a positive example of preventative dental care and positive attitudes. Additionally these parents exhibited knowledge of dental services and products, expressing a high capacity to identify and obtain dental care services. Non-attendees reported not transmitting a positive dental example or attitude to their children and having low feelings of self-efficacy regarding child tooth brushing and flossing.

Lower levels of knowledge about the services and system and poor opinions of the medical care provider were associated with non-attendees as were lower levels of trust and negative dental experiences of the parent (Kelly et al., 2005). While nearly all parents gave reported negative dental experiences, non-attendees seemed to be more dissatisfied with their care, referring to pain, poor quality care, cost and perception and uncertainty of cost and feeling discriminated against. These parents also spoke of dental fear and anxiety and of needle phobia. Non-attendees reported feeling less able to overcome the structural barriers to dental care such as time, transport and scheduling. Non-attendees received less social support from friends and family.

As Watt (2007) highlights, there is a vast body of literature showing an association between SES and dental health generally, however the processes by which association exists are unclear. A review of SES and its relationship with the risk factors associated with dental decay reported that much of the evidence linking SES and tooth decay within U.S. populations is from cross sectional national surveys (Reisine & Psoter, 2001). While these have the advantage of generalisability (within the U.S. at least), they do not provide a basis
for suggesting that SES plays a causal role in the development of tooth decay. This is true also in terms of explaining the role of SES in child dental attendance. While data appears to link SES and service utilisation, it is difficult to outline how exactly being of low SES may affect child dental attendance. Therefore this study uses qualitative investigation to explore parents’ perceptions around child dental attendance and their experiences in the local area. Due to the association of SES with child dental health and attendance, participants were selected from a range of SES areas.

There is an abundance of health service literature which deals with the structural problems associated with dental health service access (Curtis, Evans, Sbaraini, & Schwarz, 2007; Gulliford et al., 2001; Mitchell & Lassiter, 2006; Mofidi, Rozier, & King, 2002). Factors such as location of services, waiting lists/ times and attitudes of dentists have been identified as possible barriers to access. These structural factors are not the focus of this study; instead the focus is on the psychosocial barriers and facilitators to dental access as experienced by parents.

2.1.1 Study focus

Dental attendance, for the purposes of this study has been dealt with as a health behaviour. Health behaviour can be thought of as an action taken for the purposes of good health. This action leads to starting something new (visiting the dentist), maintaining something already done (such as regular dental attendance) or stopping something (such as eating sugar laden foods). Health behaviour has been defined as,
“Any activity undertaken by a person believing himself to be healthy for the purpose of preventing disease or detecting it at an asymptomatic stage” (Kasl & Cobb, 1966, p. 246).

Health behaviour is often taken by an individual for themselves; however in this thesis parent’s health behaviours for their children are the focus.

Research question:

What are the psychosocial barriers and facilitators perceived by parents around their child’s dental attendance behaviour?
2.2 Methodology

2.2.1 Design

This was a qualitative focus group study carried out with parents of young children in Salford, UK. Ethical approval for this study was granted by the University of Salford.

The aim of the study is to draw upon the barriers and facilitators specific to this population in order to supplement the information in the literature and provide an understanding of processes affecting child dental health attendance in this locality. A qualitative design was selected as it is the most appropriate method to explore these phenomena in depth (Folch-Lyon & Trost, 1981; Labuschagne, 2003). This is an initial study of parent’s perceptions and little is already known in this locality. In order to answer these research questions it is necessary to generate in depth qualitative data in which participants discuss their thoughts, feelings and behaviours. This will be achieved through a series of focus groups with parents. Focus groups were selected as a method over one-to-one interviews due to practical advantages as well as the opportunity they provide for participants to develop and reflect their attitudes and experiences. Focus groups are a recommended method for exploring knowledge and experiences (Kitzinger, 1995) and for providing insight into complex behaviours and motivations and may therefore be an especially useful method when the purpose of the research question is exploratory (Morgan & Morgan, 1996), as it is here.
Focus groups

A helpful definition of focus groups has been provided by Krueger,

“The focus group interview taps into human tendencies. Attitudes and perceptions relating to concepts, products, services or programs are developed in part by interaction with other people. We are a product of our environment and are influenced by people around us” (Krueger, 1994, pp. 10–11)

Focus groups offer a useful format for exploring perceptions among a group of people around a specific topic. Participants are selected based on them having the ‘focus’ of the research question in common (Parker & Tritter, 2006). Focus groups differ from interviews and group interviews primarily because of the dynamics of the process. In interviews generally, there is a question and answer format; the researcher asks and the participant(s) answer.

An ethnographic study comparing interviews and focus groups used discourse analysis to analyse the data and found that the dynamic of the interview is such that interviewees may feel burdened to explain themselves to the researcher whereas this was not the case in the focus groups (Agar & MacDonald, 1995). In group interviews, the researcher may operate a ‘polling’ process, asking how many of the participants would agree with a point or not. Although such a question may be used as a prompt to facilitate a focus group discussion, it wouldn’t usually be the intention of the researcher to ascertain how many participants of a focus group had a particular opinion. Focus groups have been referred to as “structured eavesdropping” (Barbour, 2010; Kitzinger, 1995; Powney, 1988), in that it is the intention of the researcher to facilitate a flowing dialogue between participants, structured by questions or prompts and sometimes props provided by the researcher.
It is posited that through rich discussion, participants may express and even develop views and ideas (Arksey & Knight, 1999). A ‘momentum’ may occur in which opinions, attitudes and beliefs are discussed alongside experiences (Parker & Tritter, 2006). These focus group dynamics can be beneficial, encouraging participants to discuss their perceptions openly by allowing them to express themselves within established norms (Powney, 1988) and vocabulary (Kitzinger, 2005) and within a less formal, perhaps less daunting setting (Kitzinger, 1995). Poor power dynamics may result in inaccurate reporting (Smithson, 2000) so having a setting familiar to the target group is essential.

Focus groups have their origins in market research but have been used in the social sciences since the 1950s (Parker & Tritter, 2006). Arguably their popularity has been sustained due to a practical advantage they offer over individual interviews (Parker & Tritter, 2006). By gathering data from a group of people rather than one at a time, focus groups can be more resource efficient (Krueger & Casey, 2009). Focus groups may vary in their length and in the number of participants. The length of focus groups is usually determined by the momentum of group discussion and by in-group data saturation, whereby the group has covered all interested questions and no one has any new discussion to add, typically focus groups last from 30 - 90 minutes.

In terms of size, while larger focus groups of eight to 12 participants may be advantageous because they are able to collect data from a wider range of people, it is advised that for topics which may be emotionally charged, for example involving the participants’ children, smaller groups of between four and eight are more appropriate (Morgan et al., 1996). Morgan (1996) also puts forward that smaller groups offer the advantage of allowing each participant to make a more in-depth contribution to the conversation. There is no
agreement in the literature as to the ideal number of focus group members, it is instead important to consider what is most appropriate for the subject matter and research question for the study in hand (Tang & Davis, 1995).

However, there are some important limitations of focus groups. The nature of participant selection for focus groups, for example may negatively affect the degree to which the findings can be considered representative of the overall population (Stewart, Shamdasani, & Rook, 2007). Parker and Tritter (2006) in their discussion of the published literature on focus groups put forward that there is no satisfactory solution to the problem of sampling and representativeness in focus group research. While there are a variety of ways in which participants can be selected, none avoid methodological flaws entirely (Parker & Tritter, 2006).

Focus groups used in academic research are often not sampled on an individual basis, like they may be for interviews. In order to ensure that the crucial dynamics of the focus group are healthy, groups of participants may be put together based on previous acquaintance (Kitzinger, 1995), for example parents whose children attend the same school. If instead focus group participants are advertised for, there may be a tendency for more self-assured people to take part, having the confidence to speak up in group situations (Sim, 1998). Therefore an element of self-selection bias may be introduced into the research.

A further method for recruitment is to utilise the advice and access of community members. This is increasingly being used in qualitative research with an emphasis on public patient involvement (PPI), whereby patients and or members of the public are involved in the process of the research. A study into loneliness’ in older adults, for example utilised members of the target group to both recruit and interview other older adults (Walmsley et
The principle advantage of this for the researcher is access, both in the sense of locating individuals or groups and in their agreeing to participate. Parker and Titter (2006), however note that this too is a problematic strategy in that it lacks transparency. Including a non-researcher in the recruitment process may lead to people being asked to participate simply because the recruiter has good access to them meaning there may an over reliance on convenience sampling thereby introducing bias. However, it can be argued that these community recruiters were invited into the research process precisely because of their access. While it may be impossible to govern the procedures they use to find willing participants, carefully chosen community members can be uniquely placed to identify appropriate focus group participants that the researcher would not normally have access to. Moreover, from the point of view of the potential participant, they may be more comfortable with taking part in a focus group when asked by someone they are familiar with rather than a stranger.

In employing the help of community member to recruit participants, access may be improved, however the representativeness and subsequent generalisability of results remains questionable. This is due to the potential for selection bias but also due to the sample number needed to represent the population of interest. As discussed, selection bias is a persistent problem in qualitative research.

Logically, the best way to eliminate selection bias is through true random sampling however, it is clear based on the reasons stated above that this would be an inappropriate sampling method for focus groups. It is frequently the case that random sampling is not possible in qualitative research (Marshall, 1996). Therefore transparency in the reporting of sampling methods for focus groups is crucial, communicating the potential bias present and that this
should be taken into account when interpreting the findings. Large numbers of participants are often not used in focus group research primarily because of the strain this would place upon resources.

Coming from a positivistic perspective, a small sample would likely impact the statistical power negatively impacting the generalisability of the findings. However, a concept developed within ‘grounded theory’ (Glaser & Strauss, 1967), data saturation, is commonly used in qualitative research, including in focus groups in order to ascertain the appropriate numbers of focus groups or interviews necessary. Data saturation is known to occur when a high degree of repetition of the emergent themes is evident (Pope, Ziebland, & Mays, 2000), that is to say, new themes do not continue to emerge.

There are no clear guidelines on how to recognise data saturation but clearly it may be affected by both the complexity of the research area and interpretation by the researcher (Ryan & Bernard, 2003). Therefore, it is necessary for the analysis (or a degree of analysis) to run concurrently with data collection. In achieving data saturation, it is posited that no new themes will arise; it is this logic which allows much qualitative research to assert its validity (Whittemore, Chase, & Mandle, 2001) and some level of generalisability, that is to say generalisability to other populations similar to the sampled participants.

That said, selection bias remains, the issue of generalising findings from a focus group study is a contentious one and different arguments have been presented based on various epistemological perspectives. Realists such as Kruegar put forward that generalisability is possible but that this very much depends on the sampling procedure (which would to some extent control for selection bias), Kitzinger however remains sceptical, asserting that theoretical insights may be potentially transferable (Freeman, 2006). Ultimately, the degree
of generalisability of the findings remains with the reader; therefore the reporting of the methods used is crucial.

2.2.2 Participants

Participants were eligible for recruitment in this study if they were parents of a child attending one of the selected schools. There were no exclusion criteria.

2.2.3 Procedure

Salford primary schools were identified as an appropriate target audience for the study primarily because of their inclusive nature in terms of population variables. That is to say the large majority of eligible children across Salford attend primary schools and therefore the majority of parents of children below the age of eleven could, in theory, be accessed via primary schools. In order to gauge the opinion of a cross section of the population, it was necessary to select a range of schools for this study.

Schools with 30% or more of pupils entitled to Free School Meals (FSM) have previously been classed as deprived (Pendry, Lashkari, & Bewley, 2004). This was used as a guide as this division was originally based on a national population and the North West has a significantly higher level of deprivation than the national average (Noble, McLennan, Wilkinson, Whitworth, & Barnes, 2008). It was therefore thought necessary to divide the schools on a local relative scale. Percentile calculations, taken at 0.33 were 18.10. Therefore Salford schools with a FSM entitlement of less than 18.10% were classed as high SES; 18.10% - 36.30% were classed as mid SES and 36.31% and over was classed as low SES.
Initially, it was thought that two schools should be randomly selected from each SES division; however, it quickly became apparent that this would not necessarily be the most helpful strategy. Parents from higher SES areas were more willing to freely provide data and large amount of data was generated at these focus groups, so much so that data saturation was quickly reached. It was necessary to research a higher amount of low SES participants in order to gain a similar level of saturation. In addition to this, the high variation in school environment and access issues prompted advice to be sought from the Healthy Schools Coordinator at the local NHS Trust, who was able to provide expertise which supported the selection process. The Healthy Schools Coordinator asked a staff member in each school to help set up the focus group by inviting suitable participants to take part in the research. The suitability of participants was determined by their having a child who attended the school and their being willing and able to contribute to the group conversation. These criteria were communicated to the staff member responsible for recruitment at each school and a convenient time was arranged for each focus group to be conducted. All participants received a study information sheet (Appendix 2.1) and returned signed consent forms (Appendix 2.2). All focus groups took place during the school day.

One focus group was conducted at a high level SES\(^1\) school (this was a private school), two focus groups were conducted in mid-level SES schools and four focus groups were conducted at low SES schools.

The focus groups took place in quiet private areas including spare classrooms and staffrooms. The structure of the focus groups varied according to the direction of the topics

---

\(^{1}\) Low, mid and high SES here are taken to be relative to the population in question and do not stand up against a national interpretation. The indicator, %FSM was used to divide the population into thirds; schools with the least recorded entitlement were ranked as high SES.
taken by the participants; broadly the first half of the session was around identifying barriers to dental services for children in the area, incorporating a semi-structured style of questioning and ensuring continuity of topics discussed across the groups. The second half of the session discussed possible facilitators, mediated through the use of various visual aids prompting discussions around identifying dental surgery locations and engaging with families. All focus groups were audio recorded to assist transcription and field notes were written up immediately following each session. Focus groups varied in number of participants from four to seven. Interviews were conducted following the same overall structure (the interview schedule can be seen in Appendix 2.3); however discussion was more focused on individual experiences. The length of all sessions ranged from 25-85 minutes.

2.2.4 Analysis

There were two stages of analysis, the first a very brief initial analysis in which each focus group recording was transcribed and immediately analysed for themes and a record kept of emergent themes (an excerpt of a transcript is shown in Appendices 2.4). While this process formed part of data familiarisation, it was conducted primarily to aid the recognition of data saturation. Once all focus groups were complete, the data was analysed using Framework analysis (Krueger & Casey, 2009) and this process was managed within NVivo8. NVivo is a qualitative analysis software package that primarily aids the storage of transcripts and facilitates their coding. Framework analysis is a systematic yet flexible process, thematic in terms of its approach it allows for themes to rise from the data as well as from a priori issues (Rabiee, 2007; Ritchie & Spencer, 1994).
An advantage of framework analysis is that it is a structured process having five distinct stages, thereby aiding transparency. Stage 1 involves familiarisation, sometimes referred to as immersion in the data. In this study, the researcher who facilitated the focus groups (LO) also transcribed them. Following this, each transcript was studied and notes made within NVivo8 around potential themes. Rabiee (2007) outlines that it is important to become immersed in the transcripts and to understand each one as a whole event before synthesising the data. The second stage is around the identification of a thematic framework. Themes apparent in stage 1 that were also common across the transcripts were termed recurring themes. The presence of recurring themes indicates a possible pattern and these were gathered into the thematic framework. Stage 3 involves the pilot coding of the data using the thematic framework, this is an iterative stage in which the thematic framework continues to be developed. This was conducted within NVivo8. In stage 4, the data is coded whereby the specific aspects of the data are assigned to the themes they represented. In stage 5, the themes and their contents are mapped and interpreted. This was achieved using the graphics package available within NVivo8, which draws the themes diagrammatically.

Field notes taken during and immediately following data collection aided the analysis, particularly in terms of incorporating visual cues to correctly interpret the meaning of the discussions that would have been less clear from the transcription alone, for example where participants were sarcastic indicated visually by a smile. Where this was the case, notes were assessed to the transcripts within NVivo8.

The thematic framework was identified. Following the analytic process, the frame was then subdivided to allow for the categorisation of barriers and facilitators (see Tables 2.2 and
2.3). This was necessary due to the interconnectedness of many of the barriers and facilitators across each of the themes.
2.3 Results

2.3.1 Participants

A higher number of parents classed as low SES were represented in the sample as can be seen in Table 2.1. A much higher proportion of the participants were female (90%) and the majority were also white British (74%), the second highest ethnic group was white Irish (18%).

Table 2.1 Characteristics of participants in the focus groups

<table>
<thead>
<tr>
<th>Demographic information</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>6</td>
<td>16.67%</td>
</tr>
<tr>
<td>Mid</td>
<td>9</td>
<td>25.00%</td>
</tr>
<tr>
<td>Low</td>
<td>21</td>
<td>58.33%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>8.33%</td>
</tr>
<tr>
<td>Female</td>
<td>33</td>
<td>91.67%</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White British</td>
<td>26</td>
<td>72.22%</td>
</tr>
<tr>
<td>White Irish</td>
<td>7</td>
<td>19.44%</td>
</tr>
<tr>
<td>Asian</td>
<td>2</td>
<td>5.56%</td>
</tr>
<tr>
<td>North African</td>
<td>1</td>
<td>2.78%</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>100%</td>
</tr>
</tbody>
</table>
2.3.2 Barriers

Barriers commonly reported related to parent’s anxiety, vocalised in terms of memories as well as negative experiences of their children’s dental visits. Parental perception of their child’s reaction to dental attendance was focused around the dental environment and the demeanour of dental professionals towards the children. This related to the degree of trust which parents felt could be placed in staff. Risk perception and outcome expectancies were also apparent. Lack of appropriate knowledge and poor capacity to identify necessary information related to access was discussed widely. A summary of the barriers highlighted in the discussions is shown in Table 2.2 below. For the purposes of reporting, the barriers have been grouped into three areas, 1) anxiety and difficult child behaviours, 2) trust, communication and environment; 3) knowledge about access and procedure and attitude.

Table 2.2 Summary of barriers to child dental attendance

<table>
<thead>
<tr>
<th>Barrier (theme)</th>
<th>Reporting category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child anxiety and parental anxiety</td>
<td>Anxiety and difficult child behaviours</td>
</tr>
<tr>
<td>Difficult child behaviour</td>
<td></td>
</tr>
<tr>
<td>Low levels of trust in dentist</td>
<td>Trust, communication and environment</td>
</tr>
<tr>
<td>Poor communication with dentist</td>
<td></td>
</tr>
<tr>
<td>Clinical child unfriendly environment</td>
<td></td>
</tr>
<tr>
<td>Low perception of risk</td>
<td></td>
</tr>
<tr>
<td>Knowledge about access – perceptions and norms</td>
<td>Knowledge about access and procedure and attitude</td>
</tr>
<tr>
<td>Practical issues</td>
<td></td>
</tr>
<tr>
<td>Health seeking behaviour</td>
<td></td>
</tr>
</tbody>
</table>
Anxiety and difficult child behaviours

Being scared of the dentist was a concept widely recognised among the participants both in terms of child and adult dental anxiety, one participant reported,

“You hear about so many people being scared of the dentist though don’t you? I’ve got to have a root canal and I keep putting it off, and I don’t know why” (Participant 5, high SES)

Dental anxiety was seen as common by many of the participants. Though it was not well understood, consensus was reached by two focus groups that dental anxiety was normal. Three participants commented that they thought that the dental exam itself was frightening for children due to its invasive nature. Many more felt the clinical environment of the dental surgery was daunting. A further three participants recognised the potential for passing on fear from parent to child and felt it necessary to manage their own fear in front of their children so as not to cause alarm. Some participants did this by asking their partners to take the child to their dental appointment. Seemingly, parents sought to protect their children from unpleasant feelings and experiences. One mother said,

“I’m scared of going to the dentist yeah, when they [her children] have to go to the dentist, when their appointments are due, I have to send them with their Dad cos I don’t want to go and be scared and for them to see me cos I don’t want them to worry that it’s something bad, like pass on my fear to them or something like that” (Participant 22, Mid SES)

Dental fear and anxiety of the parent or child was found to have a marked effect on child dental attendance behaviour. Participant 9, a mother in a focus group at a low SES school, explained that it was simply too difficult to persuade her three year old daughter to attend any type of health appointment including a dental one, because she would scream and throw a tantrum upon entering the waiting room. She also explained that she was a single
parent struggling to run the home and hold down shift work, she often worked nights and felt permanently exhausted.

“It’s hard you know, with them kids and I’m on me own and I have to go to work all hours and that. I can’t take her, well I can take her but she just starts screaming you know, and it’s like what’s the point cos they can’t see her like that” (Participant 9, Low SES)

Participant 9 felt that the behaviour exhibited by her child was too challenging to outweigh any benefit that may have been gained by forcing her to attend regular dental appointments. As a consequence, she would avoid bringing the child to the dentist unless a dental problem requiring immediate attention was to arise.

Another mother at a mid-range SES school reported that she was in a similar situation with her four year old daughter. She explained that her child absolutely refused to go to the dental practice and she felt that there was nothing that could be done to resolve the situation. She recognised that there would be a time in the future when her daughter would need treatment but that she would deal with that when necessary. This mother also reported that she felt that there was no point in trying to take her daughter to the dentist because she would not open her mouth and would only waste the dentist’s time. She explained,

“I mean I’ve had 15 minutes with ...[child], won’t even open her mouth, so I don’t even take her now cos she just will not open her mouth. If I said to her now, if I got home and said to [child] you’ve got a dentist appointment on Friday for the dentist, that’d be it, I wouldn’t even do it cos she wouldn’t go, she wouldn’t go ... Well she will yeah, and then she won’t open her teeth, her teeth are breaking and that, you know, they’re not and she won’t go, no she’s not interested and she’ll go hysterical if I mention the dentist, so cos I know when I get her in, when I get her there and they’ve never had a bad experience but I know when I get her there she’s not going to let him do anything so it’s no use me taking her cos it’s just wasting an appointment” (Participant 3, mid SES)
Trust, communication and environment

When the dental environment was viewed as ‘child unfriendly’, this was of particular concern to parents, resulting in their expressed need to protect their child. Trust in the competence of the dental staff was an important factor for the participants. Parents in the low SES focus groups and interviews agreed if they could not trust the child’s dentist with their care they would not take the child to regular appointments with that dentist even if no other option was available. One mother, interviewed at a low SES school explained,

“yeah they [her dental surgery] are rubbish, without sounding horrible, we don’t understand them, they don’t understand us because it’s an emergency dentist they have new people coming and going all the time and eh, ... [the] eldest, last time she went, they did a filling, they really hurt her so she will not go back, she needs a filling but she won’t go in, and because of her, my youngest won’t go” (Participant 36, low SES)

This mother consequently did not currently have a dentist that she was happy to take her children to and was in the process of searching for a new family dentist. She reported that she was finding this process very difficult and lacked the capacity to search any more extensively. She had become quite disgruntled and a little apathetic.

For the lower SES groups, the perceived need to protect their child from the dentist was stronger than the need for regular dental attendance at a dental surgery that did not match their expectations for dental care perceived to be sub-standard.

A parent at a mid-range SES school described how she did not have a dentist for either herself or her son and that they were both currently in need of dental treatment and continued care. Her son had recently suffered trauma to his mouth and she had taken him to an emergency out-of-hours dental appointment for treatment but he still did not have a regular dentist. Both mother and son had previously had a regular dentist but no longer
intended to visit this dental practice because she was unhappy with the quality of the treatment available and mistrusting of the motives of the dentists at the practice. She said about the dentist,

"we talk about the weather and we talk about where you’ve been on holiday and all the rest of it and he won’t you know, I don’t and he’ll do x-rays and everything like that, it’s almost as if he’s just ... going through the motions let’s get as many x-rays done, for proof of what I’ve done and seen with this patient, cos I presume that’s where they get the money from and then it’s like right, off you go see you in three month when I can fit you in to do a filling, I mean, I’ve been left with a hole in the back of my tooth for ... probably about 19 months and I won’t go back cos he’s just butchered [me] and I was in pain for about eight months so, I won’t go back there no and I won’t take my son there no". (Participant 28, mid SES range)

This participant went on to note that reported that she had heard similar stories regarding this same dental practice from other families that she knew. Through the discussion generated by this experience, the other participants recommended a nearby dentist and provided her with directions and contact details.

Knowledge about access and procedures and attitudes

Every focus group referred to a low level of awareness regarding dental services and facilities either among themselves or among people they knew.

In some cases knowledge about how to access appropriate dental care was so poor that parents would attempt to access care through general medical services. One participant at a mid SES range school who did not have a regular dentist for either herself or her child said about her own dental treatment seeking behaviour,

“I think probably go to the GP if I had tooth ache to be honest because I wouldn’t know where else to go. Or if it was really severe, probably A&E or something cos I wouldn’t know where else to go I don’t know” (Participant 28, mid SES)
Throughout the focus groups and interviews, it was immediately clear that many of the parents were unsure of how to obtain information about dental service access both for themselves and for their children. One mother at a focus group in the high range SES school remarked about the difficulties she had had in locating a dentist in her local area,

“I still can’t get a dentist where I live, I’ve lived there two years in September and I still can’t get a dentist, I’m still in [non-local location]” (Participant 5, high SES)

The participants were generally at a loss as to where specific information about dental services was or would be distributed and who was responsible for such information. One mother, during a focus group at a mid SES range school said,

“Yeah but there isn’t a standard list is there that Salford do of dentists is there?” (Participant 16, mid SES)

Low or poor levels of information concerning the locations, costing procedures, processes and standards of dental care and treatment as well as misinformation and a lack of consistency in the dental health advice given were common themes. Even parents who felt they had a satisfactory dentist for their own family sympathised with other parents who did not, one mother whose child attended a mid SES range primary school said,

“I don’t know if they’re looking in the right place or they just don’t know where to go, cos to be honest, I don’t think the information is out there, I don’t because if we didn’t have the dentist we... say if [my dentist] now was retiring and she said you’re going to go and have to get another dentist, I wouldn’t have a clue where to go if I’m honest. I wouldn’t know” (Participant 14, mid SES)

She went on to say,

“I just don’t think it’s, I don’t think it’s advertised enough, I don’t think that there’s enough information and I don’t think parents probably know where to look” (Participant 14, mid SES)
Other mother’s participating in the focus groups, which took place at the lower SES range school, seemed to feel even less able to locate information on dental access. Many simply believed that dentists in their areas were not accepting patients at all and when asked how they would go about finding a dentist for their child if they needed to, one participant replied,

“Well you wouldn’t have a clue would you?!” (Participant 9, low SES)

Registered parents cited that when accessing care for their children that they would take their child to their own dentist. In cases where there had been no availability at their own dentist, the child would be taken to a dentist near to their home or school and this was usually due to location, the practice being visible on a regularly taken route such as the school run or the weekly shopping trip. In illustrating this point, one participant said,

“Personally, I wouldn’t know, unless it was, I passed it on the way home, a dentist, I’ll be honest with you, you know, you just go to your nearest one don’t you? I suppose it’s not like your GP is it where you have a choice of GPs don’t you? Dentists, you do tend to go to the one that you’ve seen that’s close to your house” (Participant 11, mid SES).
2.3.3 Facilitators

Child friendly dental clinics encompassing both the demeanour of the health professionals and the physical environment of the clinic were discussed most frequently in terms of facilitators by the parents. Positive attitudes around dental health and dental care as well as effectively placed signposting were reported as facilitating factors by parents. Preparing the child for dental visits was carried out by some parents to control for anxiety and to disseminate positive attitudes to dental care. A summary of the facilitator themes and frequencies can be seen in Table 2.3. The facilitators have been grouped into three categories for the purposes of reporting: 1) environments and relationships with dental staff; 2) parental capacity and preparation; 3) signposting.

Table 2.3 Summary of facilitators to child dental attendance

<table>
<thead>
<tr>
<th>Facilitators (theme)</th>
<th>Reporting category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child friendly environment</td>
<td>Environments and relationships with dental staff</td>
</tr>
<tr>
<td>Good relationship with dentist – continuity, memory, personal service</td>
<td></td>
</tr>
<tr>
<td>Special opening hours, child only clinics</td>
<td></td>
</tr>
<tr>
<td>Cross over working – dental workers in schools</td>
<td></td>
</tr>
<tr>
<td>Social norms</td>
<td></td>
</tr>
<tr>
<td>Child compliance</td>
<td></td>
</tr>
<tr>
<td>Parental preparation</td>
<td>Parental capacity and preparation</td>
</tr>
<tr>
<td>High value placed on dental health</td>
<td></td>
</tr>
<tr>
<td>High personal capacity to access necessary information</td>
<td></td>
</tr>
<tr>
<td>Reminders</td>
<td>Signposting</td>
</tr>
<tr>
<td>NHS signposting</td>
<td></td>
</tr>
<tr>
<td>Community and individual level signposting</td>
<td></td>
</tr>
</tbody>
</table>
Environment and relationships with dental staff

Many of the participants appeared to understand dental care in different ways from general medical care. They felt that the care that they received for their children at their local GP surgery tended to be more focused on the children. They referred to baby clinics to emphasise this point and also commented that the relationships they build up with their GPs were stronger than those built with their dentists, one mother said,

“Everybody knows their GP don’t they, they don’t know their dentist do they?” (Participant 30, mid-SES)

The point however was made that this would only be beneficial if they were happy with the care provided by that dentist, a mother a high SES range school said,

“if you could get a dentist that was good with children all the time you’d want them all the time wouldn’t you” (Participant 20, high SES)

She then went on to wonder about the possibility of a dentist that specialised in child dental care and treatment,

“I don’t know why some dentists, like the large practices don’t have a particular child dentist do you know what I mean?” (Participant 20, high SES)

This was a theme that was common throughout a number of the focus groups but especially apparent among participants of the high and mid SES ranges. Parents noted that a child friendly environment served two functions, firstly to distract the child from the clinical environment and secondly to show that children were welcomed in the surgery and would be cared for appropriately. Twelve participants remarked on the need for dental surgeries to be more targeted towards children.
“Yeah, you go to your baby clinic don’t you and things like that ... so why can’t you go to your child’s dental clinic?” (Participant 1, mid SES)

This was a theme that was common throughout a number of the focus groups but especially apparent among the high SES and mid SES range participants. Having a ‘friendly dental environment’ to many parents meant having children’s toys scattered around, bright colours, pictures and games to distract the children as they waited.

“I think it needs to be more brighter, it needs to be really for children in the dentists” (Participant 21, high SES)

“I think it has to be child friendly doesn’t it. Cos I know when I was a kid I’d sit there in the dentist and I was terrified” (Participant 7, low SES)

However as can be seen in this example given by participant 26 below, at a high level SES focus group, as she referred to child friendly dental environments, it is not simply what the environment looks like that is key but how the dentist acts towards the child and parent.

“Well one dentist that I went to was looking at him like oh he better not break anything and like he’d go destroy the room but sometimes they want to look at the chair and start blocking the mirror and look at light and this” (Participant 26, high SES)

This mother felt that her child was curious about the new environment and that he would have benefitted from the interplay with it, she then went on to talk about his experience at another dentist,

“and he was like here you are get some gloves mate or get a mask on, like doing all that and he was fine with him but other dentists... and you know if they sort of let them do that bit and got used to the atmosphere in the room they would get further and it would be probably twice as quick cos they wouldn’t have to waste time” (Participant 26, high SES)

The behaviour of the dentist towards the child seemed a key factor in facilitating dental treatment. One mother described her son’s experience with a dental hygienist, who specialised in treating children,
“When I went to the dentist I used to take [my child] with me and when we went to the dentist he wouldn’t sit in the chair, wouldn’t open his mouth, well he’d open his mouth but he cry loads ... when we went there [to see the hygienist] she said ... ‘we’ll wait to start treatment, in his own time’... So he went and she didn’t do it straight away, she introduced him to the chair, she introduced him to the little drill and the suction and then did the work, she was absolutely fantastic, brilliant, brilliant she was” (Participant 32, low SES)

The parents generally felt that the principle benefit of a child friendly environment would be a reduction in child dental anxiety, meaning an easier and quicker appointment for both the child and the dentist. They felt that by improving the dental environment, incidences of child tantrums that may act as a barrier to regular attendance could be reduced. A mother at a mid SES school said about child friendly dental clinics,

“And there might be less tantrums, cos some parents just don’t want to do it because of the tantrums” (Participant 1, mid SES)

Another mother in the same focus group said in agreement,

“Yes cos if they [the parent] don’t care enough about it to you know, the tantrum would just put them off” (Participant 17, mid SES)

Nine participants referred to the clinical nature of the dental environment as a possible cause of child anxiety because it was not ‘child friendly’. At the high SES focus group, all agreed that a dentist known to be ‘good with children’ would be in high demand. Trust appeared to be important for parents. Participant 14 established a trusting relationship with her dentist based on her own treatment and then felt that the dentist would take similar good care of her children.

“I trusted [the dentist with the children] because she’s been so good with me I just felt really comfortable with her” (Participant 14, mid SES)

Many of the parents talked about the importance of a good relationship with their child’s dentist, and the frustration they felt when they did not see the same dentist at each visit.
Parents simply wanted a regular dentist who was good with children and who provided high quality care. Child friendly dentists were thus talked about in conjunction with child friendly environments.

**Parental capacity and preparation**

Some parents were able to present positive behavioural examples around being in a dental surgery as well as being examined or having treatment depending on a number of factors. Parents without anxiety themselves were able to achieve this relatively easily whereas those suffering from anxiety required the ability to overcome their own difficulties, at least on the surface level.

> “you don’t want the children to be hurt, you have to make sure the kids are happy, if you’re going in and getting it done and coming out smiling, your children are going to think it’s ok too” (participant 21, high SES)

> “I always try and not let my son see I’m frightened of it because I always try and let him not be frightened of it” (participant 14, mid SES)

Where anxiety could not be overcome, some parents explained that someone else would accompany the child to the dentist.

Participant 14 dealt with child dental anxiety by pre-empting it,

> “I’ve always just made sure that my kids have never been scared and that’s why I’ve took them every six months cos I didn’t want them having that experience I had”. (Participant 14, mid SES)

Parents who recognised the potential for child dental anxiety, possibly because they themselves had been dentally anxious as a child, felt the need to prepare their child before the visit. Participant 7, a mother in a focus group at a low SES range school was very careful
to prepare her two year old son before a dental visit, not because he was anxious but because she wanted to prevent dental anxiety. She commented,

“when I first took him it was all about letting him sit on the chair and not be scared of the environment and the dentist is really good with him and so he’s fine and he knows that it’s an aspect of his health that I look after so I do promote it with him cos I am conscious of it and I take it really seriously” (Participant 7, low SES)

This particular mother also spoke about her own dental experiences as a child, she explained that she had suffered dental fear and had a high level of treatment, having had most of her deciduous teeth removed at a young age. However it was her awareness of health issues that ensured that she placed a high degree of importance on the dental health of her son. She also used her own bad experiences with dental health to motivate this importance as well as to demonstrate to her son what the consequences of poor oral health could be.

**Sign posting**

It was apparent from discussions with a number of participants that there was an expectation that NHS health care workers should be able to direct patients toward dental care for children. This was especially the case for those workers coming into contact with children such as doctors and health visitors. Eleven participants talked about general medical practices as places they would expect to find information about accessing dentists. Health visitors, as sources of dental access information, were mentioned by five of the participants. Some were confused by the idea of dental access information not being available outside a medical or dental setting, one mother remarked when asked about this subject,

“To be honest with you I wouldn’t go [to a library or community centre to find dental access information] no” (Participant 4, low SES)
Schools were considered as suitable locations for dental access information by five of the focus groups. This was generally in the interests of targeting children’s parents and that schools were sources of other health information. One mother commented on the inclusive nature of schools for targeting children, who might otherwise miss out on contact with health professionals,

“\textit{I think school would be a good place to start right from nursery, cos some children might come to nursery at the age of three and not even be registered with a dentist, they might have not even seen a health visitor for a one or even two year check}” (Participant 7, low SES)

Interestingly a number of parents referred to cross working between schools and health professionals, one mother said,

“\textit{I think they should have more in schools, have a dental nurse in every school}” (Participant 36, low SES)

Another mother referred to cross working between doctors and dentists in order to provide patients with appropriate access information. She said,

“\textit{[they’re] all part of the NHS so they should be working together you know? I don’t see why that can’t happen}” (participant 10, mid SES)

Here, participant 10 refers to an expectation that NHS staff should have the necessary knowledge and tools to effectively sign post patients in the right direction for dental access.
2.4 Discussion

The objective of this qualitative study was to identify the barriers and facilitators to dental attendance for young children living in an area of NW England. The main barriers identified were child and parent anxiety, lack of awareness of services, attitudes around dental health and attendance and lack of trust. Facilitators were found to be child friendly dental staff and environments, effective signposting and parental preparation. The parent’s own experiences of dental services appeared to be an active component in their decision making around their child’s regular attendance.

In an in depth interview study, which also used Framework analysis, Smith and Freeman (2010) report parents own dental avoidance behaviour to be linked to negative experiences with treatment and consequent anxiety. This avoidance behaviour was repeated through their actions around their children’s dental care. The authors of this study found that parents delayed dental treatment until the child’s pain level made the treatment unavoidable. It was this behaviour, they reported, which mirrored the parent’s dental avoidance patterns. Smith and Freeman (2010) recruited participants from a dental hospital while attending for tooth extraction under general anaesthetic, the sample was therefore of a specific clinical population. In contrast the present study recruited from the community providing data on a sample of participants with a mixed history of asymptomatic and symptomatic attendance. This limits the comparability between the two studies.

Many of the parents in the present study were able to recall negative dental experiences from their childhood in graphic detail often referring to the smell of the dental surgeries and remarking in four cases that the experience remained with them. Other experiences recalled were around actual treatment, which was often remembered as traumatic. This study did
not record levels of dental anxiety or traumatic symptoms among participants, as this was not the focus. While these experiences must have impacted upon knowledge, attitude and awareness in their own right, they may also have affected the impetus to gather or absorb information around dental health and care. Previous studies have shown that negative dental experiences can continue to affect dental health related behaviours for decades (Armfield, Stewart, & Spencer, 2007; de Jongh, Aartman, & Brand, 2003).

There is clear evidence of a link between trauma experience and anxiety, although trauma is not thought to be the variable with the greatest explanatory power (Armfield, 2010). A descriptive study comparing anxious patients with non-anxious patients reported that although negative experiences were similar in both groups, the attached negative memories were triggered by dental visits most often in anxious patients (de Jongh et al., 2003). Although this study did not control for the differences in psychological profiles between the groups given its qualitative focus, results suggest an explanation of the way in which avoidance behaviour may be maintained. There is evidence to suggest there is a significant association between dental attendance in children and their parents. In a cohort study of pre-school children, those whose parents had visited the dentist themselves had 6.12 the odds (95%CI 3.58-10.44) of attending the dentist than those whose parents did not regularly attend (Leroy et al., 2013).

Amin and Harrison (2009), in a grounded theory study to understand parental behaviours for their children undergoing general anaesthetic (GA) extractions found that all parents in their study “expressed a clear desire to do what was best for their child” (p. 124) following the GA. This shows that despite their children being in need of specialist dental surgery, parents’ motivations for health behaviour related to their children were driven by a desire to care for
their child as best they could. This was a cross sectional study and reported on parent’s motivations around the time of treatment. This can be understood within the context of Attachment theory (Bowlby, 1970), which describes the emotional bond between parent and child. Attachment develops when the child is an infant and remains throughout development. Secure attachment (considered optimal), is characterised by a psychological tie between parent and child. Bowlby stipulates that the infant-mother attachment has a specific evolutionary function to protect the child.

Attachment theory may help toward explaining the link between parent’s own dental avoidance behaviour and their actions around their children’s dental care. It is suggested that, as a result of the parent-child bond, parents seek to protect their children and one consequence of this is that they may prevent their child from being subjected to what is perceived to be frightening and anxiety provoking dental treatment. Dental procedures in young children can be stressful for both the parent and child. In this way, parent’s behaviour can be seen to be motivated by a desire to protect their child and this is something that can be seen across the sample of parents reported in the present study. Freeman, has previously commented that avoidance may be a culmination of the parent’s own anxiety and their worry about their child’s distress (1999). Through seeking to protect their child, the parent is framing the dental appointment as the threat rather than the risk of their child developing tooth decay. This comment appears to be based on expert opinion and clinical experience and there are as yet few empirical studies which confirm this. Further research is needed.

Much of the existing literature relating to personal, rather than structural barriers to dental care refers to low perception of need (Baker, 2009; Freeman, 1999; Guay, 2004; Gulliford et al., 2002). Many report that parents do not understand the severity or likelihood to which
their child is at risk of developing tooth decay. If this were the case, raising awareness of the issue should be enough to engage parents with child dental services. However, it is known that knowledge increase, although necessary for behavioural change has an overall low impact on behaviour if used in isolation to other techniques (Cooper et al., 2013; Kay & Locker, 1996, 1998). Data collected in this present study suggests that parents have an awareness of the risk of tooth decay in their children but that they also have perceptions about risk to their child as a result of attending a dental appointment. Now they are faced with a tension, that they either subject their child to a here and now risk, something with visible, temporal and spatial concreteness or that they do not and may be subjecting their child to a risk which is not certain in any physical sense and has no concrete temporal properties. Festinger’s theory of Cognitive Dissonance states that where two pieces of information are psychologically inconsistent, an individual may seek consistency by changing their thoughts, feelings or behaviours (1962). Protecting their child and taking the child to the dentist (depending on perception of this experience), may be psychologically inconsistent for some parents.

Regardless of their behaviours around their child’s dental care, parents’ actions were motivated by protection. This motivation could result in opposing behaviours. Ultimately, parents either engaged in regular attendance for their child or they did not. Not taking the child on a regular basis could constitute intermittent or symptomatic attendance or indeed no contact with dental services at all. Engagement with child dental services was tied to the parent’s need to protect their child. Those who engaged in child dental services on a regular basis protected their child by following best practice advice around caring for children’s teeth. For these parents, the best way to protect their child from traumatic dental
experiences and anxiety was to ensure that the child had optimum oral health thus eliminating the need for treatment. Parents who did not engage with child dental services regularly were motivated to do so to protect their child from frightening, potentially painful experiences which they understood to evoke feelings of anxiety.

Among the participants in this study, two spoke of their own difficulties in dealing with difficult child behaviours in the dental clinic. Feeling unable to cope with these, they saw little value in taking these children to see the dentist. This can be understood within the context of low PSE for dealing with child behaviour. A qualitative study of another child oral health behaviour, tooth brushing, found that some parents with low PSE were unable to cope with brushing their child’s teeth due to problems with the child’s temperament (Amin & Harrison, 2009). Similar findings were echoed in another qualitative study (Huebner & Riedy, 2010). In the present study, participants generally noted child tantrums in the dental clinic as a potential barrier for some parents and recommended child friendly environments as a solution to appease the child and help to alleviate this difficulty for parents.

