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Exploring the Patient Experience of Changes in Appetite and Diet with Incretin Analogue Therapy

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Copyright statement

Exploring the Patient Experience of Changes in Appetite and Diet with Incretin Analogue Therapy

by

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Abstract Rosamund May Paisey

Exploring the Patient Experience of Changes in Appetite and Diet with Incretin Analogue Therapy

Incretin analogue therapies are a valuable recent treatment option for type 2 diabetes (T2D) as they can improve blood glucose control and aid weight loss. The way in which an individual recognises and responds to changes in satiety signals induced by these treatments may explain why individual response is variable. Purposive sampling of individuals with successful outcome of incretin analogue therapy (GLP-1) for T2D gathered a participant cohort 15 people with 37 years (448 months) combined experience of this treatment and 149 years of living with diabetes. The focus group data reported in this thesis, explores their experiences, the differing relationship with food and varying strategies used to accommodate the incretin effect. The insightful contributions of living with T2D and integrating GLP-1 treatment into lifestyle will likely be applicable to a wider group, as the thoughts and experiences of the study participants should inform advice to people living with T2D considering GLP-1 treatment and those encountering difficulties after its introduction. The three broad themes which emerged from analysis: 1) The experience of ‘A Changed Relationship to Food and Eating’ set in context with links and interactions to both 2) ‘The Medical Experience’ and 3) ‘Social, Cultural and Emotional Influences’ are discussed in the context of existing evidence. The physical, social and emotional aspects of living with diabetes and the wider issues of how changed food and eating practices, have impacted on a generation and links with obesity and chronic disease risk are also explored.

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Author's declaration

At no time during the registration for the degree of Master by Research has the author been registered for any other University award without prior agreement of the Graduate Committee.

Work submitted for this research degree at the Plymouth University has not formed part of any other degree either at Plymouth University or at another establishment.

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Signed .....

Date .....

Chapter 1 Introduction

1.1 The Global, National and Local Impact of Diabetes

Diabetes is a metabolic disorder of multiple aetiology, characterised by chronic hyperglycaemia leading to the diabetes specific microvascular complications of retinopathy, nephropathy and neuropathy. The additional disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both, contribute to an increased risk of macrovascular complications particularly ischaemic heart disease, stroke and peripheral vascular disease, all contributing to a diminished quality of life (WHO 2012; The International Expert Committee 2009; Alberti and Zimmet 1998). As one of the commonest non-communicable, chronic diseases worldwide, diabetes is recognised as a major health and development challenge of the 21st century (Whiting *et al* 2011; Unwin *et al* 2010). The increased morbidity and mortality caused by diabetes has far reaching implications for healthcare costs, quality of life and life expectancy (Danaei *et al* 2011). The International Diabetes Federation (IDF 2012) highlights that in 2011 diabetes accounted for 11% of total global healthcare spending in adults (20-79 years), the majority of cases and fastest growth is seen in type 2 diabetes (T2D) mainly in 40-59 age range (González *et al* 2009; Mulnier *et al* 2006). In Europe fifty five million people (8.4% of adults) are living with diabetes, this is expected to rise to 64 million by 2030 and 552 million globally (IDF 2012). Analysis of the UK national diabetes audit in 2011, showed that diabetes accounted for an extra 22,200 deaths in England and those living with diabetes had a 39.9% greater risk of dying compared to the general population (YHPHO 2012).

These global and national trends have been mirrored in the district general hospital (DGH) in the South West of England where I work as a diabetes research nurse. Numbers identified as living with diabetes have increased more than fivefold in 25 years from 2,500 known cases in 1986 to over 14,500 in 2011. This global diabetes epidemic has been fuelled by increasing levels of obesity, as developing countries have urbanised and adopted increasingly sedentary lifestyles with rapid changes from traditional to westernised diets (Hu 2011; Zimmet 2000). Whilst in developed countries, improved healthcare and increased longevity of an ageing population as well as escalating obesity levels, contribute an overall increase of people living with diabetes (Shaw *et al* 2010).

1.2 Reducing the risk of diabetes and complications

Prospective and epidemiological studies have demonstrated that being overweight or obese is the most important risk factor for developing T2D (Malik *et al* 2012; The NHS Information Centre 2011; Colditz *et al* 1995). Nolan (2011) asserts that consumption of high-calorie, high-fat foods and inadequate physical activity results in an accumulation of excess weight as intra-abdominal fat in genetically susceptible individuals. This central adiposity increases the risk of ischaemic heart disease, hypertension and stroke and also accounts for 80–90% of all T2D cases (Wassink *et al* 2011; Finucane *et al* 2011a). Astrup and Finer (2000) proposed redefining T2D as ‘diabesity’ in recognition of the importance of addressing both diabetes and obesity in management and treatment plans, as the significant health risks of each condition intensify when co-presenting (Colagiuri 2010; Campbell 2009). Lifestyle and dietary advice to support weight loss, increase activity and improve quality of diet have been shown to delay progression to T2D in at risk individuals and improve outcomes in established diabetes (DPP Research Group 2009; Lindström *et al* 2008).

Dietary advice is seen as underpinning all diabetes treatments, Diabetes UK guidelines recommend weight management as the primary approach to improve glycaemic control and reduce cardiovascular complications (Mellor 2012; Dyson *et al* 2011). However, maintaining success of lifestyle interventions over a long term has been elusive (The Look AHEAD Research Group 2013; West 1973).

The UK Prospective Diabetes Study (UKPDS) demonstrated the importance of initiating active treatment following initial dietary advice to prevent or delay onset of diabetes micro and macrovascular complications and improve quality of life. This long term prospective randomised controlled trial (RCT) demonstrated a statistically significant association between incidence of micro and macrovascular complications, which were reduced with each incremental reduction in hyperglycaemia and hypertension respectively (Stratton *et al* 2006, 2000) as shown in table 1, appendix V. The diabetes specific microvascular complications are thought to result from damage by glycosylation of proteins, whilst macrovascular complications are almost certainly linked to hypertension and dyslipidaemia as well as hyperglycaemia (Stratton *et al* 2006; Colhoun 2004; Adler *et al* 2000). Established treatment pathways recommend addition of metformin to diet and exercise with the later addition of sulphonylurea and either glitazone or insulin if hyperglycaemia is not adequately controlled (NICE 2013; Czupryniak 2009). However, these interventions do not resolve the underlying obesity and with the exception of metformin, frequently lead to increased weight and risk of hypoglycaemia (Bailey and Day 2010; Phung *et al* 2010). This weight increase and risk of hypoglycaemia with sulphonylurea and insulin treatments is known to cause psychological distress and physical problems for patients (Khunti and Davies 2010; Amiel *et al* 2008; Hermansen and Mortensen 2007).

1.3 A solution to the cycle of weight gain with intensive therapy?

Research has shown that gut hormones known as incretins are crucial in both glucose control and appetite suppression after food. Glucagon like peptide-1 (GLP-1) stimulates insulin secretion, lowers glucagon levels, induces satiety and delays gastric emptying in response to rising glucose levels thus reducing post prandial hyperglycaemia (Nauck 2009; Drucker 2001). As GLP-1 levels have been found to be reduced in the majority of individuals with T2D, replacement of the hormone became a research priority, with exenatide (exendin-4) being the first incretin based therapy to be licensed. Initial studies showed significant weight loss and improvement in blood glucose levels in obese individuals with T2D (Barnett *et al* 2007; DeFronzo *et al* 2005). These newer treatments offer hope that the cycle of intensifying therapy and weight gain could be avoided. However, audits of use in general prescription have shown only a 50 to 60% success in reducing body weight by 5% and HbA1c by 1% (Ryder *et al* 2010). The key factor associated with good response may be the way in which individuals respond to this newly discovered satiety during meals. The research on which this thesis reports explores dietary changes and adaptations made by those succeeding with this therapy. It is notable that there is no firm evidence base as to how best to advise patients initiating this therapy as the early studies did not include dietary advice.

1.3 The Research Idea

Working as a research nurse in diabetes for 27 years I have had the privilege of recruiting over 1000 individuals into a variety of research studies. Some such as the UKPDS were long term from 1986-2002, others shorter, but each has afforded the opportunity not only to capture study data and clinical outcomes whilst providing care and support but also the luxury of time to listen to each

individual story. My initial research question for the study which I report here, emerged from clinical experience whilst working closely with a group of people living with T2D recruited as participants to a premarketing multicentre RCT the Helping Evaluate Exenatide versus Long Acting insulin (HEELA) study (Davies *et al* 2009). Exenatide (exendin-4) was the first incretin based therapy to be licensed for human use, therefore this group were amongst the first in the UK to use this class of medication. Although GLP-1 and agonists of it such as exenatide, had been shown to decrease energy intake, few of these initial studies included any investigation of particular individual dietary response (Edwards *et al* 2001; Verdich *et al* 2001; Flint *et al* 1998). There was consequently a paucity of evidence to support individuals with dietary advice starting this class of treatment either as part of the study or when available for wider prescription in the UK.

Standard advice for people with T2D is to eat regular carbohydrates to prevent hypoglycaemia especially when escalating treatment dose or adding hypoglycaemic agents such as sulphonylurea or insulin (Diabetes UK 2012; Mellor 2012). This requirement to ensure regular carbohydrate portions or snacks tends to hinder attempts to stabilise or lose weight, thus weight gain is a frequent consequence, which may counteract any benefits of improved glycaemia (Phung *et al* 2010; Holman *et al* 2007). Hauber and colleagues (2009) found weight gain from medication and cardiovascular risk are significant predictors of likely medication non-adherence in T2D whilst Gelhorn and colleagues (2013) confirmed the importance of potential weight gain and risk of hypoglycaemia or gastrointestinal side effects negatively affecting medication preference and choice in participants surveyed. Individuals living with diabetes describe being frustrated, confused and feeling out of control when their weight

increases despite efforts to lose weight (Wallace and Mathews 2000). Fear of hypoglycaemia may also result in a pattern of increased carbohydrate snacks continuing even after changes in medication (Barendse 2012; Amiel *et al* 2008).