While parent’s behaviour for their children was driven by their motivations, it was too shaped by their attitudes. Parents with positive attitudes towards dental care were more likely to ‘protect’ their child by keeping up with regular dental appointments. Whereas parents who had negative overall attitudes to dental care were more likely to engage in avoidance behaviours. This is exampled in the work of Milgrom and colleagues (1998), who have reported that child utilisation of dental services is affected by parent’s expectation of care quality. The parent’s motivation to protect their child means they will not subject that child to substandard care. Expectations of care quality are formed from the parents own experience of dental services (Pine et al., 2004; Smith & Freeman, 2010). Attitude and beliefs
are likely to have been influenced by past experience and anxiety. Parental attitude towards
dental care is a significant factor with respect to their children’s dental health (Adair, Pine,
Burnside, et al., 2004; Arnrup, Berggren, Broberg, et al., 2002) and had previously been
reported to be significant for child dental attendance (Kelly et al., 2005; Milgrom et al.,
1998).

Kelly and colleagues (2005) found that parents who did not access regular dental care for
their children viewed dental treatment to be important for aesthetic reasons or necessary in
response to pain, rather than in terms of preventive care. Parents who had low outcome
expectancies of dental care for their children placed less value on it, exhibiting a more
negative overall attitude to child dental care. This appeared to be the case for preventive
care, potentially due to low risk perception, but not for emergency treatment. In the event
that their child developed dental pain, the parent then saw that the best way to protect their
child was to manage the problem with symptomatic dental attendance as was the case in
the aforementioned Kelly et al study. This could be seen to be indicative of social norms that
have evolved from the biomedical model of dentistry which Watt (2007) refers to which may
encourage cultural attitudes that give preference to treatment over prevention.

Previous research (Broder, Russell, Catapano, & Reisine, 2002) highlighted poor staff
demeanour as a significant barrier to compliance with child dental care, this study also cited
a child friendly environment as a facilitating factor. Nowak and Casamassimo (2002)
comment that a child friendly environment may help to reduce child stress and thus ease
parental anxiety. When viewed within the context of the findings presented here, it is
proposed that the physical environment of the clinic is an outward sign and an instant visual
signifier that children are welcome, cared for and ultimately safe. Parents, motivated by the
need to protect their child, may be likely to comply with dental care when they feel assured that their child is not in physical or unnecessary emotional danger. On this basis a relationship between the dental health professional and the family may more easily develop.

This study was based on a small sample of parents in North West England (n=36), the qualitative nature of which, together with the self-selection bias to which focus groups are subject, limits the generalisability of these results to other populations and settings. However, in this exploratory study, it was not the intention to produce findings that could be applied to different settings but to gain a rich insight into the motivations, attitudes and beliefs of parents in the city of study in order to aid the development of an appropriate oral health promotion intervention that focuses on dental attendance as well as relevant oral health behaviours.

Participants were selected from a sampling frame of schools and based on SES. The literature around dental health status suggests that one of the most significant associated variables in terms of child dental health, as well as access to services for this age group is SES. The most comprehensive measure available in terms of SES is the Index of Multiple Deprivation 2007 (IMD, 2007), this measure was calculated by ONS based on seven domains of deprivation indicators at lower super output area (LSOA) level across England and is the most up to date measure currently available. However the post code data of the families attending schools was not available, meaning that if this classification was based on the physical location of the school, the assumption that the children attending lived in the area surrounding the school would have been made, resultantly it was not possible to use this measure as a primary indicator.
Instead, a proxy measured was substituted. Families are entitled to free school meals for their children if their total annual income does not exceed £16,190. Percentage of eligibility for free school meals (%FSM) therefore is an indicator of family income. Data referring to the percentage %FSM was obtained via the Freedom of Information Act (2000) and employed as a proxy measure for SES. While it is understood that there are various concerns regarding the accuracy of %FSM as a proxy for SES (Hobbs & Vignoles, 2007; Kounali, Robinson, Goldstein, & Lauder, n.d.; Shuttleworth, 1995), it remains that %FSM is the best available measure and therefore the most appropriate by default. It is however important to keep in mind the limitations of using %FSM in this way due to its instability and tendency to underestimate deprivation levels (Kounali, Robinson, Goldstein, et al., working paper).

The findings presented here, however contribute to the literature around the complex nature of parental behaviour regarding their children’s dental attendance patterns. Qualitative studies of access to dental care are not abundant (Gregory et al., 2007). This study further highlights that access to care for children is not always a simple process and cannot be solved entirely through service-based initiatives. Interventions aimed at improving access to child services should appeal to the parent’s motivation to protect their child by incorporating child friendly tactics easing parental anxiety thus encouraging compliance with care. Interventions should also target attitudes to preventive dental care and PSE in order to improve parent’s outcome expectancies of routine child dental encounters.
2.5 Conclusions

Parents’ past experiences of dental care provide them with a basis for framing their attitude to their children’s dental care. Ultimately parents are motivated by their need to protect their children; attitude to dental care and PSE determines whether protective behaviour will result in compliance with routine dental check-ups or in avoidance. This attitude is integral acting either as a barrier to or facilitator of child dental attendance.

Components of attitude include risk perception and outcome expectancies. Risk perception may be improved through raising awareness but will not necessarily result in behaviour change. Outcome expectancies of child dental encounters must be improved among parents to improve compliance with regular child dental care. This may be achieved through child friendly environments and professional demeanour which improve the parent’s confidence in child appropriate dental care thus increasing parental perception of control for clinical encounters. Targeting PSE directly may also be an option. This may enable development of communication, relationships and trust in dental practitioners.
2.6 Next steps

The evidence presented in this study suggests that psychosocial factors are related to the uptake and regular use of child dental services. An intervention to affect these factors has the potential to impact upon dental attendance and other oral health behaviours. An intervention of this nature must be accepted by the population, that is to say, it must appeal to parents and children alike. Appeal increases the probability that the intervention would be used. The parents in this study commented frequently on child friendly approaches to dental health care, this type of approach is inclusive of children and shows that the intervention has been developed with them in mind, which is important for parents who are focused on looking after and protecting their child. A child friendly approach, such as a story, therefore has the potential to be popular among this population.

Stories have been used for interventions involving children in the area of special education. Social stories can be read to children with varied levels of autism and Asperger syndrome and are aimed at changing patterns of social behaviour. Stories are often highly descriptive of environmental cues that are likely to be encountered by the children. Although empirical evidence is limited, it does indicate that such interventions can have promising effects (Barry & Burliew, 2004).

Stories have been used to convey healthy eating messages to children (Bellows et al., 2013; Byrne & Nitzke, 2002; Lawatsch, 1990) and in potentially more interactive ways including television programmes and video games. ‘Sesame Street’, a North American children’s television show developed in the late 1960s, was one of the first television programmes designed to have an educational impact on children (Pecora, Murray, & Wartella, 2007). Research in the 1970s, showed the programme to have positive effects on children’s
learning skills and attitudes to learning (Bogatz & Ball, 1971) and on social behaviour (Coats, Ellison Pusser, & Goodman, 1976). Although doubt was raised around how effective the programme had been for socially disadvantaged children (Cook, 1975). More recent research has focused on new technologies including games (e.g. Fisch, 2005).

Stories are also used in interventions to prepare children for clinical procedures such as venepuncture or operations (Kolk, van Hoof, & Fiedeldij Dop, 2000; Sale, Burgmeier, & Schmidt, 1988). These types of interventions use cognitive behavioural strategies to coach children (and their parents) around expectations and coping. Preparation information is given in a variety of ways including through stories read to children by their parents. This indicates a story may potentially be an appropriate medium for a psychosocial intervention related to a clinical environment.
Chapter 3

A review and analysis of children’s dental storybooks
3.1 Overview

In order to fully appreciate the impact that a health behaviour change intervention might have, if delivered using a storybook approach, it was decided to analyse the content of those dental related children’s storybooks currently available in the UK. A search was conducted in as systematic a way possible and the nine books identified were content analysed for oral health messages (Department of Health, 2007), change techniques (Abraham & Michie, 2008a) and preparation techniques (LeRoy et al., 2003).

Stories

Stories have long been used to convey information across time and places and are one way that people understand each other, their environments and social worlds (Alderfer et al., 2008; Feldman, 2004; Snowden, 1999; Wilson & Short, 2011). Fairy tales, often passed down through generations, may be thought of as ‘scripts’ (Rice, 2000), which construct cultural meanings and roles about acceptable behaviour, for example gender roles (Parsons, 2004; Rice, 2000). Stories can help to give cognitive and emotional meaning to experiences (Roberts, 2000). Across the social sciences, stories feature in qualitative research methodology whereby people use storytelling as a way in which to explain or relive their lives and experiences (Frank, 2002; Georgakopoulou, 2006; Sandelowski, 1991; Woolfe & Dryden, 1996). Storytelling is thus an important part of sense-making (Boje, 1991; Koenig Kellas & Trees, 2006). This has particular relevance for therapeutic applications (McMahon, Murray, & Simpson, 2012; Redshaw, Wilson, Scarfe, & Dengler, 2011; Tuck et al., 2012). The use of children’s storybooks for purposes other than (or alongside) entertainment has been investigated in a variety of fields. Stories are an established educational strategy (Haigh
& Hardy, 2011). Storybooks have been explored in terms of their role in child development related to language, speech and literacy (Abdul & Sindh, 2010; Asmini, 2012; Senechal, LeFevre, Thomas, & Daley, 1998), and even in the establishment of ‘ideal affect’ - ultimately the child’s perception of ‘happiness’ (Tsai, Louie, Chen, & Uchida, 2007). Stories, along with songs in African culture have been used for many years to communicate necessary information. In a study conducted in Uganda, Silver (2001) describes a community capacity building health promotion intervention in which health messages relevant to pre-natal mothers were communicated using a song based on current advice. Silver emphasises the use of both songs and storytelling for health communication because of its universal accessibility and suitability for building community health capacity and low cost (2001).

Many children’s books, whether for entertainment or educational purposes or both, deal with everyday situations such as playing with friends and meeting new people. Moral messages, demonstrating commonly held cultural values are often featured and ideal personality traits portrayed, some more subtly than others. For example, the tale of the hare and the tortoise is a short story with a strong morale, ‘slow and steady wins the race’ in which the tortoise’s hard work and persistence pays off and the hare is punished in losing the race due to his arrogance and laziness. An article in the New York Times in 2007 written by children’s author Emily Jenkins (Jenkins, 2007), discussed the relative success of conveying moral messages through stories. She put forward that those books in which “the moral is conveyed with delicacy and complexity” delivered moral messages in the strongest way. By this she meant that by conveying a moral message in an obvious or blatant way, a story lost its interest, it became boring. It would therefore not become a story to read time
and time again, as so many loved children’s books are. This is because this repetition is driven by the interest in the layers of meaning in stories, not just by a single moral message.

While only an assertion, it is interesting to think about why it may be the case. ‘Delicately’ delivered messages may most closely resonate with real life situations; it may merely be that children possess enough critical awareness to guess the book’s intentions which may undermine the delivery of the message. “Children are not simply receivers of messages; they are actively involved in the production of their own understanding of the world” (Tormey, 1999, p. 78). Children’s understanding of the world and presumably their interpretation of information is dependent on their developmental stage (Piaget, 1964).

**Stories for health related outcomes**

In recent years, storybooks have emerged as therapeutic tools in child related interventions such as ‘social stories’ (e.g. Cihak, Kildare, Smith, McMahon, & Quinn-Brown, 2012; Crozier & Tincani, 2007; Iskander & Rosales, 2013; Kagohara et al., 2012; Reynhout & Carter, 2009; Test, Richter, Knight, & Spooner, 2010). In this context, social stories aim to introduce everyday situations, often to children with developmental conditions including autism, Asperger syndrome and general learning disabilities. Targeted behaviours range from routine habits such as hand washing (Hagiwara & Myles, 1999) to turn taking in conversations and communication skills (Thiemann & Goldstein, 2001) to shouting, inappropriate and aggressive behaviours (Haggerty, Black, & Smith, 2005; Quilty, 2007). The stories aim to introduce situations and prepare children to form appropriate behavioural responses when in similar situations themselves. That is to say behaviour is modelled
through pictorial stories. Thus, this type of story, in one respect, bridges fiction and reality and attempt to impact upon real world behaviour.

A further example of stories being used for therapeutic purposes can be found in the literature surrounding the preparation of children for surgical or invasive procedures including venepuncture (blood taking) and operations. In particular, a variety of interventions have been tested for reducing distress or anxiety in children undergoing procedures involving needles.

A Cochrane review (Uman, Chambers, Mcgrath, & Kisely, 2010) looking at psychological interventions for needle-related procedural pain and distress in children found that distraction techniques were effective at reducing self-reported pain. Two of the included studies utilised stories as part of the distraction intervention (Fanurik, Koh, & Schmitz, 2010; Kleiber, Craft-Rosenberg, & Harper, 2001), however it is important to note these stories were being used at the time of the procedure and were unrelated in terms of content, to what was actually taking place. Distraction techniques were found to be effective in reducing the child’s feelings of pain. The Cochrane review also found sufficient evidence to recommend the use of information and preparation interventions combined with cognitive-behavioural interventions including components such as parent training or coaching.

A study which used a combined behavioural and medical intervention delivered by the child’s parent to prepare them for venepuncture procedures, (Kolk, van Hoof & Fiedeldij Dop, 2000), found that prepared children were observed to be less distressed than non-prepared children. The intervention involved two short and simple stories being read to the child. The first was about the effects of a numbing anaesthetic cream to be applied to the child’s skin and was read to the child shortly before application. The second story was read,
again by the parent, while the cream was taking effect and this story focused on the procedure that would follow. While this was a small study (n=14 in preparation group; n=17 in control group), the prepared children were significantly less distressed than the control children (mean difference 0.95, 95%CI 0.20-1.70). Distress was measured using the Gorning Distress Scale (Humphrey, Boon, van Linden van den Heuvell, & van de Wiel, 1992), which measures distress on a 5-point scale, the lower the score, the calmer the respondent.

Parents, in both conditions, were instructed to sit out of the child’s sight (child sat on parent’s knee facing away from them) to minimise the effect of parental distraction in both groups. Parental active involvement during the procedure in this study may have played an important role. These parents were willing and able to prepare their children having been given instructions and support. Parent involvement as a result of instructing or coaching (by medical or support staff) may be an important component for improving the effectiveness of preparation interventions (Blount, Davis, Powers, & Roberts, 1991; Manne et al., 1990; Taylor, Sellick, & Greenwood, 2011).

Additionally, stories read by parents to their children while waiting for a procedure may help to distract children from environment-inducing anxiety. However stories may have the capacity to go further, offering potential for delivering messages and for modelling behaviour (demonstrated through the use of social stories). Through communicating a story of a relatable experience, expected behaviours (of others) and appropriate behaviours (of the child) may be modelled and specific instruction might be provided. Furthermore, information and behavioural techniques may be conveyed which could in theory, help to
increase self-efficacy, an important variable in the prevention of childhood tooth decay (de Silva-Sanigorski et al., 2013).

Furthermore, a study conducted in a hospital in Kuwait (Harrison, 1991) utilised a storybook to prepare children for routine blood sampling procedures. The story aimed to increase the child’s knowledge and coping strategies and to reduce the associated fear and stress. A convenience sample of 100, eight year old children was recruited and randomly divided into either the intervention or control group. Psychometric and observational data consistently showed that children in the intervention group were less alarmed or upset by the procedure. Children in the intervention group in this study had their parent present, whereas children in the control group did not. Although the study author claimed that this component did not make a significant difference to the results, parental accompaniment is a recognised coping strategy for children undergoing medical procedures (LeRoy et al., 2003). It may be relevant that the study by Harrison (1991) was published some time ago and there was a school of thought that parental accompaniment may lead to distress (for example, if parents showed signs of discomfort) (Frank, Blount, Smith, Manimala, & Martin, 1995).

More recently, an RCT conducted in Belgium with an immigrant population (Felder-Puig et al., 2003) used a storybook to prepare children aged between two and 10 years for tonsillectomy and/or adenoidectomy. The storybook depicted the character (a rabbit) being unwell and in need of surgery, meeting the medical staff, the procedures themselves, all the way up to discharge from hospital. The book was given to the intervention group at the pre-operative procedure and intended to be read by both parent and child together.

The child’s feelings of distress were measured using a short checklist (completed by the parent and based on their observation) and parental anxiety recorded using the State and
Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The data showed parents in the intervention group recorded less state anxiety and their children less distress, though in terms of absolute differences between intervention and control, variation was not large. Parent anxiety was significantly lower in the prepared parents the night before surgery (mean difference 3.86, 95%CI 1.61-6.11) but not the night after surgery (mean difference 0.51, 95%CI -1.66-2.86). The parent observed child checklist, showed some significant differences in parents reporting their child as ‘anxious’, ‘irritable’, ‘helpless’ and ‘well-tempered’ in favour of the experimental group. However, this non-validated measure is highly subjective, using broad terms such as ‘friendly’ and ‘annoyed’ and was recorded by the parents who were part of the experiment and aware of the child’s study condition. These factors put into serious doubt the findings around child distress based on this intervention either one way or the other. Added to this, the time between receiving the intervention and undergoing surgery varied in this study and there was no way of knowing how the books were used in the homes (i.e. frequency).

**Dental health and behaviour**

Interventions delivered using stories have been used to a lesser extent with children undergoing dental treatment or dental examinations. A small study (n=4) investigated the utility of a distraction intervention which included positive reinforcement but found mixed results (Stark et al., 1989) whereby observational measures showed that although there was an initial improvement in the child’s behaviour, this was not maintained at subsequent visits.

More recently, a study in Iran (Aminabadi, Vafaei, Erfanparast, Oskouei, & Jamali, 2011) examined the effect of reading a short story about going to the dentist to six and seven year
old children on their perceived pain and anxiety. Eighty children requiring treatment for diseased mandibular primary molars were randomly assigned to either the intervention or control groups in this triple blind RCT. Children had no prior dental experiences or anxiety disorders. The intervention group were read ‘Freddie Visits the Dentist’, a storybook by Nicola Smee while the control book was a story about visiting a barbershop. The reading of the book occurred pre appointment. Pain was measured using a standardised observational instrument (Sound Eye and Motor scale; SEM) and anxiety using the Modified Child Dental Anxiety Scale (MCDAS). Scores for both outcomes significantly favoured the intervention indicating that the storybook (Freddie Visit’s the Dentist) was successful in ‘preparing’ children for dental treatment thus reducing their associated pain and anxiety.

The authors offer that the use of stories for this purpose taps into social learning theory and helps to familiarise children with a new environment which in turn helps them to feel more comfortable about the procedure. It is posited in social learning theory, that people learn though observations in the environment and witnessing the behaviours of other people (modelling) (Bandura, 1977a). Thus through exposure to the intervention, children may observe a behaviour that is successfully carried out and learn from this.

Presently, Aminabadi and colleagues’ (2011) study is the only one that is reported in the literature which uses children’s stories as an intervention in dentistry. There do not appear to be any studies which have investigated children’s stories as a means to communicate oral health promotion.

Research detailing interventions that change dental health related behaviour have tended to focus primarily on health education which merely provides information on dental health but not behaviour change. Such interventions sometimes show short term success but this is
rarely maintained (Adair et al., 2013; Blinkhorn, Downer, Mackie, & Bleasdale, 1981; Cooper et al., 2013; Kay & Locker, 1996, 1998). By only providing information, the other determinants of behaviour (e.g. self-efficacy) remain unaffected, thus behaviour is not changed in the longer term (Bandura, 2004).

The key to utilising a children’s story as health promotion is to convey more than merely information. Writing from the social cognitive perspective grounded in theory, Bandura (2004) reiterates that educational efforts alone have little impact on health improvement in younger people. While children may receive factual information about health, they are not provided with the coping skills and self-efficacy necessary to enact the desired behaviours (Bandura, 2004). Stories therefore, if used simply to communicate factual information about health, are likely to make only a negligible impact on behaviour (unless used by someone already having high self-efficacy, lacking only knowledge). Bandura details that health promotion models for children must contain the following:

- Factual information about health, linking behaviour and health and informing of health risks and the benefits of behavioural change.
- Social and self-management skills so that children are able to translate the information into positive action, rather than ignoring it because they are unable to cope.
- Bolstering self-efficacy so there is belief in their ability to carry out the behaviour and overcome obstacles
- Social supports for change (Bandura, 2004, p. 158)

Perceived self-efficacy may be increased through four sources (Bandura, 1997; Luszczynska & Schwarzer, 2005). Through personal achievements where success is attributed to the person as opposed to an outside influence; through social comparison whereby a relatable character is seen undertaking a similarly relatable task with success; through persuasion by a trusted person (e.g. medical practitioner; teacher); through engaging in an experience where
nothing ‘bad’ happens, thereby bolstering feelings of capability (Luszczynska & Schwarzer, 2005). In terms of health communications (from mass communications to the use of storybooks), social comparison and persuasion are possible sources through which an individual’s self-efficacy may be affected (Luszczynska & Schwarzer, 2005). Additionally, heightened self-efficacy experienced at the time a behaviour is being enacted can produce positive emotions, which creates a positive state countering feelings of anxiety (Luszczynska & Schwarzer, 2005). Positive emotional states can help to facilitate behaviour, it may therefore be important to avoid unnecessary negative connotations. For example when portraying a dental visit, negative situations such as use of the dental drill may be unhelpful (particularly because in routine care, the necessity for treatment is in the minority, rather than the majority of cases).

For these components to be accessible to children and acceptable to their parents, they must be delivered in appropriate ways. That is to say, such communications should be child friendly (pleasant and entertaining) and suitable for the child’s developmental stage (Beech, Klesges, & Kumanyika, 2003). Just as text is altered for children of different ages, the components in child focused interventions relating to self-efficacy and social support need to be pitched at the appropriate level. McGraw (1994) identifies child development theories that may be of relevance for understanding how best to prepare children for clinical procedures. Behavioural models may inform relevant techniques such as positive reinforcement and how to enable parents to teach children positive behaviours for clinical procedures (Chen, Joseph, & Zeltzer, 2000; Manne et al., 1990).

Children’s understanding of what is happening to them throughout clinical procedures may be framed within Cognitive theories such as Piaget’s theory of intellectual Development
Piaget theorised that children between the ages of two and seven years are in the ‘pre-operational’ period. During this period, children start to understand the use of symbols for objects (for example they may start to play imaginary games), meaning they may be able to associate with non-human characters in cartoons and storybooks. Children at this stage tend to attribute life and emotion to inanimate objects. Piaget also put forward that pre-operational children could not manipulate information. Using a classic example, children will think that a tall narrow glass will hold more liquid than in a short wide glass, even though the volume is the same (McGraw, 1994). Other dominant theories of child development have placed greater emphasis on social and cultural environments. Vygotsky, (1978) theorised that children’s learning is very much dependent on interaction with those who know more than they do. In this way, learning aids development.

Bandura’s social cognitive theory (1986) put forward that a child’s development is aided by social observations of those around them. This has been termed modelling or observational learning. Bandura’s famous experiment known as the ‘Bobo doll’ involves children observing an adult being either aggressive or calm with the Bobo doll. Children who observed aggressive behaviour, when later given the chance to play with the doll, exhibited aggressive behaviour themselves, conversely those who observed calm behaviour exhibited calm behaviour themselves (Bandura, Ross, & Ross, 1961, 1963).

A child’s social environment may therefore be very important to both learning and development. Learning may be bolstered by interaction with caregivers, for example through reading stories together concerning everyday situations, related conversations may occur through which the child’s questions can be encouraged and answered. Children may also develop their understandings of how to behave through the observation of how
characters in stories behave as well as through the actions of their parents and others in their immediate environment (Bronfenbrenner, 1993; Cochran & Brassard, 1979; Meadows, 2012).

Storybooks as a medium through which to promote health behaviours may represent a developmentally appropriate way of communicating health information to children. While it is often the parent who is responsible for the child’s health, child friendly methods may be more acceptable to parents (Chapter 2) and could therefore improve parents’ use of them. Additionally, because books for pre-school children are most often intended to be read to the child by an older family member (usually a parent), the messages and techniques they contain are simultaneously delivered to the parent and child together (Bellows et al., 2013).

In terms of delivering the important theoretical components necessary to impact behaviour, a relatively recent approach to describing the content of health related interventions via a taxonomy of BCTs published by Abraham and Michie in 2008 is useful. A few published studies have used the taxonomy to identify techniques in a range of health behaviour change interventions (Adair et al., 2013; Cooper et al., 2013; Golley et al., 2011; Michie et al., 2012).

Some techniques may be more obvious than others, and therefore more commonly used. This may be simply because they appear to be ‘common-sense’, for example the provision of information linking health and behaviour (BCT1, derived from the information-motivation-behavioural skills model; Fisher & Fisher, 1992). Whereas, the prompting of barrier identification (BCT5 derived from social cognitive theory; Bandura, 1986) or the setting of graded tasks (BCT7; also from social cognitive theory) are perhaps less likely to appear in existing storybooks. Some BCTs may be highly unlikely to appear due to their complexity. That is to say, it may be difficult to deliver some BCTs in a storybook format, for example motivational interviewing (BCT25).

This chapter aims to content analyse existing relevant storybooks from the perspective of their oral health education content such as that currently offered by the Department of Health in their ‘Delivering Better Oral Health’ Toolkit (Department of Health, 2009). The books were also evaluated for their role in ‘preparing’ a child for a dental visit given the focus of the previous chapter. This was carried out using the following analytical framework derived from several sources:

a) Accuracy of health messages (measured against current best practice guidance - Department of Health, 2009)
b) Presence of Behaviour Change Techniques (BCTs) using a taxonomy developed by Abraham & Michie, (2008a).
c) Degree of preparation for the dental visit (measured using criteria derived from recommendations from the American Heart Association of Paediatric Nursing - LeRoy et al., 2003).
Preparation techniques recommended by LeRoy and colleagues (2003) are as follows,

Attempts to:

- Ease concerns around harms/ pain
- Ease concerns about separation from parents
- Establish familiarity with new objects/ environments
- Demonstrate acceptable behaviours
- Reassure children of control/ autonomy
- Responses to stress

LeRoy et al (2003) in guidelines for the preparation of children undergoing invasive cardiac treatment, note that among the factors which may cause stress in children facing invasive medical procedures are anticipation of pain, separation from parents, uncertainty about how to act and loss of control and autonomy. Parents, too face factors which may cause stress which are in some ways similar to their child’s fear. This guidance was prepared for children undergoing cardiac procedures which are arguably different from children undergoing dental procedures (particularly routine dental exams). However, similarities can be drawn between the two. The filling and extraction of teeth are forms of surgery and some children require a general anaesthetic for the removal of diseased teeth (usually due to the severity of disease) (Hosey et al., 2006). Moreover, no other guidance of this kind could be identified.

3.1.1 Study focus

The aim of this study was to identify and analyse children’s books that tell a story about a trip to the dentist. Oral health messages, BCTs and pre-treatment preparatory techniques were to be extracted from the books using standard coding frames chosen specifically for this purpose. The study was limited to storybooks published in the UK and Ireland so that books would have the maximum cultural relevance for the target population.
Research questions:

1. What are the specific health messages in children’s dental storybooks and do they conform to current best practice guidance?

2. What are the specific BCTs in children’s dental storybooks in relation to the three key oral health behaviours (dental attendance, tooth brushing, sugar snacking)?

3. Which specific preparation techniques are included in children’s dental visit storybooks?
3.2 Methodology

3.2.1 Design

A quantitative deductive content analysis of children’s dental visit storybooks, in which the written and pictorial content of the books was examined and data extracted based on a priori criteria, was undertaken. Data was extracted from the books based on the health messages, BCTs and preparation techniques present. The storybooks were identified via a literature search of relevant publisher and library websites, conducted following a systematic process.

Content analysis was selected for this study for its practical advantages. Content analysis is particularly useful for analysis of text (Kondracki, Wellman & Amundson, 2002). Testament to this, it has previously been used to analyse health messages in newspapers (Jeong, Kim, & Chon Park, 2013; Luke, Caburnay, & Cohen, 2011), magazines (Cho, Hall, & Kosmoski, 2010; Joshi, Peter, & Valkenburg, 2011; Stang, Hoss, & Story, 2010) as well as cultural messages in storybooks (Pittman, 2012; Smith, 2012).

Content analysis is a systematic process in which, based on the framework chosen allows for the organisation of information according to codes (Kondracki, Wellman & Amundson, 2002). It is flexible, being that it can be adapted as a qualitative, quantitative, inductive or deductive method (Elo & Kyngäs, 2008). Qualitative content analysis may be concerned with the meaning of text and the latent constructs within it. Quantitative analysis tends to focus on manifest meanings, which are clearer on the surface level, for example through the identification of key words and phrases. The identification of manifest variables involves less subjective interpretation and therefore can offer better reliability (Kondracki, Wellman &
Amundson, 2002). However, these approaches need not be mutually exclusive (White & Marsh, 2006).

Inductively, content analysis is an iterative process (Kondracki, Wellman & Amundson, 2002). Categories are decided upon throughout the coding process whereas deductively, codes (key words for example) are decided upon before the materials are studies. Berg has suggested that the establishment of a priori criteria to be extracted from the materials is advantageous to the objectivity of the raters (Berg, 2004). However, this is a decision which rests on purpose and is necessarily tied to the research question. That is to say, explorations of materials may be inductive whereas if it is particular content (codes) that are sought, then a deductive approach is most appropriate. Deductive approaches may be necessarily rigid, limiting the emergence of new categories however, such approaches offer the advantage of replicability (Neuendorf, 2002) and where the interest is primarily in the categories, this approach is a good one. More than one rater should code the data, as agreement between the raters is important for the reliability of the findings (White & Marsh, 2006).

The validity of content analysis is very much dependant on the breadth of the materials selected (Kondracki, Wellman & Amundson, 2002). Selection bias may limit the interpretation of the findings, for example if materials for study are selected from only one region, they may have limited applicability beyond this. It is important therefore that there is a systematic and documented process of material selection in order that the limitations of the findings are made clear to the reader (Graneheim & Lundman, 2004).
3.2.2 Procedure

**Identification of materials (storybooks)**

The first step to be taken was to identify relevant storybooks for analysis. A search was conducted in as systematic a way as possible online databases. The intention was to identify books which could also be identified and read by families in the UK so searches of publically accessible databases were taken. This methodology is similar to previous studies which have sought to identify children’s storybooks (Fitzpatrick & Kostina-Ritchey, 2013) and other non-academic literature (Coleman & Nickleberry, 2009; Kramer, & Ramsburg, 2002).

**Search strategy**

The key term ‘dentist*’ was used to search the British Library’s database (http://catalogue.bl.uk/), Blackwell’s website (http://bookshop.blackwell.co.uk) and the internet book shop Amazon (www.amazon.co.uk). The databases were carefully chosen to provide relevant materials. All databases were searched using the same key term dentist*.

**Inclusion criteria**

Books were included if they met the following criteria:

- Published in the UK or Ireland and currently in print (i.e. freely available in the UK)
- An animated story detailing a character portrayed as a child visiting the dentist for any reason
- Aimed at children aged around three to five years (either reading age or interest, i.e. designed to be read to children by parents or carers)
- English language
Exclusion criteria

Books were excluded from the study if:

- They were factual accounts of dental visits not presented in a story format
- Pictures were photographs rather than animations

The identified titles were screened for relevance. All titles which appeared to meet inclusion criteria based on their entry on the respective web-databases were ordered for further inspection. The search was recorded using Microsoft Excel.

Data coding

The following information was recorded from each of the books:

- Publication details
- Stated purpose of book
- Content advisors

The content of the storybooks was coded deductively using pre-specified coding frames. Health messages were coded according to those recommended in the Department of Health’s current evidence based guidance, ‘Delivering Better Oral Health’. Behaviour change techniques (BCTs) were coded according to the Abraham and Michie’s 26-item BCT taxonomy (2008). Preparation techniques were coded according to the guidance of LeRoy et al. (2003).

It was considered that in order to most accurately examine the identified books for the presence of BCTs that Health Psychologists, as experts in this field, would be consulted to assist with the BCT aspect of the content analysis. Four Health Psychologists were consulted and agreed to take part in the study. These Health Psychologists had all undergone the same training of the BCT taxonomy and were provided with the coding manual (Abraham &
Michie, 2008b). Four raters were chosen for this analysis to strengthen confidence in the findings.

Once the books were identified, copies were distributed to the health psychologists together with an online survey (via Survey Monkey; www.surveymonkey.com) that was created based entirely on the BCT coding manual (Abraham & Michie, 2008b). The survey was made up of 26 items, each having two parts, the first asking if the BCT was present in the book, the second asking the rater to record it (a screen shot of the survey can be seen in Appendix 3.1). Responses were recorded online and were later transferred to Excel for storage.

The analysis of health messages and preparation techniques present in the books was carried out by two raters (LO; PA). The coding frames for both of these were more straightforward than the BCT taxonomy and did not require the same robust process involving multiple raters. A single data extraction form was drawn up based on the recommended oral health messages in current Department of Health guidance (Department of Health, 2009) and the 5-point checklist of preparation techniques developed by LeRoy and colleagues (2003).

3.2.3 Analysis

The coded data was described in terms of the number of times each code appeared across all books and in each of the books. For the data relating to BCTs, reliability tests were carried out using Fleiss’ Kappa, this analysis was conducted using ReCal 3 (Freelon, 2010)².

² SPSS is capable of calculating Cohen’s kappa but not Fleiss’ Kappa which is used when there are more than 2 raters, therefore ReCal3 was used instead.
3.3 Results

3.3.1 Search results

The search identified 233 records in total, the highest number of results came from the internet bookshop ‘Amazon’ (n=106), the search of Blackwell’s returned 64 records and the British Library, 47. Following de-duplication, 121 records remained. Through screening, 101 records were removed because they did not meet the inclusion criteria, 69 were out of print or unavailable and 32 were printed in other continents, namely North America or Africa. Twenty storybooks were screened more closely and a further 11 were excluded at this point for either being photographic books (i.e. pictures not animation) or because they were factual books about dental visits that were not communicated as a story. The screening process is detailed in Figure 3.1. The nine included books were: Topsie and Tim (Adamson & Adamson, 2007); Peppa Pig Dentist Trip (Astlet & Baker, 2009); My First Time going to the Dentist (Petty, Kopper, & Pipe, 2007); Read at Home: first experiences: at the Dentist (Hunt & Brychta, 2007); Freddie Visits the Dentist (Smee, 2003); Usborn First Experiences: going to the dentist (Civardi, 2009); First Time Dentist (Stockhome, 2011); Off we go: going to the dentist (Webster, 2008); My First Visit to the Dentist (Marleau & Garton, 2009). The characteristics of each book are detailed further in Table 3.1.
Figure 3.1 Flowchart showing search and selection process

- Storybooks identified via Electronic search, n=233
  - After duplicates have been removed, n=121
    - Records screened, n=121
      - Full copies of storybooks assessed, n=20
        - Storybooks included in analysis, n=9
        - Records excluded with reasons, n=101
          - Unavailable/out of print (n=69)
          - Printed in US or Africa (n=32)
  - Storybooks excluded with reasons, n=11 (Not stories/ not animated)
<table>
<thead>
<tr>
<th>Book ID</th>
<th>Book</th>
<th>Publication details</th>
<th>Subject advisors</th>
<th>Purpose/ stated intentions</th>
</tr>
</thead>
</table>
| Book 1  | Topsie and Tim | **Publisher:** Ladybird for Penguin, London  
**Author:** Jean and Gareth Adamson  
**Illustrator:** Not stated  
**Year:** 2007 | The British Dental Health Foundation | A book about new experiences produced with the help of the British Dental Health Foundation |
| Book 2  | Peppa Pig Dentist Trip | **Publisher:** Ladybird for Penguin, London  
**Author:** As publisher  
**Illustrator:** Book based on the TV series created by Neville Astley and Mark Baker  
**Year:** 2009 | None stated | It is stated that one of the characters is nervous about visiting the dentist but that the story depicts a successful trip |
| Book 3  | My First Time going to the Dentist | **Publisher:** Aladdin/Watts, London/Sydney  
**Author:** Kate Petty and Jim Pipe  
**Illustrator:** Lisa Kopper  
**Year:** 2007 | None stated | A book to help young children learn about and discuss new experiences. Intended to ease children’s concerns about dental visits. |
| Book 4  | Read at Home: First Experiences: At the Dentist | **Publisher:** Oxford University Press  
**Author:** Roderick Hunt and Annemarie Young  
**Illustrator:** Alex Brychta  
**Year:** 2007 | None stated | A book to introduce young children to new situations. The book depicts all elements of a first dental visit. To be read together (parent and child). The book is intended to facilitate exploration of the wider world with children, talking about feelings and emotions and to build vocabulary through fun activities. |
<table>
<thead>
<tr>
<th>Book</th>
<th>Title</th>
<th>Author</th>
<th>Illustrator</th>
<th>Publisher</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book 5</td>
<td><strong>Freddi Visits the Dentist</strong></td>
<td>Nicola Smee</td>
<td>Nicola Smee</td>
<td>Orchard Books, London</td>
<td>2003</td>
<td>A book depicting positive new experiences</td>
</tr>
<tr>
<td>Book 6</td>
<td><strong>Usborn First Experiences: Going to the Dentist</strong></td>
<td>Ann Civardi</td>
<td>Stephen Cartwright</td>
<td>Usborn, Oxon</td>
<td>2009</td>
<td>Intended to introduce young children to new situations in a fun and friendly way. The book is aimed at aiding learning and generation conversations</td>
</tr>
<tr>
<td>Book 7</td>
<td><strong>First Time Dentist</strong></td>
<td>Not stated</td>
<td>Jess Stockham</td>
<td>Child’s Play, Swindon</td>
<td>2011</td>
<td>Designed to answer common questions children may have about their first trip to the dentist and to generate conversations around the subject. To introduce a new experience</td>
</tr>
<tr>
<td>Book 8</td>
<td><strong>Off we go: Going to the Dentist</strong></td>
<td>Avril Webster</td>
<td>Dabid Ryley</td>
<td>Off We Go Publishing</td>
<td>2007</td>
<td>Aimed at preparing a child for a new experience, easing concern and bolstering confidence. The book was developed with the author’s son in mind (he has a general learning difficulty). The book is also aimed at pre-school children for this same purpose.</td>
</tr>
</tbody>
</table>
3.3.2 Dental health messages

Dental health messages varied across books, both in terms of content and frequency. The most common message across the book was around child sugar consumption appearing at least once in seven out of the nine books. Messages about regular dental attendance were also common appearing in five of the books and a message about brushing teeth twice daily was found in four of the books. Messages about brushing were divided according to the recommendation around frequency which they gave (Table 3.2, Figure 3.2). Messages about brushing twice daily were recorded alongside messages to brush daily and then simply regularly. These categories are mutually exclusive. Therefore it can be said that eight of the nine books communicated messages for, at least, regular tooth brushing. The number of health messages in each book is detailed in Figure 3.3 and shows that Book 1 (Topsie and Tim) contained the most health messages (n=7); book 7 (First Time Dentist) contained six messages and Book 5 (Freddie Visits the Dentist) had five messages, with all other books containing four or less. Book 2 (Peppa Pig) contained only a single health message.
Figure 3.2 Frequency of health message by type

Figure 3.3 Number of health messages present in each book
The health messages themselves can be seen in Tables 3.3 and 3.4, which detail dental hygiene messages, sugar consumption messages and messages about dental attendance. As may be expected, messages pertaining to brushing teeth twice a day are the most specific for example referring to the times of day to brush teeth in the case of books 1 (Topsie and Tim), 7 (First Time Dentist) and 9 (My First Visit to the Dentist). Messages that refer to daily or regular brushing are less detailed although in the case of Book 2 (Peppa Pig), morning is specified. It may be worth remembering that this is the only health message delivered by Book 2 (Peppa Pig). Brushing method was presented in a comprehensive way in Book 4 (First Experiences at the Dentist) that showed a series of images of the character brushing their teeth accompanied by instruction. However, the final instruction is to rinse the mouth which is not recommended in current best practice guidelines (Department of Health, 2009). Additionally the child is pictured alone; parental support for enacting this behaviour is something that is recommended by current oral hygiene guidance (Department of Health, 2009).
Table 3.2 Dental health message identified in each book

<table>
<thead>
<tr>
<th>Message subject</th>
<th>Book 1</th>
<th>Book 2</th>
<th>Book 3</th>
<th>Book 4</th>
<th>Book 5</th>
<th>Book 6</th>
<th>Book 7</th>
<th>Book 8</th>
<th>Book 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brush 2x</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brush daily</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brush regularly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brushing method</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brush type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use fluoride paste</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toothpaste amount</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of disclosing tablets for oral hygiene</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce frequency and amount of sugar consumed</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Don't snack in bed at night</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General healthy eating (healthy substitutes)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular dental attendance</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Messages around sugar consumption were also detailed with differing ways of framing the concept, using both negative (fear appeal) and positive language. Book 1 (Topsie and Tim), frames sugar as ‘hurting’ teeth possibly in an attempt to help the child to conceptualise a complex process. Books 6 (Going to the Dentist), 7 (First Time Dentist) and 9 (My First Visit to the Dentist) simply state that sugar is bad, harmful to teeth. Book 4 (First Experiences at the Dentist) is more abstract in referring to sugar leading to holes in teeth and Book 3 (My
First Time Going to the Dentist) uses more positive wording talking of not eating sweets in order to ‘take care’ of teeth. Messages around dental attendance were only specific in 1 of the four books in which they appeared. Book 6 (First Experiences Going to the Dentist) states that another check-up appointment will be due in ‘six months’. 
### Table 3.3 Dental hygiene message identified in each book

<table>
<thead>
<tr>
<th>Book ID</th>
<th>Brush 2x daily</th>
<th>Brush daily</th>
<th>Brush regularly</th>
<th>Brushing method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book 1</td>
<td>“never forget to clean your teeth in the morning and at bedtime” p18</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 2</td>
<td>-</td>
<td>“every morning, Peppa and George brush their teeth” p2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 4</td>
<td>-</td>
<td>“you can get holes in your teeth if you don’t clean them every day” p19</td>
<td>-</td>
<td>“you must always clean your teeth properly” p8 detailed picture and instruction on brushing method pp28-9</td>
</tr>
<tr>
<td>Book 5</td>
<td>-</td>
<td>-</td>
<td>“I must keep my teeth brushed and clean the way the dentist showed me”</td>
<td>-</td>
</tr>
<tr>
<td>Book 6</td>
<td>“Jake and Jessie must brush their teeth twice a day with a fluoride toothpaste to keep them clean and healthy” p17</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 7</td>
<td>“brush your teeth in the morning and the evening” p13</td>
<td>-</td>
<td>-</td>
<td>“brush in small circular movements, top and bottom” p12 “gently brush your teeth and gums, back and front” p13</td>
</tr>
<tr>
<td>Book 8</td>
<td>-</td>
<td>“brush your teeth everyday” p10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 9</td>
<td>“Arun and his big brother brush their teeth every morning and every night” p5 “plaque is a sticky layer of bacteria that can make holes in your teeth if you do not clean them twice a day” p14 “clean your teeth after your breakfast and before you go to bed” p18</td>
<td>-</td>
<td>-</td>
<td>“move your brush round and round your teeth, start at the back, then brush the front and make sure you reach the tops and sides” p17; repeated pp22-3</td>
</tr>
<tr>
<td>Book ID</td>
<td>Fluoride paste use</td>
<td>Toothpaste amount</td>
<td>Brush type</td>
<td>Use of disclosing tablets for hygiene purposes</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------</td>
<td>-------------------</td>
<td>------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Book 1</td>
<td>“Never forget to clean your teeth … with a fluoride toothpaste” p18</td>
<td>-</td>
<td>-</td>
<td>“the chemist told them about disclosing tablets, ‘just chew half a tablet, then rinse your mouth with water … the parts of your teeth that most need cleaning will turn pink”</td>
</tr>
<tr>
<td>Book 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>“The dentist gave Kipper a tablet to chew. Soon there were little specks of red on his teeth … the specks show where you haven’t cleaned your teeth and gums very well” p21</td>
</tr>
<tr>
<td>Book 5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 7</td>
<td>-</td>
<td>“brush your teeth with a pea-sized amount of toothpaste” p11</td>
<td>“you need a soft toothbrush with bristles” p10</td>
<td>-</td>
</tr>
<tr>
<td>Book 8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book ID</td>
<td>Frequency and amount of sugar consumed</td>
<td>Bedtime snacking / drinking</td>
<td>General healthy eating</td>
<td>Regular dental attendance</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------</td>
<td>-----------------------------</td>
<td>------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Book 1</td>
<td>“sweet foods can hurt your teeth, so don’t eat them too often” p17; “sweet drinks can hurt your teeth as much as sweet food” p18</td>
<td>“don’t eat or drink in bed” p18</td>
<td>“she bought them lovely crunchy apples from the greengrocer” p22</td>
<td>“come back and see me soon” p18; “before they went home the receptionist wrote own the date for their next visit” p19</td>
</tr>
<tr>
<td>Book 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 3</td>
<td>“Can we buy sweets now mum? ‘no! … you have to take care of your new teeth” p21</td>
<td>-</td>
<td>“so they buy some apples instead” p21</td>
<td>-</td>
</tr>
<tr>
<td>Book 4</td>
<td>“you can get holes in your teeth … if you eat lots of sweets” p19</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 5</td>
<td>“remember Freddie, not too many sweets” p17</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 6</td>
<td>“the dentist shows them what will happen if they don’t take care of their teeth properly – eat less of these [pictured sweets, biscuits, cakes sweet drinks]” p16; “sugar and sweet foods and drinks are bad for teeth” p16</td>
<td>-</td>
<td>“the dentist shows them what will happen if they don’t take care of their teeth properly – eat more of these [pictured fruit, vegetables, milk and cheese]” p16</td>
<td>“on their way out, Mrs. Judd makes an appointment to see the dentist or another check-up after six months” p19</td>
</tr>
<tr>
<td>Book 7</td>
<td>“sugary foods and drinks can harm your teeth” p11</td>
<td>-</td>
<td>-</td>
<td>“we’ll see you soon for a check-up!” p26</td>
</tr>
<tr>
<td>Book 8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Book 9</td>
<td>“make sure you don’t eat too many sweets, they are full of sugar which is bad for your teeth” p18</td>
<td>-</td>
<td>-</td>
<td>“bye bye, see you next time” p15</td>
</tr>
</tbody>
</table>
3.3.3 Behaviour change techniques

Reliability:

Table 3.5 shows percentage agreement and Fleiss’ Kappa scores for the BCT extraction by the four raters. Kappa scores ranged from 0.04-0.45, for only one of the books (Book 3, My First Time Going to the Dentist) was the agreement very low indicating either very slight or chance agreement (Landis & Koch, 1977). Interestingly, the percentage agreement for this book is among the highest, possibly highlighting this as a less reliable measure.