Although studies demonstrated the potential for incretin based treatments to improve glycaemic control whilst also reducing weight, the lack of evidence to support dietary changes could be problematic. Healthcare professionals (HCP's) with little experience of these newer treatments could assume carbohydrate snacks were necessary with any additional medication for diabetes and advise accordingly. This advice could negate the benefits of enhanced satiety and weight loss, whilst increasing the potential for gastrointestinal side effects. In my clinical experience of supporting participants in the HEELA Study (Davies *et al* 2009) I noted that those who successfully improved their glycaemic control and reduced weight reported spontaneously adapting their eating habits in response to the study medication. I discussed using this group of 'expert patients' experience to develop appropriate advice for clinicians and their patients with a variety of colleagues, and a research writing group, including a 'patient representative'. All encouraged me to continue.

1.4 The project

I acquired charitable research funds for the project, university sponsorship and National Research Ethics Service (NRES) South West approval and my local hospital trust Research & Development (R&D) agreement. With relevant approvals in place, I felt as though I was embarking on a very exciting journey, as a nurse researcher leading my own project rather than a research nurse gathering data for others.

The acronym **Eat study** as a short title for- **E**xperience of changes in **A**ppetite and diet with incretin analogue **T**herapy –Exploring the 'Patient Experience' encapsulated the research idea. This was condensed during the writing of this thesis to 'Exploring the 'patient experience' of changes in Appetite and diet with incretin analogue Therapy (EAT study)'.

Qualitative research is frequently used to explore the personal or individual response to phenomena and to attempt to gain a deeper understanding of 'the lived experience' (Creswell 2009; Silverman 2004; Denzin and Lincoln 2000). As such a qualitative approach to study design and methodology was chosen as consistent with my study aims:

- To explore how changes in appetite induced by incretin (satiety hormone) treatment of type 2 diabetes influences dietary choices.
- To identify whether people treated with incretin analogue therapy develop strategies to moderate side effects.
- To enable the 'lived experience' to inform clinical practice and patient education/advice.

Purposeful sampling strategy was used to recruit participants with successful experience of incretin analogue therapy, by identifying individuals known from the previous research study and by referral from the clinical team. Fifteen participants with 3 - 52 months experience of incretin analogue therapy and 4 - 22 years living with T2D were recruited to share their experience within a focus group. Data were collected during three focus groups each comprising five 'expert users' between July and November 2011. Using focus groups facilitated access to a wide range of experiences, views and ideas shared in spontaneous and emotional way as well as insight into whether a consensus was (or was not) reached on the issues discussed (Minet *et al* 2011; Morgan 2010).

1.5 The thesis

The subsequent chapters describe the research in more detail. Chapter 2 sets the context with references to a selection of relevant literature from a wide range of sources. Review of existing evidence was ongoing throughout the study, data analysis and writing of the thesis. Initial background reading focused on emerging clinical evidence establishing the safety and efficacy of the first of the incretin based treatments, exenatide. Although the side effect profile including reduced appetite with some nausea has been reported in clinical and basic science papers, there is a paucity of evidence examining the patient experience of the anorexigenic effects of treatment, thus endorsing a need for the study.

Since the initial study proposal, clinical papers describing comparative efficacy and insights into the pathophysiology of diabetes have proliferated, as new GLP-1 based treatments have been marketed and licensed. A review of basic science and clinical papers enabled an understanding of the mode of action and impact for an individual living with established diabetes of GLP-1 treatment. A review of the evidence of the close relationship between increasing incidence of T2D and the global obesity epidemic demonstrated how these changes have impacted on a generation. Broadening the focus to include qualitative and quantitative papers across a wide range of disciplines illuminated the impact of these changes at a personal level within family and society. Insights relating to social and cultural attitudes to food and meals and living with diabetes have been gleaned from sociology and psychology literature and the healthcare disciplines of nursing, psychiatry and clinical psychology, dietetics and nutrition.

In the methods and methodology chapter (C3) I position myself within the research through a biographical account of my interests and career path as

suggested by Swift and Tischler (2010) and Letherby (2013; 2004). I continue with the rationale for my choice of method, data collection and sampling strategy. The process of recruitment and consent including participants' biographies, establishment of the groups and organisation of venue are described followed by a discussion of practical issues and reflections on my facilitation of the focus group and group dynamics. I present my approach to data analysis in the final section of chapter 3.

In Chapter 4, I present my analysis of the data set within a framework of existing evidence and understanding, drawn from a range of academic disciplines. I use the three broad themes which emerged from analysis as titles for each subsection; the experience of 'A Changed Relationship to Food and Eating' set in context with links and interactions to both 'The Medical Experience' and 'Social, Cultural and Emotional Influences'. Finally in chapter 5, I reflect on the process, outline the implications for future practice and suggest further avenues of enquiry.

Chapter 2 Background and Context

2.1 Introduction

In this chapter I describe the background to the research on which this thesis reports. The idea for the EAT study began when I was unable to find information to advise and support participants initiating GLP-1 analogue therapy as part of a clinical trial (Davies *et al* 2009). Clinical and basic science papers described side effects including reduced appetite and nausea, there was however a lack of evidence describing the individual experience of the anorexigenic effects of treatment in T2D, endorsing the value of a study (Verdich *et al* 2001; Naslund *et al* 1999). In keeping with the qualitative study design, wishing to approach the area with as few preconceptions as possible, I did not undertake a systematic review of the literature in advance. I attempted to set aside background knowledge from my clinical role whilst conducting focus groups, returning to a non-systematic review of existing and emerging clinical evidence as well as topics pertinent to issues identified within the focus groups and data analysis..

The subsequent sections of this chapter present a review of basic science and clinical papers describing pathophysiology of T2D, pharmaceutical management and importance of diet and lifestyle advice to enable an understanding of mode of action of GLP-1 analogues and potential impact on established diabetes. A broader focus of qualitative and quantitative texts across a range of disciplines illuminates implications for an individual, their family and society of the increasing incidence of T2D and the global obesity epidemic. An exploration of the social and cultural attitudes to food and meals follows before returning the focus to the individual living with diabetes.

2.2 Physiology

2.2.1 Diabetes diagnosis and classification

The diagnostic criteria and aetiological classification of diabetes summarised in tables 2, 3 and 4 below have been hotly debated as described by Levy (2011). The diagnostic threshold levels of hyperglycaemia, have been chosen as they are accompanied by the appearance of the uniquely diabetic complications of retinopathy, neuropathy and nephropathy and a two to four fold increase in cardiovascular disease (American Diabetes Association 2012; Brunner *et al* 2006). The use of glycosylated haemoglobin (HbA1c) to replace fasting plasma glucose and oral glucose tolerance tests was recommended as a more practical diagnostic tool for diabetes by an International Expert Committee (2009).

Table 2 Diagnosis of diabetes recommendation HbA1c (The International Expert Committee 2009)
A1C assay is an accurate, precise measure of chronic glycaemic levels and correlates well with the risk of diabetes complications.
Diabetes diagnosed when **HbA1C is ≥ 6.5%** [#] confirmed with a repeat HbA1C test Previously recommended diagnostic methods are acceptable if HbA1C testing is not possible
[#] International Federation of Clinical Chemistry (IFCC) equivalent 48 mmol /mol [##] Confirmation not required if symptomatic with plasma glucose levels > 11.1 mmol/l

Table 3 Diagnostic criteria for diabetes using plasma glucose measurements (WHO/IDF consultation 2006)			
	Fasting plasma glucose		**2 hour plasma glucose ***
Diabetes Type1 or Type 2	≥7.0 mmol/l	Or	***≥11.1 mmol/l
Impaired Glucose Tolerance	<7.0 mmol/l	and	***≥7.8 and <11.1 mmol/l
Impaired Fasting Glucose	6.1 to 6.9 mmol/l	and *(if measured)*	***<7.8 mmol/l
***** *Venous plasma glucose 2 hours after ingestion of 75g oral glucose load*			

Impaired glucose tolerance (IGT) and impaired fasting glycaemia (IFG) are recognised to be intermediate conditions reflecting an alteration from normal metabolism, indicating an increased risk of progression toward diabetes and a

proven increased risk of cardiovascular disease as highlighted by of the IDF Expert Consensus Workshop on IGT/IFG (2002).

Table 4 Aetiological classification of disorders of glycaemia (Zimmet *et al* 2001)	
Type 1	beta-cell destruction, usually leading to absolute insulin deficiency Autoimmune Idiopathic
Type 2	may range from predominantly insulin resistance with relative insulin deficiency to a predominantly secretory defect with or without insulin resistance
Other specific types	Genetic defects of beta-cell function Genetic defects in insulin action Diseases of the exocrine pancreas Endocrinopathies Drug- or chemical-induced Infections Uncommon forms of immune-mediated diabetes Other genetic syndromes sometimes associated with diabetes. *American Diabetes Association provide a fuller list of specific types* (2012)
Gestational diabetes	Includes the former categories of gestational impaired glucose tolerance and gestational diabetes.
As additional subtypes are discovered it is anticipated that they will be reclassified within their own specific category	

Less than 10% of diabetes cases globally are type 1 diabetes (T1D), in contrast over 90% are T2D characterised by resistance to the action of insulin and/or abnormal insulin secretion and disturbances of lipid metabolism (Nolan *et al* 2011; González *et al* 2009; WHO/IDF consultation 2006).

2.2.2 Pathophysiology of T2D

The complex interaction of genetic, epigenetic, environmental and lifestyle factors leading to T2D is still not fully understood. There is widespread variation in susceptibility with some individuals and ethnic groups, particularly recently urbanised, developing cultures being at greater risk of T2D (Nolan *et al* 2011; Zimmet 2000). O'Rahilly (2011, 2009) highlights that research of single gene disorders, has led to better diagnosis and treatment for rare monogenic forms of diabetes and advanced understanding of hyperglycaemia and pathophysiology of diabetes. However, the association between increased incidence of T2D and

obesity, particularly central or visceral obesity and sedentary lifestyle is widely accepted, having been reported and studied in the past 50 years from Himsworth (1949) to the Nurses' Health Study (Cameron *et al* 2013; Carey *et al* 1997).

Nolan and colleagues (2011) describe normal metabolism and the mechanisms that distinguish overweight or obese diabetes resistant individuals who remain healthy from those who develop diabetes. A compensatory increase in insulin secretion channels excess energy into subcutaneous fat, maintains healthy blood glucose and protects tissues and organs from the damaging effects of over nutrition. Whereas, in susceptible individuals a chronic energy imbalance overwhelms glucose homoeostasis and lipid trafficking, resulting in excess, hepatic, pancreatic beta cell and skeletal muscle intracellular fat. This disrupts the finely balanced interplay of hormonal responses to food, leading to a destructive cycle of glucotoxicity and lipotoxicity (DeFronzo 2009; Taylor 2008). Astrup and Finer (2000) proposed redefining T2D as 'diabesity' in recognition of the importance of addressing both diabetes and obesity in management and treatment plans, as the significant health risks of each condition intensify when co-presenting.