Table 3.5 Analysis of agreement between raters on BCTs

<table>
<thead>
<tr>
<th>Book Title</th>
<th>% agreement</th>
<th>Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book 1</td>
<td>71.79%</td>
<td>0.31</td>
</tr>
<tr>
<td>Book 2</td>
<td>86.54%</td>
<td>0.29</td>
</tr>
<tr>
<td>Book 3</td>
<td>83.33%</td>
<td>0.04</td>
</tr>
<tr>
<td>Book 4</td>
<td>77.56%</td>
<td>0.45</td>
</tr>
<tr>
<td>Book 5</td>
<td>88.46%</td>
<td>0.43</td>
</tr>
<tr>
<td>Book 6</td>
<td>76.28%</td>
<td>0.31</td>
</tr>
<tr>
<td>Book 7</td>
<td>80.13%</td>
<td>0.38</td>
</tr>
<tr>
<td>Book 8</td>
<td>93.59%</td>
<td>0.41</td>
</tr>
<tr>
<td>Book 9</td>
<td>78.85%</td>
<td>0.45</td>
</tr>
</tbody>
</table>

BCT frequency

Twenty-one BCTs were identified by at least 1 Health Psychologist in the nine books analysed. Most commonly occurring were general encouragement, information on the behaviour health link and information on consequences. The number of BCTs present by book is shown in Figure 3.4 and the frequency of BCTs across all books is shown in Figure 3.5.

Three of the books exhibited a substantially higher number of BCTs than the others (Book 1,
Table 3.6 shows the BCTs present in each of the books. The numbers indicate how many raters identified each BCT in each book. BCT2 for example is agreed upon by all four raters in books 1 (Topsie and Tim), 4 (First Experiences at the Dentist), 6 (First Experiences Going to the Dentist) and 9 (First Visit to the Dentist) whereas BCT14 is only agreed upon by a single rater in books 1 (Topsie and Tim), 3 (My First Time Going to the Dentist), 5 (Freddie Visits the Dentist) and 7 (First Time Dentist). Table 3.6 shows that the raters agreed most about BCT2 in that all four agreed that it was present in four of the books, three raters agreed it was present in a 5th book also. Two of the raters indicated that it appeared in Book 3 (First Time Going to the Dentist) meaning that two of the raters also found it not to be present. The second most agreed upon technique was BCT8 which all four raters found present in three of the books and three raters in two of the books. BCT1 was the most disagreed upon technique being that in four of the books, two raters indicated that it was present, again meaning that two raters did not find it in these books. Where no rater indicated that a BCT was present, a ‘-’ appears in the table, this can be taken to mean that all four raters agreed that the BCT was not present. Agreement that a technique was not present is more consistent; however for 20 of the techniques, a single rater indicated its presence showing disagreement with the other three raters. Six of the BCTs (BCTs12, 16, 22, 23, 25 and 26) were not found in any of the books.
Table 3.6 BCTs identified in each book by four raters

<table>
<thead>
<tr>
<th>BCT #</th>
<th>BCT</th>
<th>Book 1</th>
<th>Book 2</th>
<th>Book 3</th>
<th>Book 4</th>
<th>Book 5</th>
<th>Book 6</th>
<th>Book 7</th>
<th>Book 8</th>
<th>Book 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Provide general information on the behaviour health link</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Provide information on consequences</td>
<td>4</td>
<td>-</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Provide information about other’s approval</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Prompt intention formation</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Prompt barrier identification</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Provide general encouragement</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Set graded tasks</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>Provide instruction</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>Model/ Demonstrate behaviour</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Prompt specific goal setting</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>Prompt review of behavioural goals</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>Prompt self-monitoring of behaviour</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>Provide feedback on performance</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td>Provide contingent rewards</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>15</td>
<td>Teach to use prompts/ cues</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Agree behavioural contract</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>17</td>
<td>Prompt practice</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>Use of follow up prompts</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>19</td>
<td>provide opportunities for social comparison</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>Plan social support/ social change</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>21</td>
<td>Prompt identification as role model/ position advocate</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>22</td>
<td>Prompt self-talk</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>23</td>
<td>Relapse prevention</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>24</td>
<td>Stress management</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>25</td>
<td>Motivational interviewing</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>26</td>
<td>Time management</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Figure 3.4 Number of BCTs identified per book by a majority of raters

Figure 3.5 Number of BCTs identified across all books by a majority of raters
3.3.4 Preparation techniques

All preparation techniques described by LeRoy et al. (2003) were covered in the included books with the exception of ‘responses to stress’. An overview is presented in Table 3.7 and descriptions of the identified techniques below. The range of preparation techniques by book was between 3 and 5 with a median of 4.

All but three of the books (Book 2, Peppa Pig; Book 8, Going to the Dentist; Book 7, First Time Dentist) referred to pain associated with dental examinations or treatment. The reference made to potential pain was generally brief (for example, “I open my mouth very wide for the dentist to check my teeth, it doesn’t hurt at all!”. Book 5, Freddie Visits the Dentist) and no book referred to the potential length or severity of pain. Parental presence in the treatment room was apparent or implied in all books. At least one parent was present in the clinic during the dental examination or procedure. This features quite lightly in most of the books in that parents’ presence is denoted by presence alone and not reiterated in the text.

All books aimed to establish familiarity with new objects and or environments through visually picturing typical scenes from dental offices and clinics. This included staff, waiting rooms, clinics and instruments. In all the books, the children shown act in a compliant way. In Book 2 (Peppa Pig) and Book 3 (My First Time Going to the Dentist), a child is resistant to the dental exam or to entering the dental office but both quickly comply when asked once, conveying high levels of coping. In just three books was the child featured having any control at all (Book 1, Topsie and Tim; Book 2 Peppa Pig; Book 3, First time going to the Dentist). In both Book 1 (Topsie and Tim) and Book 2 (Peppa Pig), the child is given the option to go first or second. In ‘First time going to’, the child can choose to have the parent sit with them on
the dentist’s chair. No obvious stress was depicted in any of the books thus responses to stress could not be observed.
Table 3.7 Preparation techniques identified per book

<table>
<thead>
<tr>
<th></th>
<th>Book 1</th>
<th>Book 2</th>
<th>Book 3</th>
<th>Book 4</th>
<th>Book 5</th>
<th>Book 6</th>
<th>Book 7</th>
<th>Book 8</th>
<th>Book 9</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease concerns about pain</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>6</td>
</tr>
<tr>
<td>Ease concerns about separation from parents</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>9</td>
</tr>
<tr>
<td>Establish familiarity with new objects/ environments</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>9</td>
</tr>
<tr>
<td>Demonstrate acceptable behaviours</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>9</td>
</tr>
<tr>
<td>Reassure children of control/ autonomy</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>3</td>
</tr>
<tr>
<td>Responses to stress</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>36</td>
</tr>
</tbody>
</table>
3.4 Discussion

This study has demonstrated that existing children’s books telling a story about dental care can act as a vehicle for health messages, BCTs and preparation techniques to children and their parents. Each of the books included in this study exhibited a range of health messages, BCTs and preparation techniques, albeit to varying levels and quality.

According to Bandura’s social learning theory (Bandura, 1977a), children learn from observing the behaviours of others. In stories, health messages and BCTs may be delivered simultaneously. BCT9 (model/demonstrate behaviour), for example was delivered in Book 4 (First Experiences at the Dentist) through an image of the character enacting the behaviour alongside a tooth brushing message. With these particular books, it is also important to remember their context. Book 1 (Topsie and Tim) which exhibited the highest amount of health messages was produced in consultation with the British Dental Health Foundation. Book 2 (Peppa Pig), which only featured a single health message was based on a television cartoon and aimed primarily at reassuring children by depicting a ‘successful dental trip’ (based on the book’s stated intention).

The most common health message related to the frequency and amount of sugar that children consumed. Sugar has long been associated with the development of tooth decay (Burt & Pai, 2001; Newbrun, 1982) and has been identified as a known risk factor for this disease (Burt & Pai, 2001; Harris et al., 2004; Touger-Decker et al., 2003). Control of the amount and frequency of sugar consumption features in the
current UK recommendations for prevention of tooth decay (Department of Health, 2009). Sugar can be considered a particular problem in countries such as the UK where consumption among children is high (Ismail, Tanzer, & Dingle, 1997; Lustig, Schmidt, & Brindis, 2012). Analysis of the UK National Diet and Nutrition Survey looking at children aged four to ten years showed that although the proportion of energy taken from non-milk extrinsic sugars appears to have fallen over the period 1997-2008/9 from 16.80% to 14.60%, it remains substantially higher than the recommended average of 10% (Whitton & Nicholson, 2011). It is therefore unsurprising that messages around sugar should be common in dental focused children’s books.

Many of the diet related messages in these books were positively or negatively framed. Fear appeal has been used in health promotion with mixed results (Ruiter, Abraham, & Kok, 2001). It has been considered by some as a good way in which to grab attention and impress reason for change (Yzer, Southwell, & Stephenson, 2012). However, fear appeals tend to be an unsuccessful way to affect behaviour unless substantial support is given alongside the negatively framed messages (Cho & Salmon, 2006; Witte & Allen, 2000). Moreover, there is a question around appropriateness of fear appeals (Hastings, Stead, & Webb, 2004). This is a particular concern with regard to interventions focused on young children. Using messages to invoke fear in young children who are not in control of their health behaviours may not be ethical.

Messages around regular dental attendance also featured in five of the books, which may be expected considering the stories themselves were about dental visits.
Brushing and specific aspects of dental hygiene including brush type and the use of disclosing tablets for improving dental hygiene were present, representing quite detailed information around tooth care. However this level of detail was the case in only a two of the books (22.22%). Importantly no clear single message about tooth brushing routine came out across the books, with a variety of messages concerning the timing and regularity of brushing. While some instructed brushing in the morning and the evening, others were less clear, noting every day or even ‘regularly’. This lack of consensus may be reflective of previous guidance which may have been less clear than the current guidance (Department of Health, 2009). Current guidance is now very clear stipulating twice daily brushing with fluoride paste (>1000ppm) at bedtime and at one other time during the day.

Criticism in the past has been made around the inconsistencies of dental health messages. Frazier (1983) once commented on the conflict between the messages given to the public and those which the scientific community would agree on (Frazier, 1983). More recently however due to the rise of evidence based medicine, messages given by clinicians and researchers tend to come increasingly from the same knowledge base (Miles, 2008). This can be seen in the case of the current best practice guidance, ‘Delivering Better Oral Health’ (Department of Health, 2009). The document is intended as an evidenced based toolkit for the prevention of oral disease and for use nationally. The majority of the messages communicated in these books are in line with this guidance. That is, in spite of the fact that the majority were published before this guidance was available. With regard to the variation in messages around the frequency of tooth brushing, it is interesting that of the four
books delivering messages around twice daily brushing, three of these books were published after the first version of the guidance (Department of Health, 2007). Unfortunately it is not possible to say if the guidance influenced this or whether this is a coincidence.

Two of the books give messages which conflict with the current guidance (Department of Health, 2009). Book 1 (Topsie and Tim) depicts the characters, at the end of the books, brushing their teeth with a glass of water in hand. The implication may be that the children will rinse their teeth after brushing them. This message is communicated overtly in Book 4 (First Experiences at the Dentist), in which the instruction states that teeth should be rinsed with water following tooth brushing. Official Department of Health guidance states that rinsing should be avoided straight after brushing so that the fluoride applied during the procedure can have a greater benefit. Fluoride is most effective at reducing decay when it is allowed to remain on the teeth for 30 minutes or more (Chestnutt, Schäfer, Jacobson, & Stephen, 1998). In a large double blind clinical trial, Chestnutt and colleagues found that rinsing after brushing was significantly associated with tooth decay in that this could account for more than 50% of explained variance in increments of tooth decay (Chestnutt et al., 1998).

A number of different BCTs were identified in the included books. As expected, more complex BCTs were not present. A recent Cochrane review of school-based oral health promotion interventions found that the BCTs included tended to be limited and simple in nature (Cooper et al., 2013), however due to the poor reporting of the included interventions, it remains difficult to say with certainty if this was a fair
evaluation of BCTs in these interventions (Adair et al., 2013). The more complex BCTs, BCT12 (prompt self-monitoring of behaviour), BCT16 (agree behavioural contract), BCT22 (prompt self-talk), BCT23 (relapse prevention), BCT25 (motivational interviewing) BCT26 (time management) were not identified by any of the raters. As previously discussed, it may not be surprising that the more complex BCTs should not be apparent in children’s books which were not explicitly designed with behaviour change in mind. A majority of the raters identified BCT6 (provide general encouragement) in six of the books, and BCTs 2 (provide information on consequences) and 8 (provide instruction) in five of the books. These BCTs are perhaps most suited to being conveyed within a storybook.

This study is merely exploratory and has sought no answers to questions around the effectiveness of any of these books for the purposes of health promotion. Importantly, this study is limited in its scope due to the small number and restricted type of books included in it. The search strategy used to identify books for this study was very simple, being only a single word (dentist). While this helped to ensure consistency of the search across websites that did not have the sophisticated search facilities of databases such as Medline, the limitations of the search must be taken into account when interpreting the findings of this study. It is likely that there are other children’s storybooks concerning oral health that may have met the inclusion criteria for this study but were missed by this search.

Furthermore, the search and the inclusion criteria for this study were very much focused on stories specifically related to oral health. This was decided upon due to the focus of this thesis, however there have been a number of studies conducted
around the use of children’s storybooks to deliver healthy eating messages (e.g. Bellows et al., 2013; Byrne & Nitzke, 2000, 2002; Lawatsch, 1990) and it may have been of value to have included books such as these in the analysis.

This study is further limited by the lack of reliability between the raters who extracted the BCT data from the books. In terms of the reliability of the coding of the BCTs, agreement was moderate. This indicates that even among experts in the area, there may be some ambiguity around the identification of BCTs. The percentage agreement is generally quite high but a less robust measure than Fleiss’ kappa which indicates a lower level of agreement. Based on criteria described by Landis and Koch (1977), a kappa score of 0.41 – 0.60 indicates moderate agreement, scores between 0.21 – 0.40 indicates fair and 0.01-0.20 slight agreement. Scores of less than 0 indicates poor agreement. Only one case falls into the latter category, Book 3 (First Time Going to the Dentist) received a kappa score of 0.04, a fair amount of disagreement must be assumed here. Based on the results presented in Tables 4.1 and 4.2, it may be considered that more agreement between the raters could be observed where there were more BCTs to be identified. This appears as a moderate trend and is unlikely significant.

Agreement among raters was more common for the absence of BCTs rather than the presence. A majority agreement (three or more raters) was observed for BCTs 5, 7, 11-16 and 21-25. These tended to be the rarest BCTs identified in the storybooks. The discord among raters may relate to the nature of the BCTs themselves or may be around ambiguity of identification of some BCTs rather than others. Given the number of raters used for this study, it is unlikely that preconceptions, about the
type of BCTs raters expected to be present, affected the results a great deal. However it is important to note that this cannot be certain. Recently, the taxonomy has been updated, in 2011, to a 40-item list (Michie, Ashford, Sniehotta, et al., 2011) and in 2013 to a 93-item list (Michie et al., 2013). This is testament to how new this work is and how it is still developing.

A recent paper presented at the conference of the European Health Psychology Society investigated the reliability of coding of BCTs in published reports (Johnston et al., 2013). Six raters used the 93-item BCT taxonomy, ‘taxonomy v1’ (Michie et al., 2013) to code potential BCTs in published reports of interventions. Reliability of coding was tested on 26 BCTs (those which appeared frequently enough) using Kappa statistics, 23 of the BCTs had kappas greater than 0.60 and nine greater than 0.80. This level of agreement can be judged as substantial (Landis & Koch, 1977) and is greater than was achieved in this study in spite of having two more raters. Without greater details of the conduct of the study (anticipated in the full paper) it is difficult to suggest why such a difference exists. It is possible however that the standardised training provided to the raters in Johnston’s study was responsible. Training in the identification of BCTs may be crucial for improvements in the reliability of coding, training in the BCT taxonomy is one of the outputs intended from the ongoing work on the BCT taxonomy (Michie, Abraham, et al., 2011).

Owing to the lower levels of reliability between the raters in this study, it may have been beneficial to include further stages of agreement, as in Delphi studies. A Delphi study design has been used in the development of the most recent BCT taxonomy v1 (Michie et al., 2013).
It remains difficult to report with certainty on the presence of the BCTs in the books analysed due to the variation in scoring by the raters. It has been assumed that agreement by three or more raters would indicate the presence of the BCT with some certainty. This is because agreement by two raters only indicates that the other two rates interpreted the technique as not being present. A majority decision then can be taken at either one or less (meaning most raters agree the BCT is absent) and at three or more (meaning most raters agree that the BCT is present).

Behaviour change techniques are a relatively new way of categorising and understanding the active components of behavioural interventions. There is yet limited knowledge about the best techniques for particular behaviours or indeed the optimum combination or concentration (Adair et al., 2013). The taxonomy itself has been redeveloped since 2008. In 2011, a 40 item taxonomy was published (Michie, Ashford, Sniehotta, et al., 2011), further work having been done to ensure the techniques are mutually exclusive. This 40 item taxonomy is recommended for future studies seeking to analyse the contents of interventions (Adair et al., 2013).

While there was a good deal of variation in the books with regards the health messages and BCTs, preparation techniques were more consistent. The majority of the preparation techniques identified by LeRoy and colleagues (2003) were observed as being present in the books studied. Familiarity was generally well covered as all books presented animated images of the dental office, clinic and dental staff as well as the dental chair and various instruments likely to be encountered on a visit. Only in one book (Book 2, Peppa Pig), was the dental chair not presented very accurately. A qualitative study thematically analysed YouTube videos of children and
adolescents describing their anxious dental experiences (Gao, Hamzah, Yiu, McGrath, & King, 2013). The study found that some children considered the dental chair to be a source or ‘trigger’ of their anxiety. Attempts to manage potential negative connotations to the dental chair are apparent in the books’ representations of them. Effort was put into describing the chair in the text in a positive way, referring to the movement of the chair and the chair being ‘special’. References were made by some participants in the study reported on in Chapter 2 around the dental chair as being particularly clinical and thus scary for children. A number of these participants commented that making the chair more ‘child friendly’ would make examinations easier for children and their parents.

Child control or autonomy was depicted in only three books (Book 1, Topsie and Tim; Book 2, Peppa Pig; Book 3, My First Time Going to the Dentist) and where it was referred to, the choice given to the children was limited, allowing them only the option to go first or second, not the option to opt in or out. In a less overt sense however the books do show the child characters asking questions of the dental staff and their parents throughout. Thus, children may be seen to have control over the information they are being given for the duration of the visits. The child characters model confident self-assured behaviours and are forthright in their questioning. This is reinforced further by the compliant behaviour they exhibit throughout. Non-compliant child behaviour in clinical settings is associated with anxiety (Klingberg & Broberg, 2007).

Child compliance in the dental setting is important from a functional perspective so that examination and treatment can be effectively carried out. This is recognised in
guidance documents such as the one produced by the American Association of Paediatric Dentistry (American Academy of Pediatric Dentistry, 2011). This recommends the use of a number of behavioural management techniques, mostly communication based. Advanced techniques include physically restricting movement (with or without consent) and sedation. Interestingly no recommendations are made for preventing anxiety and associated distress. However considering that the guidance is directed at dentists for use in the dental clinic, this is perhaps not surprising. The emphasis on physical techniques of restraint is much less in the UK than in the U.S. (Crossley & Joshi, 2002). A survey of UK paediatric dentists (n=218) and found that there was a preference for non-physical behavioural management techniques, most favouring ‘tell-show-do’ (dentist explains, demonstrates and then carries out exam/procedure) rather than the ‘hand over mouth technique’ (the child is physically restrained with a hand placed over their mouth and told that the hand will not be removed until they comply) (Crossley & Joshi, 2002).

Only communicative techniques were shown in the books studied here. Tell-show-do was communicated for example but mostly as a means of explanation. Responses to stress were not observed in any of the books, quite simply because stress was not depicted. This is likely because the books wanted to present positive stories and situations to the children in order to convey such emotions. The intention being, children would connect positive emotion and dental visit situations thus making for pleasant future experiences and memories.

While most of these storybooks claimed to introduce children to and prepare them for dental visits, there is a dearth of reported preparation interventions for child
routine dental visits. Interventions for preparing children are more common for some for medical procedures than others. For example, venepuncture or blood taking for routine or test purposes is rightly considered as a potential source of anxiety for children and parents (Bagnasco, Pezzi, & Rosa, 2012; Duff, 2003; Willock, Richardson, Brazier, Powell, & Mitchell, 2004). A wide variety of psychological interventions have been developed to reduce child distress when undergoing these types of procedures (Schechter et al., 2007; Uman et al., 2013).

Presumably this is due to the clinical situation and possible pain - including the anticipation of pain. These can be worrying for children and their parents. As a result, there are numerous reports of interventions for preparing children and parents for venepuncture (Duff, 2003; Kolk et al., 2000; Manne et al., 1990). The same cannot be said for dental procedures, however parallels can be drawn, in terms of the potential worries a child and parent may suffer, between venepuction and dental examinations.

**Familiarity**

Introducing children to new situations is one of the ways in which preparation interventions claim to be effective. This is also one of the five criteria identified by LeRoy et al (2003) and as previously mentioned something which was quite prominent in the books studied here. Some of the books claimed that in introducing children to concepts, objects and vocabulary, they would be more familiar with and therefore less scared of these new situations. There is however, little evidence that increased familiarity with situations is associated with reduced anxiety.
There persists some disagreement in the literature as to the processes around familiarity, or recognition, and emotion; there is a vast body of evidence linking familiarity or recognition of stimuli with positive feelings. Zajonc (1980) refers to Titchener (1910) thesis in which he explained that people exhibit a preference for familiarity. This is now thought of as a classical theory and is referred to as the ‘warm glow effect’ (de Vries, Holland, Chenier, Starr, & Winkielman, 2010). Zajonc (1980) in a seminal paper examined in some detail the neurological processes around recognition and emotion (termed ‘affect’). Recognition is a cognitive response and Zajonc argued that the ‘warm glow’ - affect, could occur independently of recognition (and therefore cognition). This position was in complete contrast to the dominant model of the time. Accepted thinking indicated preferences (affect) were largely driven by logical processes; immediate responses to stimuli were cognitive; these in turn, drove affective responses. By this reasoning, affect is rooted in thought.

Zajonc maintains that although in most cases, emotion is not free from cognition; emotion is primary and thus drives cognition. Cognition in many cases may therefore be generated in order to bring logic to decisions, preferences and even behaviour once they have been carried out. Cognition, in this respect seeks to justify the impulses sparked by emotion in the first instance. That is not to say however that emotions cannot be the end result of information processing in some cases, Zajonc illustrates this point by using the example of a joke. Information is processed, followed by the punch line and then an emotive reaction.
Lazarus (1981) however does not attempt to separate cognition and feeling, quite the opposite. He writes that cognition underlies emotion in absolute terms. Much of the debate between Zajonc and Lazarus lies in definition. Both assert that primal processes are the basis of emotion. These are described to be illogical and autistic by Lazarus who understands these to be the lowest level cognition, which he refers to as primary processing, a term borrowed from psychoanalysis. This he states can be distinguished from secondary processing, which is based in reality, complex and ordered. Zajonc sees these processes as an aspect of emotion itself.

Getting back to the issue of familiarity or recognition, Zajonc posits that recognition is so much a part of emotion, that the two can barely be separated. Stimuli are better remembered if emotion is applied to it. Familiarity or recognition, for Zajonc, occurs so rapidly that emotion is related to it even before conscious thought is able to process the environment. Up until Zajonc’s paper, the dominant position in Psychology was that cognition drove emotion. Zajonc has put forward that recognition can occur at a level more basic than cognition; stimuli is not necessarily processed cognitively having to be categorised and labelled thus.

More recent writings have made assumptions that familiarity signals that something is safe; if something similar has been previously experienced with no dire consequences, it can be assumed that this pattern will replicate (de Vries et al., 2010). Whatever the cognitive process, familiarity or recognition is strongly associated with emotional responses. This has been documented in children, Izard (1978) found that at 10 weeks old babies smile and they smile at familiar faces at 12 weeks old. Children respond positively to familiar visual stimuli.
According to Zajonc, familiarity with dental situations may immediately conjure up emotions for children and parents. This may have a strong impact upon subsequent behaviour. Positive emotions may come from associations made during the preparation process; they may also result directly from recognition itself. However, if these emotive expectations are not met at the real-life situation, positive associations and therefore attitudes may be substantially damaged.
3.5 Conclusion

This study shows that children’s storybooks have the capacity to convey a variety of health related messages and techniques. Storybooks can be appealing for children and families and may prove to be an effective means of communicating health messages and BCTs in behaviour change interventions across a variety of fields. Books may also be tools for preparing children for medical and surgical examinations and procedures. Further clarity around BCTs may be necessary to better identify their presence in future studies.
3.6 Next Steps

It is postulated here that children’s storybooks might provide a medium for the delivery of oral health promotion. Specifically, storybooks may incorporate BCTs and health messages as well as specific preparation techniques that can promote health outcomes. The books studied here which covered a range of BCTs arguably did not all deliver up-to-date health messages (in accordance with the Department of Health’s (2009) guidance, ‘Delivering Better Oral Health’). There is thus a need for a children’s story with up to date, evidence based health messages and BCTs to be tested as an intervention to improve parental attitudes relevant to child oral health behaviours. Such a story would represent a behavioural intervention in itself, not simply a means of communicating health information.

The content of such an intervention should be based on evidence and theory which attempts to pin point the psychosocial determinants of these behaviours. As discussed in Chapter 1, a large international study (Adair et al., 2004), has shown that PSE and parents’ attitudes towards behaviours themselves to be significant predictors of behaviour. Further studies have emphasised the role of self-efficacy for child oral health (Cinar, Tseveenjav, & Murtoomaa, 2008; de Silva-Sanigorski et al., 2013; Finlayson et al., 2007). Previous research has focused on child tooth brushing and sugar snacking behaviours because these are important preventative behaviours (Harris et al., 2004). In addition dental attendance, explored in Chapter 2, is an important factor associated with optimum child oral health. Designing a suitable intervention incorporating these three oral health behaviours is therefore the next challenge.
Chapter 4

The development of a health promotion intervention

(Kitten’s First Tooth)
4.1 Overview

This chapter describes the process involved in developing the storybook and DVD called Kitten’s First Tooth. The storybook and DVD were designed following a review of the literature and theoretical models outlined in Chapter 1. This initiated the first two studies of this thesis, the qualitative exploration reported on in Chapter 2 and the content analysis of children’s storybooks (Chapter 3). These two studies together with literature and theory have informed the design of the story described in this chapter.

The story is a behaviour change based oral health promotion intervention aimed at improving parents’ attitudes and increasing PSE for three key child oral health behaviours (dental attendance, tooth brushing, sugar snacking). These behaviours are associated with improved oral health in children (Al Ghanim et al., 1998; Harris et al., 2004; Holt et al., 1996; Lader et al., 2003; Marinho et al., 2009; Walsh et al., 2010). Consequently they are recommended for oral health promotion in the Department of Health’s current evidence based guidance, ‘Delivering Better Oral Health’ (2009). Kitten’s First Tooth was communicated in two formats, a storybook and a narrated version of the storybook delivered via DVD, and was based on the findings from the studies detailed in the previous 2 chapters (Chapters 2 and 3). The ways in which these studies informed the development of the intervention are discussed in section 4.2.1 of this Chapter.

While some child oral health promotion has been previously criticised for not having being based on theory (Cooper et al., 2013), other such programmes have failed to
produce a significant effect even though they have been based on theory. An RCT evaluated an oral health promotion intervention for Belgian pre-school children and their parents (Declerek, Vanden Broucke, & Vanden Branden, 2011). The intervention was multi-component and included education, communication and provision of toothbrushes and paste. The RCT itself was sufficiently powered and the intervention had been developed using the theory of planned behaviour. Despite this, child oral health and tooth brushing behaviours did not differ significantly between control and intervention groups at the two year evaluation point, showing only a one percentage point difference between control and intervention groups (4.10% and 3.60% respectively). The researchers offered a range of explanations for this including, the intervention had not been implemented correctly (lack of fidelity) and that the population was wrong, in that a ceiling effect had impacted on the outcomes. In fact, a notable positive change could be observed in both groups over the time period, indicating that improvement in clinical outcomes and behaviours occurred either due to factors outside the intervention or simply because they were enrolled onto the study and had contact with researchers over the time period.

Additionally however, it appeared that the theoretical constructs may not have been operationalised as part of the intervention. For example, perceived behavioural control (PBC), a construct that is in some ways similar to self-efficacy, refers to the extent to which parents feel they have control over a particular behaviour. The researchers claim to have actioned this through ‘communication with parents’ and the provision of dental hygiene equipment (tooth brush, paste and rinsing cup). While we have no way of knowing what the ‘communication’ consisted of as the
intervention has not been fully reported, provision of equipment relates to breaking down barriers and would likely have little impact on the PBC of parents to carry out tooth brushing behaviours. Providing the tools to carry out the behaviour does not necessarily result in their being used. This may be because confidence in the parents’ ability to carry out the behaviour is lacking (due to problems with child cooperation for example) or it may be that they do not have the necessary skills. It is also possible that additional unknown barriers may have had an impact. Unfortunately, this evaluation remains unpublished thus the possibility of learning from this work further is limited. The work was presented at the European Association of Dental Public Health 16th Annual Conference 2010; the presentation is available online (http://www.eadph.org/congresses/16th/Evaluation_of_ora_health_interventions.pdf).

Parents identify a range of issues that may make it difficult for them to take their child to the dentist as evidenced in Chapter 2. These include lack of awareness of available services, risk perception, perception of cost, child and parent anxiety and dealing with problematic child behaviour and trust in ability and manner of dental staff and levels of communication. Having trust in the ability and quality of care of the dentist may be an important facilitating factor for parents’ dental attendance behaviour for their young children. What is meant by trust here is the parent’s belief in the competencies, manner and motivation of their child’s dentist, simply put, belief that the dentist can and will look after their child (Freeman, 2008).

To compound the situation further, factors common to those living in low SES circumstances may negatively affect the development of PSE (Jones & Prinz, 2005)
which, it has been established is significantly related to the other two key oral health behaviours focused on here (tooth brushing and sugar snacking). The literature demonstrates that being of low SES is associated with lower levels of self-efficacy generally (Boardman & Robert, 2000; Gecas, 1989) and specifically; including self-efficacy related to parenting (Bandura, Barbaranelli, Caprara, & Pastorelli, 2001; Eccles & Harold, 1993, 1996; Elder, Eccles, Ardelt, & Lord, 1995; Shumow & Lomax, 2002).

Self-efficacy may already be lacking among those living in lower SES environments so it follows that for those who become parents, their self-efficacy related to parenting skills and abilities may too be low. SES itself is an unlikely causal factor of low self-efficacy; variations in self-efficacy are apparent across the SES spectrum. Instead, it is much more likely that factors related to social, personal and material strains common among those classed as lower SES are contributors. Ability to cope with these strains is often bolstered by self-efficacy (Bandura et al., 2001).

Thus for those whose self-efficacy is low, coping with everyday parenting may be more challenging. Examples of difficult situations that require a high level of perceived coping (moderated by one’s perceived self-efficacy) may include visits to the dental clinic. This may be particularly true for those parents who anticipate difficult child behaviour or perhaps associate the dental clinic with unfriendliness, pain, discomfort and even a sense of loss of control (Shapiro, 2007). This may be the case for both parent and child.

Additionally, where disease or risk perception is low, less value may be placed on putting the child through such an experience (Goettems, Ardenghi, Demarco,
Romano, & Torriani, 2012). Similarly this may be the case if confidence in the dental exam or subsequent treatment is low (Litt, 1996) and certainly a combination of these two factors with low self-efficacy may act as a substantial barrier to regular dental attendance for young children. In terms of facilitating factors for the routine dental attendance of young children in this context, trust, self-efficacy, risk perception and outcome expectancies have been identified through the qualitative study presented in Chapter 2.

These factors can be found within the HAPA model (Schwarzer, 1992). Trust, another important factor refers to the parent’s belief that their child will be cared for appropriately and is driven by the underlying parent-child bond theorised as ‘attachment’ (Ainsworth & Bell, 1970; Bowlby, 1970) and more commonly characterised as ‘parental love’. This is something, which may be unique to parent-child health behaviours and as such would not be an expected construct in generic theories of health behaviour. Fisher and Fisher (1998), for example, in their research around sexual and reproductive health have discussed that the attitudes of parents, towards sex reflect upon whether they delivered health promoting behaviours to their children. That is to say, those parents with positive attitudes towards sex and sexuality were more likely to deliver sexual health promotion messages to their children than those parents with more negative attitudes.

In Chapter 2, trust was found to relate to parents’ perception of ‘child-friendliness’ of the dental environment. For example, when entering the dental clinic, toys, bright colours and child play areas, seemed to encourage parents’ belief that the dental
staff (thought to be responsible for the environment) would be friendly and accommodating to children.

4.1.1 Study focus

Based on the findings in Chapter 2, it was hypothesised that health promotion involving children should be child friendly in order to maximise acceptability. Furthermore, the content analysis study of children’s storybooks (Chapter 3) demonstrated that short stories offering entertainment can have a dual purpose. Health behaviour change techniques can be delivered alongside relevant health messages through a child friendly medium, i.e. a story delivered via animation. It was therefore decided that an oral health promotion intervention would be developed and that it would take the form of a children’s animated story, delivered in written (storybook) and audio-visual formats (animation on a DVD).

In order to maximise the accessibility and exposure of the intervention both written and audio-visual formats were decided upon. Offering intervention materials in various formats is endorsed by social marketing for this reason (Andreasen, 1995; McDermott, Stead, & Hastings, 2005).

Study aim:

To describe the method and process of developing an oral health promotion intervention (Kitten’s First Tooth).
4.2 Methods

4.2.1 Development process

The conceptualisation and formative research, which feed into the development of the intervention described here, are reported on in the previous three chapters. The ways in which the reviewed literature, theory and findings from the two studies reported on in Chapters 2 and 3 influenced the development of Kittens First Tooth are shown diagrammatically in Figure 4.1.

The findings from the qualitative study reported on in Chapter 2 were briefly that parents preferred that health communications concerning child health behaviours should be child friendly and inclusive of children, and that parents’ were motivated by their desire to look after their child. This study also indicated that parents’ attitudes towards dental services were framed by past experience and mediated by attitudes around outcome expectancies and risk perception – this finding was theoretically contextualised through the HAPA. This qualitative study informed the nature of the intervention in that it was to be a story for children and parents to read or watch together and in this sense it would be ‘child friendly’ and inclusive of children. Additionally, this study informed the content, which was a story about a dental visit with positive outcomes; this was with regard to the construct outcome expectancies which arose from the study and was theoretically contextualised using the HAPA.

The content analysis in Chapter 3 identified BCTs that could be used within children’s stories, these BCTs, where possible were to be embedded within the script of
Kitten’s First Tooth. Two of the BCTs identified in the books in the study reported on in Chapter 3 (namely BCT19 social comparisons and BCT21 identification of self as a role model for other) were not included in Kitten’s First Tooth. This was due to resource restrictions. Social cognitive theory was used to contextualise the literature, particularly in terms of self-efficacy which the literature indicated was an important construct for child oral health behaviours (e.g. de Silva-Sanigorski et al., 2013; Pine et al., 2004). This informed the type and content of the intervention, specifically through the use of modelling.

Figure 4.1 How Kitten’s First Tooth was informed by previous studies and theory
The social marketing framework was drawn upon to aid the design of this oral health promotion intervention known as Kitten’s First Tooth (Table 4.1). Audience segmentation, a criterion from Andreasen’s social marketing framework (Andreasen, 1995) has not been drawn upon for this phase of the development.

Table 4.1 Design of Kitten’s First Tooth Mapped on to the social marketing framework

<table>
<thead>
<tr>
<th>Social marketing criteria</th>
<th>Kitten’s First Tooth</th>
</tr>
</thead>
<tbody>
<tr>
<td>A strong customer orientation and focus</td>
<td>Child and parent focused, formative research conducted with target group of parents (Chapter 2)</td>
</tr>
<tr>
<td>A clear aim of achieving a specified behavioural change</td>
<td>Aimed at affecting parent’s attitudes and subsequent behaviours towards: Child dental attendance Child tooth brushing Child sugar snacking</td>
</tr>
<tr>
<td>Application of the concept of exchange</td>
<td>Operationalised through the use of BCTs which link health and behaviour showing potential for exchange</td>
</tr>
<tr>
<td>Audience segmentation</td>
<td>Not targeted</td>
</tr>
<tr>
<td>A marketing mix</td>
<td>Delivery of story via audio-visual and written mediums</td>
</tr>
<tr>
<td>Application of the concept of competition</td>
<td>Review of other children’s dental visit storybooks (Chapter 3)</td>
</tr>
</tbody>
</table>

Adapted from Andreasen (2002)

The development process utilised interdisciplinary expertise from specialist children’s animators, paediatric dentists, general dentists, oral health commissioners and behavioural specialists through the form of a consultation group who were regularly updated about the development process (Appendix 4.1). The development process was an iterative one, as can be seen in Figure 4.1. It was guided by the consultation group who acted as advisors throughout the process. The members of the group were selected because of their clinical and local knowledge. A single meeting was initiated and chaired by LO; further communications continued over email.
Intervention development is recognised as an iterative process (MRC, 2008). Sometimes many iterations are required in order to refine the intervention as much as possible (Fjeldsoe, Miller, O’Brien, & Marshall, 2012). The intervention may be refined following testing in order to increase its acceptability and feasibility (Kern, Evans, & Lewis, 2011). However, this chapter only describes the intervention and how it came to be Kitten’s First tooth. Pilot evaluations and suggestions for redevelopment are presented in the later chapters of this thesis.

4.2.2 Design of visual story and characters

An external company (WAK studios), specialising in children’s animation and with a particular interest in using animation for educational purposes, was identified. The company agreed to produce a five minute long animation based on the idea that was presented to them. The story was called ‘Kitten’s First Tooth’ and consisted of five
characters. It can be found in both its storybook and animation form at the rear of this thesis. In the first instance, the external company returned a storyboard mock-up. This first storyboard went through a single revision (storyboards 1 and 2 can be seen in appendices 4.3 and 4.4) following which it was presented to the consultation group. A summary of the characters in the story and the roles represented is shown in Table 4.2. Revisions made to this first storyboard were obvious changes. For example, the use of a ‘magic’ acorn to treat the tooth complaint could have caused confusion and been associated with self-medication treatments including clove oil or hard liquor. It was felt important for the story to model a dental visit that was not motivated by pain and did not lead to dental treatment as some of the stories reviewed in Chapter 3 did.

Table 4.2 Character key

<table>
<thead>
<tr>
<th>Characters</th>
<th>Initial Roles represented</th>
<th>Final roles represented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat</td>
<td>Parent</td>
<td>Parent</td>
</tr>
<tr>
<td>Kitten</td>
<td>Child</td>
<td>Child</td>
</tr>
<tr>
<td>Squirrel</td>
<td>Dental receptionist</td>
<td>Community member/ friend</td>
</tr>
<tr>
<td>Owl</td>
<td>Dentist</td>
<td>Dentist</td>
</tr>
<tr>
<td>Mouse</td>
<td>Dental Nurse</td>
<td>Dental Nurse</td>
</tr>
</tbody>
</table>

4.2.3 Design of the script

The narration accompanying the story was written so it contained the key health messages (tooth brushing; controlled sugar snacking; regular dental attendance) and a range of the BCTs according to Abraham and Michie’s (2008a) 26-item taxonomy were embedded within the script and supported by the images.
Ten of the 12 BCTs previously identified in the storybook review reported on in Chapter 3 were embedded into the story through the script. Two of the BCTs were not incorporated due to resource restrictions. BCT19 (social comparison) and BCT21 (identifying self as a role model for other) could not be incorporated within the story due to limitations on length and the number of characters. Additionally, PSE was focused on through the modelling of positive experiences, and success; this is in accordance with Bandura’s writings around self-efficacy (1986). This is supported by the literature reviewed in Chapter 1 showing the significance of self-efficacy for oral health behaviours. The use of positive experiences was also used to affect other relevant constructs, namely outcome expectancy for the dental encounter itself. This is consistent with findings from Chapter 2 and the HAPA. The images acted as a basis for the script. The script can be found in full in Appendix 4.2.