Microvascular complications are seen as a consequence glycosylation from hyperglycaemia whilst dyslipidaemia as well as hyperglycaemia contributes to macrovascular complications. The UKPDS demonstrated a reduction of diabetes related deaths endpoints with improved glucose control (Stratton *et al* 2000), appendix V table 5. Similarly, adequate blood pressure control in T2D reduced incidence of retinopathy and stroke (UKPDS Study Group 1998a, 1998b). RCT's of statin treatment for primary and secondary prevention of heart disease have shown a 30% reduction in cardiovascular morbidity and mortality

in 5 years (Ford *et al* 2007; Colhoun 2004; Collins 2003; Pedersen *et al* 2000). Targets to improve glucose control, reduce blood pressure and widespread use of statin treatment have been effective in improving life expectancy in T2D from 10 to 20 years, thus prolonging exposure to hyperglycaemia and the associated risks of blindness, renal failure and lower limb amputation. This increased life expectancy coupled with increasing incidence of T2D at a progressively younger age makes expert management of diabetes to prevent or reduce complications more important (Fonseca 2009).

2.2.3 Pharmaceutical management of T2D

Convergence of evidence from studies such as the UKPDS for T2D (Stratton *et al* 2000; Manley *et al* 2000; UKPDS Study Group 1998c), the Diabetes Control and Complications Trial (DCCT) for T1D (DCCT Research Group 1994) and cardiovascular protection studies as cited, linked with a growing understanding of the physiology and genetics of diabetes has led to the adoption of an evidence based treatment pathway for T2D. Initial diet and lifestyle advice followed by a stepped escalation of treatment to achieve glycaemic targets is recommended due to the progressive nature of T2D with additional medications to reduce hypertension and cardiovascular risk factors (Matthews *et al* 1998). Despite being potentially burdensome for individuals and costly for health services, evidence of improved quality of life and cost effectiveness of reduced complications justify this polypharmacy (Gray 2000; UKPDS Study Group 1999).

The beneficial cardiovascular outcomes of metformin have led to its establishment as first line therapy for T2D (NICE 2013; Bailey 2008; UKPDS Study Group 1998c). Metformin does not induce hypoglycaemia, nor weight gain but may cause gastrointestinal side effects in 25% of patients leading to

10% discontinuation (Andújar-Plata *et al* 2012; Berne and Campbell 2011; Donnelly *et al* 2009a). In contrast, established second line treatments of sulphonylurea and insulin are associated with weight gain and hypoglycaemia (Morgan *et al* 2012; Phung *et al* 2010; Krentz 2005). Insulin action on intermediary metabolism and the pathophysiology of diabetes explain why this combination of therapies can increase appetite, causing weight increase and only partial restoration of the disordered lipid metabolism characteristic of T2D (Colagiuri 2010).

During the past 15 years a parallel set of investigations has been undertaken flowing from the work of Bloom and Holst on gut hormones (Holst *et al* 2009; Flint *et al* 1998; Todd *et al* 1997). Over thirty separate peptide hormones are released from the gut to regulate appetite and satiety (De Silva and Bloom 2012). Glucagon like peptide-1 (GLP-1) is released at the start of a meal, stimulating insulin secretion and lowering glucagon levels in response to rising glucose levels thus reducing post prandial hyperglycaemia. GLP-1 also induces satiety by direct effect on the hypothalamus and delays gastric emptying until degraded by the counter regulatory hormone DPP IV (Nauck 2009; Drucker 2001). As GLP-1 levels have been found to be reduced in the majority of individuals with T2D replacement of the hormone became a research priority, with exenatide (exendin-4) being the first incretin based therapy to be licensed. However audits of use in general prescription have shown only a 50 to 60% success in reducing body weight by 5% and HbA1c by 1% (Ryder *et al* 2010). Possible behavioural reasons underlying the success/failure of these therapies are the subject of this research.

2.2.4 Diet and Lifestyle

The key importance of diet and lifestyle in both the prevention of T2D (Gong 2011; Diabetes Prevention Program Research Group 2009; Lindström *et al* 2006) and management of established diabetes is internationally recognised (Andrews *et al* 2011; Dyson *et al* 2011). Dietary recommendations for diabetes have evolved over time, originally a low carbohydrate and high protein diet with strictly prescribed portions and carbohydrate exchanges developed for T1D (Lawrence 1933) was standard advice for all diabetes. During the 1980's evidence of increased cardiovascular and renal disease in T2D led to recommendations to increase complex carbohydrate, fruit and vegetables, dietary fibre and to moderate protein intake and reduce saturated fat. This advice later merged with general healthy eating guidelines. Various specific dietetic approaches have been studied and highlighted in the media as 'cures' for diabetes including very low calorie meal replacement diets (VLCD), Mediterranean diet, Glycaemic Index (GI), low carbohydrate diet, intermittent fasting and bariatric surgery (Brown *et al* 2013; Santos *et al* 2012). The evidence that any of these approaches show long term benefit is poor (Day and Bailey 2012; Paisey *et al* 2002). The net effect for both the general public and many HCP's is an uncertainty as to what a person with diabetes can and should eat, leading to a lack of consistent message from the health care team. Lawton (2005) suggests that recommendations based on existing healthy eating guidelines without specific person centred advice may undermine the value of the message and appear vague and non specific. Diabetes UK emphasise the importance of a multidisciplinary team led by a specialist registered dietitian to provide advice 'tailored for the individual, taking into account personal and cultural preferences, beliefs, lifestyle and willingness and ability to change'

(Dyson *et al* 2011, pp.1282–3). Krebs and Parry-Strong (2013) echo this when they suggest that the optimal diet for T2D is one that works for the individual.

The pathway for managing T2D as published by NICE (2013) recommends structured education at or near to diagnosis with annual reinforcement and regular nutritional advice. Various diabetes educational programmes to provide advice and support have been developed and evaluated in the last 20 years (Trento and Porta 2012; Norris *et al* 2001; Kronsbein 1988). Provision of education has been variable and where it is available not always accessed by individuals with diabetes, Davies (2008) reports 70% uptake for the Diabetes Education and Self Management Ongoing and Newly Diagnosed (Desmond) study whilst in the X-Pert patient study 21.8% of those approached responded to an invitation to join (Deakin *et al* 2006). However, the Diabetes Attitude, Wishes and Needs second study (DAWN2) found that cross-nationally 81% of people with diabetes who attended education programmes found them somewhat or very helpful (Nicolucci *et al* 2013).

2.3 Obesity

2.3.1 The size of the problem

Obesity is not a new phenomenon. Throughout history a minority, often the most affluent in a society have been obese (Unger and Scherer 2010), and ancient physicians recognised links between obesity and diabetes (Tipton 2008; King and Rubin 2003). However, the last forty years has seen an increasing proportion of overweight, obese and morbidly obese adults in most countries in the world (Danaei *et al* 2011; Wang *et al* 2011; James 2008). Finucane and colleagues highlight that Body Mass Index (BMI), has increased by 0.4 - 0 5 kg/m^2 per decade between 1980 and 2008 in 199 countries (2011b). Although there are geographical and societal variations, this trend has spread from the

United States of America and is now a global phenomenon. Improved healthcare and an aging population in the west with globalization, urbanization, and economic development in developing countries leading to changes in lifestyle are cited as driving both the obesity and diabesity epidemics (Malik *et al* 2012; James 2008; Kelly *et al* 2008).

The Health Survey for England (NHS Information Centre 2012) showed that over half the adult population in England are now overweight or obese, 66% of men and 57% of women. Weight and BMI have remained normally distributed within the population but the whole distribution curve has shifted to the right such that 8 - 9% fewer adults were of normal BMI in 2009 compared to 1993 and obesity has increased by the same percentage from 13% to 22% for men and from 16% to 24% for women. Consequently the perception of normality is changing thus an individual diagnosed with T2D may not consider dietary and lifestyle changes important because they see themselves to be of normal weight or not as 'big' as many of their peers without diabetes. Studies have shown familial, trans-generational trends (Pollard et al 2011) and that parents of obese children perceive their child to be normal weight (Regber et al 2013; Oude Luttikhuis et al 2010).

Widespread acknowledgement that societal changes are fuelling the obesity epidemic have led organisations and authors to extol the need for concerted preventative action, global policies and coordination by governments, organisations, communities and individuals to positively influence behavioural change (Malik *et al* 2012; Hu 2011; Keeling 2011). Yet, the mechanisms by which these changes are driving the obesity epidemic is still debated (Ravichandran 2013; Taubes 2013). Education and advice to support individual behaviour change are proffered as a solution. Guttman and Salmon (2004)

highlight this may be counterproductive as it can reinforce self-blame and helplessness and thus elicit the opposite behaviour. Exhorting individuals to adopt a healthy lifestyle without taking into account the social and environmental factors that affects their behaviour can lead to a culture which blames and stigmatises the individual. Delormier and colleagues (2009, p.217) suggest that rational choice has little to do with peoples food choices as: ‘eating is embedded in the flow of day-to-day life’ and furthermore daily interactions within family and social groups at work and school shape peoples eating patterns.

2.3.2 Food rationing to the obesogenic society in a generation

Reflecting on changes in social and environmental influences over the life-course of individuals may help explain these obesity statistics from a person centred approach (Devine 2005). Although T2D is being diagnosed at a progressively younger age, many of the people living with established T2D for five to ten years were diagnosed in their 50’s and 60’s they were therefore born in the late 1930’s to 1950’s. In the United Kingdom this generation experienced rapid changes from childhood food shortages and rationing during and immediately after World War II to increasing access to a variety of foods with mass advertising of convenience foods and fast food restaurants. This surfeit of energy dense foods became increasingly more available concurrently with dramatic changes occurring in society which resulted in reduced energy expenditure (Prentice and Jebb 1995). Working lives became more sedentary with increased mechanisation and a revolution in household appliances in the 1950’s abolished much of the drudgery of housework whilst cold, draughty houses began to be replaced by energy efficient centrally heated homes (Corbishley 1993). Increased car ownership has reduced active transport to

work and school, whilst the development of supermarkets heralded the end of frequent trips on foot to local shops for fresh food (The Daily Mail 2013). Social eating outside the family home became more frequent with increasing affluence and social mobility for many from the late 1960's (Warde 2000). Burnett (1989, p.318) reporting a classic survey of leisure activity in late 1980's stated that: 'going out for a meal or entertaining friends to a meal at home were rated as the most popular occupations after watching television'. The link between these societal changes in eating habits and obesity may be explained by studies showing that marketing strategies of increasing portion and package size of restaurant meals and food products encourage higher consumption not only at that meal but for the subsequent 24 hours (Chandon and Wansink 2012; Vermeer *et al* 2010; Ello-Martin *et al* 2005).