The script was recorded for use in the animation using high quality sound recording equipment at Media City UK, University of Salford by LO. The sound technician who operated the recording equipment also edited the recording in order to minimise unintended sounds (such as hesitations) and improve the flow of the narration. The digital narration file was sent to the external animation company who added the narration to the animation. Appropriate sound effects (for example, singing and tooth brushing noises) and music were also added to the finished animation file. The complete digital file was delivered by the company in a format suitable for copying onto a DVD. Together with this digital file, still images of the story were provided and these were arranged into a storybook format. The written text for each of the scenes was structurally the same script narrated on the animation.
4.2.4 Publication of materials

The publication of the materials was arranged by the project funders (a local NHS organisation). Products were provided to the communications team who printed the required amount of storybooks and DVDs for the evaluation study. At this point, an opportunity became available to create other accompanying materials – a bookmark and a fridge magnet (see rear of book). Both these items were designed by the NHS internal design team and were intended to complement the animation and book. Images of the characters were included on all study materials. The messages were primarily for informational purposes.

The intervention materials, once published, were then packaged up and ready for distribution to participating parents and their children in A4 brown paper envelopes.
4.3 Results

4.3.1 The intervention: ‘Kitten’s First Tooth’

*Changes to the original story*

Following initial conversations with the animation design company, a storyboard (Storyboard 1) was produced and reviewed by the research team. At this stage a number of changes were made and following further consultations with the animators, Storyboard 2 was produced. The changes between Storyboard 1 and Storyboard 2 are outlined in Table 4.3.

The most significant changes to the story outline were made following the consultation group meeting. The consultation group were presented with Storyboard 2. Table 4.4 shows, scene by scene the changes made following feedback at the consultation group.
<table>
<thead>
<tr>
<th>Story outline from Storyboard 1</th>
<th>Story outline from storyboard 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat and Kitten are at home; we see an invitation to a tea party in the forest.</td>
<td>[No change]</td>
</tr>
<tr>
<td>Cat and Kitten leave to go to the tea party and sign a song on the way</td>
<td>[No change]</td>
</tr>
<tr>
<td>On the way, a cloud appears above Kitten’s head and he looks to be in pain with a paw held to his mouth, images of the dentist’s drill and sugar laden foods appear in thought bubbles</td>
<td>On the way there, Kitten realises that something is different in its mouth (a new tooth is emerging) and asks the Cat about it,</td>
</tr>
<tr>
<td>Cat and Kitten are both confused and upset</td>
<td>We see a close up of tooth which is smiling, Kitten is confused and Cat and Kitten have a chat about teeth</td>
</tr>
<tr>
<td>Squirrel sees Cat and Kitten and is alarmed. He tries to help.</td>
<td>Squirrel sees the Cat and the Kitten and overhears their convocation, has an idea and then goes to get Owl</td>
</tr>
<tr>
<td>Suddenly, a shadow is seen on the floor as Owl and Mouse come in to land</td>
<td>Cat explains teeth to Kitten</td>
</tr>
<tr>
<td>Owl has Mouse as a helper; Mouse is holding a glow worm as a light source</td>
<td>Owl suddenly appears from above</td>
</tr>
<tr>
<td>Owl locates the painful tooth in Kitten’s mouth and rubs a magic acorn on it which eases the pain</td>
<td>Owl has Mouse as a helper; Mouse is holding a glow worm as a light source</td>
</tr>
<tr>
<td>All characters at the tea party, everyone is happy</td>
<td>Owl gives Kitten thumbs up – everything is ok</td>
</tr>
<tr>
<td>End</td>
<td>All characters at the tea party where Owl gives a speech on dental health</td>
</tr>
<tr>
<td>Story outline from storyboard 2</td>
<td>Amended story outline according to feedback</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Cat and Kitten are at home, we see an invitation to a tea party in the forest.</td>
<td>[No change]</td>
</tr>
<tr>
<td>Cat and Kitten leave to go to the tea party and sign a song on the way</td>
<td>[No change]</td>
</tr>
<tr>
<td>On the way there, Kitten realises that something is different in its mouth (a new tooth is emerging) and asks the Cat about it,</td>
<td>[No change]</td>
</tr>
<tr>
<td>We see a close up of tooth which is smiling, Kitten is confused and Cat and Kitten have a chat about teeth</td>
<td>We see a close up of tooth which is smiling, Kitten is confused</td>
</tr>
<tr>
<td>Squirrel sees the Cat and the Kitten and overhears their conversation, has an idea and then goes to get Owl</td>
<td>Cat talks to the kitten about teeth a little and then Squirrel walks by</td>
</tr>
<tr>
<td>Cat explains teeth to Kitten</td>
<td>They ask Squirrel for help and he understands straight away and holds up a sign which says ‘NHS family dentist’ with an arrow on it and then Squirrel leads the way to the Owl</td>
</tr>
<tr>
<td>Owl suddenly appears from above</td>
<td>Owl is standing next to a log, Owl greets Cat and Kitten (he recognises Squirrel), Squirrel leaves and Owl examines Kitten’s mouth</td>
</tr>
<tr>
<td>Owl has Mouse as a helper; Mouse is holding a glow worm as a light source</td>
<td>Mouse is Owl’s helper and hold up a light</td>
</tr>
<tr>
<td>Owl gives Kitten thumbs up – everything is ok</td>
<td>Cat and Kitten leave happy</td>
</tr>
<tr>
<td>All characters at the tea party where Owl gives a speech on dental health</td>
<td>All the animals meet up with Squirrel at the tea party in the forest where Cat is telling Kitten and others about dental health</td>
</tr>
<tr>
<td>End</td>
<td>End with Cat and Kitten at home in bathroom, Cat is brushing Kitten’s teeth (while standing behind Kitten), showing a crescent moon in the background and dark sky to signify night time brushing</td>
</tr>
</tbody>
</table>
4.3.2 Targeted behaviours and behaviour change techniques

Three behaviours were targeted in the story: 1) dental attendance 2) tooth brushing, 3) sugar snacking. Table 4.5 shows these behaviours/health messages and indicates how they appear in Kitten’s First Tooth.

Table 4.5 Health messages in Kitten’s First Tooth

<table>
<thead>
<tr>
<th>Targeted behaviour</th>
<th>Kitten’s First Tooth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental attendance</td>
<td>“Owl is pleased with Cat and Kitten and tells them to come back and visit her soon”</td>
</tr>
<tr>
<td></td>
<td>“She will take him for a dental check up again soon”</td>
</tr>
<tr>
<td>Tooth brushing</td>
<td>“Brush ... teeth every morning and every night”</td>
</tr>
<tr>
<td></td>
<td>Use fluoride paste</td>
</tr>
<tr>
<td></td>
<td>Tube of fluoride tooth paste is pictured</td>
</tr>
<tr>
<td></td>
<td>Parent should help child to brush</td>
</tr>
<tr>
<td></td>
<td>“Cat should help Kitten to brush”</td>
</tr>
<tr>
<td>Sugar snacking</td>
<td>“and not eat sweet things at night time”</td>
</tr>
<tr>
<td></td>
<td>General healthy eating (healthy substitutes)</td>
</tr>
<tr>
<td></td>
<td>“Our teeth are helpful to chew healthy foods”</td>
</tr>
</tbody>
</table>

The BCTs are defined by Abraham and Michie’s taxonomy (2008a) and 10 BCTS featured in the story (Table 4.6). These ranged from information around the behaviour health link to planning social support. Each of the BCTs appear only once in the story, with the exception of BCTs 1, 3 and 8 which appear twice (Table 4.7). A larger portion of the text appears in the table than would be coded as a BCT, this has been provided for context; the text in bold represents the BCT.
Table 4.6 Showing the BCTs in Kitten’s First Tooth.

<table>
<thead>
<tr>
<th>BCT #</th>
<th>BCT</th>
<th>Kitten’s First Tooth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Provide general information on the behaviour health link</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>Provide information on consequences</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Provide information about other’s approval</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td>Prompt intention formation</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Prompt barrier identification</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Provide general encouragement</td>
<td>✓</td>
</tr>
<tr>
<td>7</td>
<td>Set graded tasks</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Provide instruction</td>
<td>✓</td>
</tr>
<tr>
<td>9</td>
<td>Model/ Demonstrate behaviour</td>
<td>✓</td>
</tr>
<tr>
<td>10</td>
<td>Prompt specific goal setting</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Prompt review of behavioural goals</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Prompt self-monitoring of behaviour</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Provide feedback on performance</td>
<td>✓</td>
</tr>
<tr>
<td>14</td>
<td>Provide contingent rewards</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Teach to use prompts/ cues</td>
<td>✓</td>
</tr>
<tr>
<td>16</td>
<td>Agree behavioural contract</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Prompt practice</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Use of follow up prompts</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>provide opportunities for social comparison</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Plan social support/ social change</td>
<td>✓</td>
</tr>
<tr>
<td>21</td>
<td>Prompt identification as role model/ position advocate</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Prompt self-talk</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Relapse prevention</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Stress management</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Motivational interviewing</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Time management</td>
<td></td>
</tr>
</tbody>
</table>

The BCTs are defined by Abraham and Michie’s (2008a) taxonomy.
Table 4.7 BCTs featuring in Kitten’s First Tooth by type and example from the text

<table>
<thead>
<tr>
<th>BCT number</th>
<th>BCT</th>
<th>Example text</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Provide general information on the behaviour health link</td>
<td>“Teeth are helpful to chew healthy foods. They also help us have a <strong>bright smile when we keep them clean with our toothbrush and toothpaste.</strong>” “Clean your teeth for a bright smile”</td>
</tr>
<tr>
<td>2</td>
<td>Provide information on consequences</td>
<td>Owl tells cat and kitten to <strong>keep kitten’s mouth clean so that the new teeth can grow to be as healthy as his first one</strong></td>
</tr>
<tr>
<td>3</td>
<td>Provide information about other’s approval</td>
<td>“Owl is sitting next to kitten and <strong>tells him how good he was today when he visited her in the dental surgery</strong>” “<strong>Owl is very pleased with kitten</strong>” “<strong>Owl is pleased with Cat and Kitten</strong> and tells them to come back and see her soon”</td>
</tr>
<tr>
<td>4</td>
<td>Prompt intention formation</td>
<td>“Owl is sitting next to kitten and tells him how good he was today when he visited her in the dental surgery today <strong>Kitten says he will brush his teeth tonight</strong>”</td>
</tr>
<tr>
<td>6</td>
<td>Provide general encouragement</td>
<td>Owl is sitting next to kitten and <strong>tells him how good he was today when he visited her in the dental surgery</strong>.</td>
</tr>
<tr>
<td>8</td>
<td>Provide instruction</td>
<td>“She says Cat should help Kitten to brush his teeth” – instructs that Kitten should be helped by Cat (though further instructional detail is not given) “Cat is <strong>standing behind kitten helping</strong> him to brush”</td>
</tr>
<tr>
<td>9</td>
<td>Model/ Demonstrate behaviour</td>
<td>Dental attendance is modelled, as is Cat helping Kitten to brush his teeth. Intentions that are formed are carried out, e.g. tooth brushing in the final scenes.</td>
</tr>
<tr>
<td>13</td>
<td>Provide feedback on performance</td>
<td>“The new teeth can grow to be as healthy as his first one” – This line implies that Cat and Kitten have been looking after Kitten’s mouth sufficiently so far – they should continue this good behaviour.</td>
</tr>
<tr>
<td>15</td>
<td>Teach to use prompts/ cues</td>
<td>“<strong>Brush his teeth every morning and every night and not eat sweet things at night time</strong>” encouraging time of day as a prompt.</td>
</tr>
<tr>
<td>20</td>
<td>Plan social support/ social change</td>
<td>“Cat is very happy that Owl and Mouse were so nice to Kitten she will take him for a dental check up again soon again” This BCT appears only in the storybook and not in the animation.</td>
</tr>
</tbody>
</table>

The BCTs are defined by Abraham and Michie’s (2008a) taxonomy.
4.3.3 Overall story and themes

The story provided the platform to present a positive dental experience and convey oral health messages. For example, no pain or anxiety is portrayed in the story, no treatment was necessary following the dental appointment, the ‘dentist’ was pleased with both the parent and child and delivered health messages in a positive way. It was intended that this would demonstrate a desired dental visit, supplemented with health messages and BCTs around tooth brushing and sugar snacking behaviour in a non-directive and supportive way. As such, the story shows the characters visiting the dentist not because of dental problems but to obtain preventative dental advice. The focus of the story is not a visit to the dentist as in other similar stories (such as those reviewed in Chapter 2); rather, the walk in the woodland is independent but provides a platform for delivering health behaviour change.

Other themes touched on in the story, are that of a positive parent-child bond. The Cat and Kitten characters are portrayed having conversations, as being with each other in every scene and specifically, the Cat (parent character) is shown as helping the Kitten (child character). This is intended to reflect ‘normal’ parent-child bonds. If behaviour is demonstrated by a *relatable* character (or pair of characters in this case) and the character is successful, self-efficacy may be bolstered (Luszczynska & Schwarzer, 2005). This has been targeted through the motivations of parents around caring for their child. In Chapter 2 it was demonstrated that parents’ motivations for attending to their children’s health may be driven by the feelings of love and care they have for their child.
4.3.4 Differences between the storybook and animation

The story communicated in each format was the same though the script was abridged in the storybook due to space restrictions. Space was restricted in the storybook format because for printing purposes, the story had to be no more than 16 pages (including the over). This was due to budget restrictions. The notable aspects of the script however were present in each of the formats (Table 4.8). The pictures in the book all appeared in the animation because the animation was created first and the pictures in storybook are still images from the animation. The reasons for the differences between the narration and the text are primarily due to restrictions on length. Some of the narration was cut (for example on pages 2, 6 and 9) or altered to shorten it and in some cases (Table 4.8), subsequent text was altered in order to tell the story. Some of the differences were due to slight changes from the script during the recording of the narration, for example, the differences in tense on page 10. Some of the differences are greater, for example on page 10 of the book; a BCT (BCT20; planning) appears in the text of the book but not the animation. This is due to the recoding process of the narration.
<table>
<thead>
<tr>
<th>Page in storybook</th>
<th>Outline of difference (N.B. ‘narration’ always refers to the animation and ‘text’ always refers to the storybook)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 1</td>
<td>No difference</td>
</tr>
<tr>
<td>Page 2</td>
<td>Narration, ‘Cat and Kitten like to sing a little song as they walk’ appears in the animation but not the storybook</td>
</tr>
<tr>
<td></td>
<td>Narration states, ‘Oh, Kitten has found something, something in his mouth, what can it be?’ Whereas in the book, the equivalent text reads, ‘On the way to the tea party, Kitten notices that something is different in his mouth’</td>
</tr>
<tr>
<td>Page 3</td>
<td>Narration states, Kitten is pointing to his mouth, in the storybook, there is no text as such but the picture on the page shows a close up of Kittens tooth.</td>
</tr>
<tr>
<td></td>
<td>Narration states: ‘Kitten opens wide for Cat to see a little tooth is saying “hello!”’ whereas the storybook text reads, ‘Kitten opens wide for Cat to see a little tooth is saying “hello!”’</td>
</tr>
<tr>
<td>Page 4</td>
<td>Narration states, ‘there are lots of things we need our teeth for, teeth are helpful…’ whereas in the book the text reads, ‘Cat says “our teeth are helpful…”’</td>
</tr>
<tr>
<td></td>
<td>The statement “more teeth will grow soon...” is identical in both narration and text but comes before the above lines in the narration and after in the storybook</td>
</tr>
<tr>
<td>Page 5</td>
<td>Narration states, ‘Squirrel has been standing by a tree nearby and has been listening to Cat and Kitten talking about Kitten’s new tooth, squirrel thinks he can help, squirrel is very excited, he want to help and he knows someone who is very good with new teeth, look squirrel points...’ Whereas in the book the text reads, ‘Squirrel has been listening nearby and knows he can help, squirrel points...’</td>
</tr>
<tr>
<td></td>
<td>Narration states, ‘the sign says NHS family dentist’, whereas in the book, a close up of the sign is shown with no accompanying text. And in the narration, ‘Cat says, “Ah, someone who can look in Kitten’s mouth”’, this does not feature in the text of the book</td>
</tr>
<tr>
<td>Page 6</td>
<td>Narrations states, ‘In a small clearing, in the forest, Owl is sitting on a log, Mouse is sitting on Owl’s head, Mouse has a bright shining light, the light will help Owl to see in Kitten’s mouth’, whereas in the book, the text reads, ‘look its Owl the dentist.</td>
</tr>
<tr>
<td></td>
<td>Narration: ‘Owl thanks Squirrel for being so helpful’ there is no equivalent in the book.</td>
</tr>
<tr>
<td></td>
<td>Cat tells Owl, whereas in the book Cat explains to Owl.</td>
</tr>
<tr>
<td></td>
<td>Owl asks Cat and kitten if they would like her to take a look in Kitten’s mouth, not appearing in the book.</td>
</tr>
</tbody>
</table>
Page 7

Owl uses her mirror to look inside whereas in the text, ‘Owl looks at Kitten’s new tooth carefully with her mirror’

| Page 7 | Narration, it is stated, ‘Owl can see Kitten’s brand new tooth, oh look there’s Kitten’s new tooth, the tooth is happy, Owl and Mouse have looked after Kitten very well. Kitten has lots of space for more new teeth to grow’, whereas the text reads ‘the new tooth is happy, Owl and mouse have been very nice to Kitten’.

Page 8

It is stated in the narration, ‘Owl tells Cat and Kitten to keep...’ whereas in the book, the text reads, ‘Owl explains to Cat and Kitten how to keep...’

| Page 8 | In the book, ‘she says’ in reference to Owl, precedes instructions around when to brush teeth, this does not feature in the narration.

| Page 9 | The narration ‘later that day’ appears in the animation but not the book

| Page 9 | Narration, ‘comeback and visit her soon’ instead of ‘see her soon’ in the text

| Page 10 | Narration it states that ‘Cat reminds him that she will help him to brush his teeth tonight too and...’ in the text of the book, the word ‘too’ is omitted.

| Page 10 | Narration, it is stated that Cat was happy, whereas in the text, ‘Cat is happy’, following on from this, in the book, the text goes on to read, ‘she will take him for a dental check up again soon’, this does not feature in the narration of the animation.

| Page 11 | Narration, it is stated, ‘Cat helps Kitten to brush his teeth before bedtime...’ whereas in the text, ‘Cat is standing behind Kitten helping him to brush his teeth’

| Page 11 | The narration ‘he must keep the new tooth clean’ is also omitted in the text of the book.

| Page 12 | Narration: ‘Cat and Kitten are now very tired and ready for bed’, whereas in the text, ‘Cat and Kitten are very tired now, goodnight Cat and Kitten!’

| Page 12 | 4.3.5 Additional materials

The opportunity was taken to reinforce some of the messages and techniques from the story by way of providing additional “props” such as a bookmark and fridge
magnet in the study pack. The text communicated on these materials and the rationale behind each message is outlined in Table 4.9.

Table 4.9 Text appearing of the additional materials (bookmark and fridge magnet) and the rationale for each section of text

<table>
<thead>
<tr>
<th>Material</th>
<th>Message</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bookmark</td>
<td>“Help keep your child’s smile bright by brushing morning and night, and visiting the dentist regularly [in thought bubble from Cat (representing a parent): Great idea – now I can take my child to visit the dentist]”</td>
<td>This message reinforces BCT 1, linking behaviour and health outcomes and BCT 15 using the time of day as a prompt for tooth brushing. In also reinforces the health messages around brushing and dental visits and shows the ‘parent’ forming an intention to take their child to the dentist.</td>
</tr>
<tr>
<td></td>
<td>“There are 2 ways to find a dentist for your child in Salford ... You can call Salford’s dental helpline on 0161 212 4292 ... or text ‘dentist’ to 64746 and get a text back showing which dentists are nearby”</td>
<td>Information around how to find a dentist for children in the local area. This could be potentially useful for breaking down barriers around not knowing how to go about searching for a local dentist.</td>
</tr>
<tr>
<td>Fridge magnet</td>
<td>“Call Salford Dental Helpline on 0161 212 4292 or text ‘dentist’ to 64746”</td>
<td>Repeat of phone and text numbers.</td>
</tr>
<tr>
<td></td>
<td>[Speech bubble from Owl and Mouse (representing dental care professionals): “We can help you to look after your children’s teeth”]</td>
<td>Intended to reinforce that dentists are caring towards children and that there is a shared responsibility for child dental health</td>
</tr>
</tbody>
</table>
4.4 Discussion

A health promotion intervention to influence three specific oral health behaviours was developed. The intervention was published as two formats, a DVD animation and a storybook. The story outline was the same in both formats, differences between the narration script and book text have been outlined. One BCT was missing from the animation that appeared in the book. This was due to an error, which occurred during the recording of the narration and had time and resources allowed, would have been rectified. Unfortunately this was not possible. Differences not due to error occur in order to tell the story succinctly as part of a 16-page book.

Additional materials were produced for informational purposes but also to reinforce selected messages and techniques further.

The health messages focused on in the story are dental attendance, tooth brushing and sugar snacking. Due to restrictions on the length of the story, opportunities for communicating the messages were limited. In the finished version, only a single message relating to sugar free bedtimes was present as well as a brief mention of healthy foods. For example, in the closing scenes where the tea party takes place, the narration states that the characters are eating nuts and drinking tea (non-sugar foods and drinks). However neither of these represents explicit health messages. All health messages that appear in the book are evidence based and recommended in the current Department of Health guidance (Department of Health, 2009).

Guidance on the included health messages was via the consultation group. This expert input was important for ensuring that the content complied with the clinical evidence base, however, many of the members of the group were able to comment...
as parents as well as clinicians. Parent involvement in this stage, in addition to the earlier qualitative study could have improved this development process. Such involvement may have helped to provide an understanding of the acceptability of the content of the intervention prior to its pilot evaluation. Furthermore involvement from children as well as parents may have helped to ensure the story’s appeal to children. Oral health research has been criticised for its failing to involve children more in the research process (Gilchrist, Rodd, Deery, & Marshman, 2013; Marshman et al., 2007). While Kitten’s First Tooth was primarily aimed at caregivers, it was designed as a child friendly intervention and would likely have benefitted from child involvement in the development process, particularly in terms of ensuring developmental appropriateness.

There are specific limitations that need to be recognised in terms of this intervention with regard to the absence of children in its development. Children have not directly been used in any part of the development process of Kitten’s First Tooth. Instead parents were used to gather data about child health behaviours. The reason for this was that children aged three to five years do not tend to carry out health behaviours for themselves. Additionally, there may have been practical difficulties in gathering health behaviour information from such young children. However, it would have been possible to actively involve children alongside their parents in a steering panel to guide the development of the story itself. Such a steering panel could have input into the story and the subsequent storyboards and script. Child opinions about the story could have helped to ensure that it looked and ‘felt’ contemporary and made sense to children.
The involvement of key stakeholders in the development of interventions is supported by the MRC’s guidance on complex interventions (2008) as well as NICE’s guidance on behaviour change (NICE, 2007). In not actively involving children in the development of Kitten’s First Tooth, the intervention lacked child insight. This may have negative consequences on the extent to which the story is used by children and their parents as well as understood. Fundamentally, the evidence based health messages and BCTs are to be carried by the story and if it is not appealing or understandable, then it is unlikely to be successful. Any future iteration of the story should look to involve children as well as parents, not only to improve the intervention itself but also to improve the experience of receiving the intervention for participants.

The use of a consultation group may lead to subjectivity in the design process. A relatively small number of people having substantial input into the redesign of an intervention may increase the possibility of anecdotal experience and opinion impacting upon the intervention. In terms of the hierarchy of evidence, expert opinion is considered to be low (Evans, 2003). However, expert opinion was used only to guide the design phase of the intervention and not to inform it as such. The steering group were primarily clinical meaning that the information provided was technically correct. Additionally, a Health Psychologist was included in the group to advice on delivery style regarding behavioural messages.

In terms of the BCTs included in Kitten’s First Tooth, the review of children’s dental storybooks reported in Chapter 3 revealed that a number of the BCTs from Abraham and Michie’s taxonomy (2008a) may be reasonably conveyed through a printed story
medium. All BCTs were delivered through the two mediums (book and animation), except for BCT20, which, due to a recording error appears in the book but not the animation. The number of characters was necessarily confined due to financial restrictions; the available budget only allowed for the design of five characters.

A further error in the development process meant that there was no BCT in Kitten’s First Tooth which related to sugar snacking behaviours. The research team or consultation group did not pick up this oversight until the story had been produced and signifies a limitation of this process. This is testament to the tight timeframe in which Kitten’s First Tooth was produced. The process took longer than anticipated and the pressures of the upcoming planned evaluation study meant that the development was more rushed than it should have been. Further studies should look to build in a contingency period to allow for the overrunning of intervention development phases. Better planning may have improved Kitten’s First Tooth in terms of its potential as an oral health promotion intervention. However, it is important to remember that the development of Kitten’s First Tooth is an iterative process with further developments anticipated following the pilot evaluation.

Previous studies using stories for improving aspects of health have not reported on the development which is important to fully understand the ingredients of the intervention (Fanurik et al., 2010; Felder-Puig et al., 2003; Harrison, 1991; Kolk et al., 2000). While some of these studies note that the intervention book is available upon request and one study uses an existing child dental health storybook which can be easily obtained (Aminabadi et al., 2011), most studies simply report the brief outline of the story used negating any real detail that would allow for accurate coding of
possible BCTs used or replicated. For example, in the study described by Harrison (1991), the description of the story is as follows,

“The preparation story offered a simple description of the venous blood sampling procedure, why it is carried out, and what happens to the blood after it has been collected. It emphasised that the procedure creates a brief period of pain, and that the pain is noticeable but not unbearable. The story also stressed that venepuncture is less painful if a child relaxes his arm and cooperates with the technician” p229

This offers no insight into any BCTs which may have been present in the intervention. Furthermore, no mention is made of the availability of the book. This perhaps reflects the age of the study. The RCT reported by Felder-Puig and colleagues (2003), is more recent and includes some still images from the book as well as a declaration of availability of the book and an outline of its cost.

The recently developed workgroup named Workgroup for Intervention Development and Evaluation Research (WIDER) has recommended that behavioural interventions be reported comprehensively (http://interventiondesign.co.uk/?page_id=9). Led by Charles Abraham, this is aimed at improving the transparency of behavioural interventions. When the interventions are explicitly reported and made freely available, it becomes possible to accurately code them for the presence of BCTs. This helps to provide an understanding of why or why not interventions have the intended effects. Ultimately, the ability to code interventions at this level means that evidence can be complied around the specific BCTs that are effective for particular behaviours in particular settings. Theories can be tested improving the literature base of behavioural science more generally (Cane, O’Connor, & Michie, 2012; Glanz, Rimer, & Viswen, 2008; Michie, 2008). Furthermore, the WIDER group makes
recommendations around the reporting of the development of interventions as well as detailed descriptions of the components of active control groups.

The development and BCTs of Kitten’s First Tooth has been specifically reported for these reasons of transparency. It is intended that through the explicit reporting of the BCTs present in the intervention, that the evaluation of this intervention will provide scientific insight into the specific BCTs that are either helpful or unhelpful in the promotion of oral health behaviours. A limitation of this research lies in the quick progression of the literature around BCTs. Since its publication in 2008, the original 26-item taxonomy of Abraham and Michie has been redeveloped and published as a 40-item taxonomy (Michie, Ashford, Sniehotta, et al., 2011). Further research is currently ongoing to produce a much larger taxonomy of more than 90 items, grouped into 16 sets (Michie et al., 2013). Due to the timing of the current project, it was not possible to incorporate the newer taxonomy. Although no longer the most current BCT taxonomy, the 26-item list has had substantial impacts upon behavioural science and has been reported as widely used in systematic reviews as well as in intervention development (Michie, Abraham, et al., 2011).

In terms of the theory base, oral health promotion and education has been criticised for its lack of impact regarding behaviour change (Adair et al., 2013; Blinkhorn et al., 2003, 1981; Cooper et al., 2013; Kay & Locker, 1996, 1998). Oral health education and promotion (which has traditionally tended to focus primarily on education) predominantly works on improving knowledge and attitudes around the disease or condition. However Adair et al, (2004) showed that it is parental attitudes and self-efficacy towards behaviours that are more important in terms of predicting dental
disease. These can be translated into BCTs. BCTs offer a potential way in which to bring theory into interventions both in their development and delivery. Moreover, the use and evaluation of specific techniques for oral health promotion would lead to a better understanding of the most effective BCTs or combination of BCTs for impacting on oral health related behaviours. No study in the literature to date has attempted to apply BCTs in oral health promotion interventions for young children. This has been the aim of Kitten’s First Tooth.

A Cochrane review (Cooper et al., 2013) examined RCTs of school-based oral health promotion interventions aimed at changing children’s behaviours to prevent tooth decay. The interventions of the four included studies included in the review were analysed using Abraham and Michie’s 26-item taxonomy of BCTs (2008a). All four interventions were found to include BCTS 1, 2 and 17 (information about behaviour health link; information on consequences; prompt practice). BCT 9 (demonstration of behaviour) occurred in three of the interventions and BCT 2 (instruction) occurred in two. Some other BCTs were identified but not consistently across the interventions. While this does not demonstrate effectiveness of techniques, it does identify those methods which oral health researchers choose to include in interventions to improve child dental health.

A subsequent study based on this Cochrane review (Adair et al., 2013), further analysed the BCTS in these interventions and commented on their usefulness for future oral health research. This study analysed five interventions in total (the extra intervention being a study that was excluded from the Cochrane review due to concerns about random allocation; Peng, Petersen, Bian, et al., 2004). Adair and
colleagues found that a total of eight of a possible 26 BCTs had been used across any of the five interventions, the median number of BCTs occurring in any one intervention was 3 (range 2-6). Compared with similar studies which have sought to identify BCTs present in interventions in the field of healthy eating and physical activity (Michie, Jochelson, et al., 2009), more BCTs have been identified than in oral health interventions (Adair et al., 2013). However, it is true to say that the concentration of BCTs does not necessarily mean an intervention will be more or less effective; it may be the combination or simply the inclusion of specific techniques that is pertinent. A review of interventions aimed at changing smoking, eating or physical activity behaviours in low SES groups for example, found that interventions comprised of less rather than more BCTs to be more effective (Michie, Jochelson, et al., 2009). Further research into BCTs included in oral health promotion interventions is necessary to establish which or what combination of BCTs are most effective.

There is a lack of oral health promotion interventions for use in more general (non-clinical) populations which explicitly aim to use theory-derived techniques to change parents’ oral health related behaviours for their young children (Adair et al., 2013; Cooper et al., 2013). To date, no oral health promotion intervention utilising BCTs in its development has been evaluated and reported in the literature. Furthermore, the aforementioned Cochrane review (Cooper et al., 2013), concluded that the included interventions were not based on behavioural theory and were not robustly developed. The following chapters, chapter 5 and 6, report on two pilot evaluations of Kitten’s First Tooth.
4.5 Conclusion

A novel story was developed using an iterative process involving a consultation group of oral health and behavioural specialists. Kitten’s First Tooth was published in both a storybook and animation format (DVD), in line with the social marketing framework which recommends delivering promotional materials by more than one means to increase the reach and use of the intervention. The story targeted three evidence based oral health behaviours and included BCTs (Abraham & Michie, 2008a).
4.6 Next steps

Having developed a story-based oral health promotion intervention, Kitten’s First Tooth, the next step was for a pilot evaluation to take place. Through such an evaluation, it would be possible to understand more about what aspects of the intervention are successful (if any) and what aspects may require further development. This was in line with the overall iterative development process of the intervention. The following chapter describes a pilot evaluation study in which the effectiveness of Kitten’s First Tooth was assessed among a group of parents living in an urban deprived environment.
Chapter 5

Pilot evaluation of Kitten’s First Tooth
5.1 Overview

As reported in the previous chapter (Chapter 4), a health promotion intervention in the form of a combined DVD animation and storybook, ‘Kitten’s First Tooth’, was developed with aim to change parental confidence to carry out child oral health behaviours, namely tooth brushing and sugar free bedtimes. This chapter reports on a pilot field study carried out to evaluate the effectiveness and acceptability of Kitten’s First Tooth in this population.

Evaluation was by means of a non-randomised controlled before and after study (n=149) taking place in two demographically similar but geographically distant areas of North West England. The primary outcome was parents’ self-efficacy for key behaviours (tooth brushing, sugar free bedtimes) associated with looking after the health of their children’s teeth. Secondary outcomes were parents’ behavioural intention to carry out the key behaviours and outcome expectancy for dental attendance.

Evaluating health promotion interventions such as Kitten’s First Tooth is important for a number of reasons. Testing interventions that have been developed using theory can improve understandings of which mechanisms (or combination of mechanisms) are important for affecting particular behaviours (Adair et al., 2013; Michie, 2008). Even where evaluations show interventions not to be effective in their aims, important questions can be formed around the reasons why the intervention failed or had unexpected results and these can help to inform future research directions. Kitten’s First Tooth is embedded with specific BCTs (Abraham &
Michie, 2008a), evaluation of which will help inform on whether these (as a set) are important for oral health behaviours in this population.

Moreover what this evaluation will add is insight into the utility of children’s stories to convey health promotion messages to parents. Through examination of change (or no change) in parent’s attitudes and intentions, an understanding of whether the intervention is able to affect the psychosocial determinants of behaviour may be possible. Further to this, an idea of the acceptability this type of intervention is for parents will be sought in terms of its use in the home. Answering these questions may help to inform future iterations of Kitten’s First Tooth and intervention development in the area of child oral health promotion more generally.

Previous evaluations of child oral health promotion interventions that have used behavioural rather than clinical outcome measures have tended to collect data on knowledge increase and self-reported behaviours (Cooper et al., 2013). While knowledge is often a prerequisite to change, it is not known to be a direct psychosocial determinant of behaviour (Kay & Locker, 1998; Watt, Fuller, Harnett, Treasure, & Stillman-Lowe, 2001).

An example of a fairly recent oral health communication intervention which focused on knowledge rather than behaviour was implemented in Kerala, India. Parents of children aged up to six years used a dental professional led educational session to improve oral health knowledge (Nair et al., 2009). Significant improvements in parents’ knowledge were recorded in this uncontrolled study. Knowledge was an outcome in itself and no attempt was made to support parents transform this knowledge into behaviour.
Another community-based study was conducted in Ireland (Friel, Hope, Kelleher, Comer, & Sadlier, 2002) and aimed to increase awareness of oral health messages and improve subsequent behaviours by combining a dental professional led session (in school) with a mass media campaign. The behaviour focused on was tooth brushing with fluoride toothpaste and messages were communicated in a classroom setting by a dental nurse who used props such as leaflets and posters and a video which was linked to the media campaign. The media campaign was television based and incorporated well known personalities who repeated the oral health messages. Based on the limited information provided in the paper, it can be posited that this intervention utilised role models as well as repetition to communicate its health messages.

The impact of the intervention described by Friel and colleagues (2002) was evaluated using a questionnaire designed specifically for the study. This questionnaire measured awareness of the oral health messages as well as self-reported behaviours pre and post the intervention. Significant improvements in terms of the net effect of the intervention were found regarding awareness of the oral health messages in the test group after the intervention (twice daily brushing 4.80%; three minute brushing 13.40%; toothpaste amount 26.30%), a similar pattern followed for reported tooth brushing behaviours. It is possible however, that the evaluation, which relied on self-reported behaviour as an outcome here is inherently flawed. The celebrity (a member of a popular music group at that time) who endorsed the oral health messages did not act as a role model in the way in which Bandura talks of role models as part of his social learning theory (Bandura, 1977a).
Rather celebrity endorsement here works through ‘reach’ (Chapman, 2001). Such celebrity involvement can help to attract and maintain attention to the campaign as well as aligning the behaviour with social acceptability and norms generally. This may introduce a substantial bias for self-report behavioural outcomes; aligning the oral health messages with what is widely publicised to be socially acceptable is likely to encourage inflated responses in the test group.

A more recent community-based study of a child oral health promotion campaign took place in Finland and was conducted as an RCT (Tolvanen et al., 2009). The intervention was multilevel and aimed at affecting child knowledge, attitudes and behaviours around their oral health. The evaluation found improvements in reported behaviours but no significant change, when compared to control groups, in knowledge and attitudes.

Tolvanen and colleagues’ study had two intervention arms and a control, both intervention arms were exposed to a community-based promotion campaign which disseminated messages and included an interactive component which took place in schools. One of the intervention arms was also provided with oral hygiene equipment. The outcome measure used for child knowledge and attitudes was a questionnaire developed in a previous study which was shown to have good levels of reliability (Poutanen, Lahti, Seppä, Tolvanen, & Hausen, 2007). Reported behaviour improved across the groups in this study but the difference was significant between intervention groups and the control; both intervention groups improved self-reported behaviour outcomes. It is possible that social desirability answering impacted on responses regarding reported behaviour; due to the knowledge and
attitudes measure having greater reliability, these outcomes were more accurate, meaning the intervention may have not been effective in its aim. This may explain why there was an observed change in behaviour but not in knowledge and attitudes.

5.1.1 Study focus

Study aim:
To evaluate the effectiveness and acceptability of Kitten’s First tooth using a non-randomised comparative study design.

Subsequent research questions:
The research questions and hypotheses for this study are three fold. The first is the principal research question and deals with the efficacy of the intervention for its aim in improving child dental health primarily via parental change in self-efficacy. The second research question deals with parent intention to enact specific behaviours and attitudes towards tooth decay more generally and outcome expectancies for dental attendance. The third deals with the acceptability and use of the intervention by participants.

1. Primary research question:

Is Kitten’s First Tooth effective at improving parents’ self-efficacy for their children’s oral health behaviours?

Primary hypotheses:
1. Kittens’ First tooth will have no effect on parent’s self-efficacy for their child’s tooth brushing behaviours.

2. Kittens’ First tooth will have no effect on parent’s self-efficacy for their child’s sugar snacking behaviours.

2. Secondary research questions:

- Is Kitten’s First Tooth effective at changing parents’ self-reported intentions to enact oral health behaviours for their children?
- Is Kitten’s First Tooth effective at changing parents’ attitudes?
- Is the story acceptable as an oral health promotion intervention to parents?

Secondary hypotheses:

1. Kitten’s First Tooth will not change parents’ intentions to take their child to the dentist.

2. Kitten’s First Tooth will not change parent’s intentions to brush their child’s teeth.

3. Kitten’s First Tooth will not change parents’ intentions to control their child’s sugar snacking.

4. Kitten’s First Tooth will have no effect on parents’ attitudes to child tooth decay, prevention and outcome expectancies for dental attendance.
5.2 Methods

5.2.1 Design

The intervention was evaluated in the field, i.e. school children and their parents. Specifically, a controlled before and after study design was applied resulting in two groups – Group 1 (intervention) who received the storybook and DVD (Kitten’s First Tooth) and Group 2 (control) who did not receive any intervention. The control group was a wait list control group meaning that the intervention was provided to them following the collection of outcome data. The study was conducted within a city located in North West England. Ethical approval for this study was granted by the University of Salford.

The intervention Kitten’s First Tooth was developed (Chapter 4) and it was necessary to run a pilot in order to obtain some initial data as to its effectiveness for promoting child oral health behaviours. This is in keeping with the MRC guidance on the development and evaluation of behaviourial interventions (MRC, 2008). Pilot studies can help to ensure that future evaluations of the intervention are successful (Charlesworth, Burnell, Hoe, Orrell, & Russell, 2013) and have been cited as prerequisite to RCTs (Thabane et al., 2010). A pilot evaluation of Kitten’s First Tooth is an appropriate next step immediately following its initial development. Understanding more about the strengths and limitations of the intervention is pertinent to its redevelopment and for future evaluations.

Two areas within this city were selected for study. These areas represented similar populations but lay at opposite ends of the city. Geographical distance was planned
in order to limit the possibilities of contamination. In terms of populations, the city in which the evaluation took place is characterised by an ethnically homogenous population consisting of White people (of UK and Irish heritage). This is something which has changed little since the industrial revolution over 100 years ago. While more recent influxes of immigration have seen ethnic diversity in the city rise higher than ever before, figures are still much lower than national averages (5% versus 10% nationally ONS, 2007). While the city as a whole is ranked as deprived (The IMD score for the city was 35, nationally the average is 21.67; IMD 2010, 2011), deprivation within the city is varied, with some areas very much more deprived than others (median 32.41, range is 3.95- 79.65). The literature demonstrates a consistent association between dental health and SES (Bernabe, Delgado-Angulo, & Murasko, 2012; Du, Luo, & Zeng, 2007; Dye, Arevalo, & Vargas, 2010; Ferreira, Beria, & Kramer, 2007; Reisine & Psoter, 2001; Tanaka, Miyake, Sasaki, & Hirota, 2013; Telford, Coulter, & Murray, 2011; Watt, 2007). SES is therefore a likely confounding factor in terms of dental health. Therefore, the areas of study were matched as much as practically possible on SES (further details of the areas are given in Table 5.1 below).

The health promotion intervention (Kitten’s First Tooth) was applied in one geographical area (Group 1) and data was collected from participants in that area as well as from participants in that area and another area, which acted as a control (Group 2). Schools were identified as a reliable source through which to access children and parents for the study.
5.2.2 Participants

Inclusion criteria:

- Parents with children aged between three and five years at the beginning of 2012.
- Parents with children attending a nursery or primary school in the areas of study.

Exclusion criteria:

- No exclusion criteria were specified.

Characteristics of population of areas of study

Some basic characteristics of the population from which the study took place are shown in Table 5.1. The number of people living in the intervention area is slightly larger than in the control area, however, the number of children under nine years old is comparable. There is a higher percentage of immigrants living in the intervention area, though in both areas, the percentage is lower than the national average (Office of National Statistics, 2011). Deprivation is also higher in the intervention group, however, both areas have a much higher score than the national average of 21.27 (IMD, 2007).

Table 5.1 Population characteristics of areas chosen for study

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Intervention (Group 1)</th>
<th>Control (Group 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate population size</td>
<td>19,000</td>
<td>11,000</td>
</tr>
<tr>
<td>Approximate number of children aged between 0 and 9 years</td>
<td>1,500</td>
<td>1,400</td>
</tr>
<tr>
<td>Approximate % of population of ethnic minorities</td>
<td>5.00%</td>
<td>2.00%</td>
</tr>
<tr>
<td>Index of Multiple Deprivation</td>
<td>55.43</td>
<td>39.98</td>
</tr>
</tbody>
</table>

*Based on data from Salford City Council (2010)*
5.2.3 Procedure

In terms of the length of the intervention period, it was necessary to work around school term times as participants were to be accessed via schools. Three months was deemed to be a practical period of time in which to pilot the intervention. There is little evidence to suggest an optimum period of time for interventions aiming to impact on psychosocial factors, instead it has been considered that the degree of support provided is more important (Yehle & Plake, 2010). Interventions to affect self-efficacy for health have been found to last between five minutes and two years (Ashford, Edmunds, & French, 2010). Three months was selected as a practical amount of time for the intervention to run because it fitted into the school term time well. This time period has also been used in a previous oral health promotion intervention targeting self-efficacy (Yekaninejad et al., 2012).

Sampling and recruitment

The areas of study were purposively selected and all eligible participants were invited to the study. Schools were selected as points of access to recruit children and parents. All eligible parents of children in the selected schools were invited to take part in the study. All schools in the areas of study were contacted and parents were eligible if their child attended the school and was aged between three and five years. Approximately 90% of preschool aged children in the Greater Manchester area attend a pre-school institution (Davies et al., 2005). Children can enter nursery following the first school term after they have turned three years of age. Salford City Council’s document ‘Choosing a Primary School in Salford academic year 2011-2012’ was used as a basis through which to select the schools to be invited to the study.
The document included information on nursery schools as well as primary schools and provided an approximate number of nursery children in each school.

Each of the schools was contacted by telephone initially, principally to establish the name of and contact details of the current head teacher. A letter inviting the school to take part in the study was then sent out either by post or email (depending on advice from the school receptionist). This letter was followed up by a phone call, no longer than 1 week later. If no contact had been made with the head teacher at this point, the letter was resent and a reminder provided to the school receptionist. Again a phone call to the head teacher was made within 1 week of the second letter being sent. If this was not successful, no further attempts were made to recruit the school.

Once schools had been recruited to the study, contact was made to establish the role they would have in distributing questionnaires and intervention packs and in collecting questionnaires back again. Numbers of eligible children were established via contact with the head teacher of each school and packs including study information sheets, a consent form (Appendices 5.1 and 5.2) and the baseline questionnaire (Appendix 5.3) together with two return envelopes (one to return to the school; one to return via pre-paid post – whichever best suited the participant), were printed and packed ready to be distributed. Participants were considered recruited to the study only if their completed consent form was received. If questionnaires were returned without the completed consent form, a second consent form was sent out and if this was not returned, the parent was not considered a participant and associated data was destroyed.
Implementation and evaluation

In September 2011, baseline questionnaires were distributed to the population three times and collected over a two month period. Delays in the production of the intervention materials meant that the intervention was not distributed until after the Christmas break 2011. In January 2012, 91 intervention packs (Animation on DVD, storybook, fridge magnet, bookmark and note detailing the pack contents and date when contact would next be made) addressed to each individual participant (naming both parent and child) were delivered to participating schools in the intervention area. The schools distributed the packs to participants and informed the research team if problems were encountered (for example if children had left the school since signing up to the intervention).

The control group did not receive any intervention. Instead, they completed interim further pre-questionnaire or comparison with baseline data taken three months previous. A single drop of this questionnaire was made and only those questionnaires returned immediately (within one week) were used for comparison.

After three months, the post questionnaire packs were prepared and delivered to all participating schools in the intervention and control areas and distributed to parents. All participants (intervention and control) received a ‘thank you’ end of study pack upon returning their completed questionnaires. This pack consisted of a Kitten’s First Tooth themed brushing chart with stickers and oral health themed stationary.
5.2.4 Measurements

The Oral Health Behaviours Questionnaire (OHBQ)

The OHBQ (Adair et al., 2004), was developed to measure attitudes and beliefs of parents around their child’s dental health. The construction of the items was based on the health belief model (Rosenstock, 1966), the theory of planned behaviour (Ajzen, 1991) and the health locus of control (Wallston & Wallston, 1978). Exploratory factor analysis (principal component) revealed eight underlying factors, three grouped as parental attitudes toward child tooth brushing behaviour, two grouped as parental attitudes towards child sugar snacking and three grouped as parental attitudes towards dental decay. Reliability, measured by Cronbach’s α for all these subscales ranged from 0.52-0.81. Scores greater than 0.70 are normally considered good (Bland & Altman, 1997; DeVellis, 2003; Tavakol & Dennick, 2011), scores of more than 0.60 and even arguably 0.50 may be considered as moderate considering that the constructs being measured are not known to have high levels of stability.

Logistic regression demonstrated the scales could reasonably predict behaviours related to sugar snacking ($R^2$ 19%, $p=0.038$) and tooth brushing ($R^2$ 14%, $p=0.041$). Although social cognitive theory (Bandura, 1986) was not explicitly used in the construction of the items, PSE was identified as a key factor affecting parents’ dental health behaviours for their children and subsequent health. Beliefs around control and efficacy feature in both the theory of planned behaviour (Ajzen, 1991) and the health locus of control (Wallston & Wallston, 1978).
The measure has been further used in a varied form among Norwegian children (Skeie, Espelid, Riordan, & Klock, 2008; Skeie, Klock, Haugejorden, Riordan, & Espelid, 2010). The findings have been used to develop conceptual models to explain ethnic minority oral health (Mejia et al., 2008) and child oral health (Fisher-Owens et al., 2007) and a number of primary research studies have demonstrated findings in agreement with those of Adair and colleagues (2004) (Amin & Harrison, 2009; Astrøm & Kiwanuka, 2006; de Castilho, das Neves, & de Carvalho Carrara, 2006; Holgerson, Twetman, & Stecksên-Blicks, 2009; Maserejian, Trachtenberg, Link, & Tavares, 2008; Poutanen, Lahti, Tolvanen, & Hausen, 2006).

Based on a previous study, intention towards enacting behaviour as well as self-efficacy for the behaviours were found to be important psychosocial constructs for tooth brushing and sugar control (Adair et al., 2004). Regarding dental attendance behaviour, the focus groups study presented in Chapter 2 indicated that outcome expectancy may be an important construct. This is supported by the HAPA approach (Schwarzer, 1992). Table 5.2 shows the constructs measured for this study in relation to the relevant oral health behaviour.

Table 5.2 Constructs to be measured using the modified OHBQ in relation to oral health behaviours

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tooth brushing</td>
<td>Intention and self-efficacy for the behaviour</td>
</tr>
<tr>
<td>Sugar snacking</td>
<td>Intention and self-efficacy for the behaviour</td>
</tr>
<tr>
<td>Dental attendance</td>
<td>Intention, outcome expectancy, and risk perception, self-efficacy for prevention of tooth decay</td>
</tr>
</tbody>
</table>
It was necessary to modify the instrument somewhat for the purposes of this study. Four items were added pertaining to intention and to outcome expectancy for dental attendance; two items relating to each construct were added in order that reliability analysis could be carried out. The items are shown in Table 5.3.

<table>
<thead>
<tr>
<th>Item</th>
<th>Relevant construct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Going to the dentist regularly would help keep my child’s mouth healthy</td>
<td>Outcome expectancy</td>
</tr>
<tr>
<td>Attending regular dental appointments is good for me</td>
<td>Outcome expectancy</td>
</tr>
<tr>
<td>I have made an appointment to take my child to the dentist soon</td>
<td>Intention</td>
</tr>
<tr>
<td>I plan to take my child to the dentist in the next 6 months</td>
<td>Intention</td>
</tr>
</tbody>
</table>

Further evaluation questions were added to the questionnaire. These were sent to the participants in the intervention group and only asked at the end of the study. They were based on relevant theoretical constructs for each of the three behaviours but were specifically worded around Kitten’s First Tooth. It was intended that these evaluation style questions would be able to strengthen the findings in helping to tie any effect (either way) to the intervention itself. Examples of the questions can be seen in Table 5.4. The questions were asked on a 5-point Likert scale from strongly disagree (1) to strongly agree (5). Therefore higher scores on this scale indicate higher levels of agreement with the statement. Some items were reverse scored. These scores were adjusted for analysis.
Table 5.4 Evaluation questions and related constructs used to develop them

<table>
<thead>
<tr>
<th>Questions</th>
<th>Related construct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitten’s First Tooth did not make any difference to whether I will take my</td>
<td>Intention to take child to the dentist</td>
</tr>
<tr>
<td>child to the dentist or not</td>
<td></td>
</tr>
<tr>
<td>After reading Kitten’s First Tooth with my child I intend to limit them</td>
<td>Intention to restrict child’s sugar</td>
</tr>
<tr>
<td>having sugary food and drink</td>
<td></td>
</tr>
<tr>
<td>Kitten’s First Tooth did not make any difference to how I look after my</td>
<td>Intention to brush child’s teeth</td>
</tr>
<tr>
<td>child’s teeth</td>
<td></td>
</tr>
<tr>
<td>After reading Kitten’s First Tooth with my child I feel that our next</td>
<td>Outcome expectancy for attendance</td>
</tr>
<tr>
<td>trip to the dentist will be more positive</td>
<td></td>
</tr>
</tbody>
</table>

Evaluation questions were also asked in the final questionnaire to the intervention participants relating acceptability of the book, for example if it fitted into the child’s routine and if the child understood the content. These questions were asked for evaluative purposes only and not based on theoretical constructs.

5.2.5 Analysis

Baseline data collected in September and October 2011 is presented here with final data collected between May and July 2012. The baseline data collected September/October 2011 was used for this evaluation after it was compared with a sample of repeat data collected in January 2012. Only questionnaires that were returned within one week of being sent out were reviewed, this was to ensure responses were not affected by exposure to the intervention. Due to this time restriction, only 38 questionnaires were reviewed. No significant difference was found.

Data was entered directly into SPSS and each entered case was double checked with the questionnaire to control for data entry errors. Descriptive statistics, including frequencies for nominal or ordinal data and means for continuous data were
generated to check for outliers. Where outliers were found, the original questionnaires were checked against the database.

Data collected using the OHBQ was analysed according to the original eight factor structure determined through principal components analysis (Adair et al., 2004). The additional items were considered separately. Scale means were calculated for each of the subscales. The normality of the scale data was determined by reviewing the skewness and kurtosis. The scale data from the OHBQ was analysed using a general linear model (ANCOVA) whereby the dependant variable was the mean score at post intervention and the baseline score was entered into the model as a covariate. The comparison was made between the groups (intervention and control). This analysis allowed for a between groups comparison of the mean scores following the intervention while adjusting for the baseline mean scores. All tests were carried out using SPSS v20.
5.3 Results

Of the total 149 participants, 129 returned both baseline and evaluation questionnaires (retention of 86.57%), 125 of these pairs of questionnaires were used in the analysis (83.38%). Following data entry, the data was checked for errors. Frequencies were run to highlight any obvious errors and where these were apparent, the database was checked against the original questionnaire. Missing data was apparent, though no systematic pattern could be attributed. No attempt was made to estimate missing values. Cases with missing values were not included in the final analysis.
Table 5.5 shows the skewness and kurtosis of the data. The scores fall between +/-2 for most at both baseline and post intervention. The data can therefore be considered for parametric use (Jondeau & Rockinger, 2003).

Table 5.5 Skewness and kurtosis of the subscales of the OHBQ

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Baseline</th>
<th>Post intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Skewness</td>
<td>Kurtosis</td>
</tr>
<tr>
<td>PSE in relation to child tooth brushing</td>
<td>-1.01</td>
<td>1.06</td>
</tr>
<tr>
<td>PSE in relation to controlling child sugar snacking</td>
<td>-0.38</td>
<td>-0.67</td>
</tr>
<tr>
<td>Intention to brush child’s teeth</td>
<td>-0.64</td>
<td>0.05</td>
</tr>
<tr>
<td>Intention to control child sugar snacking</td>
<td>0.08</td>
<td>-0.79</td>
</tr>
<tr>
<td>Intention towards child dental attendance item 1</td>
<td>-1.18</td>
<td>1.53</td>
</tr>
<tr>
<td>Intention towards child dental attendance item 2</td>
<td>0.01</td>
<td>-1.17</td>
</tr>
<tr>
<td>Outcome expectancy for dental attendance</td>
<td>-0.56</td>
<td>-0.50</td>
</tr>
<tr>
<td>Attitudes towards prevention</td>
<td>-0.72</td>
<td>-0.26</td>
</tr>
<tr>
<td>Perceived seriousness of tooth decay in children</td>
<td>4.25</td>
<td>-1.95</td>
</tr>
<tr>
<td>Chance control – decay occurs by chance</td>
<td>-0.08</td>
<td>-0.54</td>
</tr>
<tr>
<td>External control – preventing decay is the dentist’s responsibility</td>
<td>0.28</td>
<td>-0.52</td>
</tr>
</tbody>
</table>
5.3.1 Participant characteristics

Characteristics of the participating children and their parents are shown in Tables 5.6 and 5.7 respectively. The average age of the children at the start of the study was just under four years (3.93 years in the intervention and 3.80 years in the control groups). There was no significant difference in terms of age of the child between the two comparison groups. As can be seen in Table 5.7 however, there was a significant difference as indicated by a t-test in the age of the participating parents in this study. The age difference of parents between the two comparison groups is 2.46 years (t= 2.26 df=142 p<0.05).

All other participant characteristics were comparable, having no significant difference between groups except for IMD. The postcode data was input into an online tool ‘GeoConvert’ (part of UK Data Service Census Support), which is able to provide IMD 2007 data based on lower super output areas (LSOAs) for each postcode. The average IMD 2007 score for the intervention group was higher at 57.99 than the control group score of 49.29 indicating that the participants in the intervention group lived in an area of higher deprivation.
### Table 5.6 Characteristics of children recorded in the questionnaires at baseline

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total N</th>
<th>Intervention (n=93)</th>
<th>Control (n=56)</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child’s mean age at start of study</td>
<td>144</td>
<td>3.93 ± 0.68</td>
<td>3.80 ± 0.71</td>
<td>t-statistic (df) 1.14 (142)</td>
</tr>
<tr>
<td>IMD 2007 score</td>
<td>125</td>
<td>57.99</td>
<td>49.29</td>
<td>χ² (df)    4.15 (125)**</td>
</tr>
<tr>
<td>Child gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=146</td>
<td>Male</td>
<td>79</td>
<td>48 (51.61%)</td>
<td>31 (55.36%)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>67</td>
<td>43 (46.24%)</td>
<td>24 (42.86%)</td>
</tr>
<tr>
<td></td>
<td>Not reported</td>
<td>3</td>
<td>2 (2.15%)</td>
<td>1 (1.79%)</td>
</tr>
<tr>
<td>Child ever attended the dentist</td>
<td>Yes</td>
<td>107</td>
<td>66 (70.97%)</td>
<td>41 (73.22%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>25</td>
<td>14 (15.05%)</td>
<td>11 (19.64%)</td>
</tr>
<tr>
<td></td>
<td>Not reported</td>
<td>17</td>
<td>13 (13.98%)</td>
<td>4 (7.14%)</td>
</tr>
</tbody>
</table>

**p<0.01

### Table 5.7 Characteristics of parents recorded in the questionnaires at baseline

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total N</th>
<th>Intervention (n=93)</th>
<th>Control (n=56)</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent’s mean age (SD)</td>
<td>144</td>
<td>31.82 (6.61)</td>
<td>29.36 (5.81)</td>
<td>t-statistic (df) 2.26 (df 142)*</td>
</tr>
<tr>
<td>N=148</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>93</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Parent’s dental attendance</td>
<td>Regular asymptomatic</td>
<td>98</td>
<td>62 (66.67%)</td>
<td>36 (64.29%)</td>
</tr>
<tr>
<td></td>
<td>Regular symptomatic</td>
<td>8</td>
<td>6 (6.45%)</td>
<td>2 (3.57%)</td>
</tr>
<tr>
<td></td>
<td>Irregular symptomatic</td>
<td>32</td>
<td>17 (18.28%)</td>
<td>15 (26.79%)</td>
</tr>
<tr>
<td></td>
<td>No attendance</td>
<td>8</td>
<td>6 (6.45%)</td>
<td>2 (3.57%)</td>
</tr>
<tr>
<td></td>
<td>Not reported</td>
<td>3</td>
<td>2 (2.15%)</td>
<td>1 (1.78%)</td>
</tr>
<tr>
<td>Mother’s education</td>
<td>Secondary school or lower</td>
<td>51</td>
<td>33 (35.48%)</td>
<td>18 (32.14%)</td>
</tr>
<tr>
<td></td>
<td>Further education</td>
<td>62</td>
<td>37 (39.78%)</td>
<td>25 (44.64%)</td>
</tr>
<tr>
<td></td>
<td>Higher education</td>
<td>31</td>
<td>20 (21.51%)</td>
<td>11 (19.65%)</td>
</tr>
<tr>
<td></td>
<td>Not reported</td>
<td>5</td>
<td>3 (3.23%)</td>
<td>2 (3.57%)</td>
</tr>
<tr>
<td>Father’s education</td>
<td>Secondary school or lower</td>
<td>68</td>
<td>47 (50.54%)</td>
<td>21 (37.50%)</td>
</tr>
<tr>
<td></td>
<td>Further education</td>
<td>40</td>
<td>19 (20.43%)</td>
<td>21 (37.50%)</td>
</tr>
<tr>
<td></td>
<td>Higher education</td>
<td>25</td>
<td>15 (16.13%)</td>
<td>10 (17.86%)</td>
</tr>
<tr>
<td></td>
<td>Not reported</td>
<td>16</td>
<td>12 (12.90%)</td>
<td>4 (7.14%)</td>
</tr>
</tbody>
</table>

*p<0.05
5.3.2 Reliability of the measures

The reliability of each of the subscales was calculated using Cronbach’s alpha. Ideally to assume that the scale is of good reliability, alpha should be between 0.70 and 0.90, however an alpha statistic of 0.60-0.69 can be considered acceptable (DeVellis, 2003). Low alpha statistics (α=0.50) do not necessary indicate that the scale is unreliable (Schmitt, 1996) but should be used with caution. Alphas of below 0.50 are considered to indicate poor levels of reliability.

5.3.3 Subscales of the OHBQ

Cronbach’s alpha for subscales of the OHBQ are shown in Table 5.8. The alpha statistics for the subscales, ‘intention to brush child’s teeth’, ‘parental efficacy in relation to tooth brushing’, ‘parental efficacy in relation to child sugar snacking’ and ‘perceived seriousness of tooth decay in children’ indicated good levels of reliability. The subscales ‘intention to control sugar snacking’ and ‘chance control’ were shown to have acceptable levels of reliability. The alpha statistic for the subscale ‘attitudes towards prevention’ was lower at 0.58 and therefore the subscale must be used with caution. Reliability for the subscale ‘external control’ however was found to be low at 0.44 was therefore excluded from further analysis.
### Table 5.8 Reliability for subscales of the OHBQ

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parental efficacy in relation to tooth brushing (6 items)</td>
<td>0.74</td>
</tr>
<tr>
<td>Parental efficacy in relation to child sugar snacking (4 items)</td>
<td>0.76</td>
</tr>
<tr>
<td>Intention to brush child’s teeth (5 items)</td>
<td>0.77</td>
</tr>
<tr>
<td>Intention to control sugar snacking (5 items)</td>
<td>0.65</td>
</tr>
<tr>
<td>Attitudes towards prevention (3 items)</td>
<td>0.58</td>
</tr>
<tr>
<td>Perceived seriousness of tooth decay in children (7 items)</td>
<td>0.77</td>
</tr>
<tr>
<td>Chance control – decay occurs by chance (5 items)</td>
<td>0.62</td>
</tr>
<tr>
<td>External control – preventing decay is the dentist’s responsibility (3 items)</td>
<td>0.44</td>
</tr>
</tbody>
</table>

### 5.3.4 Additional questions

The alpha statistics for the additional questions can be seen in Table 5.9. The reliability of the outcome expectancy subscale is good however the intention subscale for dental attendance is of poor reliability. Due to this it was not appropriate to analyse these questions as a scale. Instead they will be presented as lone items.

### Table 5.9 Reliability for subscales of the additional questions

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention to take child to the dentist (2 items)</td>
<td>0.49</td>
</tr>
<tr>
<td>Outcome expectancy for attendance (2 items)</td>
<td>0.89</td>
</tr>
</tbody>
</table>
5.3.5 Evaluation questions

The reliability of all of the subscales from the evaluation questions was good, as can be seen in Table 5.10. The subscale, intention to restrict child sugar snacking, however was a little lower than the others although still within the acceptable range.

Table 5.10 Reliability for evaluation questions

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention to take child to the dentist (2 items)</td>
<td>0.81</td>
</tr>
<tr>
<td>Intention to brush child’s teeth (2 items)</td>
<td>0.86</td>
</tr>
<tr>
<td>Intention to restrict child’s sugar (2 items)</td>
<td>0.66</td>
</tr>
<tr>
<td>Outcome expectancy for attendance (2 items)</td>
<td>0.72</td>
</tr>
</tbody>
</table>

5.3.6 Parental self-efficacy for child oral health behaviours

Tooth brushing

To assess for a change in PSE for child tooth brushing behaviour, the post intervention mean score were compared between the intervention and the control groups and baseline scores were adjusted for (Table 5.11). Comparison showed there to be a significant effect with regard to PSE for child tooth brushing in favour of the intervention ($F_{(1,1)} = 12.04, p=0.001$).
Table 5.11 PSE for child oral health behaviours

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Baseline</th>
<th>Post intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention group (n=74) mean (SD)</td>
<td>Control group (n=51) mean (SD)</td>
</tr>
<tr>
<td>Self-efficacy for tooth brushing</td>
<td>4.29 (0.56)</td>
<td>4.25 (0.69)</td>
</tr>
<tr>
<td></td>
<td>Intervention group (n=74) mean (SD)</td>
<td>Control group (n=51) mean (SD)</td>
</tr>
<tr>
<td></td>
<td>4.62 (0.47)</td>
<td>4.29 (0.68)</td>
</tr>
<tr>
<td><strong>F statistic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12.04**</td>
<td></td>
</tr>
<tr>
<td>Self-efficacy for sugar control</td>
<td>3.72 (0.75)</td>
<td>3.69 (0.87)</td>
</tr>
<tr>
<td></td>
<td>Intervention group (n=74) mean (SD)</td>
<td>Control group (n=51) mean (SD)</td>
</tr>
<tr>
<td></td>
<td>3.82 (0.79)</td>
<td>3.63 (0.85)</td>
</tr>
<tr>
<td></td>
<td><strong>p&lt;0.01</strong></td>
<td>*p&lt;0.05</td>
</tr>
<tr>
<td>Between group comparison post intervention having adjusted for baseline scores (ANCOVA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores were significantly related to post intervention scores (F(1,1)=32.54, p&lt;0.001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores were significantly related to post intervention scores (F(1,1)=224.39, p&lt;0.001)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sugar snacking**

Analysis to assess the effect of the intervention on PSE related to child sugar snacking was carried out and is reported in Table 5.11. No statistically significant difference could be found between the intervention and control groups for this subscale (F(1,1)=3.34, p=0.07).

**5.3.7 Behavioural intention**

**Dental attendance behaviour**

The two item subscale pertaining to intention to take the child to the dentist was not shown to have sufficient reliability to be presented as a scale. These questions were added to the OHBQ as additional questions and had not been previously validated. The scores for the individual items are instead presented in Table 5.12.
Table 5.12 Self-reported dental attendance behaviours for two items from the OHBQ

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Baseline</th>
<th>Post intervention</th>
<th>F statistic(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention group (n=76) mean (SD)</td>
<td>Control group (n=49) mean (SD)</td>
<td></td>
</tr>
<tr>
<td>I plan to take my child to the dentist in the next 6 months(^2)</td>
<td>4.36 (0.71)</td>
<td>4.43 (0.74)</td>
<td>11.21** (0.001)</td>
</tr>
<tr>
<td>I have made an appointment to take my child to the dentist soon(^3)</td>
<td>3.31 (1.16)</td>
<td>3.51 (1.22)</td>
<td>18.93** (0.000)</td>
</tr>
</tbody>
</table>

\(^{**}p<0.01\)

\(^1\)Between group comparison post intervention having adjusted for baseline scores (ANCOVA)

\(^2\)Baseline scores were significantly related to post intervention scores \((F_{1,1}=46.70, p<0.001)\)

\(^3\)Baseline scores were significantly related to post intervention scores \((F_{1,1}=32.03, p<0.001)\)

For the first item listed in Table 5.12, (‘I plan to take my child to the dentist in the next 6 months’), comparison at post intervention (adjusted for baseline scores), showed there to be a statistically significant change in favour of the intervention \((F_{1,1}=18.93, p<0.001)\). Looking at the mean scores for this item, it can be seen that while the score for the control group was initially higher than that of the intervention group, at post intervention the score had dropped. Over the same time period the mean score for the intervention group increased.

For the second item listed in Table 5.12 (‘I have made an appointment to take my child to the dentist soon’), a significant difference was found between the groups, which again, favoured the intervention \((F_{1,1}=11.21, p=0.001)\).
Table 5.13 Parents’ child oral health behavioural intention based on evaluation questions

<table>
<thead>
<tr>
<th>Evaluation questions</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention to take child to the dentist (2 items)</td>
<td>3.80 (0.92)</td>
</tr>
<tr>
<td>Intention to brush child’s teeth (2 items)</td>
<td>3.50 (1.01)</td>
</tr>
<tr>
<td>Intention to restrict child’s sugar (2 items)</td>
<td>3.43 (0.61)</td>
</tr>
</tbody>
</table>

**Tooth brushing behaviour**

Results around intention to enact tooth brushing behaviour among the participants are shown in Tables 5.13 and 5.14. Table 5.13 shows mean scores of the evaluation question. Table 5.14 shows the comparison between intervention and control groups in the score on the subscale from the OHBQ which relates to intention to enact child tooth brushing. A statistically significant difference between the groups (having adjusted for baseline scores) was found in favour of the intervention ($F_{(1,1)}=11.61, p=0.01$). This is somewhat supported by parents’ reported intentions for tooth brushing related to the use of Kitten’s First Tooth in that the scale mean was greater than 3 (Likert scale was 1-5) seen in Table 5.13.

Table 5.14 Parental intention to enact child oral health behaviours

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Baseline</th>
<th>Post intervention</th>
<th>F statistic(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention group (n=74) mean (SD)</td>
<td>Control group (n=51) mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Intention to brush child’s teeth(^2)</td>
<td>4.19 (0.57)</td>
<td>4.12 (0.61)</td>
<td>11.61*</td>
</tr>
<tr>
<td>Intention to control sugar snacking(^3)</td>
<td>4.09 (0.54)</td>
<td>4.06 (0.47)</td>
<td>2.71</td>
</tr>
</tbody>
</table>

\(^*p<0.05\)

\(^1\)Between group comparison post intervention having adjusted for baseline scores (ANCOVA)

\(^2\)Baseline scores were significantly related to post intervention scores ($F_{(1,1)}=33.06, p<0.001$)

\(^3\)Baseline scores were significantly related to post intervention scores ($F_{(1,1)}=66.32, p<0.001$)
Sugar snacking behaviour

In terms of parents’ intention to control child sugar snacking behaviours, no statistically significant difference could be identified between the groups following the intervention \((F_{(1,1)}=2.71, p=0.102)\). Based on these results it could be said that the intervention did not affect parents’ intention to enact this behaviour. However, the mean score of evaluation questions for this behaviour (Table 5.13) indicated that the parents reported an intention to control sugar snacking because of their use of Kitten’s First Tooth. The findings of the evaluation questions therefore do not support those of this subscale on the OHBQ.

Parental attitudes

Attitudes towards tooth brushing

In terms of parents’ attitudes towards tooth brushing as a preventive method, a statistically significant difference was observed between the intervention and the control group \((F_{(1,1)}=6.70, p=0.011)\) in favour of the intervention. The mean values are shown in Table 5.15.
### Table 5.15 Parental attitudes towards prevention

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Baseline</th>
<th>Post intervention</th>
<th>F statistic$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention group (n=74) mean (SD)</td>
<td>Control group (n=51) mean (SD)</td>
<td>Intervention group (n=74) mean (SD)</td>
</tr>
<tr>
<td>Attitudes towards prevention (tooth brushing)$^2$</td>
<td>4.29 (0.63)</td>
<td>4.12 (0.61)</td>
<td>4.53 (0.52)</td>
</tr>
</tbody>
</table>

$^{**}p<0.01$ *$p<0.05$

$^1$Between group comparison post intervention having adjusted for baseline scores (ANCOVA)

$^2$Baseline scores were significantly related to post intervention scores ($F_{(1,1)}=72.76, p<0.001$)

### Attitudes towards tooth decay

General parental attitudes towards tooth decay were measured using two subscales of the OHBQ (the mean scores of which are both shown in Table 5.16). A third subscale measuring external control was excluded due to an unacceptable level of reliability (as previously noted). For the subscale ‘perceived seriousness of tooth decay’, between groups comparison following the intervention showed a statistically significant difference in favour of the intervention ($F_{(1,1)}=17.31, p<0.001$). Whereas for the subscale ‘chance control’, no statistically significant difference was found between groups following the intervention ($F_{(1,1)}=3.47, p=0.065$).
Table 5.16 Parental attitudes towards tooth decay

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Baseline</th>
<th>Post intervention</th>
<th>F statistic¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention group (n=74) mean (SD)</td>
<td>Control group (n=51) mean (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Perceived seriousness of tooth decay in children²</strong></td>
<td></td>
<td>17.31**</td>
</tr>
<tr>
<td></td>
<td>3.72 (0.75)</td>
<td>3.69 (0.87)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intervention group (n=74) mean (SD)</td>
<td>Control group (n=51) mean (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Chance control – decay occurs by chance³</strong></td>
<td></td>
<td>3.47</td>
</tr>
<tr>
<td></td>
<td>3.83 (0.55)</td>
<td>3.97 (0.63)</td>
<td></td>
</tr>
</tbody>
</table>

**p<0.01 *p<0.05
¹Between group comparison post intervention having adjusted for baseline scores (ANCOVA)
²Baseline scores were significantly related to post intervention scores (F(1,1)=53.26, p<0.001)
³Baseline scores to be significantly related to post intervention scores (F(1,1)=252.86, p<0.001)

Outcome expectancy for dental attendance

Items pertaining to outcome expectancy for dental attendance were added to the OHBQ and were not part of the original validated questionnaire. These items however had acceptable levels of reliability (see Table 5.9) and were therefore analysed as a subscale (Table 5.17). A statistically significant difference between the intervention and control group was found in favour of the intervention (F(1,1)=8.67, p=0.004).

Table 5.17 Parents’ outcome expectancy for dental attendance

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Baseline</th>
<th>Post intervention</th>
<th>F statistic¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention group (n=79) mean (SD)</td>
<td>Control group (n=50) mean (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Outcome expectancy for dental attendance²</strong></td>
<td></td>
<td>8.67**</td>
</tr>
<tr>
<td></td>
<td>4.37 (0.61)</td>
<td>4.37 (0.60)</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>Intervention group (n=79) mean (SD)</td>
<td>Control group (n=50) mean (SD)</td>
<td></td>
</tr>
</tbody>
</table>

**p<0.01
¹Between group comparison post intervention having adjusted for baseline scores (ANCOVA)
²Baseline scores were significantly related to post intervention scores (F(1,1)=26.06, p<0.001)
The evaluation questions relating to outcome expectancy for dental attendance gave a mean score of 3.79 (SD 0.84), indicating that parents agreed that their outcome expectancies were improved as a result of the intervention. This supports the analysis of the OHBQ.

5.3.8 Acceptability of Kitten’s First Tooth to parents

The items asked around the practicality of the book were simple stand-alone questions. The answer format was a on a 5-point Likert scale (1, being a negative response and 5, a positive one). The mean scores for these can be seen in Table 5.18. The scores indicate that the parents who were provided with Kitten’s First Tooth felt that their children understood the content of the story and that they were able to fit it into their child’s routine. The scores also indicate that parents agreed that the story served as a prompt for them to engage in conversation with their child about tooth brushings, sugar snacking and dental attendance. In terms of parent reported preference, there was no real difference between the book and animation formats.

Table 5.18 Mean scores for the evaluation items relating to practicalities

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean score (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitten’s First Tooth made it easier for me to read with my child</td>
<td>4.11 (0.68)</td>
</tr>
<tr>
<td>My child understood the content of Kitten’s First Tooth</td>
<td>4.31 (0.53)</td>
</tr>
<tr>
<td>Kitten’s First Tooth helped me to talk to my child about sweet foods and drinks</td>
<td>4.14 (0.60)</td>
</tr>
<tr>
<td>Kitten’s First Tooth helped me to talk to my child about going to the dentist</td>
<td>4.26 (0.74)</td>
</tr>
<tr>
<td>Kitten’s First Tooth helped me to talk to my child about brushing his/her teeth</td>
<td>4.2 (0.72)</td>
</tr>
<tr>
<td>It was easy to fit reading the Kitten’s First Tooth into my child’s routine</td>
<td>4.11 (0.68)</td>
</tr>
</tbody>
</table>
5.4 Discussion

This study set out to evaluate Kitten’s First Tooth as an oral health promotion intervention to improve PSE for twice daily tooth brushing and for controlling sugar snacking as well as improving outcome expectancies for dental attendance and general attitudes towards prevention and tooth decay. An additional aim was to understand the acceptability of the intervention to parents. The pre post evaluation using the OHBQ showed promising findings in terms of PSE for tooth brushing as well as for outcome expectancy for dental attendance. However, the intervention failed to impact on PSE for controlling sugar snacking or for parents’ intention to control sugar snacking. Findings around the acceptability of the intervention to parents indicate that it was positively received.

This study is unique in that it used a novel approach (a story) to deliver oral health promotion to parents and children in two formats (book and DVD). In addition, the story was developed with BCTs (Abraham & Michie, 2008a), which not only means for the operationalisation of theory-linked methods of behaviour change but also helps to ensure clarity in reporting of the ‘active ingredients’ of the intervention (Michie et al., 2013). This is a in line with the recommendations of the WIDER group who promote clarity in reporting of behavioural interventions (Adair et al., 2013).

Despite the first taxonomy of BCTs having being published five years ago (Abraham & Michie, 2008a), relatively few interventions have been reported which have been developed using BCTs. This is likely due to the time necessary to develop, evaluate and publish behavioural interventions. Instead, there are many more studies that have utilised the BCT taxonomy to assess techniques present in existing studies (e.g.
Briscoe & Aboud, 2012; Cooper et al., 2013; Golley et al., 2011; Webb & Joseph, 2010).

An RCT however, conducted in Iran reports on an oral health promotion intervention directed at 12 year old children that was designed using Abraham and Michie’s (2008a) taxonomy (Yekaninejad et al., 2012). The intervention took place over a three month period, similar to the present study, and was delivered through schools. Yekanienejad and colleagues included two intervention groups and one control group in this study, the first intervention group was classroom delivery based education and the second group received this intervention in addition to take home materials provided for parents. Self-reported tooth brushing and flossing behaviours and self-efficacy were significantly improved in both intervention groups compared to the control group.

While classroom based delivery of interventions like this can be successful, as demonstrated by Yekanienejad and colleagues (2012), this intervention which took place in the Middle East may be limited in its applicability to UK settings. Furthermore, while the authors list a range of BCTs that were delivered in the sessions, it is difficult to assess the fidelity of this study because the intervention was not more prescriptive and no process evaluation appeared to have been conducted. Moreover, interventions such as this may be costly in the long term due to the use of a health educational specialist for delivery. A major advantage of a story-based intervention such as Kitten’s First Tooth is that being printed (book) or recorded (animation), the study is reproducible to allow for further evaluations and it can be delivered with greater ease to large populations. Although funding is required for
the production of the initial intervention, once it has been produced the potential for reach is greater than one that requires a specialist for each delivery. Experts may be best employed to deliver higher intensity interventions to populations requiring greater levels of support, for example in the case of motivational interviewing interventions.

Some research has been conducted into the use of motivational interviewing with parents to prevent tooth decay in their children (Arrow, Raheb, & Miller, 2013; Weinstein, Harrison, & Benton, 2004, 2006). Motivational interviewing is classed as a BCT (Abraham & Michie, 2008a). It requires a trained practitioner to conduct a one-to-one session with the parent in which the practitioner facilitates behaviour change through targeting the parent’s motivation. In these sessions, skilled counsellors attempt to bolster the self-efficacy and identify the specific motivations of the patient that may be related to behavioural change. These interventions are resource heavy and arguably suited to high-risk populations rather than general populations (Weinstein et al., 2006). Story-based interventions such as Kitten’s First Tooth may present a suitable delivery mechanism for oral health promotion to general populations.

However, Kitten’s First Tooth although having shown some promising findings in this pilot evaluation, must still be considered a work in progress. Although the intervention included health messages around sugar snacking, there was unfortunately no BCT that directly targeted this behaviour. The reasons for this have been previously discussed in Chapter 4 and remain a limitation of Kitten’s First Tooth as an oral health promotion intervention. However, this failing highlights the
importance of an iterative development process of interventions whereby pilot evaluations such as this one can highlight issues such as this and feed back into the further development of the intervention. This process is important in terms of ensuring that the final intervention has the best possible chance of success (Thabane, Ma, Chu, et al., 2010).

In terms of the limitations of this pilot study, although a wide sampling frame was used for recruitment, the participants were self-selecting (in that they volunteered to participate) and it is possible that those who chose to participate in the study may have been more amenable to change. Additionally, due to the lack of randomised allocation of participants to study group the possibility of confounding factors is likely. This limits the potential of the findings in terms of generalisability. Based on the associations of SES and oral health behaviours in the literature (Bernabe et al., 2012; Du et al., 2007; Dye et al., 2010; Ferreira et al., 2007; Reisine & Psoter, 2001; Tanaka et al., 2013; Telford et al., 2011; Watt, 2007), SES was considered to be a likely confounding factor, for this reason, the areas of study chosen were comparable in terms of their deprivation scores. Additionally, these areas were chosen because of their geographical distance from each other which, it was hoped, would limit issues of contamination.

Regarding measurements used in this study, the OHBQ is a previously validated instrument which as demonstrated good levels of reliability (Adair et al., 2004; Skeie et al., 2008). Good or acceptable levels of reliability were found in this study, with the exception of one of the subscales, which was subsequently removed from analysis. This evaluation was not able to measure success in terms of oral health
status. However, Kitten’s First Tooth aimed to improve parental-efficacy, behavioural intention and other oral health related attitudes of parents. This data was collected using self-report measures that are subject to potential reporting bias. That said, the pre post controlled design of this study means that the observed effect can be considered real, in terms of the study participants.

Looking at the evaluation questions around behavioural intention, these supported the findings of the OHBQ for both dental attendance and for tooth brushing. A statistically significant difference was found between baseline and evaluation in the intervention group but not in the control group. The evaluation questions indicated that parents attributed intention to enact these behaviours to Kitten’s First Tooth. However, no significant change was found for parents’ intention to control sugar snacking behaviours by the OHBQ. The evaluation question for this behaviour did not support this finding. This inconsistency between the instruments indicates a potential problem in terms of measurement by the evaluation questions. Validated instruments are more likely to produce accurate findings. This may have consequences for the findings produced using non-validated means. This relates to the acceptability of Kitten’s First Tooth by parents. It is therefore important to recognise the possibility of inflated positive responses by participants when interpreting these findings.

This evaluation is limited in that it did not include a process evaluation. As a result, it is difficult to say anything about how the intervention materials were used in the home, how often they were used and if participants had a preference for the animation over the storybook or vice a versa. This information would have been
valuable in terms of understanding the processes through which the intervention was able to affect participants and may also have been able to provide insight into why it worked better for some than others. Specifically this knowledge would have been important when thinking about the applicability of these findings and for future interventions of this kind.

A process evaluation was not carried out as part of this study due to concern around limitations of time. However given how valuable knowledge gathered from a process evaluation could have been for this study, it is regrettable that a process evaluation was not planned during the design phase. Issues around usage of the materials, preferences and further insight into how the intervention did or did not work for participants could have been explored through undertaking a series of focus groups with the parent and child participants. Further research seeking to redevelop Kitten’s First Tooth or similar interventions should ensure that outcome evaluations are accompanied by process evaluations.

A strength of this study however was the level of retention which was greater than 80%. This was achieved through the development of working relationships with key school staff members who helped to facilitate the delivery and collection of the study questionnaires. Retention can be problematic in intervention studies sometimes having detrimental impacts on the study findings (Coday et al., 2005). This study shows that school settings can be helpful environments for accessing children and parents as well as maintaining their participation in studies. Additionally, three drops of the questionnaire were delivered at baseline and evaluation periods which helped to improve return rates.
In terms of the development of Kitten’s First Tooth, there were a number of issues that impacted on its evaluation. It was originally intended that the study would run in the winter term of 2011 and as such the baseline questionnaire was due to be distributed in September. This was delayed by a few weeks when it became apparent that the production of the intervention would take longer than was anticipated. However, with the new deadline of October in place, distribution of the baseline questionnaire together with the consent forms and information sheets for the study took place in September - October 2011. Unfortunately, further delays to the completion of the animation, largely due to the iterative feedback process set up involving the consultation group, meant that the timeline of the study had to be shifted. A new start date of spring term 2012 was decided upon allowing adequate time for the completion of the intervention materials.

This had obvious implications for the participating parents in this study as well for the schools. Another issue was the baseline data already collected in September/October may not be an adequate representation of the participants’ oral health self-efficacy, behavioural intention and attitudes. For this reason, the OHBQ was distributed to parents again, at the same time as they received the intervention. This was intended to demonstrate whether there were any significant changes in the attitudes or behaviour of the participants. Fortunately, there were not. This timeline problem occurred because the development process of Kitten’s First Tooth was underestimated in terms of how long it would take. This was in spite of the animation company’s assurance of the timeframe being a realistic one. However, based on these experiences, a reasonable contingency period is recommended for
inclusion in the timeline of future iterations of Kitten’s First Tooth or similar interventions.

It is important to remember however that this was a pilot study and part of the iterative development process of Kitten’s First Tooth. Further studies are required to truly assess the efficacy of the intervention in order to provide reliable and generalisable findings.
5.5 Conclusion

In conclusion, this first evaluation of Kitten’s First Tooth shows some promising findings indicating the potential utility and parent acceptability of story-based interventions for delivering oral health promotion to parents and their young children. Interventions delivered in this ‘child-friendly’ way, based on the findings presented here, can improve PSE for child tooth brushing, behavioural intention for tooth brushing and dental attendance as well as outcome expectancies for dental attendance and attitudes around perceived seriousness of tooth decay.