2.4 Social and cultural attitudes to food and meals

Food choices are not governed by individual taste alone but are shaped in social and cultural contexts (Caplan *et al* 1998). Age, gender, ethnicity, religion, beliefs and socioeconomic background all influence attitudes to food and eating. Food and eating is primarily a social activity so life experiences and relationships add fresh dimensions which may encourage adaptation or reinforce existing preferences. Social interactions, settings and environments alter what, when and how much we eat (Sobal *et al* 2012; Wansink and Sobal 2007).

A qualitative study of food choice in older Irish adults (Delaney and McCarthy 2011) found that social and historical circumstances as well as life experiences influence food choices in a myriad of ways and that enduring dietary habits can become firmly established in childhood. Early food experiences for this group of Irish adults were similar to other parts of the British Isles with food shortages

and meals prepared from basic home cooked local produce in their childhood. The participants recounted as there were no oranges or sweets they highly prized as they became available. In my clinical practice I have found that patients who remember food shortages and rationing often explain they have a ‘sweet tooth’ and crave sweet things because they were in such short supply during their childhood. Some also recount that as children of the 1950’s they were told to finish everything on their plate as food should not be wasted.

Traditionally women have been responsible for preparing and providing family meals. Studies by Charles and Kerr (1988) interviewing mothers of young children in the north of England in 1982/3 and in South Wales by Murcott 1979/80 cited by (Kemmer 2000) found that women still considered it their role to provide the meals for the family. They spoke of ‘proper meals’ being a cooked meal consisting of meat, or fish and two vegetable servings, with the family sitting at the table, with a more elaborate version of roast meat on Sundays and celebrations such as Christmas. A salad or meal with bread was not a ‘proper meal’ more of a snack. Kemmer (2000) argues that the studies conducted in late 70’s and early 80’s were both historically and geographically located as well as very specific in the life-course of the women interviewed. She highlights the significant economic, social and political changes for women in Britain over the previous fifteen years, commenting that the ‘…rigid gendering of employment and domestic tasks is being broken down’ (Kemmer 2000, p.329). Contrasting these earlier studies with a study of young couples as they began to live together Kemmer (2000) notes these young couples in mid-1990’s share and collaborate over food related tasks but still consider it important to have a ‘proper meal’ together when possible. Food diaries of younger couples demonstrated a shift from traditional meat with vegetables and a cooked

pudding to 23% of evening meals being pasta or rice based or light meals, whilst home cooked puddings were not featured (Marshall and Anderson 2002; Kemmer *et al* 1998).

These studies two decades apart serve to highlight the importance of recognising broader influences on an individual's food choices. Although conducted in the 21st century, responses in a study of older Irish adults by Delaney and McCarthy (2011) and another by Lawton (2008) of first generation Pakistani and Indian migrants living in the UK mirrored earlier work of Murcott (1982) and Charles & Kerr (1988), particularly the value of a 'proper meal'. However, the migrant participants' interpretation of a 'proper meal' was a cooked meal of their traditional foods. Participants of these later studies were a similar age cohort to those interviewed as young mothers 1979-83 and many individuals currently living with established T2D. For many of this generation of women providing family meals has been central to their role and identity. Brown (2012) found that women who were used to feeding a family found difficulty adapting their cooking to changed life events.

Biscogni (2002) highlights that food is such an important element of our lives that people will often refer to themselves with reference to how or what they eat such as 'I'm a vegetarian' or 'I'm a meat and two veg man', 'I'm a picky eater' or 'I'm a big eater'. Others relate that they are known amongst family or friends and work colleagues as 'someone who loves his food' or 'he enjoys a hearty meal', these labels thus become part of their identity. Similarly some women, the traditional food providers mourn the loss of this identity when the family leave home.

2.5 Living with Diabetes

2.5.1 Ambiguity and complexity

In common with other chronic conditions, the daily management of diabetes relies on individuals living with the condition performing a range of complex self-care behaviours, such as adhering to a healthy diet and lifestyle, monitoring blood glucose levels and taking medications appropriately (Forbes 2011). Thus management should be a collaboration between the person living with the condition and those providing care and support (Heinrich *et al* 2010; Funnell *et al* 1991). To prevent complications hyperglycaemia, insulin insensitivity, dyslipidaemia, hypertension and obesity all need to be addressed according to severity, yet from the perspective of an asymptomatic individual, they may need time to adjust to the diagnosis before engaging with education (Peel *et al* 2004). In a study of emotional reactions to a diagnosis of T2D Peel and colleagues (2004) found the participants would have liked more information, particularly on management of diabetes at diagnosis, but not too much about potential complications. Diabetes care for the majority of individuals with T2D in the UK is provided by a combination of consultation with a practice nurse and GP with a special interest in diabetes. Group education courses are delivered by a multi-disciplinary team at diagnosis with practice based annual review and retinal screening. Access to specialist podiatry, dietetic and lifestyle advice and psychological support depend on priorities set within each locality and may vary according to funding initiatives and governmental targets over time. In the cross-national DAWN2 study of HCP's perspective 60% reported the need for major improvements in self management education and in some countries less than two thirds of HCP's had any formal diabetes training (Holt *et al* 2013).

2.5.2 Barriers and supports for self management

Gomersall and colleagues (2011) highlight the increased prevalence of T2D relative to social deprivation in Europe and criticise the assumption that all individuals have the ability to instigate and maintain lifestyle recommendations. There is an increased incidence of T2D in individuals with depression whilst at least a third of people with diabetes have clinical depression (Roy and Lloyd 2012; Renn *et al* 2011; Nouwen *et al* 2010). The added burden of depression in diabetes is known to contribute to poor self care, lack of adherence to medications and significant reduction in quality of life (Holt and Katon 2012; Lloyd *et al* 2012). Diabetes distress (DD), a measure of the emotional burden of diabetes, has been shown to adversely affect diabetes management even in the absence of clinically diagnosed depression (Fisher *et al* 2010).

Minet and colleagues (2011) acknowledge the importance of existing social and family support networks, especially at times of vulnerability, highlighting that when patients were dealing with problems and difficulties they found it difficult to mobilise resources. A systematic review of the literature (Rintala *et al* 2013) found both positive and negative aspects of family and spousal interactions. As dietary changes are part of diabetes treatment, a common theme was the gendered nature of food related tasks. Authors suggested that female partners of men with diabetes frequently take responsibility for adapting the food and cooking, often embracing healthy eating guidelines for the whole family, whereas women with diabetes attempt to balance the family food choices whilst denying themselves the ‘unhealthy choices’ (Rintala *et al* 2013; Broom and Lenagh-Maguire 2010; Peel *et al* 2005). In a study of spousal support of adults living with T2D, Beverly and colleagues (2008) reported that a female participant felt unsupported so she decided to prepare her own meals

separately and that although, many men welcomed support from their wives, some expressed resentment ‘I resent … her nagging.... a single piece of candy is like the black plague’ (Beverly *et al* 2008, p.712). Franks and colleagues (2012) found that spousal support to address dietary changes reduced DD for both, but if a spouse exerted pressure, they increased their own emotional burden without reducing DD for their spouse. The DAWN2 study of family members highlighted the distress and concern felt by family members of people living with diabetes (Kovacs Burns *et al* 2013). If couples shared meals the individual with diabetes found food choices easier, was more likely to have a good glycaemic control and suffered less DD than those who ate alone (Franks *et al* 2012). Similarly, family support aided initiation and maintenance of exercise (Rintala *et al* 2013).

Lack of time, suitable facilities or pre-existing conditions which limit activity and for some groups, cultural norms were cited as typical barriers to physical activity (Lawton *et al* 2006). Whilst, Peel (2010) found that walking, especially walking a dog was most likely to be sustained long term. Malpass and colleagues (2009) highlight the value diet and physical activity information offered concurrently as increased physical activity may support other lifestyle changes.

2.5.3 Compliance or informed choice and concordance?

The progressive nature of T2D necessitates initiation or escalation of glucose lowering treatments in addition to initial diet and lifestyle changes to maintain glycaemic targets (Khunti and Davies 2010; Nathan *et al* 2009). Seventy five percent of UKPDS cohort required triple therapy within 9 years of diagnosis (Wright *et al* 2002; Turner *et al* 1999). Individuals may perceive this as a personal failure, particularly in the light of healthcare terminology such as ‘diet and lifestyle or sulphonylurea failure’ (Polonsky 2007a; Vermeire *et al* 2007).

For a person living with diabetes, implementation of new treatment regimes often triggers a re-evaluation of the seriousness of their diagnosis, reflecting that it is no longer ‘mild diabetes’ controlled with diet but a condition which now needs complex treatment. In a study exploring uncertainties inherent in T2D a participant encapsulated the choices people make as they become more aware of potential complications:

> I’m not certain that I can keep all of my limbs the longer we go along. You have to balance that with . . . if I cheat a little bit here then I have to lose a toe later. Is it worth it? (Middleton *et al* 2012, p.595).

The side effects of diabetes treatments discussed in 2.2.3, gastrointestinal disturbances, potential weight gain and particularly fear of hypoglycaemia are cited as barriers to both timely initiation of treatment regimes and adherence to prescribed medication. There is significant risk of hypoglycaemia with insulin or sulphonylurea treatment, particularly with increasing duration of diabetes and age. An estimated 5000 individuals on sulphonylurea a year experience severe hypoglycaemia requiring emergency intervention (Amiel *et al* 2008; UK Hypoglycaemia Study Group 2007). Hypoglycaemia adversely affects quality of life and all activities of daily living including work, driving, leisure time and restricts dietary freedom. Hypoglycaemia and fear of hypoglycaemia have been shown to undermine confidence, compromise self-care and limit efforts to achieve glucose and weight loss targets (Barendse 2012; Peyrot *et al* 2012; Khunti and Davies 2010). Donnelly and colleagues (2007) noted that non collection of insulin prescription was related to poorer glycaemic control in T2D which may indicate a deliberate choice to reduce or omit their insulin doses following hypoglycaemic episodes. Kripalani (2007) highlights that in chronic conditions poor medication adherence is linked to worse clinical outcomes and increased healthcare costs a pattern also observed in T2D (Cramer 2004).

Although there are many references to compliance or adherence to treatment plans in the diabetes literature, Anderson and Funnell (2000) suggest this is inappropriate for a self-managed condition. The person living with diabetes will make informed choices according to their own priorities and are therefore compliant in their own terms, HCP's need to provide information and support to ensure these choices are fully informed. As Snowden and Marland (2013) highlight the King's Fund report advocates shared decision making 'no decision about me without me'(Coulter and Collins 2011). Discrete choice questionnaires used to assess the weight individuals place on differing symptoms against a balance of improved glycaemic control for T2D, demonstrated a preference for treatments with lower risk of hypoglycaemia, weight gain or gastrointestinal side effects (Gelhorn *et al* 2013; Hauber *et al* 2009).

2.6 Summary

This chapter has highlighted complex physiological and societal influences which impact on human health with a particular focus on an individual living with T2D. With increasing options for diabetes management it is now possible to work collaboratively with the wishes and needs of the person with diabetes to individualise their personal targets and treatment plan (Kruger 2012; Peters 2012). In order to achieve this, HCP's need a better understanding of the mode of action of different medications and likely impact of any side-effects on the lifestyle of the individuals living with diabetes. Studies exploring the lived experience of medication usage such as the EAT study will inform practice.

Chapter 3 – Methods and Methodology

3.1 Introduction

I present Chapter 3 as a 'natural history' of the research, consistent with the approach of Silverman (2010). The impetus for the study began as described in Chapter 1.3 and Chapter 2.1 from observations as a clinical research nurse initiating GLP-1 analogue therapy as part of a clinical trial (Davies *et al* 2009). Although GLP-1 analogue therapy has been shown to decrease energy intake in healthy volunteers (Verdich *et al* 2001; Flint *et al* 1998), no studies included investigation of particular individual dietary response in T2D. I reflected that participants in my practice, who improved their glycaemic control and reduced weight, reported adapting their eating habits in response to study medication. I wondered if a factor associated with good clinical outcomes could be individual responses to newly discovered satiety during meals and whether their experience could inform future practice and formulated my initial research question;

- To explore the most appropriate dietary and lifestyle advice to enhance the efficacy and tolerability of incretin analogue treatment in T2D

with a secondary question of;

- Can food choices explain why some patients with T2D fail to respond to incretin analogues therapy?

To address the question I felt a qualitative methodology to be the most appropriate as it is frequently employed to explore the personal or individual response to phenomena, to gain a deeper understanding or in exploratory scenarios (Silverman 2011; Creswell 2009; Denzin and Lincoln 2000). I designed a study to address the question, the study aims

being to use the ‘lived experience’ of a group of ‘expert users’ of GLP-1 analogue therapy to:

- Explore how changes in appetite induced by GLP-1 analogue therapy in T2D influenced dietary choices.
- Identify whether people treated with GLP-1 analogue therapy develop strategies to moderate side effects.

A more detailed description and rationale for my choices of qualitative research design, data collection and sampling strategy follows in section 3.3, with subsequent sections detailing funding and ethics, recruitment and participants, focus group dynamics and approach to data analysis.

Conscious that the research was shaped by my own past experiences and personhood (Letherby *et al* 2013; Swift and Tischler 2010; Letherby 2004), I include a short biography of my career path.

3.2 My Background

Twenty seven years ago I took my first steps in diabetes research when appointed as clinical research nurse at a district general hospital, responsible for establishing and running one of 23 recruiting centres for an academic RCT in new onset T2D, the UKPDS (1998d). I was fascinated and knew I had found my ideal job. My workload involved balancing study recruitment and provision of on-going care with support and education for individuals with a new diagnosis of T2D. The study grew organically; after three and a half years recruitment, 195 patients were receiving their regular clinical care whilst contributing enthusiastically to the research cohort of 5,102 individuals. The research clinics became a lively hubbub of the multi-disciplinary team meeting research

participants as old friends whilst addressing clinical needs, conducting assessments and collecting research samples and data.

Neither I nor the people who kindly volunteered realised we would be involved in a 20 year journey contributing to a landmark study in T2D providing the evidence base for current treatment aims (Holman *et al* 2008; Stratton *et al* 2000; UKPDS Study Group 1998c, 1998d, 1998a, 1998b). Collaboration continued with Oxford Clinical Trials Unit contributing to other diabetes studies whilst developing our own studies exploring different dietetic approaches and an RCT of group education and lifestyle support (Daly *et al* 2006; Paisey *et al* 2002). When government funding in 2006 established a research network in diabetes (DRN) at national and local level, our diabetes research team became one centre of initially four in the South West Peninsula Local Diabetes Research Network (SWPDRN).

3.3 The Research Design

3.3.1 Methodological choices

The multi-national programme of research leading to the licensing of exenatide for human and clinical use followed the recognised pathway within medicine and healthcare from lab bench to patient (Davies *et al* 2009; Drucker and Nauck 2006; Elrick *et al* 1964) to establish efficacy and safety of a new drug or intervention. Although quantitative questions related to side effect profile and 'quality of life questionnaires' were employed, the impact for an individual attempting to integrate this new form of treatment into their lifestyle, can be lost when data is presented as statistical means and standard deviations. As Hardy and colleagues citing Greenhalgh (2006) highlight there is a dilemma for HCP's:

> ... upholding the individual narrative in a world where valid and generalisable truths come from population driven evidence (Hardy *et al* 2009, p.9).

They argue that:

> ... empirical population based observation about illness cannot be applied directly to individual patients, whose behaviour is contextually driven and idiosyncratic (Hardy *et al* 2009, p.9).

In social sciences and nursing research this dilemma is addressed by changing the focus from the broad based, experimental analysis of large statistically measureable variables of the quantitative research paradigm to a qualitative approach which seeks to explore the personal or individual response to phenomena in natural settings (Creswell 2009; Silverman 2004; Denzin and Lincoln 2000). This interpretive, descriptive approach of qualitative research has evolved from different social science traditions, initially philosophy, anthropology, history, sociology and psychology with differing epistemologies and methodologies (Silverman 2011; Flick *et al* 2004; Brewer 1989). Qualitative research has been espoused and adapted by other professionals including those in healthcare to suit their needs (Holloway and Wheeler 2010; Morse 2010; Bowling 2009). Sparkes (2005) suggests that when a practitioner attends to the individual story told by those who experience healthcare, it can significantly improve daily practices, identifying themes which affect the person's quality of life, paving the way for meaningful person centred care. Whilst Galvin and Todres (2011, p.523).agree, they propose combining phenomenological methodology with empathic nursing knowledge to develop a way of knowing 'that is inclusive of the head, hand and heart' to provide holistic care

3.3.2 Data collection choices

Conscious that research design and methodology should be appropriate for the research question (Silverman 2010; Holliday 2007; Letherby 2004) my experience and background reading suggested that qualitative methodology would be the most appropriate design to allow a thorough exploration of the

issues surrounding taking incretin analogue therapy and thus provide insight into the impact of this type of medication.

In-depth interviews are frequently employed within healthcare research as they have the potential to gather rich data, exploring experiences, beliefs or phenomenon from the participants' perspective, particularly where little is known of the subject (Silverman 2011; Holloway 2005). Individual interviews are flexible and offer the opportunity for the researcher to probe and clarify participant responses, however gathering data can be costly both in time and resources (Holloway and Wheeler 2010). Tod (2006) cites Field and Morse (1985) when she cautions that role conflict, particularly for nurses or other clinicians conducting research with less structured interviews can be difficult to avoid. I suspected that as a nurse proposing my own study there would be difficulties securing funding and sufficient time to conduct in-depth interviews. I was also concerned that as some of the potential participants were known to me as patients and participants in previous clinical studies there would be potential for role conflict and power imbalance in a setting not too dissimilar to a clinical consultation (Karnieli-Miller *et al* 2009).

Following exploratory discussions with some of the participants from the HEELA study and colleagues, I recognised that it was difficult for either an individual using exenatide or their HCP to articulate how appetite was affected and what, if any changes were made as a consequence. Despite this I believed there was potential to explore the 'lived experience' of experienced users of this relatively new medication and use their pooled knowledge to support future care. Previous experience as a group facilitator both in research and education settings (Daly *et al* 2006; Paisey *et al* 2002) taught me the value of group discussions to facilitate insight and understanding. Group dynamics in small

group discussions of ‘expert users’ in a focus group, may prompt and generate a previously unrecognised shared knowledge (Green 2004; Morgan *et al* 1997). Focus groups are particularly suited to exploratory research in healthcare, especially experiences of specific topics or treatments (Greaney *et al* 2012; Gerrish and Lacey 2006; Kitzinger 2005). Goodman and Evans (2006, p.362) suggest that this ‘exploratory and illuminatory function’ of focus groups can extend and enrich understanding.

There are enthusiastic proponents of individual in-depth interviews and of focus groups to gather evidence (Kitzinger 2005; Greenbaum 2000). Goodman and Evans (2006) suggest that the synergy of group discussion may enable a more enthusiastic consideration of a topic by participants than individual interviews. This view however is contested, as is whether sensitive issues may also be more readily discussed within the safety of a group setting (Kitzinger 2005; Farquhar 1999; Michell 1999). Weighing the advantages and disadvantages of interviews versus focus groups for my research question, potential participants, the resources available and my skills, I considered focus groups were the most effective method of gathering rich data within the time and funding available. I felt that as a researcher asking participants to share their experiences as ‘expert users’ within a focus group would allow me to discard my ‘specialist nurse hat’ for that of a group facilitator. This strategy would therefore respect the participant experience and neutralise a potential power imbalance inherent in many clinical or research settings (Karnieli-Miller *et al* 2009; Richards and Emslie 2000).

3.3.3 Sampling strategy and final study design

A purposeful sampling strategy was employed to recruit participants with successful experience of incretin analogue therapy by identifying individuals

known from the previous research study and by referral from the clinical team. Two focus groups of four to seven people were planned to be small enough to allow free and open discussion but large enough to help generate ideas and for themes to emerge (Greenbaum 2000; Morgan *et al* 1997; Krueger 1998a).