Kitten’s First Tooth did not have an effect on the psychosocial detriments of sugar snacking measured in this study (PSE; intention). The intervention similarly had no measureable effect on attitudes around prevention of tooth decay. Further developments are required to improve the intervention and more robust evaluation such as through an RCT is required in order to understand the efficacy of this intervention and its generalisability across populations.
5.6 Next steps

As outlined in the conclusion of this chapter, a more robust evaluation of Kitten’s First Tooth is required. While the pilot evaluation was taking place, an opportunity arose to further evaluate Kitten’s First Tooth in London with a view to planning an RCT to more fully test Kitten’s First Tooth (likely a further developed version of the story). However, the population of study (Inner East London) differed a great deal from the population for which Kitten’s First Tooth was developed and where this pilot evaluation had taken place (Salford). For this reason a further pilot evaluation in the form of a feasibility study was planned. This further study would help to assess the potential applicability of an English language story-based intervention in a culturally diverse population. Chapter 6 describes this feasibility study.
Chapter 6

A pilot study of ‘Kitten’s First Tooth’ to determine usefulness, feasibility and acceptability in a culturally diverse urban community

This chapter describes a mixed method feasibility study which took place in East London in collaboration with Barts and the London, School of Medicine and Dentistry at Queen Mary’s University, London from February – June 2012.
6.1 Overview

A further pilot study of Kitten’s First tooth was conducted. The purpose of this study was to inform the development and implementation of a future RCT in East London. The planned RCT intends to use a storybook-based oral health promotion intervention to change the three key oral health behaviours related to child oral health (dental attendance; tooth brushing; sugar snacking). Children will be accessed through schools with the storybooks being delivered through schools to be used primarily in the home with primary caregivers. The feasibility study conducted with a view to implement an RCT was broader than what is reported on in this Chapter, which focuses on Kitten’s First Tooth as an oral health promotion intervention in a culturally diverse environment.

The aim of the pilot study was to test the potential usefulness, feasibility and acceptability Kitten’s First Tooth in a culturally divergent community, as this would be the audience in further trials. The pilot study was conducted in two schools in the London borough of Newham and evaluated for potential usefulness, feasibility and acceptability using a mixed methods approach. Feasibility was assessed using the OHBQ (Adair et al., 2004), usefulness was assessed through the use of a post evaluation questionnaire (Kitten’s First Tooth Evaluation Questionnaire) and acceptability was assessed through a series of focus groups with parents.

In stark contrast to the previous pilot study in NW England, this study was conducted in the London borough of Newham where 60.60% of the population are classed as belonging to ethnic groups other than white. The Asian or Asian British population is estimated at 32.50% and the Black or Black British population at 21.60% (Office of
National Statistics, 2011). Newham’s ethnic diversity rates are significantly higher
than the national averages for England and Wales.

In this sense at least, the populations of Salford and Newham are at opposite ends of
the spectrum. In terms of similarities, both areas are inner city and characterised by
relatively high deprivation. The IMD 2010, shows that Salford has a mean
deprivation score of 35 (SD 19.2) and Newham an average of 42.31 (SD 7.93). Both
scores are well above the national average of 21.67 (SD 15.51). Oral health among
five year old children in Newham, although having improved in recent years, remains
among the worst in London with a dmft of 1.65 compared to a national average of
0.94 (Public Health England, 2012b).

Evolving populations may present new challenges for the provision of health
promotion interventions. It has been considered that health behaviours may be
different among ethnically diverse populations (Sterling, Rosenbaum, & Weikam,
1987). More recent studies echo these thoughts, for example, an exploratory
descriptive study of women with gestational diabetes living in Sweden, indicated
that women’s beliefs around health were an important part of their lived experience
of health (Hjelm, Berntorp, & Apelqvist, 2012). Semi-structured interviews with 23
women (13 born in Sweden and 10 African born) showed that Swedish born women
have a higher level of health knowledge and risk awareness.

Hjerm and colleagues (2012) note that knowledge is mediated by attitudes and
beliefs inferring that beliefs guide care seeking and preventive health behaviours.
Beliefs surrounding health care may be culturally specific. Illness may be framed
differently in terms of its origins (Hjelm et al., 2012). In addition to affecting health
behaviours of pregnant women, beliefs around the understanding of tooth decay have been found to be important in terms of child dental health (Kelly et al., 2005). An exploratory study conducted in Singapore for example, found that the culturally specific beliefs of parents to be associated with the way in which they cared for their children (Gao et al., 2012). Among the parents studied, belief in the ‘tooth worm’ appeared to be associated with child tooth brushing behaviours with 80% of those who held the belief brushing their child’s teeth at least twice a day whereas 68% of those who did not hold this belief carried out regular child tooth brushing.

These studies demonstrate that health beliefs may impact upon health behaviours and subsequent outcomes. Health beliefs are considered to be an important determinant of health (e.g. social cognitive theory; theory of planned behaviour; health belief model).

There have been mixed findings regarding the oral health status of children of different ethnic backgrounds living in the UK. Some studies have claimed that differences in oral health status relate to the ethnic origin of the child (Godson & Williams, 1996; Gray, Morris, & Davies, 2000). However, a study of South Asian and White children looking at infant feeding practices found that although differences could be observed in feeding patterns, when the impact of SES was considered, ethnic differences were minimal (Dykes, Watt, & Nazroo, 2002).

Recent data from a cross-sectional study in Inner East London, looked at the oral health status of ethnically diverse three and four year old children (Marcenes et al., 2013). Data was collected from 27 different ethnic groups, later categorised into 13 groups, totalling 2,434 children. Although differences could be observed in terms of
health by ethnic group, at least some of this variation could be explained by SES. Furthermore, variation in oral health status was found within the broader categories of ethnic groups, for example Asian Pakistani children were found to have significantly higher rates of tooth decay than Asian Indian children. Black and White children had similar levels of dental health. This study shows that it cannot simply be posited that children from ethnic minority backgrounds have worse oral health or greater need; the reality is far more complicated.

There is a lack of longitudinal data from the UK explaining how the relationship between ethnicity and oral health status may work. The data discussed above is based on cross-sectional data, meaning that the only conclusions to be drawn are around associations. There is therefore limited information about how oral health promotion programmes may work in culturally diverse populations like East London.

Therefore this study was designed to assess the potential usefulness, feasibility and acceptability of Kitten’s First Tooth in a different population. Through establishing these properties, the potential for an efficacy trial of a story-based health promotion intervention in a culturally diverse setting would become clearer.

Understanding the potential usefulness of a story-based oral health promotion intervention relates to establishing whether there is a need for improved oral health behaviours in the population. This is an exploratory question which will be assessed using a cross-sectional questionnaire. Feasibility will be assessed using a post-evaluation questionnaire and acceptability through the use of focus groups with parents.
This pilot study in relation to the previous pilot study (Chapter 5)

The present study is similar to the previous evaluation of Kitten’s First Tooth described in Chapter 5 in that it attempts to access children and their parents through schools. However, this study differs from the previous pilot evaluation in that the children of study are older, five to seven years rather than three to five years. The rationale for intervening with an older group of children is based around the intentions of the future potential RCT which this pilot aims to inform. Therefore, considering the difference in development and learning between these age groups, it is anticipated that potential redevelopments of the storybook may focus on the age appropriateness of the intervention.

6.1.1 Study focus

Research questions:

1. Is a story-based oral health promotion intervention potentially useful in a culturally diverse population?

2. Is a story-based oral health promotion intervention feasible in a culturally diverse population?

3. Is a story-based oral health promotion intervention acceptable to parents in a culturally diverse population?
6.2 Methods

6.2.1 Design:

A concurrent mixed method pilot study to investigate potential usefulness, feasibility and acceptability was set up in Newham, East London in two schools. A third school was invited to take part but declined due to other commitments. The two participating schools provided contacts who acted as points of contact for the duration of the study. Ethical approval for this study was granted by Queen Mary’s University, London by the second supervisor (CP).

Pilot study to assess feasibility, usefulness and acceptability

Pilot studies to establish feasibility, or feasibility studies, have been found to have a flexible methodology; however they can be defined as a small study to aid the design of a further confirmatory study (Arain, Campbell, Cooper, & Lancaster, 2010). These types of studies have been reported as increasing the likelihood of successful subsequent trials and can help to justify further spending in the area of research (Charlesworth et al., 2013). These types of studies can be of vital importance to subsequent large RCTs (Thabane, Ma, Chu, et al., 2010).

It is important nonetheless, to be clear about what a feasibility study can be useful for. For example, there are limitations in terms of the potential claims such a study can make about the intervention in question. That is to say, establishing feasibility does not mean that the intervention itself will prove successful (Arnold et al., 2009) mainly often due to the fact that such studies are often underpowered.
While a pilot study can predict the feasibility and acceptability of a future trial, it is important to remember that even if the pilot study concludes positively, this may not necessarily guarantee the future success of the trial (Arnold et al., 2009). If the pilot study for example takes place in a single centre, this may not be representative of the population as a whole. Additionally if that centre is self-selecting, an unrepresentative level of enthusiasm for the project may produce false positive results (Arnold et al., 2009). For this reason, the success of all pilot studies should be treated with caution and that understanding should be brought into the design and conduct of the subsequent trial.

Pilot studies to assess feasibility have been classed as process evaluations (Thabane et al., 2010). A clear advantage of assessing feasibility is to uncover the potential barriers which may affect the implementation of the subsequent trial. Process evaluations specifically look at the implementation and are useful ways of reporting on potential barriers which can be helpful for the design and implementation of the next phase of study (Michie, 2008).

**Process evaluation**

Process evaluations should be in place from the start of a study to explore the implementation and receipt of the intervention within the setting to aid the interpretation of findings (Oakley, Strange, Bonell, Allen, & Stephenson, 2006). Process evaluations can allow for the identification of specific components of interventions which work well, or are in fact not particularly helpful. This may allow for a more successful redevelopment or maintenance of an intervention (Linnan &
Linnen and Steckler (2002), note that this type of evaluation has become increasingly common, featuring in the published literature in Public Health in the past two decades. This, they attribute to the increasing complexity of interventions as well as the pursuit to understand why particular components work and others do not. Process evaluations are recommended by the MRC in their guidance for the design and evaluation of complex interventions (Craig et al., 2008).

Process evaluations may be considered to be of importance to overall evaluations of interventions because they provide an insight into how the intervention worked in a practical sense. Additionally, understanding how participants used an intervention may expand upon the explanatory power of the evaluation (Oakley et al., 2006) which is beneficial for future implementations or redesigns of the intervention or others like it. At the most basic point, an evaluation may not be wholly accurate if understood on the basis of outcome data alone, an intervention which appears to have low efficacy for example may in fact suffer from an impractical or unworkable implementation, meaning that the intervention itself may be efficacious if implemented differently.

Process evaluations may therefore be an important part of knowledge development around theory (if the intervention is theory based) as well as aiding an iterative intervention development process (MRC, 2008). This study will use a process evaluation approach to assess the feasibility of a storybook based oral health promotion intervention. It may also be helpful as an iterative step to aid the refinement of Kitten’s First Tooth in further research. The components of the process evaluation in this study are shown in Table 6.1.
Table 6.1 Process evaluation components in this study

<table>
<thead>
<tr>
<th>Component</th>
<th>Definition</th>
<th>Aspect of evaluation covering component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>Environmental influences (social, political, and economic) that may influence the implementation of the intervention.</td>
<td>Observation and contact with school</td>
</tr>
<tr>
<td>Reach</td>
<td>The proportion of intended target audience that participates in an intervention. If there are multiple interventions, then it is the proportion that participates in each intervention or component. It is often measured by attendance. Reach is a characteristic of the target audience.</td>
<td>Class lists, obtained from schools</td>
</tr>
<tr>
<td>Dose delivered</td>
<td>The number or amount of intended units of each intervention or each component delivered or provided. Dose delivered is a function of efforts of the intervention providers.</td>
<td>Only one dose was delivered in this study</td>
</tr>
<tr>
<td>Dose received</td>
<td>The extent to which participants actively engage with, interact with, are receptive to, and/or use materials or recommended resources. Dose received is a characteristic of the target audience and it assesses the extent of engagement of participants with the intervention.</td>
<td>Questionnaire – questions relate to the use of the book, in terms of frequency and time of day</td>
</tr>
<tr>
<td>Fidelity</td>
<td>The extent to which the intervention was delivered as planned. It represents the quality and integrity of the intervention as conceived by the developers. Fidelity is a function of the intervention providers.</td>
<td>Monitored through contact with schools</td>
</tr>
<tr>
<td>Implementation</td>
<td>The extent to which the intervention has been implemented and received by the intended audience.</td>
<td>n/a</td>
</tr>
<tr>
<td>Recruitment</td>
<td>The ways in which participants were approached/ invited to take part in the research</td>
<td>Research team and school contact</td>
</tr>
</tbody>
</table>

Adapted from Linnan & Steckler (2002)
**Use of Mixed methods in this pilot**

This study was designed using mixed methods in order to answer the research questions in the most appropriate way. Public health research, incorporating the biological, the psychological and the sociological, in many ways is best understood within the Biopsychosocial model (Engel, 1977), rather than the medical model. The medical model is overtly individualistic in its focus; it is based on the idea that health is the absence of illness (Baum, 1995). In contrast, “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1948, p. 100). This definition given by the WHO, which remains unaltered, clearly relates much more to the Biopsychosocial model. It follows that there is more to be understood about individual and population health than merely the instances of disease. Positivism has been accused of being too reductionist, interpretism and constructivism too subjective, quantitative methods respected as a hard science, qualitative looked down upon as soft, unable to contribute to the evidence base (Baum, 1995).

There can be found in the literature a good deal of contention around the use of mixed methods research (Creswell, 2011; Teddlie & Tashakkori, 2003). Much of this, whether explicitly stated, is based on the attempt to merge two somewhat distinct paradigms or sets of belief about ‘the truth’. This debate has been led by methodological purists on both sides of the qualitative / quantitative divide (Johnson & Onwuegbuzie, 2009). Concern is frequently levied around the idea that methods have become detached from their paradigms. Critics of a mixed approach may warn of cherry picking methods without sufficient thought about how the knowledge is...
generated (Milburn, Fraser, Secker, & Pavis, 1995), bunching outcomes together and producing results that do not reflect the same reality (Sale, Lohfeld, & Brazil, 2002). Methods are inherently attached to the paradigms they originated in. Quantitative methods from the positivist paradigm seek an objective truth from the only reality that exists whereas qualitative methods, seek an interpreted or constructed truth from a reality, recognising that the interpretation of one reality creates yet another.

It is considered that the complexities of much of public health and health promotion research is such that qualitative and quantitative methods may be required to answer the research questions that arise (Baum, 1995; Secker, Wimbush, Watson, & Milburn, 1995). Much of Public Health research, like the study described in this chapter, is applied rather than basic. Both types of method however, seek to answer questions about phenomena. There may be more similarities between the two than differences (Brannen, 2005; Sale et al., 2002). Sale and colleagues highlight some of the commonalities between the paradigms using these as a base point for a mixed approach. Both methodologies are upheld by rigour and critique,

"the two paradigms are thought to be compatible because they share the tenets of theory-ladenness of facts, fallibility of knowledge, indetermination of theory by fact, and a value-laden inquiry process" (2002, p. 46)

There is a rationale for combining methods and the scientific rigor offered by both would indicate that they are compatible on scientific grounds. Attention must be paid to the way in which methods (and approaches) are combined.

The principle problem with combining qualitative and quantitative methods (and approaches) lies in the idea that the phenomena studied by each are not the same
(Sale et al., 2002), qualitative methods seek an understanding whereas quantitative methods seek to measure (Baum, 1995), for example individual perceptions differ from an objective outcome like the rate of attendance. It follows simply, that which is not the same cannot be piled together and interpreted as if it is the same, it just does not make sense. This presents a fundamental problem for triangulation. Triangulation seeks to verify a phenomenon by measuring it qualitatively and quantitatively and developing a picture of a reality thus. If, as Sale and colleagues (2002) write, that the two methods are in fact measuring different phenomena, then the picture that develops is comparable to a pile of apples and bananas.

The solution presented by Sale and colleagues (2002) justifies the use of mixed methods, providing that it is recognised that the multiple methods are measuring different phenomena and the interpretation of the results recognises this. This study does not attempt to triangulate results; the case for triangulation is therefore not discussed here. Instead different methods have been used to answer different research objectives.

The use of focus groups and standardised questionnaires for data collection has been previously described in Chapters 2 and 5 respectively.

### 6.2.2 Participants

Parents of children in school years one and two (aged five to seven years) who participated in focus groups and completed questionnaires.
6.2.3 Procedure

An overview of the study procedure is shown below in Figure 6.1.

Figure 6.1 Study design overview

| Information sheets and consent forms distributed n=317 (3 drops) 177 returned (55.84 % of total population) | Week 0 |
| Baseline data n= 109 (3 drops) 61.58% of sample; 34.38% of total population | Weeks 3 - 6 |
| Intervention packs distributed n=177 | Weeks 5 - 6 |
| Final questionnaire n= 74 67.89% of sample; 23.34% of total population | Weeks 8 - 10 |

3 focus groups with parents n = 29

Weeks 5 - 7

Pre-study preparation

Three schools were contacted in the first instance and invited to take part in the study. Initial meetings were set up between the research team\(^3\) and the contacts nominated by the schools. Prior to the study taking place discussions with teachers took place around how best to distribute questionnaires to parents and maximise

\(^3\) The research team consisted of the PhD student (LO) and two supervisors (PA, CP). All analysis presented in this chapter was conducted by LO. This chapter reports on the aspects of the feasibility study which focused on Kitten’s First Tooth.
the return rates. As a result, facilitation sessions for parents were planned as part of the procedure.

**Data collection**

Study information sheets (Appendix 6.1) and consent forms (Appendix 6.2) were distributed via the schools to all children in years one and two to take home to their parents. In total three drops of the consent forms were carried out. Information sheets detailed that parents who completed the study (returned both questionnaires) would receive a £5 high street shopping voucher to thank them for their participation. Following the return of consent forms, families were enrolled onto the study and unique identification codes were assigned. Subsequently, a questionnaire booklet including the OHBQ and a reading habits questionnaire were distributed to participants (n=109).

Initially it had been planned that intervention packs would be given out only to families who had returned the questionnaire booklet, however intervention packs were provided to all families who had returned consent forms and an ongoing effort was made to gather outstanding questionnaires. A second and third drop of the questionnaire booklet was conducted at both schools.

The facilitation sessions set up to aid with the completion of questionnaires for parents who did not have English as a first language were held by members of the research team and teachers. Teachers were briefed about the questionnaires prior to sessions. These sessions were set up as a result of pre-study preparation in which
the teachers identified literacy as a potential issue that may impact upon the return rates of questionnaires.

The Facilitation Sessions were held at both Schools and were open to all parents; invitations were sent with the focus group invitation. A second facilitation session was held at one school, on this occasion a paper invite was sent home with each child three days in advance and a reminder text message sent on the day, one parent attended.

**Focus groups**

The parent focus group (n=29) sessions were advertised by the teachers who distributed leaflets to parents and recommended potential participants who they thought may be interested in being involved with the study. Participants were provided with a high street shopping voucher (£10) to thank them for their involvement in the study.

Focus groups were practically organised by school staff. A private area (free classrooms) was arranged for meetings to take place in. Discussions took place around a table and audio recording equipment was set up on the table. Duration of the focus groups ranged from 50 to 70 minutes and the number of participants from six to ten. The focus groups were exploratory in nature and followed a semi-structured schedule designed around open ended questions (Appendix 6.4)

It was not anticipated that parents with very limited levels of English language would participate in the focus groups because of the way in which they had been
advertised and recruited for (recommendations from school teaching staff). However, these parents were not excluded from the study and three parents with very limited English language skills attended one of the focus groups. They brought a friend with them who acted as a translator.

**Distribution of the intervention pack**

The intervention pack was initially given to parents following the completion of the OHBQ and reading habits questionnaire. However, packs were eventually provided to all parents who had returned a consent form (n=177).

The intervention materials were provided in a clear plastic bag and were given out by the teachers or other school staff to children to take home to their parents. In a minority of cases, members of the research team gave the intervention packs directly to parents. This was generally the case for parents who signed up for the study late.

**Post-intervention data collection**

The questionnaire to evaluate the use and acceptability of Kitten’s First Tooth was distributed three to four weeks after the intervention packs. Again three drops of the questionnaire occurred and participants received the voucher after having returned the questionnaire.
6.2.4 Measurements

The Oral Health Behaviours Questionnaire (OHBQ)

The OHBQ (Adair et al., 2004), was developed to measure attitudes and beliefs of parents around their child’s dental health. The measure was developed using a large international population (n=2822) over 17 countries. This measure has been previously described in Chapter 5 and while not standardised, has been validated in individual studies.

The Reading Habits Questionnaire (RHQ)

The RHQ (Senechal et al., 1998) is an evidence based measure to assess reading habits in the home (Appendix 6.3). This is a short 5-item questionnaire derived from empirical evidence. The authors based the questions around indicators that had been reported in previous studies (Chaney, 1992; Debrayshe, 1993; Dickenson & Snow, 1987; Dickenson & Tabors, 1991; Mason & Stewart, 1990). Indicators are based on:

- Frequency of reading of storybooks (parent and child together) in an average week – including bedtime and other times
- Frequency of child requests to be read to (indicator of child interest)
- Frequency of library visits with the child
- Number of books available in the child’s home
- The age of the child when the parent first started reading to them

The measure was developed in Ottawa on white Canadian children (n=68). It is noted that the results from this questionnaire can be used for descriptive purposes only. Senechal et al. (1998) note that this is due to the parent’s tendency to overestimate
answers to these questions. Methods of further data, collected to confirm parental reports, are described by Senechal and colleagues but are not presented or used in this study⁴.

**Kitten’s First Tooth Evaluation Questionnaire (KFT-EQ)**

This measure was developed to evaluate Kitten’s First Tooth. This survey was designed to evaluate the use of the storybook. The questions were tied to the use of the storybook. The response format was a 5-point Likert scale ranging from strongly disagree (scoring 1) to strongly agree (scoring 5), the higher the score on the scale, the more positive the response. Questions addressing how often the book was read and at what time of day were asked as category questions.

Participants were also asked two free text questions including what was the most valuable message they received from the book and who their child’s favourite character from the book was.

### 6.2.5 Analysis

**Quantitative analysis**

Data was analysed using SPSS version20. Descriptive analysis of frequencies was run and the means and standard deviations examined, where appropriate, to help identify outliers which could be data input errors. For nominal and ordinal data, the

---

⁴ Reading habits data is being used for descriptive purposes only. This study does not seek to confirm parent reporting of reading in the home as this is not the principle focus of the study. This data is intended to act as an indication of the home reading environment.
data viewer in SPSS was scanned for obvious outliers and errors. Original scripts were checked against the input data to ensure the accuracy of the database.

The data collected via the OHBQ was analysed according to the eight subscales which were determined in a previous international study (Adair et al., 2004). The subscales were summed to provide a composite score and scale means were determined to provide descriptive information about the population of study with regard to oral health attitudes and behaviours. Data normality was assessed through the skewness and kurtosis of the data. Reliability of the subscales data in the OHBQ was assessed using Cronbach’s α. The KFT-EQ was analysed according to the a priori constructs used to design it. Means of these subscales were determined and reliability was assessed using Cronbach’s α.

**Qualitative analysis**

The focus group data was transcribed fully (an excerpt of one of the transcripts is shown in Appendix 6.5) and imported into NVivo8 to support analysis. Accuracy of the transcriptions were checked by re-reviewing data files, particularly where the recordings were difficult to decipher. The data was analysed using framework analysis (Krueger & Casey, 2009) which was previously used in the focus group study reported on in Chapter 2. Framework analysis uses a thematic approach to qualitative analysis and is supported by 5 steps: 1) familiarisation with the data, 2) initial development of a coding frame, 3) pilot coding (involving an iterative step of the redevelopment of the coding frame), 4) application of the coding framework to
the data and 5) organisation and interpretation of themes. This type of qualitative analysis has been previously discussed in Chapter 2.

A feature of framework analysis is that the coding frame does not need to arise only from the data; codes may be determined a priori (Krueger & Casey, 2009). Considering the focus of the study, this was a benefit of the use of framework analysis. The initial coding frame focused on issues of acceptability of a storybook based intervention, for example issues of fitting reading into the child’s routine and of literacy in the home.
6.3 Results

6.3.1 Potential usefulness

With regard to the potential usefulness of a storybook based oral health promotion intervention in the population of study, the participant characteristics are described. Information pertaining to these characteristics was gathered using the OHBQ. However, the normality and reliability of this data are first presented.

Normality of the data

English language only measures were distributed to this population. Table 6.2 shows the skewness and kurtosis of the data. Most of the scores fall between +/-2 for both skewness and kurtosis, which can be considered acceptable for psychometric use (Jondeau & Rockinger, 2003).
Reliability of the data

The scales of the OHBQ were tested for reliability using Cronbach’s α. Statistics are displayed in Table 6.3. Reliability of the scales as described by the alpha statistics appears to be good for the majority of the scales with the exception of external control.

Table 6.2 Skewness and kurtosis for OHBQ data

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention to brush child’s</td>
<td>-1.05</td>
<td>4.36</td>
</tr>
<tr>
<td>Parental efficacy in relation to child tooth brushing</td>
<td>0.69</td>
<td>0.36</td>
</tr>
<tr>
<td>Attitudes towards prevention</td>
<td>-1.34</td>
<td>3.81</td>
</tr>
<tr>
<td>Intention to control child sugar snacking</td>
<td>-1.99</td>
<td>8.18</td>
</tr>
<tr>
<td>Parental efficacy in relation to controlling child sugar snacking</td>
<td>-0.49</td>
<td>0.11</td>
</tr>
<tr>
<td>Perceived seriousness of tooth decay in children</td>
<td>4.25</td>
<td>-1.95</td>
</tr>
<tr>
<td>Chance control – decay occurs by chance</td>
<td>-0.27</td>
<td>-0.29</td>
</tr>
<tr>
<td>External control – preventing decay is the dentist’s responsibility</td>
<td>0.27</td>
<td>-0.72</td>
</tr>
</tbody>
</table>

Table 6.3 Reliability of the OHBQ and FEQ scales

<table>
<thead>
<tr>
<th>OHBQ subscale</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention to brush child’s</td>
<td>α = 0.77</td>
</tr>
<tr>
<td>Parental efficacy in relation to child tooth brushing</td>
<td>α = 0.71</td>
</tr>
<tr>
<td>Attitudes towards prevention</td>
<td>α = 0.64</td>
</tr>
<tr>
<td>Intention to control child sugar snacking</td>
<td>α = 0.72</td>
</tr>
<tr>
<td>Parental efficacy in relation to controlling child sugar snacking</td>
<td>α = 0.74</td>
</tr>
<tr>
<td>Perceived seriousness of tooth decay in children</td>
<td>α = 0.76</td>
</tr>
<tr>
<td>Chance control – decay occurs by chance</td>
<td>α = 0.68</td>
</tr>
<tr>
<td>External control – preventing decay is the dentist’s responsibility</td>
<td>α = 0.49</td>
</tr>
</tbody>
</table>
**Participant characteristics**

Postcode information was gathered and translated into Index of Multiple Deprivation 2007 (IMD 2007) scores. Average IMD: m = 43.53; SD 7.63; range: 13 – 64.75. This average is far greater than the national average IMD for England of 21.27 in 2007. Based on available information, the study population can be considered an accurate representation, at least in terms of deprivation levels, of people living in this area of London.

**Parents, children and families**

Descriptive information pertaining to the overall study population (n=109) was collected using the non-scale questions presented in the OHBQ (Table 6.4). As can be seen, an approximately equal balance of child gender was achieved. Most parents had more than one child; with the majority have two or three children in the home (63%). Parents tended to be aged between 31 and 40 (>60%) and most were married (>80%). In terms of the parents’ education, for both mothers and fathers, the majority were educated to higher education level with around 40% of mothers completing their education at primary or secondary level, this figure was around 25% for fathers.
Table 6.4 Characteristics and reported behaviour from the OHBQ (N=109)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Boys</th>
<th>N (%)</th>
<th>Girls</th>
<th>N (%)</th>
<th>Not reported</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child’s gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>56 (51.38%)</td>
<td></td>
<td>50 (45.87%)</td>
<td></td>
<td>3 (2.75%)</td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not reported</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family size (number of children)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 child</td>
<td>17 (15.60%)</td>
<td></td>
<td>34 (31.19%)</td>
<td></td>
<td>12 (11.01%)</td>
<td>10 (9.17%)</td>
</tr>
<tr>
<td>2 children</td>
<td>32 (29.36%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 children</td>
<td>3 (2.75%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 children and more</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not reported</td>
<td>4 (3.67%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent’s age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 20</td>
<td>1 (0.92%)</td>
<td></td>
<td>24 (22.02%)</td>
<td></td>
<td>15 (13.76%)</td>
<td>6 (5.50%)</td>
</tr>
<tr>
<td>20-30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31-40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not reported</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>88 (80.73%)</td>
<td></td>
<td>1 (0.92%)</td>
<td></td>
<td>8 (7.34%)</td>
<td>3 (2.75%)</td>
</tr>
<tr>
<td>Cohabiting</td>
<td>1 (0.92%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>8 (7.34%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced/ separated</td>
<td>8 (7.34%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1 (0.92%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not reported</td>
<td>3 (2.75%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level at which child’s mother completed education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>8 (7.34%)</td>
<td></td>
<td>31 (28.44%)</td>
<td></td>
<td>31 (28.44%)</td>
<td>2 (1.84%)</td>
</tr>
<tr>
<td>Secondary school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>27 (24.77%)</td>
<td></td>
<td>3 (2.75%)</td>
<td></td>
<td>2 (1.84%)</td>
<td>7 (6.42%)</td>
</tr>
<tr>
<td>No formal education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>3 (2.75%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not reported</td>
<td>7 (6.42%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level at which child’s father completed education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>6 (5.50%)</td>
<td></td>
<td>20 (18.35%)</td>
<td></td>
<td>34 (31.19%)</td>
<td>37 (33.94%)</td>
</tr>
<tr>
<td>Secondary school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>37 (33.94%)</td>
<td></td>
<td>2 (1.84%)</td>
<td></td>
<td>2 (1.84%)</td>
<td>8 (7.34%)</td>
</tr>
<tr>
<td>No formal education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>2 (1.84%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not reported</td>
<td>8 (7.34%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reported brushing and snacking behaviour of the population

In terms of exploring the existing oral health behaviours of the population of study, information on reported behaviours was gathered using the OHBQ. These behaviours are reported in Table 6.5. Regarding tooth brushing behaviours, most parents reported to reminding their children to brush their teeth on a daily basis (>77%), slightly less reported that they checked tooth brushing on a daily basis (68%) and fewer still reported to supervising sessions (44%). Less than a third of parents reported that they helped their child to brush their teeth every day (30%) and with a quarter reporting that they brushed their child’s teeth for them (25%).

In terms of the sugar snacking behaviours which parents reported, only a small proportion stated that their children had sweets, sugary foods or sugary drinks between meals on a daily basis (<10%). However more reported that eating sweets (37%) or sugary food (46%) between meals occurred most days but not every day.
<table>
<thead>
<tr>
<th>Reported behaviour</th>
<th>Everyday</th>
<th>Most days</th>
<th>Occasionally</th>
<th>Never</th>
<th>Not reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent reminds child to brush teeth</td>
<td>80 (73.39%)</td>
<td>8 (7.34%)</td>
<td>9 (8.27%)</td>
<td>6 (5.50%)</td>
<td>6 (5.50%)</td>
</tr>
<tr>
<td>Parent checks that teeth have been brushed</td>
<td>71 (65.14%)</td>
<td>24 (22.02%)</td>
<td>9 (8.27%)</td>
<td>5 (4.57%)</td>
<td></td>
</tr>
<tr>
<td>Parent supervises brushing</td>
<td>46 (42.21%)</td>
<td>38 (34.86%)</td>
<td>19 (17.43%)</td>
<td>2 (1.83%)</td>
<td>4 (3.67%)</td>
</tr>
<tr>
<td>Parent helps child to brush</td>
<td>31 (28.44%)</td>
<td>27 (24.77%)</td>
<td>36 (33.03%)</td>
<td>9 (8.26%)</td>
<td>6 (5.50%)</td>
</tr>
<tr>
<td>Parent brushed child’s teeth for them</td>
<td>26 (23.85%)</td>
<td>23 (21.10%)</td>
<td>43 (39.45%)</td>
<td>12 (11.01%)</td>
<td>5 (4.59%)</td>
</tr>
<tr>
<td>Child eats sweets in between meals</td>
<td>10 (9.17%)</td>
<td>38 (34.86%)</td>
<td>28 (25.69%)</td>
<td>28 (25.69%)</td>
<td>5 (4.59%)</td>
</tr>
<tr>
<td>Child eats sugary foods between meals</td>
<td>12 (11.01%)</td>
<td>48 (44.04%)</td>
<td>14 (12.84%)</td>
<td>26 (23.85%)</td>
<td>4 (3.67%)</td>
</tr>
<tr>
<td>Child drinks sugary drinks between meals</td>
<td>9 (8.26%)</td>
<td>22 (20.18%)</td>
<td>19 (17.43%)</td>
<td>44 (40.37%)</td>
<td>9 (8.26%)</td>
</tr>
</tbody>
</table>
Mean scores from the OHBQ scales were calculated (Table 6.6). All mean scores for the subscales were greater than 3 (Likert scale response format was 1-5). These scores show that most parents felt that tooth decay was a serious problem and that it was important to put in place preventive practices. PSE for oral health behaviours was slightly lower but not, on the whole, reported to be negative.

<table>
<thead>
<tr>
<th>OHBQ subscale</th>
<th>Mean score (standard deviation) total N=108</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention to brush child’s teeth</td>
<td>3.95 (0.62)</td>
</tr>
<tr>
<td>Parental efficacy in relation to child tooth brushing</td>
<td>3.82 (0.72)</td>
</tr>
<tr>
<td>Attitudes towards prevention</td>
<td>4.05 (0.74)</td>
</tr>
<tr>
<td>Intention to control child sugar snacking</td>
<td>3.99 (0.57)</td>
</tr>
<tr>
<td>Parental efficacy in relation to controlling child sugar snacking</td>
<td>3.53 (0.84)</td>
</tr>
<tr>
<td>Perceived seriousness of tooth decay in children</td>
<td>4.16 (0.58)</td>
</tr>
<tr>
<td>Chance control – decay occurs by chance</td>
<td>3.51 (0.72)</td>
</tr>
<tr>
<td>External control – preventing decay is the dentist’s responsibility</td>
<td>3.14 (0.74)</td>
</tr>
</tbody>
</table>

6.3.2 Feasibility

In terms of investigating the feasibility of a storybook based oral health promotion intervention in this population, existing reading habits were investigated. Reading habits in particular were of interest in this population considering the ethnic diversity and potential for language or literacy barriers affecting the feasibility of a storybook based intervention. The findings from the RHQ are presented first. Additionally, feasibility was investigated using the KFT-EQ which evaluated how
participants used the storybook at home as well as what they felt and thought about it.

**Reading habits**

Parent and child reading habits as measured by the RHQ are shown in Table 6.7. Relatively few parents reported that they read with their children at most or at every bedtime. Nearly half of parents reported that they had 20 or less books in their household. It seemed that children asked to be read to fairly frequently. Parents reported that their child asked to be read to ‘sometimes’ (39%) often (28%) or very often (25%). Visits to the library with their child were reported to occur ‘sometimes’ for around half of the participants. The age at which the child was first read to varied with the majority starting reading before age three years and with only 5.50% reporting they did not start reading with their child until after they were five years or older.
Table 6.7 Reading habits (N=109)

<table>
<thead>
<tr>
<th>Reading habits</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency of child being read to at bed time in a typical week</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>7 (6.42%)</td>
</tr>
<tr>
<td>Once</td>
<td>8 (7.34%)</td>
</tr>
<tr>
<td>Twice</td>
<td>17 (15.60%)</td>
</tr>
<tr>
<td>3 times</td>
<td>20 (18.35%)</td>
</tr>
<tr>
<td>4 times</td>
<td>20 (18.35%)</td>
</tr>
<tr>
<td>5 times</td>
<td>11 (10.09%)</td>
</tr>
<tr>
<td>6 times</td>
<td>3 (2.75%)</td>
</tr>
<tr>
<td>7 times</td>
<td>11 (10.09%)</td>
</tr>
<tr>
<td>Not reported</td>
<td>12 (11.01%)</td>
</tr>
<tr>
<td><strong>Frequency of child being read to at other times in a typical week</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>4 (3.67%)</td>
</tr>
<tr>
<td>Once</td>
<td>4 (3.67%)</td>
</tr>
<tr>
<td>Twice</td>
<td>20 (18.35%)</td>
</tr>
<tr>
<td>3 times</td>
<td>29 (26.61%)</td>
</tr>
<tr>
<td>4 times</td>
<td>25 (22.94%)</td>
</tr>
<tr>
<td>5 times</td>
<td>14 (12.84%)</td>
</tr>
<tr>
<td>6 times</td>
<td>7 (6.42%)</td>
</tr>
<tr>
<td>7 times</td>
<td>5 (4.59%)</td>
</tr>
<tr>
<td>Not reported</td>
<td>1 (0.92%)</td>
</tr>
<tr>
<td><strong>Frequency of child asking to be read to</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>4 (3.67%)</td>
</tr>
<tr>
<td>Seldom</td>
<td>4 (3.67%)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>40 (36.70%)</td>
</tr>
<tr>
<td>Often</td>
<td>29 (26.61%)</td>
</tr>
<tr>
<td>Very often</td>
<td>25 (22.94%)</td>
</tr>
<tr>
<td>Not reported</td>
<td>7 (6.42%)</td>
</tr>
<tr>
<td><strong>Frequency of library visits</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>9 (8.26%)</td>
</tr>
<tr>
<td>Seldom</td>
<td>15 (13.76%)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>51 (44.79%)</td>
</tr>
<tr>
<td>Often</td>
<td>18 (16.51%)</td>
</tr>
<tr>
<td>Very often</td>
<td>11 (10.09%)</td>
</tr>
<tr>
<td>Not reported</td>
<td>5 (4.59%)</td>
</tr>
<tr>
<td><strong>Estimated number of books in the child’s home</strong></td>
<td></td>
</tr>
<tr>
<td>20 or less</td>
<td>50 (45.87%)</td>
</tr>
<tr>
<td>21- 40</td>
<td>31 (28.44%)</td>
</tr>
<tr>
<td>41- 60</td>
<td>10 (9.17%)</td>
</tr>
<tr>
<td>61- 80</td>
<td>9 (8.26%)</td>
</tr>
<tr>
<td>More than 80</td>
<td>3 (2.75%)</td>
</tr>
<tr>
<td>Not reported</td>
<td>6 (5.50%)</td>
</tr>
<tr>
<td><strong>Age at which parent began reading to child</strong></td>
<td></td>
</tr>
<tr>
<td>Age 1 or less</td>
<td>31 (28.44%)</td>
</tr>
<tr>
<td>Age 2</td>
<td>30 (27.52%)</td>
</tr>
<tr>
<td>Age 3</td>
<td>23 (21.10%)</td>
</tr>
<tr>
<td>Age 4</td>
<td>10 (9.17%)</td>
</tr>
<tr>
<td>Age 5 plus</td>
<td>6 (5.50%)</td>
</tr>
<tr>
<td>Not reported</td>
<td>9 (8.26%)</td>
</tr>
</tbody>
</table>
Use of the intervention in the home

Data from the KFT-EQ revealed that the majority of parents read the book a few times with their child (n=31; 48%) and 17 (26.60%) of parents read the book with their child every bedtime and in 24 cases (37.50%) the child read the book alone. Six (9.50%) reported not using the book at all. Overall 27% of the total consented population (44% of the participants who returned at least one of the questionnaire) reported to have read the book at least a few times with their child.

Table 6.8 shows the mean scores, which are all above 3 (the central point of the scale indicated neither agree nor disagree) indicating that, over all, the intervention was positively received by the parents.

Table 6.8 Mean scores for questions on the KFT-EQ around the practical use of Kitten’s First Tooth

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean value (standard deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The storybook made it easier for me to read with my child</td>
<td>3.92 (0.71)</td>
</tr>
<tr>
<td>My child understood the content of the story</td>
<td>4.25 (0.78)</td>
</tr>
<tr>
<td>The story helped me to talk to my child about brushing his/her teeth</td>
<td>3.90 (0.84)</td>
</tr>
<tr>
<td>The story helped me to talk to my child about going to the dentist</td>
<td>3.78 (0.97)</td>
</tr>
<tr>
<td>The story helped me to talk to my child about sweet foods and drinks</td>
<td>3.84 (1.00)</td>
</tr>
<tr>
<td>It was easy to fit reading the storybook into my child’s bedtime routine</td>
<td>3.89 (0.95)</td>
</tr>
</tbody>
</table>

Two free text questions were asked in this questionnaire. The first of these questions was, ‘what was your child’s favourite character in Kitten’s First Tooth?’. Fifty-two responses were recorded for this question, with the character ‘Kitten’ being favoured by most of the children (Table 6.9).
Table 6.9 Children’s reported favourite character from Kitten’s First Tooth

<table>
<thead>
<tr>
<th>Character</th>
<th>N (%) total N=52</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitten</td>
<td>31 (59.62%)</td>
</tr>
<tr>
<td>Owl</td>
<td>13 (25.00%)</td>
</tr>
<tr>
<td>Cat</td>
<td>6 (11.54%)</td>
</tr>
<tr>
<td>Mouse</td>
<td>1 (1.92%)</td>
</tr>
<tr>
<td>Squirrel</td>
<td>1 (1.92%)</td>
</tr>
</tbody>
</table>

The second question asked ‘what was the most important message in Kitten’s First Tooth for you?’ Fifty-six responses were recorded for this question (Table 6.10), with tooth brushing being reported as the most important for the majority. Four responses were recorded which were unclear due to the use of language, this may indicate a lack of understanding of the question or difficulties in expression due to language barriers.

Table 6.10 Parent reported most important messages from Kitten’s First Tooth

<table>
<thead>
<tr>
<th>Message subject</th>
<th>N (%) total N=56</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tooth Brushing</td>
<td>31 (55.36%)</td>
</tr>
<tr>
<td>Importance of good oral health generally</td>
<td>10 (17.86%)</td>
</tr>
<tr>
<td>Sugar/ healthy eating</td>
<td>6 (10.71%)</td>
</tr>
<tr>
<td>Dental attendance</td>
<td>5 (8.93%)</td>
</tr>
<tr>
<td>Unclear</td>
<td>4 (7.14%)</td>
</tr>
</tbody>
</table>

6.3.3 Acceptability

The acceptability of the storybook based oral health promotion intervention was investigated through focus groups with parents and teachers. Focus groups with explored issues around the use of a story-based oral health promotion intervention in the home.
A total of 29 participants took part in the focus groups held at the schools. All of these participants were parents of a year one or year two child attending the schools of study. However, many of these parents reported that they had other children as well. The majority of the participants were mothers rather than fathers, as can be seen in Table 6.11. In terms of ethnicity, just over half of the participants were of Asian origin (55%).