The original study design was to audiotape group discussions augmented by an independent note taker advocated by research texts as the least obtrusive method of recording (Greenbaum 2000; Krueger 1998b). However, as I was able to utilise an audiovisual recording suite recently installed for clinical training scenarios in the education and research department, I amended my plans. Although initially anxious that audiovisual recording would be too intrusive my fears were allayed on reviewing the equipment. It was flexible and reliable with three multi-directional cameras controlled from an observation room therefore very discrete, additional microphones could be placed around the room or worn by group members, offering excellent sound recording (Goodman and Evans 2006). Digital recording was direct to secure computer with immediate backup to my password protected secure confidentiality compliant NHS account. Using this equipment would be less intrusive, provide better quality data, including the ability to record non-verbal information and complied with confidentiality and data protection regulations (Johnson and Long 2006).

3.4 Funding, sponsorship, ethical and trust approvals

Having been awarded a grant for my own research proposal and with a place on a research masters course I applied for the university to sponsor the research and to the National Research Ethics Service (NRES) South West committee for approval. Approval was granted subject to clarification of the proposed audiovisual recording analysis ref: SW/11/0107. Hospital Trust and R&D approval quickly followed: (R&D) agreement ref: 11/06/016. This enabled

me to negotiate using the research grant funds to backfill one session a week to facilitate dedicated time for the EAT study and to approach and consent hospital patients as participants (Johnson and Long 2006).

3.5 Recruitment and Consent

Potential participants were identified from previous research and by referral from clinicians. The 'experienced' users from an earlier study had given written consent to be approached for future studies, enabling me to make a direct approach. Other potential participants had either consented to be approached for research or were invited by the clinician providing their routine care, thus maintaining confidentiality of personal and clinical data. The initial approach was by letter with my contact number and a reply slip (appendix I) with stamped addressed envelope. A positive response was followed up by a telephone call to establish eligibility and willingness to consider participation. Those interested were offered individual appointments to discuss and sign study consent with prior mailing of participant information and example consent form (appendix II, III) to arrive at least 48 hours before the visit. I took the opportunity to discuss which days and time of day to they were able to attend focus groups so I could schedule groups to suit the majority of participants.

For some studies the need to rely on gatekeepers can be problematic, especially if these gatekeepers do not understand or agree with the research, feel it is not their role or that they need to protect their patients. The recruitment process can thus be biased or delayed (Nugus *et al* 2012; Holloway and Wheeler 2010). I did not encounter a problem and was able to begin consent visits in July continuing until November 2011.

3.5.1 The Participants

I use the term ‘participants’ for the people who consented to take part in this exploration of their experience of incretin analogue therapy and ‘patient’ if discussing a general clinical scenario or encounter with HCP’s. Participant is the preferred term within healthcare research for individuals who volunteer for research, as it expresses collaboration in recognition that they have agreed voluntarily by a process of informed consent to participate (Holloway and Wheeler 2010). This use of participant is also reflected in the terminology used when applying for research ethical approval in healthcare.

The EAT study took place in a district general hospital in the south west of the UK with a population of nearly 300,000, a high percentage of retired residents, with rural communities and pockets of social and economic deprivation and very few non-white British residents. Tourism, farming, fishing and light industry are the main sources of employment. Socio-economic details were not collected as part of the research process although some participants volunteered information during the discussion. Although not selected to be representative, as the sampling was purposive, age, gender and ethnicity reflect the composition of the local population with T2D requiring triple therapy. A short anonymised biography of each participant by group composition appendix VI has been removed to further protect participant anonymity, whilst a summary table can be found in appendix VII

All names have been changed to respect anonymity of the participants. Bert, Adam Bob and Gerald all started on exenatide as part of the HEELA study (Davies *et al* 2009) prior to UK licensing of the first of the incretin analogue therapies. It was my experience as a research nurse recruiting to this study that was the catalyst to explore the effects of this new treatment from a patient

perspective, with particular emphasis on their adaptation to changes in satiety. Betty, Maud and Johnny all started on exenatide soon after it became available on prescription in the UK. These were the seven experienced participants with 30 to 52 months incretin analogue use at the time of consent. Participants, Ruth, Cath, Laura, Lionel and Mavis were referred by their consultant and Mark referred by his family doctor, had 12 to 24 months experience. Luke and Linda who had started incretin analogue therapy within three to seven months of the focus group were referred by their diabetes specialist nurse by another research nurse respectively.

As discussed the research idea grew from my work and awareness of an unmet need, these individuals were the only potential pool of ‘expert patients’ who were using incretin analogue therapy at the time. I was acutely aware of the dilemmas this raised, particularly insider/outsider privilege, the potential for bias and power imbalance (Holloway 2005; Silverman 2011). I attempt to highlight these conflicts throughout.

3.5.2 Organising venue and establishing focus groups

The decision to use the audiovisual recording equipment defined the choice of venue. This had the advantage of being in hospital grounds with level access, disabled toilet facilities, close to public transport and parking but away from clinical areas. I was able to organise refreshments, ensure we were not interrupted and be confident that the recording equipment was high quality, serviced and well maintained. The clinical nature of the room was a disadvantage but, I was able to screen the clinical equipment to the edge of the room and found that apologising for and explaining the purpose of the room for clinical skills training, proved a useful icebreaker as participants gathered. Although not ideal, the pragmatic choice was to ensure good quality, secure

recording, ease of access, freedom from interruptions and ability to offer a choice of times and dates for groups (Greenbaum 2000; Krueger 1998a).

Co-ordinating availability of the audiovisual suite, a colleague with experience to use the recording equipment and another to act as independent note taker, with times when a group of consented participants were able to attend was a logistical challenge. I anticipated the problem from experience and reading of research texts (Greenbaum 2000; Barbour and Kitzinger 1999; Krueger 1998a) so had a choice of tentative dates and times arranged when recruiting and consenting participants. The resulting composition of the first two groups included by chance a similar gender, age and duration of diabetes profile. However, rather than one group with more experience and a second with shorter use of incretin analogue therapy, there were experienced users in both groups. Five participants were able to attend each of these groups but one experienced participant although very keen to contribute was unable to attend, he was included in a third group.

Since the planning phase of the project, prescribing practice had changed with initiation of exenatide allowed in primary care and a second incretin analogue based treatment (liraglutide) introduced. I informed the hospital trust R&D manager of my intention to recruit a third group, to purposively sample participants with more recent experience of starting incretin analogue therapy, especially within primary care. This strategy allowed me to enrich the data and assess whether their insight would differ significantly from the data already collected (Holloway and Wheeler 2010; Kitzinger 2005; Barbour and Kitzinger 1999).

3.6 Conducting focus groups and group dynamics

Each group of five participants was held in the venue described with the same colleague taking notes, facilitated by myself and audiovisually recorded. All participants were aware from initial contact and supporting information of the aims of the research. I had discussed during the consent process that they were invited as part of a focus group to meet and discuss with others, their experience and the impact of using incretin analogue therapy, they had all therefore had time to reflect and came prepared. As each group arrived I introduced them to my colleagues recording the discussions, highlighted the position of cameras and microphones and offered refreshments. As facilitator of all the groups, I began with a similar introductory sentence thanking everyone for their time and willingness to share their experiences, reminding them that they were the experts and that my role was to gather their combined ‘gems of wisdom’ with a hope to use the information to improve future practice. I described the combined years of living with diabetes and months of incretin analogue therapy use within that group to emphasise their expertise and shared knowledge. I explained that in wider use a percentage of individuals found side effects of this new medication difficult and invited the group to discuss their own experiences and any strategies they had developed to overcome problems. I facilitated and encouraged open discussion allowing ideas and themes to emerge, ensuring all participants had the opportunity to contribute (Greenbaum 2000; Krueger 1998a). A semi-structured interview guide (appendix VI) ensured all topics were addressed.

Each individual has a different story, their interactions with others in a group or with a researcher will inform how they choose to tell that story and external influences may impact differently in each situation. Despite my best efforts each

of the groups had disruptions or delays described below that will have impacted on the participants and my facilitation of discussions.

The start of the first group (g1) was delayed over 30 minutes waiting for my colleague note taker to arrive. This proved a fruitful time to allow participants to relax and introduce themselves over refreshments, these interactions were not recorded nor any notes taken. When she arrived we moved quickly into starting the focus group discussion and recordings, initially the participants became reserved and felt the need to take turns to contribute, the spontaneity of the earlier exchanges having been lost. However with prompting a lively discussion developed of how to manage appetite changes in a social setting and how attitudes to food had been shaped by childhood and other experiences (Kitzinger 1994). The resulting recording and data collection was the shortest for this group lasting 45 minutes.

For the second group (g2), many of the group arrived early and were greeted by my colleague who introduced herself over refreshments. I came directly from clinic without time to change out my nurses' uniform. The wife of one of the participants asked if she could join in, as she had recently been diagnosed with diabetes, the other participants agreed and welcomed her and another of the participants in this group was an HCP. On reflection these three factors influenced the group dynamics making it more difficult keep the focus on the participant experience as expert users. After the initial introduction and invitation to share experiences, a lively exchange about benefits of treatment and improvements in diabetes control or weight loss ensued. However, after 40 minutes, the wife who had asked to watch and listen began answering for her husband and referring to herself as the 'food police'. Drawing in a participant who had been quiet, I realised too late he was irritated by her comments and he

became quite challenging. This exchange unsettled the whole group, it took a few minutes to bring the group back to sharing experiences and the research question (Goodman and Evans 2006; Joseph *et al* 2000). More clinical issues were discussed within this group, possibly because I was in uniform and it included another HCP who was inclined to intervene with clinical responses. However, I was able to use the group dynamics to refocus the discussions which, perhaps to compensate for the previous dominance were lively and varied (Joseph *et al* 2000; Kitzinger 1995). The group lasted one hour twenty five minutes

The third group (g3) was also delayed waiting for late arrival of a participant. Recording started as the group assembled so introductions and explanations were captured. After allowing ten minutes I began the main group discussions, we were interrupted twice first by a fire alarm test and again when the last participant arrived. Despite these interruptions this group quickly settled into sharing their experiences. As two of the participants were relatively new to incretin analogue therapy they were still coming to terms with its action and the impact it had on their eating pattern was still fresh. The value of the group exchanges in recognising the impact and support from others in the group was evident (Joseph *et al* 2000). Interesting exchanges related to side effects of other diabetes treatments as well as benefits of incretin analogue therapy provided lively discussion only halted by arrival of tea and refreshments. Discussions continued over these refreshments, the meeting lasted one hour forty five minutes.