Table 6.11 Characteristics of focus group participants

<table>
<thead>
<tr>
<th>Characteristics of parents who participated</th>
<th>N = 29 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td></td>
</tr>
<tr>
<td>African</td>
<td>5 (17.24%)</td>
</tr>
<tr>
<td>British</td>
<td>4 (13.79%)</td>
</tr>
<tr>
<td>Asian</td>
<td>16 (55.17%)</td>
</tr>
<tr>
<td>South American</td>
<td>3 (10.34%)</td>
</tr>
<tr>
<td>Non-British European</td>
<td>1 (3.45%)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>26 (89.66%)</td>
</tr>
<tr>
<td>Male</td>
<td>3 (10.34%)</td>
</tr>
</tbody>
</table>

Issues arising from discussions with parents have been organised around two central themes focused around understanding the acceptability of a storybook based oral health intervention, 1) time and child routines and 2) Literacy and child development (Table 6.12).
Table 6.12 Themes arising from framework analysis

<table>
<thead>
<tr>
<th>Themes</th>
<th>Central themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time strain</td>
<td>Time and child routines</td>
</tr>
<tr>
<td>Competing demands</td>
<td></td>
</tr>
<tr>
<td>Reading at home routines</td>
<td></td>
</tr>
<tr>
<td>Literacy</td>
<td>Literacy and child development</td>
</tr>
<tr>
<td>Parent reading</td>
<td></td>
</tr>
<tr>
<td>Child reading</td>
<td></td>
</tr>
<tr>
<td>Child development</td>
<td></td>
</tr>
<tr>
<td>Stories</td>
<td></td>
</tr>
<tr>
<td>Child understandings</td>
<td></td>
</tr>
</tbody>
</table>

**Time and child routines**

Feeling ‘stretched for time’ was something which a majority of parents reported to having experienced. Some felt that this was a normal part of parenthood, with one mother stating,

“To be a mother is to have no time!” (Participant 4)

Another mother said,

‘For mums there’s never time! (Participant 8)

Similarly another participant reported,

“The time passes so quickly you know, the time you do other things and then it’s time to sleep, always no time” (Participant 10)

This ‘time strain’ appeared to be the result of a number of ‘competing demands’, including paid or unpaid work, multiple children, household duties and religious obligations. Competing demands reportedly played a significant role in the morning and bedtime routines of the children. Caring for other children, particularly very young children or for multiple other children created a time strain. One mother said,
“it’s just making time, it’s not like we got one child, we’ve got four children and it’s just making time for the little one, I really need to make more time but it’s a challenge isn’t it?” (Participant 14)

Children of different ages have varying needs and may create an array of demands for their parents to manage. In explaining why she was unable to read with her five year old child at bed time, one mother said,

“we read in the living room together but then she (five year old) goes to bed on her own … I need to make little one ready, to pyjamas and everything and I need to sleep her because she is still one. So I need to give her time as well” (Participant 17)

The strain of time and competing demands appeared to be difficult for some parents, one mother described her difficulties in explaining why she found it hard to ensure her children had a healthy diet,

“But then there’s not always, you don’t get enough of, You don’t get enough time, you want to do the house work, you want to do the other work as well, you want to leave the things on for tea, and they want to know what they can eat so we don’t have that time” (Participant 5)

About reading with her child, this mother went on to say,

“So I don’t get that chance of reading at home, my small one is trying hard to read just a little bit cos like for me, I’m not always there, to support her, yeah, I cannot and I’m always feeling guilty because I want to read but I’m not, I don’t have time, because I want to do this before I go to bed, I want to wake up early in the mornings. So there’s not really time” (participant 5)

Bedtime reading tended to be described as something that would take place if time allowed and therefore did not appear to be part of an established routine for many. Some parents employed strategies to include reading with children into the family day. Almost all the parents agreed that older siblings helped out with the bedtime routines of younger children. In some cases the parent and children read together as a group to maximise time while older siblings would help out. For example,
“The older children read and then the younger one wants the chance, they say today is my turn, I will read for my sister” (participant 4)

Time strain and competing demands may have been an even greater problem for Muslim families due to busy lives involving daily trips to the Mosque. A number of parents described highly packed daily routines whereby they felt rushed to get children to school, back home again, to the Mosque and back home to bed while attempting to fit in reading, tooth brushing and eating too. One mother described this busy day,

“Most Muslim children do, they go to Mosque, so they have a school routine and then we go to Mosque so between five and half 7, between five and 7, they go to Mosque, so by the time they come home it’s half past 7 so our children, we’d get them dressed or whatever, get them prepared and give them something to eat ... then it’s like nine o’clock and I’m like nine o’clock! ... I’ve got a job in the evenings where I do Mosque work as well” (participant 11)

Not only did this busy day have consequences for the parents trying to fit everything in, they also seemed to take their toll on the children who complained of being tired and became less amenable to health related routines. For example, one mother explained how her son sometimes complained about being told to brush their teeth when tired,

“Sometimes mine do just get so tired and they say oh I just want to go to bed mum and I have to go up 16 flights of stairs and another 15 to go to the loft and he’s like oh I’m so tired... And he says ‘but I’m so tired mum please!’ Because the mosque is a long day” (Participant ID: 11)

However, some parents, despite not having established a regular reading routine with their children were able to insist on reading with their child even if the child was tired after a busy day. One mother said,
“My youngest is five and she goes Mosque, at the beginning, when she started reception, and she started mosque together as well, when she came back from school, she just fell off to sleep but now she’s got out of that routine now, I think her body’s quite used to it but she is tired. I do try to read, it’s not on a regular basis but I do try. Sometimes, I’ll say right, come on let’s read a book” (Participant 3)

Some parents noted that their children often read in bed alone. However in terms of a routine, bed time reading together (parent and child) was, in most cases, not established.

**Literacy and child development**

Perhaps unsurprisingly, the majority of the participants who took part in focus groups had good levels of English language so literacy was not reported to be a problem among this particular group. Three participants however, had much lower levels of English language and with the help of a friend acting as a translator; a Brazilian mother explained how her child read books to her in English and followed this with an explanation in Portuguese. She reported that this aided her own learning. Reading together for this parent and child was a different experience than for most of the participants spoken to.

Some participants spoke of how their own parents had had limited literacy skills and commented that this had impacted on their experiences of childhood reading. As can be seen in the following excerpt of conversation between two parents,

“‘It’s a culture as well in it? like in the English culture, I mean I’ve been brought up here but culture wise, my parents have never read to me, they didn’t have the time and they didn’t even know how to read English’ (Participant 9)

“So maybe that’s why?” (Participant 13)
“Maybe that’s why we’ve not kind of instilled it as well in our children’s in kind of the culture of it” (Participant 9)

Interestingly, the absence of a home reading routine was explained as being ‘cultural’, or perhaps not normal in their families. This ‘norm’ was given as an explanation as to why this mother did not read with her young children even though literacy was not a problem for her as it had been for her parents.

Some parents reported that they themselves did not read but that their children did. One mother for example, explained to the group that she often lost interest in reading for herself but liked to read to her two year old child.

“To be fair the last book I probably read was before Christmas and I haven’t even got to the end. I’m not no, I read a paper, I read magazines but not a book no … the children’s books, I do actually get in to them, it brings me back to my childhood reading yeah” (Participant 12)

Most of the parents considered that reading was important in terms of child learning and development. Reading at home was thought to be valuable as a learning tool to help children progress at school. One mother explained,

“well I suppose it helps with their words and that doesn’t it, and then when they go to school, they can read science and things, road signs and stuff for directions and that starts from storybooks really doesn’t it” (participant 18)

Linking in with learning and development, one mother reported that she was keen for her child to read age appropriate or challenging books (she referred to them as ‘grown up books’). She saw these as beneficial in terms of her child’s learning. She reported that Kitten’s First Tooth was not suitable for him stating that it was too “baby-ish”. This was the only negative remark about Kitten’s First Tooth received during the focus groups. Few parents commented on Kitten’s First Tooth at all other
than to indicate that they liked it and were grateful for receiving the book and brushing chart. When asked about Kitten’s First Tooth, one mother replied,

“The story? [Kitten’s First Tooth] they loved it, yes they did, my little daughter loved it, they read books a lot they loved it!” (Participant 6)

However, participants did talk more generally about the use of stories for helping children to understand issues associated with their health. Stories in particular were thought to be a developmentally appropriate way in which to communicate with children. In particular, stories were thought to be a way of talking to children in “their own language”. However, for this purpose, parents tended to value stories that relied on ‘fear appeal’. One mother recalled an episode of a cartoon that her children had watched at home,

“Cartoons help a lot because I know there was this cartoon, Kirby and this episode yeah about brushing your teeth and it made kids really scared about germs and bacteria and everything and it really got my kids and that helped a lot, it really got my kids – the Kirby one it is! Very good that one, very good!” (Participant 6)

Both this mother and another father in the group whose children had also seen this cartoon talked about the effectiveness of the cartoon for encouraging brushing in their children. However, ‘fear appeal’ was not always reported as a helpful way to communicate messages to children, one mother explained how her daughter read a book with negatively framed dental health messages,

“my daughter she got this book form school right and she read it and she like it and after that she said ‘I don’t want to go to the dentist, I don’t want to take my tooth out’ or you know things like that” (participant 7).

There was recognition too, of different learning styles,
“It’s dependant on the kids, somebody they watch and they learn, some kids they listen and they learn some kids they read and they learn and different” (participant 7).

Parents discussed that the difference might be gender relevant or that it may be based on personality.

Overall, parents didn’t report that they themselves read frequently but they tended to report that their children did read. Reading was felt to be important for educational purposes but seen as enjoyable for children and a way to communicate with them at their developmental level.
6.4 Discussion

This pilot study aimed to assess the potential usefulness, feasibility and acceptability of a novel oral health promotion intervention. Data was collected to explore the characteristics of the population and reported child oral health behaviours with regard to the potential usefulness of this intervention among the participants. Kitten’s First Tooth was given to parents and is utility assessed through the KFT-EQ and data pertaining to the reading habits of parents and children was collected to assess the feasibility of a storybook based intervention. An understanding of the acceptability of a storybook based intervention was sought through focus groups with parents.

Potential usefulness

Data collected via the OHBQ revealed that father’s tended to be more highly educated than mothers. A large scale international study using demographic and health data from economically developing countries confirmed a strong correlation between mother’s education level and child health outcomes, however a causal relationship could not be proved (Desai & Alva, 1998). Further research has applied pathways techniques to data from Pakistan from families with young children (up to five years), which has been able to prove strong causal links between parent’s education levels and health seeking behaviours (Aslam & Kingdon, 2010). Mother’s education level and her empowerment in the home, through employment, media exposure and knowledge channel her impact upon her child’s health outcomes. A large cross sectional survey in Uganda found that mother’s education levels, above
the father’s was significant for child health (Wamani, Tylleskär, Astrøm, Tumwine, & Peterson, 2004). If the educational level of the mother is significant for health seeking behaviour, then further research with similar populations should take into account that this factor may impact upon compliance with or uptake of a health promotion intervention.

Child tooth brushing was reported by parents to be undertaken regularly based on answers in the OHBQ, however, parental supervision and parents carrying out the behaviour for their children were reported to be lower. Supervised brushing is advised for all children until they are seven years old (Department of Health, 2009). Even though brushing frequency is reported as high in this population, lack of supervision may have consequences for brushing quality and technique.

Regular sugar snacking was reported as being common, though not on an everyday basis. However these results have been generated from self-report measures and the limitations of social desirability answering apply. Social desirability answering may be of particular concern for this behaviour because it is known that rates of sugar consumption have been underestimated by the parents in previous studies (Department of Health and the Department of Children Schools and Families, 2008; Hafekost, Mitrou, Lawrence, & Zubrick, 2011). It is important therefore to keep this in mind when interpreting results such as these.
Feasibility

The RHQ showed that most parents reported that they read at bedtime with their child at least a few times per week with less than 10% reporting that they never read with their child. This figure was less than 4% for reading at other times. A large scale national survey in the US (n=2068) found that around 52% of children are read to on a daily basis by their parents. Only a minority of parents in the current study reported reading every day to their child (most responses were between two and four times per week), this could indicate that parent-child reading among this population is lower than average, however caution must be taken when comparing results from samples in different populations and data collected via different measures. The measure used by Kuo and colleagues (2004) asked parents did they read ‘every day’, ‘3-6 days’, ‘1-2 days’ or ‘never’. Given these options it is possible that the most socially desirable option is more obvious than on a scale of 1-7.

Most children were reported as regularly asking to be read to, indicating a high level of interest in reading among the children themselves. Most of the population had less than 20 books in the household and library visits were not reported as very common for most. Parents reported that they started reading to their child at a young age (majority less than two years). This indicates that storybooks could be a viable option for an intervention as parent child reading is a fairly common activity although not every day at present. Emphasis may need to be placed on helping parents to read with their children on a daily basis.

Regarding Kitten’s First Tooth in particular, according to the data collected via the KFT-EQ, parents reported reading Kitten’s First Tooth at bed times more often than
they read other books at bed time (as recorded by the RHQ). However, it is important to remember that not all parents who returned the RHQ returned the KFT-EQ. Therefore comparisons between these measures are extremely limited. The data collected from the KFT-EQ showed the parents who returned it, evaluated it positively. However, the parents also appeared to be grateful for the storybook and it is unlikely that they would have given negative feedback to the research team in a face-to-face situation. It is therefore promising that the evaluation of the book based on the KFT-EQ was overall positive.

However, one mother in the focus groups did report that she felt the book was not developmentally appropriate for her six year old son. Kitten’s First Tooth was developed by children’s animation specialists to appeal to children aged three to five years. In terms of the iterative development of this intervention, based on this pilot study, further iterations should pay particular attention to child learning and development. Input from child education specialists may help with this.

**Acceptability**

In terms of how acceptable a storybook based oral health promotion intervention in the home setting might be in this population, time may be an important factor. Time strain of parents may affect the uptake of and compliance with an intervention of this kind. Efforts to support parents, however, could be made to minimise these potential negative effects. Time strain reportedly affected existing routines in the home. Efforts to minimise effects should focus around time management and self-efficacy for implementing and maintaining routines in the home.
Additionally the competing demands on parents as a result of having more than one child and other commitments could potentially threaten the formation and maintenance of routines. The ‘Triple P’ or Positive Parenting Program is a widely used parenting intervention aimed at preventing difficult child behaviours from developing (Sanders, 1999). The programme was designed with the recognition of the difficulties that a hectic home life can present for the implementation of successful routines in the home. Most parents have no formal training on how to bring up their children and rely on what they have learned from their own parents. This was referred to by a study participant in this study who reasoned that she did not read to her children because her parents had not read to her.

Parents may need continued support that relates to the changing developmental level of their child. Some participants in this study talked about how it had been easier to control their children when they were younger. Child independence increases as the child develops Erikson’s stages of child development state that child independence develops between the ages of three and six years (Erikson, 1963). Recognition of this could therefore be highly relevant to further research with this age group.

Limitations

This study was subject to a number of limitations which should be taken into account when interpreting the findings. Firstly, the appropriateness of Kitten’s First Tooth for this population, age and child development is an important consideration. Kitten’s First Tooth was developed for children aged three to five years, whereas the
population looked at in this study were children aged six to seven years. Developmentally, this represents a large gap and this is likely to impact upon how often and even if the book was used. Further the content, in the sense that the story revolves around a first tooth, something which for six and seven year olds is likely a distant memory, may again be inappropriate for the population. It is possible that children may have found the book irrelevant or uninteresting as a result, potentially affecting its use.

Another issue in terms of the appropriateness of the story for the population is ethnicity. Kitten’s First Tooth was developed for an ethnically homogenous population in North West England. The population in Inner East London is somewhat different in terms of the range of different ethnic groups within the population, meaning that both culture and language are hugely varied. In terms of Kitten’s First Tooth, no particular ethnicity is depicted in the images of the story as animals are used. However, the story is not able to address culturally specific issues. In terms of delivering oral health promotion to children in Inner East London, it would be beneficial to further investigate the impact of ethnicity on the use and acceptability of the storybook with a view to redeveloping a suitable version for use within this population.

The limitations due to age and ethnicity in this study may have had implications for the use of the book in this study. This may explain the lower return rate of the evaluation questionnaire. It is important to consider that this could have introduced a systematic bias in terms of the evaluation questionnaires returned, whereby families in which the ethnic and age differences were such that Kitten’s First Tooth
was not used did not complete the evaluation questionnaires. This should be taken into consideration when interpreting the findings of this study.

Completion rates for this study were low at less than 50%. More parents returned the OHBQ and RHQ than returned the KFT-EQ. Communication with the school is crucial for improving return rates. Heinrich and colleagues, found that the social structure of schools and SES of families were the most important factors for understanding participation and completion of a preventive child behaviour study (Heinrichs, Bertram, Kuschel, & Hahlweg, 2005).

In terms of reliability, the data collected using the OHBQ could be considered to be good, indicating that it is feasible to gather reasonably robust data from this population. The alpha statistic was lower however for the factor relating to external control. Commonly alphas of greater than 0.7 are considered to be good, however, it may be reasonable to accept alphas of lower than 0.7 when measuring psychosocial constructs which are not always stable in themselves (Field, 2009). That is to say, lower alphas may not necessarily indicate an unreliable measurement; they may in fact be a reflection of an unstable construct. This does not mean that lower alpha statistics should be interpreted differently in the context of behavioural data, instead this possibility should be considered alongside the traditional interpretation.

It is likely that selection bias for example impacted on the data collection, particularly for the focus groups. The focus groups were recruited for by the teachers primarily who recommended parents who they thought would be interested in participating. Therefore it is probable that parents with greater levels of contact with the school and with good levels of English language skills were overrepresented in
the sample. However, it is important for the quality of focus group dynamics that participants are willing and able to contribute to the discussions (Parker & Tritter, 2006).

Additionally, due to the restricted area in which the study took place (two schools) it was not possible to use data saturation as a guide through which to close qualitative data collection. All parents who agreed to participate in the focus groups were included in the study. In this sense ‘participant saturation’ was achieved, this was due the restricted sampling frame for the study imposed externally.

This study was conducted in two schools in specific areas of Inner East London, the population size was limited and study completion low, despite efforts. Time limitations were tight and the geographical distance created strain for data collection, administration and the maintenance of working relationships with the school staff. Language barriers may have contributed to sampling and response bias. Parents unable to understand the consent form for example may have been prevented from participating. Language barriers may also have impacted on the accuracy of the data reporting. These types of difficulties were anticipated however and measures were put in place to minimise the effects. Facilitation sessions were held at times recommended by the teaching staff and these sessions were widely advertised within the schools. Despite this, they were not very well attended. It is possible that if advice were sought from the parents as well as the teaching staff, alterations to the facilitation sessions could have been made to improve their use by other parents. Additionally providing questionnaires in languages other than English may have improved return rates.
Qualitative data collection suffered limitations based around trust which may have affected the dynamic and reporting. In one focus group, parents reported that they did not give their children sweetened drinks, however following the end of the session a parent produced a bottle of sweetened milk from her bag to give to her baby. This could have been due to language barriers or misunderstanding or because the parent did not feel comfortable disclosing the information in the focus group environment. This is important as it may be indicative of further inaccuracies in the reporting of the qualitative data.

Of the 177 consent forms received, only 108 completed OHBQ and RHQ scripts were returned. Further, 76 KFT-EQ scripts (<80%) were returned by the parents. Therefore, although the storybook appeared to be positively received based on the collected data, a systematic bias cannot be ruled out. That is to say, parents who liked the storybook may have been more likely to complete the questionnaire evaluating it.

Overall, focus groups with parents revealed that an intervention of this kind would be welcomed and the data collected by the FEQ showed that overall the storybook was positively evaluated by parents. However, data gathered through the focus groups highlighted some key areas which would need to be taken into account in future implementations of similar interventions. Parents may benefit from a supportive intervention running concurrently with the routines intervention. Support for parents should be concentrated around time management and task specific self-efficacy as well as dealing with child behaviours through developmental stages.
Parents’ feelings about the efficacy of the intervention may too be significant for compliance.

The study reported on in this chapter focuses on assessing Kitten’s First Tooth in a culturally diverse environment. However, this study was part of a larger feasibility study, therefore there were limits relating to the study design that restricted the way in which Kitten’s First Tooth could be looked at here. For example, the time frame had already been set out meaning a fuller assessment of Kitten’s First Tooth would not have been possible. While restrictions such as this have impacted on the applicability of these findings generally, this study has still been able to provide insight into how Kitten’s First Tooth might be received in a culturally diverse environment. This is useful in terms of redeveloping Kitten’s First Tooth and improving it as an oral health promotion intervention.
6.5 Conclusion

In summary, exploratory data looking at the potential usefulness of an oral health promotion intervention in this population indicated that child oral health preventive behaviours were already being carried out in this population. However parent involvement was reported to be lower. An intervention to increase parents’ oral health behaviours for their children may therefore be useful. In terms of feasibility, parents reported reading at home to be regular. Based on the data collected, it can be said that Kitten’s First Tooth was used in the home and positively evaluated by parents. However, further iterations of the intervention should look to ensure developmental appropriateness. Thinking about the acceptability of this type of intervention and how it would fit into the child’s day both at school and at home, time is likely to be an issue. Additionally further efforts must be made to ensure language barriers are minimised with regard to participation for parents and children.
Chapter 7

Discussion
7.1. Overview

Dental disease in children can have serious physical and psychosocial consequences in both the short and long terms. Dental disease can be prevented through at least daily tooth brushing with a fluoride paste and controlled sugar snacking. Should disease occur, it can be identified early through regular dental attendance and managed appropriately. Promoting children’s oral health may help to improve parents’ attitudes towards relevant protective health behaviours for their children and thereby support continued optimal behaviours or improve suboptimal ones. This programme of work aimed to develop and evaluate a health promotion intervention aimed at improving parents’ attitudes towards their child’s oral health behaviours. The targeted behaviours were tooth brushing, sugar control and dental attendance.

To achieve this aim, a number of objectives were laid out:

1. To explore the barriers and facilitators to child oral health behaviours (namely dental attendance) among parents in the population of study.
2. To assess the potential for conveying a behavioural intervention through children’s stories.
3. To develop a theory and evidence based oral health promotion intervention.
4. To evaluate the oral health promotion intervention using a non-randomised comparative study design.
5. To assess the potential usefulness, feasibility and acceptability of the oral health promotion intervention in a culturally diverse population with a view to implement a future RCT.
These objectives were addressed in five studies (Chapters 2-6) in order to answer the overall research question: Is an evidence based and theory driven oral health promotion intervention in the form of a children’s story effective at improving parent’s attitudes towards their child’s oral health behaviours?
7.2 Main findings from this thesis

The main output from this thesis is the product, Kitten’s First Tooth, a novel oral health promotion behavioural intervention in the form of a children’s story available as both an animation and a book. Kitten’s First Tooth was developed based on the first two studies presented in this thesis in addition to the literature and theory discussed in Chapter 1.

The first empirical study, a qualitative exploration of parents’ perspectives on child oral health behaviour (principally dental attendance), concluded with some interesting findings that helped to frame the development of Kitten’s First Tooth. Firstly, parents communicated through the focus groups that a ‘child friendly’ health communication intervention would be more acceptable to them than one directed only at adults. Further, it was clear from this study that parents were motivated by a desire to do their best for their children. Parents’ past experiences of dental services appeared to frame their attitudes towards their child’s dental care and risk perception and outcome expectancy as well as self-efficacy for coping with child behaviours emerged as potentially important factors for child dental attendance behaviour.

As a result of this study, the idea to use a novel child friendly medium to convey child oral health promotion arose. The HAPA was used to theoretically contextualise the findings from this study in terms of the emerging concepts thought to be important for dental attendance behaviour (outcome expectancy, risk perception, self-efficacy). The construct of outcome expectancy was used within Kitten’s First Tooth (which conveyed a positive experience with positive outcomes). Self-efficacy was
employed through modelling (Luszczynska & Schwarzer, 2005) originating from social learning theory (later developed into social cognitive theory by Bandura). Self-efficacy was focused on because of its relevance for child oral health behaviours which was apparent from the previous literature (e.g. de Silva-Sanigorski et al., 2013; Pine et al., 2004). This was contextualised within social cognitive theory (Bandura, 1986). Self-efficacy for dealing with child behaviour was not addressed due to restrictions on the length of the story because of resource limitations. Additionally, risk perception was not addressed because Kitten’s First Tooth was framed as a positive story.

Following on from this study, an investigation as to the potential for conveying health massages and behavioural techniques through children’s stories was undertaken. Nine children’s stories about going to the dentist were identified and content analysed. This study found there to be a mix of evidenced and non-evidenced based health messages conveyed in the books and also found 12 BCTs within the books. This indicated that it would be possible to use a story as a means to convey health messages and BCTs. As a result of this study, 10 of the 12 BCTs identified in the content analysis study were used within Kitten’s First Tooth. Two could not be used due to restrictions on the length of the book (namely BCT19 social comparisons and BCT21 identification of self as a role model for other) and number of characters because of the budget restrictions of this project.

From here, Kitten’s First tooth was developed. The social marketing framework was used to guide the design. For example, it was as a result of the ‘marketing mix’ criterion that the story was produced in two formats (animation and storybook).
Modelling, originating in social learning theory, was the theoretical mechanism for delivering the story as noted above. The overall process was guided by a consultation group.

Kitten’s First Tooth was then tested with the population for whom it was developed (a city in the North West of England) for its effectiveness in improving parents’ attitudes to and intention for child oral health behaviours (namely, intention to enact key oral health behaviours, and to improve parents’ outcome expectations of child dental visits as well as their self-efficacy to undertake tooth brushing for their children and to control sugar in their child’s diet). The evaluation found that Kitten’s First Tooth was effective at improving parents’ self-efficacy and intention for child tooth brushing and intention and outcome expectancies for dental attendance. It was however not successful at improving self-efficacy related to sugar control or intention for sugar control. While the success of Kitten’s First Tooth in this evaluation was found to be mixed, the study showed that a novel intervention of this kind has potential as a tool for child oral health promotion.

In addition to this evaluation, a process evaluation was carried out with Kitten’s First Tooth with an ethnically diverse population in East London. The children in this study were older than those in the Salford evaluation (six to seven years rather than three to five years) and therefore older than the intended target audience of Kitten’s First Tooth (three to five year olds). This study, found Kitten’s First Tooth to be an acceptable intervention to parents, although it highlighted new challenges for the use of such an intervention. For example, additional interventions may be required to support reading at home for families with lower levels of English language skills.
Cultural and language differences in terms of reading with children in the home may have potential consequences for the use of a story-based intervention without further support. Developmental differences in children as they grow may also be important for ensuring the use of an intervention similar to Kitten’s First Tooth. This study highlighted the need for further redevelopment of Kitten’s First Tooth for use in other populations and that support with reading in the home may be an important consideration.

Therefore in terms of answering the primary research question, based on the work presented in this thesis, it appears that a children’s story can be used to affect the psychosocial determinants of parents’ oral health behaviour for their children. Further research is required around the processes of change, understanding whether the observed improvement has a meaningful behavioural and health impact and to complete a more robust evaluation.
7.3. Limitations of the studies presented within this thesis

There are a number of specific limitations in relation to the individual studies presented within this thesis which should be taken into consideration when interpreting their findings and subsequent implications. The qualitative study presented in Chapter 2 for example, is based on a relatively small number of parents’ perceptions so the overall generalisability of the findings is limited. Further, the main focus of the study was around child dental attendance, so the findings also have limited applicability to other child oral health behaviours.

The content analysis reported on in Chapter 3 looked at a small number of children’s books and these were very restricted in terms of their focus. This restriction was as a result of the search strategy that was used to identify the books for the study. The search strategy used was very simple in that it was a single word – ‘dentist’. Clearly this limited the books that would be returned by the search to those around dental visits. It is possible that other potentially relevant child oral health storybooks were missed by this search. As a result, this study cannot conclude that the findings of the content analysis are representative of all child oral health related storybooks.

Additionally, in limiting this study to dental storybooks alone, potentially valuable lessons from other areas of health promotion have likely been missed. As discussed within Chapter 1, there are a number of children’s stories that have been used to convey health promotion in the area of child nutrition (e.g. Bellows et al., 2013; Lawatsch, 1990). The fact that these have not been included in the content analysis study is regrettable. Analysis of books from other areas may have helped to improve the content of the intervention.
In terms of the actual development of Kitten’s First Tooth, reported on in Chapter 4, the process was supported by a consultation group made up of experts including dental, behavioural and public health specialists. This process was limited in that it was not able to ensure that BCTs pertaining to each of the key behaviours were present in the story (no BCT relating to sugar snacking was present in the final story). It was further limited in that it did not include the perspectives of all relevant stakeholders in that parents and children were not a part of it.

Both the MRC framework and NICE guidance around the development of complex interventions recommend that all relevant stakeholders be included in the design of interventions (Michie, 2008; NICE, 2007). Relevant stakeholders for the development of Kitten’s First Tooth not included in the consultation group are the parents and children who it was targeted at. The exclusion of children in particular within this stage of the development may have impacted on the levels of acceptability of the intervention from a child’s point of view and this could have impacted upon its use. Unfortunately, due to the absence of a process evaluation in the Salford study (Chapter 5), little can be said about how children received Kitten’s First Tooth and how this impacted on its use within the home.

The lack of a process evaluation within the Salford study, not only restricts the understanding of how Kitten’s First Tooth was used in the home; it also limits the interpretation of the findings. While the intervention appeared to result in positive outcomes for tooth brushing and dental attendance behaviours, we know little about the processes of this change that occurred within the home. Further we know nothing about the consequences of this finding. It is possible that with the addition
of focus groups to explore how parents and children used the intervention at home, the findings on the OHBQ subscales could have been interpreted within context. That is to say, it may have been possible to understand whether the change on the subscale score had any meaningful effect for the participants. Although the change was statistically significant (on some of the subscales), it is much harder to say if it had a meaningful effect on health behaviours.

Although a process evaluation was carried out in the final study (Chapter 6), the population with which it was carried out was very different to those in the first evaluation study (Chapter 5), both in terms of their ethnic diversity and the age of the children included. Again these factors may have impacted upon the use of Kitten’s First Tooth in the home. The fact that Kitten’s First Tooth was developed for children aged three to five years, means that is highly unlikely that it is developmentally appropriate for the six to seven year old children in this study. This potentially affected the use of the book by the families.

The ethnic diversity of the population meant that cultural factors may have impacted on the amount of time available in which reading could happen in the home. For example, Muslim parents described their and their children’s evenings as being spent at the mosque with little free time at home. Being part of larger families also meant that it was not always parents that read with children, instead, younger children often read books with their elder siblings. Language may have also affected the use of the book. The schools in which the participants were sampled had high levels of diversity and attending families spoke a wide range of different languages, with some parents having little English language skill. Due to the nature of data
collection (through an English language questionnaire and focus groups conducted in
English), it is highly likely that these families are not represented within the findings
and doubtful therefore that the data could be generalised to these families. In order
to gain a fuller picture of the potential for a story-based oral health promotion
intervention with families where English is not spoken regularly, further research
and in depth analysis should be planned.
7.2. Limitations to the overall programme of work

In terms of the programme of work as a whole, there are a number of limitations to be considered. Firstly, the conclusions to be drawn on the whole are limited because of a lack of a full evaluation, for example a RCT, of the intervention Kitten’s First Tooth. In this respect primarily, the programme of work differs from the structure set out by the MRC framework (2008). Full evaluation would allow for more confidence in the validity of the findings and potentially their generalisability. However, taking into account the timeframe available as well as limited resources, it was not possible to conduct a full evaluation of Kitten’s First Tooth within the scope of this PhD. Instead this work was able to offer insight into parents’ oral health behaviours for their children. It has demonstrated a development process and indicated the potential of the intervention as effective in changing parents’ attitudes and intentions to tooth brushing and dental attendance as well as its feasibility to be evaluated in a culturally diverse population.

Behaviour change science is a rapidly expanding field and notable advancements have been made since the time when much of the work reported on here began to take shape. The BCT taxonomy (Abraham & Michie, 2008a) for example, has had two further iterations (Michie, Ashford, Sniehotta, et al., 2011; Michie, Richardson, Johnston, et al., 2013) following the 26-item version from 2008, that was used for this thesis. In this respect, it may seem that the use of the 26-item version is already outdated. However, at the time of planning, the 26-item taxonomy was the only one available. Additionally, the 26-item taxonomy has been shown to have good reliability (Abraham & Michie, 2008a) and has been reliably used since (Michie,
Abraham, et al., 2009). Moreover, the intervention developed through this work is, to our knowledge, among the very first to embed theory-linked BCTs into its materials.

Regarding practical issues within the research itself, the participants involved in the various studies were self-selecting. The very fact that parents agreed to take part and, in the case of the study reported on in Chapter 5, continued to engage with the research eludes to them being motivated and likely capable parents. Therefore, it is probable that the majority of the participating parents were not from the so-called ‘hard-to-reach’ populations. This clearly has implications for the applicability of these findings to such populations.

Engaging with ‘hard-to-reach’ groups through research is a recognised difficulty (Benoit, Jansson, Millar, & Phillips, 2005). Additionally, the focus of this programme of work was not on ‘hard-to-reach’ groups but on parents and children living in deprived urban environments. The postcode data reported on in Chapter 5 shows that in relation to the national average the index of multiple deprivation for the areas in which the participants lived was much higher (indicating higher levels of deprivation). All participants included in these studies were recruited from deprived areas.

In terms of the methods of assessment used across the work, the potential bias of self-reported attitudes, beliefs and behaviours must be taken into account. None of the studies reported on above use objective outcome data such as child oral health status, instead qualitative methods and self-reported questionnaires have been used, both of which are at risk of bias (Schwarz, 1999; Stewart, Shamdasani, & Rook,
This may be a particular risk when parents are being asked about the ways in which they care for their children (Morsbach & Prinz, 2006). However, the available time frame and resources meant that clinical data could not be collected to evaluate this study. Moreover, the instrument used to assess the outcomes was pre-validated (Adair et al., 2004) and it remained valid when tested across a variety of ethnic populations (Pine et al., 2004). Regarding the focus groups, every effort was made to make participants feel at ease, for example all groups were conducted at the schools meaning the environment was a familiar one and no directive or judgemental language was used by the researcher. The answers provided, in most cases were considered by the research team to be honest ones.

As a journey, this PhD has been one with many turns in the road. The initial focus of this work was to increase child dental attendance in the area of study, which hopefully explains the specific focus on dental attendance in the first study (Chapter 2). Funds for an intervention to achieve greater attendance rates were provided by the local NHS authority at the time. However, a substantial change in the supervisory team 18 months in to the PhD changed the direction of the work, broadening it to look at three key oral health behaviours, dental attendance, tooth brushing and sugar snacking. The reasons for this were two-fold. Firstly, the evidence base is such that these three behaviours are known to be important for child oral health (dental attendance (Gibson, 2003; Lader et al., 2003; Lopez & Baelum, 2007; Nicolau et al., 2003; Nuttall & Harker, 2004; Nuttall et al., 2006; Watt & Sheiham, 1999), tooth brushing (Marinho, Higgins, Logan, et al., 2009), sugar snacking (Burt & Pai, 2001; Zero et al., 2008), tooth brushing and sugar snacking, in particular are evidenced as
preventive measures (Harris et al., 2004; Marinho et al., 2009; Walsh et al., 2010). Secondly, structural changes in the local NHS authority put in jeopardy the potential to evaluate the levels of child dental attendance using the contacts already formed. The decision was taken to evaluate the intervention psychometrically removing the necessity for data retrieval through the local NHS authority.

These changes have presented challenges. New skills were required to be quickly learned as the direction of work changed from one grounded in a sociologically perspective on public health to one around psychosocial health behaviour change. However, this work has benefitted from these changes. The development process has contributed to further understandings of parents’ oral health behaviours for their child. Additionally, a novel form of intervention has been demonstrated to have potential as a health promotion tool with a focus on the evidence base, relevant theory, theory-linked techniques (BCTs) and of course, on children.
7.4 Implications for practice, future research and policy

Implications for practice

Social marketing

The development of Kitten’s First Tooth was informed by the social marketing framework (Andreasen, 2002). The primary reason for using the framework was that this was the request of the funders (the local NHS authority at the time of the study). It is important to understand this within the historical context. During the planning stages of this study (2009-10), social marketing was very popular, funding was available for it and many local authorities saw it as a suitable approach to health promotion, particularly following its endorsement by the Department of Health in their white paper Choosing Health (Department of Health, 2004). In terms of the evidence for this, the National Social Marketing Centre, an initiative set up following the recommendations made in Choosing Health, carries a series of ‘show cases’ of 59 social marketing campaigns on their website. Of the 59, 43 are examples from the UK and of these only two were initiated prior to 2004 with the rest beginning between 2005 and 2010 (National Social Marketing Centre, 2014). In the late 2000s, social marketing was a new and popularised approach to health promotion and little was known about its impact.

While this is the primary reason for the use of social marketing to develop Kitten’s First Tooth, there were some definite benefits to the approach, the marketing mix criterion, for example influenced the format of Kitten’s First Tooth in that it was made available as both a narrated animation and a storybook. The idea behind this is that it increases potential for ‘audience reach’ and therefore the chances that
individuals will use the intervention. The qualitative study in Chapter 2 came about because the social marketing approach recommended that this type of research be carried out in order to develop an intervention. This study provided valuable insight into parents’ oral health behaviours for their children. However, the MRC framework also recommends that formative research be carried out when developing an intervention (Michie, 2008), meaning the value of the social marketing approach can therefore be questioned.

There has been increasing criticism about the use of social marketing more generally around the ethics of its use and how plausible the link between commercial marketing and ‘selling’ a health outcome really is (Hill, 2004). In actuality, oral health behaviours are the culmination of a complex set of psychosocial and environmental factors (Fisher-Owens et al., 2007; Newton & Bower, 2005). This was to some extent demonstrated in the qualitative exploratory study reported on in Chapter 2 which found that the relationship between the parent and child, parents’ past experiences and attitudes may affect how they look after their child’s oral health. It is difficult to imagine that all these things could be addressed by a social marketing campaign based solely on the principal of ‘exchange’.

Therefore, in this thesis, constructs from relevant theories (social cognitive theory, HAPA) and the concept of modelling from social learning theory were used to develop the intervention and BCTs were embedded into the story itself. In terms of targeting behavioural mechanisms, social marketing did not add to the active components. Reflecting on this and in terms of recommendations for the development of future media campaigns, the social marketing framework provides
little more than would be obtained from current guidance around intervention development and relevant behavioural theory.

*Health promotion and communication*

Health promotion in general has been criticised for increasing the health inequalities gap (Michie, Jochelson, et al., 2009). In terms of child health, this may be because health promotion is not always able to offer enough support to parents and children who are living in challenging circumstances. There is evidence from recent national clinical surveys of child oral health status that child dental decay is declining however, there appears to be a pattern of polarisation. Prevalence of disease is decreasing but severity is increasing.

A more complete understanding of how family processes affect child oral health could aid the design of interventions to support families whose children may be at risk of tooth decay. These children may be identified as at risk if they already have tooth decay or if they have older siblings who do (although screening such as this is not entirely reliable).

There remain many questions still to be answered relating to child oral health promotion. For example, what are the specific BCTs which are most effective for improving child oral health? And what number and combination of BCTs is optimum? However, although these are important questions for child oral health promotion, answering them was not an aim of this programme of work, nor would it have been possible considering the methods that have been used here. Further work to shed
light on these sorts of questions is required, both in terms of empirical work, since so few studies have used BCTs to deliver oral health promotion interventions (Cooper et al., 2013), and also in terms of high quality evidence synthesis.

**Implications for research**

*Theoretical aspects*

The intervention developed as part of this programme of work used theoretical constructs from the HAPA and social cognitive theory. These theories attempt to describe the general relationship between an individual and their health behaviour. However, with regard to the population of study in this thesis, namely young children, it is not the relationship between the individual and the behaviour that needs to be understood and explained, rather it is that of the primary care-giver. This is simply due to the fact that it is often not the child itself who is responsible for enacting or maintaining the behaviour. Though that is not to say the child does not have a part to play, for example in their compliance around visiting the dentist, having their teeth brushed or eating healthy snacks.

In thinking about the health behaviour of young children, there is a theoretical gap that cannot be explained by existing theories of health behaviour alone. This gap is the process through which the child’s primary care giver or parent enacts health behaviours on their behalf. In addition to this, the interaction between the parent and child around the health behaviour may also be significant. The qualitative study reported on in Chapter 2 indicated that the motivation that drives the health seeking behaviour (dental attendance) of a parent for their child is their feelings of care.
Bowlby’s theory of Attachment (Bowlby, 1970) may go some way to explaining this motivation. According to this theory, a parent who is normally attached to their child feels the urge to protect them (Salter Ainsworth, 1991). This motivation may then direct the behaviours which are subsequently carried out for the child (Feeney, 2000). The parent’s interpretation of how to best protect their child may be explained to some extent by their attitudes and beliefs, both for the behaviour itself, for example as outcome expectancy and for the health benefit, for example as risk perception. This was discussed in the findings of Chapter 2.

It is acknowledged that the idea that a parent cares for their child and that this sense of care may direct their behaviour regarding their child is a rather simple and a rather obvious one. Perhaps it is this simplicity that explains its absence in much of the literature; the notion is obvious and does not need to be stated. However, a trial in which Freeman and Oliver (2009) tested a school policy aimed at improving child oral health by restricting sugar snacking, this study has already been discussed in Chapter 1 and so detail is spared here. The intervention failed in its principal aim to improve child oral health status. It was apparent that the children in the intervention schools were consuming more sugar snacks and drinks outside of the school environment. Qualitative data collected from parents exploring attitudes found that parents were motivated to do their best for their child, Freeman and Oliver state,

_The underlying attitude which pervaded the parents’ view of sugar snacking was the wish to 'do best' for their children. For some parents this required a strict form of regulation of between meal snacks whereas for others the buying of sweets, chocolate and biscuits was an expression of affection and a means of ensuring the children 'ate at least something' (2009, p624)_

All parents were essentially driven by the same motivation but the direction this took in terms of their behaviour was dependant on other factors. These factors may
relate to other attitudes and beliefs but also to PSE and parenting style. A similar observation was made in the qualitative data that was collected from parents in the study reported on in Chapter 6. Parents talked about their need to ensure their child ate breakfast in the morning, for this reason it was justifiable for them to let the child eat sugary breakfast cereal. This was better than letting them go to school with an empty stomach. These parents recognised that this was not an ideal breakfast but better than no breakfast. Similarly parents in these focus groups talked of how difficult they found it to deny their child sugary food and drinks when out shopping together. Particularly if the child attempted to persuade their parent by talking about other children they knew whose parents bought sweet treats for them.

Thinking about how this relates to health behaviour change interventions for children, if ‘doing best’ is a consequence of secure child-parent attachment, then how might the relationship vary if the attachment style does? Mary Ainsworth’s experiments in the early 1970s found that the majority of child and parent dyads were securely attached (Ainsworth & Bell, 1970) but not all. Parent motivations affecting childcare may be different in these cases.

Health behaviours around tooth brushing and healthy eating tend to happen predominantly in the home. In a review of the evidence for each theory, (Rothbaum, Rosen, Ujiie, & Uchida, 2002) identify similarities between Attachment theory and family systems theory. Both theories refer to processes between family members and categorisations are made of these processes. Rothbaum et al. note that these categories are comparable, for example secure attachment may be likened to “adaptive family systems, ambivalent to enmeshed and avoidant to disentangled” (p.
While there are some similarities, it is important to note the differences. Attachment theory refers to the processes between the child and parent whereas family systems theory looks at the processes of the whole family and structure in which these processes occur.

In both family systems thinking and attachment theory, the quality of the relationship between the parents is understood to be the “major determinant of the caregiving provided to the child” (Rothbaum et al., 2002, p. 330). Therefore, when considering health behaviours for the child, it is possible that these may be very much dependant on the structure and healthy functioning of the family and the quality of the parents’ relationship in particular.