3.7 Approach to data analysis

Following each focus group, the note taker and I exchanged initial thoughts on group interactions, important themes and if anything could be improved for

subsequent groups. I ensured the discussions had been successfully recorded and saved securely, watched the recording to check all aspects had been clearly captured and to reflect on my facilitation of the meeting, making notes whilst all was fresh in my mind. Any new ideas were noted to integrate into the schedule for future groups (Kitzinger 2005; Krueger 1998c).

Duggleby (2005), Webb and Kevern (2001) highlight that despite group interactions being the generator of data in focus groups, these interactions are rarely analysed or reported. However, Morgan (2010) suggests that although: '... saying that the interaction in focus groups produces the data is not the same as saying that the interaction itself is the data' (Morgan 2010, p.718).

I used two different phases to analyse the data. Firstly to ensure I captured the group, its dynamics and influences and early themes to feed back into ongoing data collection and later in more depth the individual story. Initially I watched and listened to the recordings several times in order to immerse myself in the data, first for an overview, then watching the ebb and flow of conversation and interactions and a third time listening more intently for emerging themes (Richards 2009; Pope and Mays 2006). To capture the focus group interaction I imported the audiovisual recordings into NVivo 9 research software. Using the computer software package facilitated coding of sections of the recording relating to specific topics of discussion enabling frequent replay to observe concordance or disagreement within the group setting (Kitzinger 1994). As three cameras had captured the group from different angles I could assess non verbal communication and reactions of all participants and make appropriate notes and memos to include in analysis (Lehoux *et al* 2006; Duggleby 2005; Hyden and Bulow 2003; Webb and Kevern 2001). Whilst I was absorbing the broad overview of the group interaction, I organised for the first two recordings to be

transcribed verbatim by a professional NHS secretary ensuring confidentiality and independent verification of the text. I checked the transcripts for accuracy against the original recordings, substituting pseudonyms and anonymising all identifiable aspects of participant contributions then imported into NVivo. I was able to share pseudonymised transcripts with my supervisors to discuss coding and emergent themes whilst maintaining confidentiality.

To change the focus from the broad overview of the group to allow the voice of each individual to surface (Morgan 2010; Duggleby 2005; Kitzinger 2005), I read the transcripts and hand coded them (Richards 2009; Krueger 1998c). These codes were added to the project in NVivo as nodes, and the pseudonymised participant log as cases. As each group was recorded and transcribed I immersed myself in the data again, watching and listening to the recordings and re-reading transcripts to discover themes revealing the impact of incretin analogue therapy and how these participants integrated this into their lives. I was now so immersed in the data that I found reading and coding by hand allowed me to follow threads and amalgamate codes into categories and eventually themes, moving up from the data (Richards 2009; Miles 1994). These insights were input into NVivo which allowed me to cross check consistency of coding across time and transcripts, display coding densities and integrate the different strands of analysis. These themes are presented with extracts of the participant contributions in the next chapter.

3.8 Summary

In this chapter I have explained the path that led me to the research question, how and where I conducted the study and my method of data analysis. I provided a short introduction to the participants, their voices will explain in

chapter 4 their experience of GLP-1 analogue therapy and changes in appetite and diet.

Chapter 4 ‘I used to eat and eat - now I just eat less’

4.1 Introduction

In this chapter I present my analysis of the data set within a framework of existing evidence and understanding. Three broad themes emerged from analysis; the experience of ‘A Changed Relationship to Food and Eating’ set in context with links and interactions to both ‘The Medical Experience’ and ‘Social, Cultural and Emotional Influences’ (figure 1). Effective self-management of diabetes requires an integration of all aspects of the ‘routines of daily living’ (Anderson and Funnell 2010) so references to food and eating and the medical experience are entwined in every aspect of the analysis and are expressed within the context of each individual’s social, cultural and emotional influences of their life-course (Bisogni *et al* 2005; Devine 2005). Extracts focussing primarily on each theme will be discussed below.

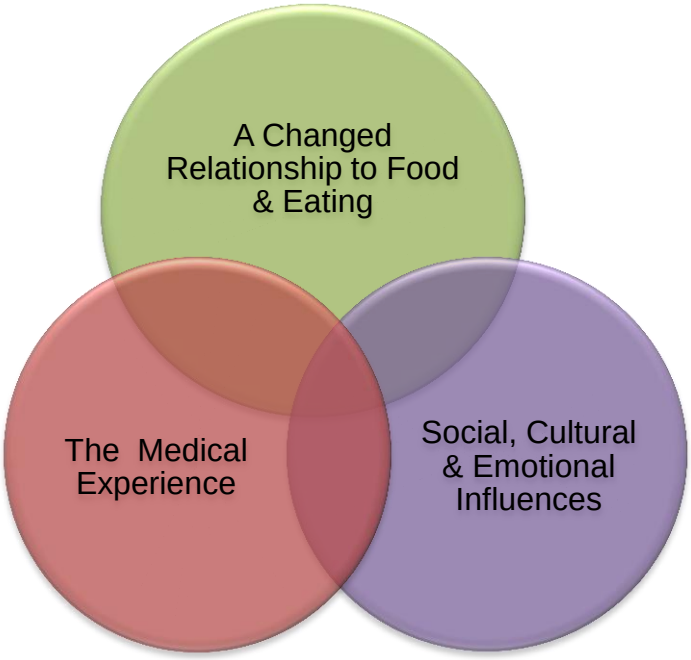

Figure 1 Three themes

4.2 A changed relationship to food and eating

Food is necessary for survival yet excess causes increased health risks (Smith 2002). The global rise in diabetes has shadowed a rising trend in obesity fuelled by an increasingly sedentary lifestyle and changes to traditional diets (Malik *et al* 2012; Hu 2011). Similar rapid changes to a less active lifestyle and greater access to energy dense foods has been mirrored in the UK during the latter half of the twentieth century, the life of the study participants. Delivery of diabetes services, including education and support has evolved as evidence and resources allowed (Davies *et al* 2008; Deakin *et al* 2006; Trento *et al* 2004; Funnell *et al* 1991). Consequently experience of dietary advice and support for self-management, which underpins all other treatments in diabetes, has varied according to time and location of diabetes diagnosis for the study participants. Peel (2005) highlights research by Sullivan and Joseph (1998) that people living with diabetes find the suggested dietary changes the most difficult aspect of their self-management to initiate and maintain.

4.2.1 Satiety

Hunger and appetite

Some participants experienced dramatic changes in appetite that helped many achieve lifestyle changes that they had previously struggled to implement. Johnny described his insatiable hunger despite eating large meals before starting GLP-1 treatment:

> The injections lowered my appetite so I cut down on my portion size, ... because I could pile my plate high with a 12 - 14oz steak with a big jacket potato and loads of veg and a big pudding and still feel I wanted more. ... Now I have trouble getting through a 4oz steak with a small helping of veg and a small jacket potato ... and the sweet comes maybe later in the evening.

Johnny's comments prompt Mark to recount with passion how hungry he used to be. He raises his voice with anger at the end of the phrase:

> That's the area that I've noticed a change in... before I came onto exenatide, I was on quite high insulin and I was always hungry and I could finish a meal and still feel hungry.

Mark expands on the consequences of constant hunger and his drive to eat:

> ... of course because you feel hungry, if you're busy you don't think about it you just grab something and you're eating all the time. … but that constantly feeling hungry has gone ... at times we'd gone out and have a meal ... before we'd get back home I'd be thinking I've got to have something to eat, ... it was a real hunger.

He considers the change was an effect of GLP-1 treatment not his own volition:

> ... that has totally gone I just don't feel that anymore and I can only, I put that down to exenatide, that's not me saying I'll cut this out I'll cut that.

Sophisticated physiological mechanisms including satiety and satiation help maintain energy balance and a healthy body weight (De Silva and Bloom 2012; Benelam 2009). However, in T2D the complex balance of metabolism is disturbed (Nolan *et al* 2011; Stumvoll *et al* 2005) including reduced levels of incretin hormone GLP-1. This may explain these descriptions of hunger and lack of satiety and subsequent reversal, as research has shown that the physiological actions of GLP-1 including reduction in hunger and increase in satiety are diminished in T2D (Nauck 2009; Holst 2007; Druce *et al* 2004). Johnny feels that GPL-1 treatment has helped him discover a previous unknown sensation of satiety:

> ...that was the best thing that happened to me, because I can never remember not being hungry. You know always eat a meal and I'd feel hungry... If I don't eat I don't feel hungry, the minute I put food in my stomach I feel hungry.

Others in the group agreed with Johnny that they had lost the sensation of constant hunger. Linda arrived after this exchange but she recounted the same experience. She expressed concern that her 25 year old son experiences a similar lack of satiety:

> ... I'm never ever full up. I could eat all day long and I never ever felt full up. My son is 25 and his wife will say '... what's the matter with you?' and he'll say 'well I'm not full, I don't feel full' and that's how I was I could have ate meal upon meal and it was ... surely you're not hungry? Yeah and it was actually I'm starving!

Linda reported that after two weeks of GLP-1 treatment the hunger constant disappeared:

> Two weeks then all of a sudden overnight and I went from I would have raided anything I could have eaten to actually no I don't feel hungry.

Johnny reiterated his experience to support Linda, whilst Mark raised his voice to emphasise his point:

> Johnny: You actually get the hunger pains ....I'm abnormal there's something wrong with my wiring in my brain
>
> Mark: It really is HUNGER, it's not just 'I fancy something' I've got to eat**.**

The orexigenic effect and weight gain associated with insulin and sulphonylurea treatment of T2D is well documented (Nayak *et al* 2010; UKPDS Study Group 1999, 1998d), whilst hyperglycaemia as such may also increase appetite (Cugini *et al* 1996). This lively discussion around changes from a previous insatiable hunger to satiety in g3 was mirrored by some but not all in the other groups, although all spoke of feeling full. Betty in g1 also experienced a dramatic change in her appetite:

> I like food I really like food and then was like 13 stone ....so Dr P give me my new injection ... I lost a stone first couple of injection. And I used to eat and eat and now I just eat less.

Adam disagreed, he did not recognise having experienced hunger but did acknowledge that he was renowned for eating large portions, something he is no longer able to do:

> I can't remember ever being hungry... because I used to eat an enormous amount. When we go to see people who have been used to cooking for me in the past 'oh Adam's coming let's make sure there's plenty in'.