A survey carried out in Brazil used random sampling to identify 164 thirteen year old children (Marcenes & Sheiham, 1996). Clinical dental health exams and interviews were carried out with the family members. The study concluded strong evidence could be found to link marital quality and child oral health. The association was judged to be strong because it remained significant even after known oral health risk behaviours were statistically adjusted for. Furthermore it remained significant after SES was adjusted for, showing the relationship to be an independent one.

However, Rothbaum et al. (2002) have emphasised the cultural relevance of aspects of family systems theory and attachment theory. In their review they argue that these theories have been developed with reference to Western societies and therefore cross-cultural applicability may be limited. Caution must be taken in applying Mercenes and Sheiham’s (1996) findings are to European populations.
Looking more broadly to other domains of family functioning, in a systematic review, Castilho and colleagues identified 13 studies which looked at the parental factors related to child oral health (Castilho & Mialhe, 2013). While this review claims to investigate the influence of the family environment on child oral health, the evidence from the included studies relates predominantly to the parental behaviours and the influence of these.

However, the authors still make claim to the influence of all members of the family and the family environment on the oral health outcomes of the child. Additionally, this review while described as systematic review only used one electronic database to identify relevant records and although the search strategy is not replicable from how it has been reported in the paper, it is surprising that only 218 records were identified at all. It is unlikely this could be a search that reliably identified all known possible records. Potentially, a more comprehensive search would reveal a greater number of records.

While this review (Castilho & Mialhe, 2013) emphasises the role of family environment on child oral health, it does not present any convincing findings to evidence this claim. It is possible that this is because the role of the family environment rather than only parents’ behaviours is an emerging concept.

A recent study conducted in the Netherlands which compared dimensions of family functioning to child dental records found an interesting relationship (Duijster, Verrips, & van Loveren, 2013). The study took a random sample of 630, five to six year old children from dental clinics across the country. Dental records were obtained through clinics and participating parents completed a validated
questionnaire pertaining to the quality of family relationships. This measure collected information around five dimensions of family functioning: responsiveness, communication, organisation, partner-relation and social network. Findings showed that most of the participating families (71-80%) were judged to have normal family functioning. Tests of association showed that children from these ‘normally functioning’ families had less dental disease. A correlation was found between four of the dimensions of family functioning and child oral health status.

However, significantly, no relationship was found between levels of child dental disease and the quality of the relationship between partners. This is interesting as Rothbaum (2002) put forward that the quality of the relationship between the child’s parents (or equivalent) was the “major determinant” in terms of the care of the child. Additionally, empirical evidence of an independent relationship between marital quality and child oral health status was found by Mercenes and Sheiham (1996).

However, in Duijster’s study, a lower number of participants were entered into the analysis of this relationship because 15% of the participants were from single parent families hence items relating to the partner relationship were not applicable. This meant that the number of parents who completed items for the dimension of ‘partner-relation’ was n=526, 68 less than the number which the power calculation for the study indicated would be necessary to detect a relationship. Potentially, no relationship was found here because the analysis was underpowered.

Duijster and colleagues also applied the OHBQ (Adair et al., 2004) and found a significant relationship between each of the dimensions of family functioning and
oral health behaviours. This would indicate the possibility of a link between all of the measured dimensions of family functioning and child oral health behaviours.

Therefore it is difficult to be definitive as to whether the quality of partner or martial relationships is a significant factor for child oral health. The strong association found by Marcenes and Sheiham (1996) in the 1990s may be culturally or temporally specific explaining why a strong relationship was not found by (Duijster and colleagues (2013). However, different measures of the concept were used in each study, and in different ways. That is to say, Marcences and Sheiham administered validated instruments during interviews with family members whereas Duijster et al. (2013) administered validated instruments in the post to be self-completed by the participants. Furthermore, regarding this particular domain, Duijster et al.’s study is potentially underpowered to detect a relationship.

More research in this area is required to understand family process and their impact upon child oral health. In particular work focusing on the oral health status of children of different ages including three to five year olds is required. Additionally, Duijster et al.’s survey found that the majority of participating families had normal levels of family functioning (up to 80%), therefore a fruitful research direction may be around the sensitivity of family functioning measures. Family functioning measures have been predominantly developed for clinical populations and their sensitivity to the processes of the majority of families is therefore poor. It is however possible that those subtleties in family structure and processes may relate to child oral health behaviours and subsequently health.
A systematic review of family functioning measures and their applicability to child oral health research identified 29 potential measures (Duijster, O’Malley, et al., 2013). Ten of these were of general functioning, four were of dyadic relationships between child and parent and 15 were of specific domains of family functioning. There are not enough (or in many cases, any) examples of these measures being used in child oral health research to be able to suggest which, if indeed any, are suitable for use in this area.

As Duijster and colleagues (2013b) state, there is evidence from other areas of child health research that suggest a relationship between family processes and health status. A systematic review carried out by Halliday and colleagues (Halliday, Palma, Mellor, Green, & Renzaho, 2013) identified 17 studies around overweight or obese children and domains of family functioning. Of these 17 cross sectional and longitudinal studies, 12 reported a significant association between child weight and family functioning. Significantly, domains identified in this relationship were poor communication, poor behavioural control, high levels family conflict and low family hierarchy values. A recent cross sectional study of 90 families similarly found a strong association between family functioning and child overweight and obesity (Mazzeschi et al., 2013).

Theoretically, a relationship between child health and family functioning can be proposed. Particularly because overweight and obesity in children, like tooth decay is the result of a set of health behaviours for which the parent is primarily responsible. The significance of parent confidence (PSE) for carrying out tooth brushing and restricting sugar snacking in children has previously been
demonstrated (Adair et al., 2004; de Silva-Sanigorski et al., 2013). Homes characterised by family dysfunction may be chaotic and disorganised, parents may not feel that they have the time to check their child has brushed their teeth or may feel compelled to treat their child to sugary snacks out of guilt or to appease the child. PSE may have a key role to play.

PSE for tooth brushing and sugar snacking behaviours, as stated above, has been demonstrated to be a significant predictor of whether oral health behaviours are actually carried out (Adair et al., 2004; A. B. Cinar et al., 2009; de Silva-Sanigorski et al., 2013; Finlayson et al., 2007). This construct may also relate to family processes and functioning. PSE is thought to be affected by ecological factors including SES (Bandura et al., 2001; Eccles & Harold, 1993, 1996; Elder et al., 1995; Shumow & Lomax, 2002). As a construct it has been considered to be a mediator linking parenting ability and ecological factors, it may also be involved in a feedback loop pattern whereby high PSE leads to better child outcomes which improves PSE and vice versa (Jones & Prinz, 2005).

In a review of the potential roles of PSE, Jones and Prinz (2005), cite some evidence that, in clinical populations, PSE has been found to relate to parenting discipline style. Other evidence cited by Jones and Prinz indicates that PSE may mediate the effects of emotional distress and social support. Jones and Prinz also cite works which found links between PSE and coping ability and parenting stress. PSE may therefore act as a mediating variable between family functioning and the cognitive aspects of health behaviour.
Qualitative evidence collected in the studies reported in this thesis highlight that parent-child attachment and parenting style may be important factors in understanding parents’ oral health behaviours which they carry out for their children. Further research into the relationship between family functioning and child oral health is required. Currently, in seeking explanation of this relationship, theory is perhaps more useful than the limited available evidence.

**Implications for policy**

The evaluation presented in this thesis indicates that children’s stories have the potential to deliver oral health promotion. Should further research continue to demonstrate positive findings and particularly if a meaningful impact is shown, theorized stories could deliver health promotion in and through schools. Storybooks embedded in the national curriculum would have the potential to reach children and families on a national scale. If successful, this could be a highly cost effective way to deliver oral health promotion to the widest range of families. Clearly, much more research is needed to better understand the potential implications for national child oral health promotion policy.
7.5. Conclusion

The work conducted within this thesis has led to the production of a novel oral health promotion intervention, the evaluation of which indicates it has potential.

This programme of work has added to the understanding of parents’ health behaviours for their children, it has also demonstrated the potential for health messages and BCTs to be communicated via children’s stories. Furthermore there appears to be potential for this type of intervention for effecting parents’ attitudes and intention to enact oral health behaviours for their child. This work has also demonstrated that story-based interventions can be acceptable in culturally diverse populations. Further research is required to better understand the processes and the impact of change.
8. References


Johnston, M., Richardson, M., Abraham, C., Francis, J., Hardeman, W., Eccles, M., ... Michie, S. (2013). Reliability of coding of published behaviour change interventions: How can we decide if a technique is effective if we cannot agree what it is? *Psychology and Health, 28*(51), 51.


Nair, M., Renjit, M., Siju, K., Leena, M., George, B., & Kumar, G. (2009). Effectiveness of a community oral health awareness program. *Indian Pediatrics, 46*(Suppl. 1), S86–S90.


NICE. (2007). *NICE Public Health Guidance 6: behaviour change at population, community and individual levels*.


Appendices
Appendix 2.1 Participant information sheet

Dental Health Campaign Study  Participant Information Sheet

We would like you to take part in this study to help design a dental health campaign to improve the dental health of children living in Salford.

We want to make sure that the campaign delivers the information that you need about your dental services and we would like to ask what you want this campaign to look like.

You have been selected to take part in this research because you are a parent of a primary school aged child.

It is up to you to decide whether or not to take part, your participation is completely voluntary and you can change your mind at any time. If you decide to withdraw your participation you do not have to give a reason why.

If you decide to take part in this study we will ask you to participate in a focus group held at your child’s school. This would involve an informal discussion with other parents from the same school about child dental health issues. The discussion will include difficulties finding an NHS dentist and the best ways for NHS Salford to tell parents about the dental services available to children in the area.

This discussion will be tape recorded so the researcher will be able to remember your comments more easily. The confidentiality of the information you give is guaranteed, no one outside the research team will see or hear these recordings.

Everything you say will be made anonymous in the report and no one will be able to trace your comments back to you. We do not need to know your address or any other details about you and these will not be collected.

If you have any further questions you can contact the researcher (Lucy) directly on 01612953103.

If you would prefer to talk to a member of the research team on a one to one basis please write this on the consent form and a telephone or face to face conversation can be arranged.
Appendix 2.2 Consent form

Dental Health Campaign Study

Consent form

1. I have read and understood the information about this research

2. I understand that my taking part in the research is completely voluntary

3. I understand that I can withdraw my participation at any time without giving a reason

4. I agree to take part in the research by attending a focus group at my child’s school

Please fill in this form and sign and date below and return it to your child’s teacher.

Name: ..............................................................................................................

Signature: ...........................................................................................................

Date: ...................................................................................................................

Please tick this box if you are under the age of 16 ☐

(If you are under the age of 16 we will need additional consent for your participation)
Appendix 2.3 Focus group interview schedule

**Barriers and facilitators focused questions:**

What are your experiences of taking your child to the dentist?

How did you find your dentist?

What are your impressions of dental services nationally?

And locally?

Are you pleased with the services available?

For what reasons do you take your child to the dentist?

For what reasons do you not or would you not take your child to the dentist?

What was the reason for your child’s most recent visit to the dentist?

How important is child dental health to children/ to you as their parents?

How important are baby teeth to children/ to you as parents?

**Campaign focused questions:**

What would you find most helpful if you were looking for dental information?

If you were looking for a dentist or dental health information, what would you find helpful?

Leaflet through door

Leaflet brought home from school by child

Drop-in information session at a local school/ clinic/ social centre

Notice boards at local community centre

Phone number

Internet website

Family/ friends advice

Advice from health practitioners (e.g. health visitors)

Which of these have you used and what did you think?

Where is the best place for you to find health information?

Who do you trust to provide health information?

What would you like a dental health campaign to look like?

What would you like a dental health campaign to achieve for a.) You and your family? And b.) Your community?
Appendix 2.4 Excerpt from a focus group transcript

LO: ok, so if you didn’t have a dentist yourself, if you didn’t have a family dentist and your child needed a dental appointment, where would you look?

SC: possibly try and contact the NHS and I would look to them to give the addresses and the details in our area of the dentist that they would recommend

LO: and how would you contact the NHS?

SC: eh to get the number, I would probably go on the internet and try and find it that way, you know, what’s available and perhaps a notice in the local newspaper, there are a few dentists that have started advertising in there now and it’s quite big adverts that they’re putting out you know?

LM: yeah but there isn’t a standard list is there there Salford do of dentists is there?

I think it’s a matter of, I mean, I know a lot of parents here go to the one that they see walking home

That’s my one

AI: that’s where I go now

LM: Yeah that’s what you said wasn’t it?

Yeah

AI: Yeah we saw that but before that, that was a few years ago now, I couldn’t get Anna into a dentist, that was about 3 or 4 years ago in Salford at all, that’s why I booked her in straight away when I saw a new dentist opening up, I don’t know why that was an issue

LO: would it be helpful to have that sort of information in certain places perhaps?

AI: yes

LO: where would you look to find this sort of information?

SC: schools making maybe, mini packages available to parents for children coming to nursery and reception, GP surgeries, libraries as well, you know some families that use it, they would pick up leaflets, but probably schools are best, would probably be the best point of contact than a GP surgery
Appendix 3.1 Screen shot of survey to collect BCTs from children’s storybooks

### Children's Storybook

**BCT survey Book 1**

1. Is BCT1 present in this storybook?
   - Provide general information on behaviour-health link - is defined as information about the relationship between the behaviour and health – including susceptibility or factual risk and/or mortality information OR, health education material relevant to the behaviour. NB Check that any instance does not also involve techniques 2 or 3.
   - Yes
   - No

2. Please give details of BCT1 (pg. location/quote)

3. Is BCT2 present in this book?
   - Provide information on consequences - is defined as involves providing information focusing on what will happen if the person performs the behaviour including the benefits and costs of action or inaction. NB check that any instance does not also involve techniques 1 or 3.
   - Yes
   - No

4. Please give details of BCT2 (pg. location/quote)
Appendix 4.1 List of members of the consultation group:

Pauline Adair – Health Psychologist
Ben Atkins – Local GDP
Lindsey Bowes – Oral Health Commissioner, NHS Salford
Cynthia Pine – Consultant in Dental Public Health, NHS Salford
Ravi Singh – Local GDP
Lucy Szimkoviak – Community Dentist
Simon Taylor – Local GDP
David Young – Local GDP
Appendix 4.2 Kitten’s First Tooth annotated narration script

Kitten’s first tooth

This is Cat and Kitten’s house

(Sound effects)

Cat and Kitten are invited to a tea part and it’s TODAY! They must hurry up and be on their way

Cat is ready, Kitten is ready. Away they go!

Cat and Kitten like to sing a little song as they walk

(No actual singing – just speech bubbles and sound effects, music)

Singing continues...

Oh, Kitten has found something...something in his mouth. What can it be?

Kitten is pointing to his mouth; Cat doesn’t know what it is either!

Kitten opens wide for Cat to see a little tooth is saying hello!

(Sound effects as tooth appears)

Oh, a new tooth says Cat, hello tooth!

Kitten is happy he has a new tooth.

Cat says more will grow soon but cannot remember how many?

There are some people who know even more about teeth than Cat, Cat wonders if she knows someone who kitten could show his new tooth to

Cat says there are lots of things we need our teeth for. Teeth are helpful to chew healthy foods. They also help us have a bright smile when we keep them clean with our toothbrush and toothpaste.

Squirrel is standing beside a tree nearby and has been listening to Cat and Kitten talking about kitten’s new tooth,

Squirrel thinks he can help,

Squirrel says, hello Cat and Kitten.

Cat is very happy squirrel has come along, can he help?

Squirrel is very excited. He wants to help and knows someone who is very good with new teeth

Look, Squirrel points to a sign to help Cat and Kitten
The sign says, NHS family dentist
Ah! Someone who can check Kitten’s mouth!

Squirrel knows the way so Cat and Kitten follow him into the forest to meet Owl the dentist

In a small clearing in the forest, Owl is sitting on a log, mouse is sitting on owl’s head

Mouse has a bright shining light. The light will help Owl to see in kitten’s mouth

Owl thanks squirrel for being so helpful

Cat tells Owl about Kitten’s new tooth. Owl knows a lot about teeth. Owl asks Cat and Kitten if they would like her to take a look inside Kitten’s mouth.

Mouse shines the shiny bright light in Kitten’s mouth and Owl uses her mirror to look inside

Owl can see Kitten’s brand new tooth, she looks at it carefully with her mirror

Oh look, there’s kitten’s new tooth!

The new tooth is happy, Mouse and Owl have looked after Kitten very well

Kitten has lots of space for more new teeth to grow

Owl tells Cat and kitten to keep kitten’s mouth clean so that the new teeth can grow to be as healthy as his first one. Cat should help kitten to brush his teeth every morning and every night and not eat sweet things at night time. Owl is pleased with Cat and Kitten and tells them to come back and see her soon

Cat is very happy that Owl and Mouse were so nice to Kitten. Cat tells Kitten she will bring him back to see Owl and Mouse soon

Cat shows Kitten her teeth and lets kitten count them, 1, 2, 3, 4, 5, 6, and more! Lots of teeth! Kitten will have lots of teeth soon too! Just like Cat.

Cat and Kitten thank Owl and Mouse. They must go—they have a tea party to go to!

Music
Later that day...

Deep in the forest is a big clearing surrounded by leafy green trees, look it’s the tea party!

All the animals are enjoying the woodland nuts and tea at the party. Kitten is very proud of his new tooth and shows everyone. And cat tells everyone that kitten will soon grow more healthy teeth because she will help kitten to keep his mouth clean and take him to visit Owl again.

Owl is sitting next to kitten and tells him how good he was today when he visited her in
the dental surgery today. Kitten says he will brush his teeth tonight. Owl reminds him to brush them in the morning too and tells him to come back and visit him in the clearing again soon.

Owl is very pleased with kitten.

Cat and kitten are home from the tea party. Cat helps kitten to brush his teeth before bedtime, he must keep the new tooth clean!

(Brushing sound effects)

Cat and Kitten are very tired now and ready for bed, Goodnight Cat and Kitten!

End
Appendix 4.3 Original storyboard for Kitten’s First Tooth

OPENING SHOT, MUSIC PLAYING...

CUT TO LONG SHOT OF CAT BRUSHING HAIR IN MIRROR, SLOW ZOOM TOWARDS FRIDGE...

CONTINUES TO ZOOM, OVER SHOULDER OF THE CAT, FOCUSING IN ON NOTE ON THE FRIDGE.

CUT TO CLOSE UP OF NOTE, HOLD FOR 6 SECONDS, SLOW FADE TO...

FRONT SHOT OF CATS WALKING TOGETHER, HAPPY AS BACKGROUND MOVES AWAY FROM HOUSE.

CUT TO LONG SHOT, SIDE VIEW OF CATS ON PATH, WALKING AND SINGING... SPEECH BUBBLE WITH NOTES COMING OUT.

CUT TO MEDIUM SHOT OF CATS WALKING AND SINGING, CAMERA PANS WITH THEM...

RAIN CLOUD APPEARS ABOVE KITTEN AND BOLTS OF LIGHTENING STRIKE HIS HEAD, HE LOOKS IN PAIN...

CUT TO FRONT SHOT OF KITTEN RUBBING HEAD, CAT LOOKING CONFUSED, KITTEN SLUMPS DOWN...

SCENE FADES AROUND KITTEN AND A SPOTLIGHT SHINES ON HIM AS HE RUBS HIS HEAD FOR HEADACHE...

MORE SYMBOLS APPEAR NEXT TO HIM, A RINGING BELL NEXT TO HIS EAR AS HE HAS EARache...

THEN FINALLY A DRILL NEXT TO HIS MOUTH AS HE RUBS HIS CHEEK AND OPENS HIS MOUTH WITH A THROBBING TOOTH.
Storyboard 1 continued

CUT TO EXTREME CLOSE UP OF KITTENS OPEN MOUTH WITH THRASLING TOOTH

CUT TO MID SHOT OF KITTEN POINTING TO HIS TOOTH AND CAT LOOKING PUZZLED AND CONFUSED...

CAMERA CUTS TO ABOVE THE CATS ON A BRANCH, CATS STILL CHATTING...

A SQUIRREL APPEARS EXTREME CLOSE UP AND PEERS OVER EDGE OF BRANCH AT THE CATS

CUT TO CLOSE UP OF SQUIRREL THINKING WITH A BUBBLE AND EXCLAMATION MARK AS HE REALIZES SOMETHING...

MID-LONG SHOT FROM SIDE OF CAT LOOKING UPSET AS SQUIRREL RUNS DOWN TREE AND OFF SHOT RIGHT.

CUT TO FRONT SHOT OF CATS STILL STATIONARY AS A SHADOW GOES OVER THEM QUICKLY...

CATS BOTH LOOK ALARMED AS SOMETHING ABOVE PASSES OVER...

CUT TO SHOT OF OWL, LANING INTO SHOT FROM ABOVE - CLOSE UP WITH SQUIRREL LOOKING PLEASED AND EXCITED CAMERA RIGHT.

CUT TO EXTREME CLOSE UP OF OWL FACE WITH FIELDS MOUSE ON TOP, WHO TURNS ON A LIGHT HE IS HOLDING.

CUT TO OVER THE SHOULDER SHOT AS OWL APPROACHES THE KITTEN WHO IS STILL HOLDING HIS MOUTH IN PAIN.

CUT TO SILHOUETTE SIDE SHOT AS OWL CLOSES IN ON KITTEN WITH OPEN MOUTH, LIGHT SHINES ON BAD TOOTH.
Storyboard 1 continued

CUT TO PERSPECTIVE SHOT AS OWL POINTS TO BAD TOOTH CLOSE TO CAMERA.

CUT TO CLOSE UP OF OWL’S WING OPENING OUT AND HOLDING A SMALL NUT WHICH IS GLOWING...

CUT TO MIDSLOT AS MOUSE RUNS DOWN OWL’S WING AND PICKS UP THE NUT, HOLDING IT CLOSE TO THE KITTEN’S MOUTH. SLOW ZOOM.

CUT TO EXTREME CLOSE UP OF MOUSE RUBBING SOME LOTION ONTO THE KITTEN’S TOOTH. MOUSE THEN RUNS OFF CAMERA LEFT.

CUT BACK TO MEDIUM SHOT OF KITTEN SMILING AND RUBBING HIS MOUTH, AND OWL SMILING BACK.

FADE INTO AN ENVIRONMENT SCENE WITH TREES AND LEAVES ACROSS SHOT. CAMERA SLOWLY ZOOMS THROUGH TREES ETC. ANIMALS ARE IN DISTANCE IN A CLEARING.

CAMERA ZOOM IN ON SCENE OF ALL HAPPY WOODLAND ANIMALS HAVING A TEA PARTY.

CUT TO CLOSE UP OF OWL, WHO IS GIVING A SPEECH ON DENTAL CARE...

SLOW ZOOM AS OWL PUTS HIS ARM AROUND KITTEN AND THEY BOTH SMILE AT THE CAMERA.

FADE TO WHITE.
Appendix 4.4 Second version of the storyboard for Kitten’s First Tooth

1. **Opening Shot, Music Playing.**
2. **Cut to Long Shot of Cat Brushing Hair in Mirror, Slow Zoom Towards Fridge.**
3. **Continues to Zoom, Over Shoulder of the Cat, Focusing in On Note on the Fridge.**
4. **Cut to Close Up of Note, Hold for 6 Seconds, Slow Fade To...**
5. **Front Shot of Cats Walking Together, Happy as Background Moves Away From House.**
6. **Cut to Long Shot Side View of Cats on Path, Walking and Singing, Speech Bubble with Notes Coming Out.**
7. **Cut to Mid Shot of Cats Walking and Singing, Camera Pans with Them.**
8. **Kitten Stops Walking and is Shocked by Something, Cat Doesn’t Realise and Walks Into Him.**
9. **Cut to Front Shot as Kitten Tries to Point Out Something in His Mouth. Cat is Confused.**
10. **Cut to Extreme Close Up of Kittens Mouth as There is a Small Tooth Emerging on the Bottom Left.**
11. **Cut to In The Mouth Shot of a ToothEmerging Up from His Gums.**
12. **Cut Back to Extreme Close Up Shot of Kitten Smiling with His New Tooth in Place.**
Storyboard 2 continued

CUT TO MID SHOT OF KITTEN Pointing TO HIS TOOTH AND CAT LOOKING PUZZLED AND CONFUSED...

CAMERA CUTS TO ABOVE THE CATS ON A BRANCH, CATS STILL CHATTING...

A SQUIRREL APPEARS EXTREME CLOSE UP AND PEERS OVER EDGE OF BRANCH AT THE CATS

CUT TO CLOSE UP OF SQUIRREL THINKING WITH A BUBBLE AND EXCLAMATION MARK AS HE REALISES SOMETHING...

CUT BACK TO MID SHOT OF CATS CHATTING, CAT IS EXPLAINING A LITTLE ABOUT TEETH AND SQUIRREL ENTERS FROM CAMERA RIGHT.

CUT TO OVER SHOULDER SHOT OF SQUIRREL WHO IS JUMPING UP AND DOWN EXCITED...

SAME SHOT AS SQUIRREL PRODUCES A SIGN READING ‘NHS FAMILY DENTIST’.

CUT BACK TO MID SHOT AS SQUIRREL IS BUCKING THEM TO FOLLOW HIM, ALL CHARACTERS WALK OFF SHOT RIGHT.

CUT TO IN THE FOREST PERSPECTIVE SHOT AS OWL IS SAT ON A LOG, CHARACTERS ENTER FROM BOTTOM RIGHT OF SHOT.

CUT TO CAMERA PANNING DOWN ESTABLISHING SHOT OF OWL WITH MOUSE HOLDING A LIGHT ON HIS HEAD.

CUT TO MID SHOT AS OWL THANKS SQUIRREL WHO WALKS OFF-SHOT RIGHT.

CUT TO OVER THE SHOULDER SHOT OF OWL AS HE APPROACHES CAT AND KITTEN.
Storyboard 2 continued

Cut to silhouette shot from side view showing owl approaching kitten with light shining onto his open mouth.

Cut to perspective shot as owl points to new tooth close to camera with his mirror and inspects it.

Cut to extreme close up of tooth inside mouth...

...tooth begins to smile.

Cut to mid-shot of all inside the mouth with a new smiling tooth and space where other teeth can emerge.

Cut back to mid-shot of kitten smiling and rubbing his mouth and owl smiling, gives him the thumbs up.

Camera pans to cat who explains a little bit about teeth to kitten who looks on intrigued.

Camera slow zooms towards cat who shows all of his healthy teeth to kitten.

Cut back to perspective shot as owl waves goodbye to cat and kitten who exit shot bottom right.

Later that day...

Shot fades in and out

Fade into an environment scene with trees and leaves across shot, camera slowly zooms through trees etc. Animals are in distance in a clearing.

Camera zoom settles on scene of all happy woodland animals having a tea party.
CUT TO CLOSE UP OF OWL WHO IS GIVING A SPEECH ON DENTAL CARE...

SLOW ZOOM AS OWL PUTS HIS ARM AROUND KITTEN AND THEY BOTH SMILE AT THE CAMERA. SHOT FADES OUT.

FADES INTO BOTH CAT AND KITTEN AT HOME. SLOW ZOOM OUT CLOSE UP OF MIRROR WITH THEM REFLECTED IN IT. CAT IS BEHIND KITTEN BRUSHING HIS TEETH.

CUT TO CAT AND KITTEN IN FRONT OF SINK. CAMERA IS ON VERY SLOW ZOOM TOWARDS WINDOW WITH MOON IN IT.

CAMERA SETTLES ON THE VIEW FROM WINDOW AS STARS TWINKLE...

FADE TO BLACK
Appendix 5.1 participant information sheet

Salford Bright Smiles Campaign study
Information Sheet

You are invited to take part in a study to help us evaluate a campaign to help families find local dental services for their children.

You have been selected to take part because you are a parent of a 3-5 year old child.

We have already spoken to parents here in Salford and we know that finding a dentist can be a difficult task for many families. We want to help families to find a dentist they are happy with for their children so that more children can have happy healthy bright smiles here in Salford.

It is up to you to decide whether or not to take part, your participation is completely voluntary and you may withdraw from the study at any time without giving a reason. If you decide to take part in this study please sign the consent form provided and fill in the questionnaire.

If you take part we will send you a questionnaire to fill in and return to us, then in September we will send you a pack which will include some information and fun materials for you and your family. The materials will be engaging for your children and we hope that they will be enjoyable for the whole family. After 3 months we will send you another questionnaire so that you can tell us what you thought of the pack. Your feedback is very important as it will help us to decide whether to provide this pack to other families in Salford.

You do not need to provide your name or address or any other details on the questionnaire and we will separate your consent forms and questionnaires when we receive them so that it will not be possible to trace your responses back to you. The confidentiality of your information is guaranteed.

If you have any questions, you can contact the researcher (name) directly on 0161... or (email address)
Appendix 5.2 Consent form

Dental Health Campaign Study

Consent form

1. I have read and understood the information about this research

2. I understand that my taking part in the research is completely voluntary

3. I understand that the information I provide will be kept confidential

4. I agree to take part in the research by completing the questionnaire enclosed and returning it to my child’s teacher

Please fill in this form and sign and date below and return it to your child’s teacher.

Name: …………………………………………………………………………………..

Signature: ………………………………………………………………………………….  

Date: …………………………………………………………………………………....

5. Please sign below if you are happy for us to check your child’s dental records with their dentist (You do not have to agree to this to participate in the study)

Signature: …………………………………………………………………………………..

Please tick this box if you are under the age of 16 ☐

(If you are under the age of 16 we will need additional consent for your participation)
Appendix 5.3 Oral Health Behaviours Questionnaire

Dental Health Campaign questionnaire to parents

Thank you for agreeing to take part in this dental study designed to give us an understanding of children’s dental health in Salford. The study involves parents and children from different areas in Salford. We are trying to understand the wide range of dental beliefs and behaviours that families have and develop about their children’s teeth. In this questionnaire there are no right or wrong answers – we are just trying to understand what is usual for your family. All information given in this questionnaire will be treated confidentially.

If you have younger children and are currently taking part in a Salford Bright Smiles study please contact Lucy on 0161 295 3103 or email l.a.omalley@Salford.ac.uk before filling in this questionnaire.

Please answer these questions about your 3-5 year old child. We realise that some families will have more than one child aged around 3-5 years, but to help us with this study please think about one child when answering these questions.

Child’s name .................................................................

Child’s date of birth   _____dd / _____ mm / _____ yy  Child’s gender: male ☐
                       female ☐.
The following questions are about the child named on the previous page:

The first set of questions is about visiting the dentist, toothache, and general questions about your child’s baby teeth and dental health.

Before today, have you ever taken your child to a dentist?
Yes ☐, No ☐

If yes, did the dentist examine your child’s teeth?
Yes ☐, No ☐

Is your child registered at a dentist?
Yes ☐, No ☐

If yes, which dental practice is your child registered at? .................................................................

Has your child ever had toothache in the last year?
Yes ☐, No ☐

If yes, how often?
Once ☐, twice ☐, three times ☐, more ☐

4. If your child gets toothache would you:
give your child painkillers ☐, obtain antibiotics ☐
go to the dentist ☐, go to the doctor ☐
use a herbal remedy ☐, ask for the tooth to be taken out ☐
do nothing, it will get better on its own ☐, consult family ☐
go to chemist ☐, seek other medical care ☐

5. Have you ever had advice about what your child should or should not be eating or drinking to look after his/her teeth?
Yes ☐, No ☐
If yes, who has advised you? *(Please tick as many boxes as necessary)*

| Family | ☐ | friends | ☐ | dentist | ☐ |
| Doctor | ☐ | health visitor | ☐ | baby clinic | ☐ |
| other | ☐ | please specify | .................................................. |

The next set of questions examine feelings and attitudes towards tooth decay and tooth brushing. Please tick one box on each line.

<table>
<thead>
<tr>
<th></th>
<th>strongly disagree</th>
<th>disagree</th>
<th>neither agree or disagree</th>
<th>agree</th>
<th>strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. As a family, we are confident that we can reduce the chances of our child getting tooth decay</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>7. Tooth decay will not get better by itself</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8. Regular visits to the dentist would be effective in stopping our child having tooth decay</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>9. Tooth decay would have major consequences on our child’s general health</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>10. Tooth decay is a serious problem in baby teeth</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11. As parents, it is our responsibility to prevent our child getting tooth decay.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>12. Our child losing a baby tooth due to tooth decay would be upsetting</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>13. We feel it is important that we check our child’s teeth for decay</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
14. If our child does not want to brush his/her teeth every day we don't feel we should make them

15. It is important to clean my child’s teeth every day so my child has a nice smile

16. It is the responsibility of the dentist to prevent our child getting tooth decay

17. No matter what we do, our child is likely to get tooth decay

18. We can prevent tooth decay in our child by reducing sugary foods and drinks between meals

19. It is just bad luck if our child gets tooth decay

20. As a family we intend brushing our child’s teeth for him/her

21. We intend brushing our child’s teeth for him/her twice a day

22. The people in my family would feel it was important to help brush our child’s teeth twice a day

23. The people we know well would feel it was important to brush our child’s teeth twice a day

24. We feel able to brush our child’s teeth for him/her

25. I don’t know how to brush my child’s teeth properly

26. If we brush our child’s teeth twice a day, we can prevent our child getting tooth decay in the future
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>27.</td>
<td>If our child uses a fluoride toothpaste, it will prevent tooth decay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>A toothpaste without fluoride will prevent tooth decay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>We can prevent tooth decay in our child by helping with brushing once a day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>Our child not tooth brushing once a day would cause tooth decay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>If our child gets tooth decay, it is by chance.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>It would not make any difference to our child getting tooth decay, if we helped him/her brush every day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>We feel it is important to check if our child has brushed his/her teeth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>We don’t have time to help brush our child’s teeth twice a day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>We cannot make our child brush his/her teeth twice a day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>My child’s teeth are brushed as part of my child’s daily washing routine (washing hands and face)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>Buying toothbrushes and toothpaste for the whole family is expensive.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.</td>
<td>Tooth decay runs in families.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39.</td>
<td>Some people just naturally have soft teeth.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40.</td>
<td>As a family, we intend controlling how often our child has sugary foods or drinks between meals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>41. The people in my family would feel it was important to control how often our child has sugary foods and drinks between meals</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>42. As a family, we feel it is difficult for us to stop our child having sugary foods and drinks between meals</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>43. We feel able to give our child healthy alternatives to sugary foods between meals (e.g. like apples instead of sweets)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>44. We feel able to give our child healthy alternatives to sugary drinks between meals (e.g. like water instead of a fizzy drink)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>45. It is worthwhile to give our child sweets/biscuits to behave well.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>46. Our child eating sugary foods and drinks in between meals would cause tooth decay</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>47. The people we know well would feel it was important to control how often our child has sugary foods and drinks</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>48. In our family, it would be unfair not to give sweets to our child every day</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>49. It is often too stressful to say no to my child when they want sweets</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>50. When our child is tired, it can be a struggle to brush his/her teeth</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>51. Bringing our child to the dentist on a regular basis is the best way to prevent tooth decay</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52.</td>
<td>It is not worth it to battle with our child to brush his/her teeth twice a day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53.</td>
<td>It is just bad luck if our child gets tooth decay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54.</td>
<td>The dentist is the best person to prevent tooth decay in our child</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55.</td>
<td>I plan to take my child to the dentist in the next 6 months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56.</td>
<td>I have made an appointment to take my child to the dentist soon</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57.</td>
<td>I make sure there is enough time in the morning and in the evening to brush my child’s teeth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58.</td>
<td>I make sure that my child does not eat sweet things between meals or last thing at night</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>59.</td>
<td>I make sure that my child does not have sweetened drinks between meals or last thing at night</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60.</td>
<td>Compared to other children of my child’s age, my child is more likely to develop tooth decay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>61.</td>
<td>Most of the people that I know take their children to the dentist regularly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62.</td>
<td>Going to the dentist regularly would help keep my child’s mouth healthy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63.</td>
<td>My child is happy to attend dental appointments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64.</td>
<td>Attending regular dental appointments is good for me</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The following question relates to your experiences of visiting the dentist:

65. What is your usual reason for going to see a dentist?  (Please tick one box)

- Regularly for a check-up □
- Regularly for treatment □
- Only if I have problems with my teeth or gums □
- I do not visit a dentist □

These are the final questions. People have different care arrangements for their children. The following questions help us understand child care routines, and the section ends with a few routine questions on background information.

66. Who does your child live with?  (Tick as many boxes that apply)

- Mother □
- Father □
- Mother and father □
- Mother and stepfather □
- Father and stepmother □
- Grandparents □
- Other relatives □: please specify ...........................................
- Other □: please specify ...........................................

67. How many children are living in your house now? ...............

68. Is this your first child, second child etc? .................

69. Are you the child’s:  mother □, father □, other □, please specify ...........................................

70. What is your age? .........................

71. What is your marital status?  Married □, Single □, Divorced / separated? □, Widowed □
72. What is your occupation? ............................................................................................................

73. What is the postcode of your home address? .................................................................

74. At what level did the child’s mother finish her full-time education?

   - Primary school  □
   - Secondary school  □
   - Further education (college)  □
   - Higher education (university)  □
   - No formal education  □
   - Other  □ please specify ........................................................................................................

75. At what level did the child’s father finish his full-time education?

   - Primary school  □
   - Secondary school  □
   - Further education (college)  □
   - Higher education (university)  □
   - No formal education  □
   - Other  □ please specify ........................................................................................................

Please take a moment to ensure that you have answered all the questions.

Thank you very much for your help.
Appendix 6.1 participant information sheet

We would like to invite you to be part of this research project. You should only agree to take part if you want to; it is entirely up to you. If you choose not to take part, you will not be disadvantaged in any way and you will hear no more about this study.

Please read the following information carefully before you decide to take part. Please ask if anything is unclear or if you would like more information.

If you decide to take part, you will be asked to sign the attached form to say that you agree. You are still free to withdraw at any time without giving a reason.

What is this study about?

We want to help children have healthy teeth. There are different ways to do this. For some children, brushing their teeth every day is enough while some children need extra care from the dental team for the best results. We want to compare different ways to help children have healthy teeth in primary schools in your area. Before we do this, we would like to know what parents and teachers think about these different approaches so that we can make our project better. We would like you to be part of this first study so that you can help to shape the larger project to make it better for children, parents and teachers.

Why was I chosen to take part?

The larger project study will be for families with children aged five –seven years of age. We have asked primary schools in in Hackney, Tower Hamlets and Newham to take part in this first study and the head teacher at your child’s school has agreed. We are writing to all parents and families with children in your child’s class to ask if they would like to take part.

What will I have to do if I take part?

We will ask you to fill in a set of questions about your tooth brushing habits, your child’s snacks and drinks, and what you think about these and about going to the dentist. We will ask some questions about your family, bedtime routines, reading at home, and your views about your child taking part in a dental health study at school. We will ask most parents for their views by filling out a form but we will also ask some parents to come to school to talk to us so we can understand different family ideas on how we can make our project better. Someone in our research team will take notes, tape-record these group interviews and type-up what you and others have said so that we record your views properly. We will keep all your views and opinions from these forms and interviews confidential; no parents’ names will be linked to their views. As a thank you for taking part, all families will be given a £5 gift voucher per household.
Appendix 6.2 consent form

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Study: BBaRTS Children’s Healthy Teeth Programme

. • Thank you for considering taking part in this research. The person organising the research must explain the project to you before you agree to take part.

. • If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

. • I understand that if I decide at any other time during the research that I no longer wish to participate in this project, I can notify the researchers involved and be withdrawn from it immediately.

. • I consent to the processing of my personal information for the purposes of this research study. I understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.

Participant’s Statement:

I ________________________________ agree that the research project named above has been explained to me to my satisfaction and I agree to take part in the study. I have read both the notes written above and the Information Sheet about the project, and understand what the research study involves.

Signed: Date:
Appendix 6.3 Reading Habits Questionnaire (RHQ) Senechal et al (1998)

Frequency of storybook reading
How often do you, or other members of the family, read to your child in a typical week?

At bedtime:
never | once | 2 | 3 | 4 | 5 | 6 | 7 times | more. please estimate:
Other times:
never | once | 2 | 3 | 4 | 5 | 6 | 7 times | more. please estimate:

Frequency of reading requests
During a typical week, how often does your child ask to be read to? Choose a number from 1 to 5, where 1 means never and 5 means very often.

My child asks to be read to:
Never | Seldom | Sometimes | Often | Very often:

Frequency of child library visits
Please circle the number that best describes your child’s behavior. Choose a number from 1 to 5, where 1 means never and 5 means very often.

My child goes to the library:
Never | Seldom | Sometimes | Often | Very often:

Number of children’s books
Please estimate the number of children’s books that are available in the household.
none | 1-20 | 21-40 | 41-60 | 61-80 | more. please estimate:

Reading onset
How old was your child when you started reading picture books to him or her? (please estimate age)

Frequency of parent teaching
During a typical week, how often do you engage in the following activities. Choose a number from 1 to 5, where 1 means never and 5 means very often.

I teach my child:
• how to print words:
  Never | Seldom | Sometimes | Often | Very often:
  1 | 2 | 3 | 4 | 5
• how to read words:
  Never | Seldom | Sometimes | Often | Very often:
  1 | 2 | 3 | 4 | 5
Appendix 6.4 Focus group interview schedule

Reading at home questions:

Do you enjoy reading and how often do you read?

Does your child enjoy reading?

Do you think it is important for children to read at home? Why?

Does your child read with anyone in your family at home? If yes, whom does your child read with most often (e.g., Mum, Dad or siblings etc)?

Can you describe how this happens? Do you read together? How often does this happen? What books do you read?

What do you think about reading at bedtimes with your child? Is this something that you do or have done in your family?

How would you feel about reading a book about keeping teeth healthy at bedtime with your child?

How comfortable do you feel reading with your child?
Appendix 6.5 Focus group interview excerpt

SL: My big one sometimes he pretend, sometimes he did, my big one, my little one he didn’t but my big one he pretend, then I have to force him, you have to, you have to because that’s bad for your teeth and if you don’t do that then decay will get into your teeth and this happen, that happen, you have to tell them everything.

MR: You have to educate your children.

SL: Because he is really tired, this age, he is really tired, he coming from school at 4.30 then he gets rush going to mosque then he comes back for 6 o’clock then half an hour he is watching TV then dinner then he have to go to bed. Sometimes I know that he is really tired, that why he doing that and I force him, then it works.

MR: Cartoons help a lot because I know there was this cartoon, Kirby and this episode yeah about brushing your teeth

All in agreement.

MR: And it made kids really scared about germs and bacteria and everything and it really got my kids and that helped a lot, it really got my kids – the Kirby one it is! Very good that one, very good!

JE: I go on the computer and I show them all the bad teeth and I feel scared when I see something scary!

LO: do you think maybe a book about

Yeah yeah yeah, I think books definitely but cartoons because they can relate to them – you were just nodding there about the Kirby one

MAN: yes my daughters watch it

MR: Yeah that specific episode made a big impact on my kids

LO: ok, so they watch the cartoons before they do the brushing and the cleaning routine before bed, but they read the books after bed, so would it be better to have a cartoon to remind them, to brush their teeth rather than story book?

You know what is good

LO: so do you think they want to look after their teeth so they don’t have any pain?

All: Yeah