He added that he still enjoys his food:

> But I almost obtain an amount of almost sensual pleasure from eating. I like eating and I like food. I don't think I've ever eaten because I'm hungry I eat because I like food and it's something I enjoy.

However, for some this new found satiety is not without consequences as now explained.

Lack of interest in food

Linda is still adapting to these changes after only three months of GLP-1 treatment:

> I never actually fancy anything, it's like well what shall we have for tea? Actually It wouldn't bother me if I didn't have anything at all ...so that yea whereas before I'd be cor what am I going to have but now it's like I don't fancy anything at all it's a case of you know you have to eat so you eat it.

After nearly two years of GLP-1 treatment Cath and Ruth still have little interest in food and find it difficult to think what to eat:

> Cath: I used to have a um good appetite, I wouldn't say I'd always eaten a lot, ... I've only had breakfast, dinner, tea or lunchtime and dinner in the evening. ... My eating habits have changed quite a lot because I find now a lot of things that I used to like I now can't eat which is a bit odd I feel.

> Ruth: I find I don't really get hungry as such until the evening really. Sometimes I can have just like maybe a biscuit for my breakfast and take my pills and then I won't eat until the evening because I'm just not hungry.

Adam also acknowledges a lack of interest in food and admits that he eats because it's meal time rather than because he is hungry but reflects that this has always been the case:

> But still there is that question that I eat cos it's breakfast time or lunchtime or supper time. .. I might not fancy anything to eat in the evening but I've got to have something because I've got to have my tablets and I've got to have them with food.

For further examples and discussion of the emotional and social consequences of these changes see section 4.4.

Recognition of Satiety

Although studies of GLP-1 treatments describe the physiological mechanisms of increased satiety, how this is recognized by the individual is not discussed

(Barnett 2009; Nauck 2009). However, authors from other disciplines have explored satiety from physiological, societal, behavioural and external factors (Benelam 2009; Booth 2008; Kral 2006; Ello-Martin *et al* 2005; Diliberti *et al* 2004).

One of the aims of the EAT study was to explore whether the experience of these participants could inform future support and advice. Betty (*some clinical details removed to protect participant anonymity)* vividly described how her appetite changed once she started on exenatide:

> I used to eat and eat and now I just eat less and if I feel like hungry, more... I couldn't even finish me plate I just left it. My tummy does actually say 'O yes, I've completely had enough' and I can't eat any more.

This change in behaviour after a lifelong struggle with attempted dietary restrictions has helped Betty achieve a 17.9 kg weight loss, and significantly improved her glycaemic control despite stopping insulin. She also reports it has transformed her life, she is more alert and active as a result, she is proud of her success:

> So now and now I'm nearly down to ten and a half stone…. I used to be in extra large clothes could never get in jeans and now I can get in jeans now and I'm sixteen in clothes and I've lost quite a lot in weight.

Luke had been prescribed GLP-1 treatment seven months earlier, he initially had side effects so his dose was reduced for a few weeks. Dose titration at initiation of exenatide or liraglutide is recommended to reduce gastrointestinal side effects (Blonde and Montanya 2012). He described recognising that he needed to adapt his portion size when the dose was increased again:

> ... but I couldn't eat as much, you get a lot of pain in your stomach, and feeling sick, so I stopped eating that much ... I never got it so I had the pain in my stomach or the sickness.

However, others had difficulty recognising the sensation of satiety. Gerald described an initial improvement in diabetes control without weight loss, until a hospital admission after seven months on exenatide. His comments below highlight that hospital portion sizes helped him readjust:

> Oh that was the best three weeks I've ever had, lost a stone and a half. There's nothing wrong the food here, no I mean it, … but it's great food.
>
> Roz: Because of the smaller portion? I remember you saying to me that you got home and said to your wife 'why are you giving me this much food I don't need it'.
>
> Gerald: yes yes I get this on Sunday you know, five veg, one potato and the meat, and I say why is it five veg? I say chop it in half that's too much for me.

Gerald's experience challenges current UK guidelines for long term incretin use CG87 (NICE 2009) and NICE diabetes pathway (2012), which recommend withdrawal of incretin therapy if 3% weight loss and glycaemic targets are not met within six months. Conversely Bob connects an improvement in his glycaemic control with the ability to recognize the satiety triggers which then triggered weight loss:

> ...weight never came off until my HbA1c came below 6. Now I'm down to 5.2 and the weight is just falling off. Because to me that's when the appetite suppressant in Byetta started to work for me ... but it was noticeable that I didn't want the evening meals.

4.2.2 Changes in behaviour

Another of the study aims was to explore what changes people made in their eating patterns or food choices in response to GLP-1 treatment and any strategies they had developed to avoid side effects of medication. The participants had all found it hard to follow the currently accepted healthy eating guidelines (Diabetes UK 2012; NICE 2012, 2008) until starting GLP-1.

Smaller portions

Many authors attribute increasing portions sizes of energy dense foods against a background of reduced activity to be the major contributing factor to

increasing obesity and associated T2D (Sharp and Sobal 2012; van Kleef *et al* 2012; Chandon and Wansink 2007; Ello-Martin *et al* 2005; Diliberti *et al* 2004; Mitchell 1999). GLP-1 therapy has helped participants in all three groups reduce portion sizes. Johnny explained how he achieved this at home and Linda agreed that portion sizes are important:

> I changed my dinner plate sizes. .. I went down to a smaller bread and butter plate. It's much smaller and it looks nice and full but the portions are half of what would be on a normal dinner plate, it works though portion control is the answer to most of it I think.

Laura also mentioned she had changed her plate size, which makes her meal appear more palatable but the thread was not picked up by anyone else in g2:

> I swapped my plates, I only have a plate about that big now, a side you see it on a smaller plate, it looks enough, a lot, yes if I have a meal or something like that I just put it on a small plate and that's my plate now.

Although larger cereal bowls and wine glasses have been shown to increase consumption (Sharp and Sobal 2012; van Kleef *et al* 2012; Sobal and Wansink 2007) research has not confirmed this effect with plates (Rolls *et al* 2007). It is of interest therefore that Johnny, Laura and Linda, reduced plate size after starting GLP-1 treatment as a response to smaller meals rather than as an aide to reducing portions, commenting that their food looks better on a full plate.

Gwen spoke for Lionel highlighting that he eats much smaller portions:

> ... portion control is far better now. He knows when he's full when he's had enough whereas a year ago he could eat a massive great plate full now he'll only eat half of that amount.

Maud and Bert a retired couple also found they were eating smaller meals, Maud spoke while Bert nodded affirmation:

> I find that smaller meals are the answer, and if I don't want it I'll just leave it.

Adam explained when he prepares his own food he has a smaller potion:

> ... I'll have a small sandwich and I've started doing things like making a sandwich with one slice of bread instead of two, so half a sandwich and I find that is normally plenty.

He contrasts this with perceived portion size when eating outside the home and acknowledges that he is recognising cues to eat less but returns to his difficulty in achieving this in a social setting:

> ..if you go somewhere, ... you say no I'll just have sandwich they will automatically do four slices and make it four, two sandwiches because that to most people is seen as a portion of sandwich. So that's the way I find it that really it's encouraging me to want to eat less although actually eating less is not as easy as it ought to be.

Rolls and colleagues (2004) investigated varying sandwich size and energy levels to study satiety. Other researchers have linked increasing portion sizes and energy density to obesity (Ello-Martin *et al* 2005; Ledikwe *et al* 2005; Young and Nestle 2002).

Reduced cravings and grazing

Craving is an intense desire to eat specific foods and is often thought to be linked with dietary restriction, poor dietary compliance and frequent snacking (Pelchat 2002; Weingarten and Elston 1990). Recent studies have shown food cravings to be associated with active dieters (Massey and Hill 2012), higher BMI in the Diabetes Prevention Trial (DPP) and more common in younger people (Delahanty *et al* 2002). Several participants commented they had noticed a positive reduction in food cravings or grazing behaviour since starting GLP-1. Linda commented:

> I haven't craved anything .. I very rarely now touch chocolate and that's not because I think oh that's bad for me, because I'd have eaten it regardless. ... I was terrible for chocolate and crisps, really bad and there can be crisps in my cupboard now for, well till they're eaten by somebody else ...and I don't crave the chocolate.

This prompted others in g3 to talk of their previous love of chocolate and how much they could eat, Cath started:

> I used to be a chocoholic, I used to eat Galaxy and there was always a Galaxy in my fridge always, and I'd take it out a whole slice [row] and I'd sit and eat it watching telly.

The conversation evolved as a competition, with Linda stressing she would easily eat a whole family bar and Luke boasting that he used to eat two. Adam preferred packets of sweets but could now make them last longer. These accounts are in concordance with reports that chocolate, savoury snacks and energy dense foods are the most commonly craved foods (Massey and Hill 2012; Rogers and Smit 2000). McVay and colleagues (2012) suggest that cravings are more common in women or limited to younger age group, yet the discussions of cravings within these groups were distributed across gender and age range. Mavis one of the older participants cited an example of buying unsuitable foods on impulse after an evening out for a drink with friends, however she is now able to resist eating them:

> ..... in the morning I open my fridge and there's a big strawberry gateau ...I've gone into the shop. All these things I know that I can't have up here and I've looked and I thought why did I do it? Where the hell did this come from ... I've had to ditch it because ... I know if it was there too long I could look at it for so long.

Mavis attributes this self-control to her GLP-1 treatment however, previous diabetes education and dietetic support could also explain her restraint as weight management programmes have been found to assist people in resisting cravings (Massey and Hill 2012; Gilhooly *et al* 2007). Not all the participants recognised food cravings, but there was a general consensus that they had reduced between meal snacking or 'grazing' especially in the evenings.

Speed of eating

It has been argued that our fast food culture, the demise of family meals and trends towards eating 'on the hoof' have contributed to the obesity epidemic. In France policy makers have reversed the obesity trend by promoting the use of locally grown produce in schools. French family style eating is encouraged with

long lunch breaks and traditional three courses rather than fast foods consumed sitting around table (Bertin *et al* 2012; Dubuisson *et al* 2010; Rozin 2005). Research has shown a positive association between eating quickly and increased body weight (Maruyama *et al* 2008), an independent association with insulin resistance (Otsuka *et al* 2008) and more recent work has linked this with T2D (Saito *et al* 2012). Discussions around changes in speed of eating occurred in each of the three groups with participants commenting that they were eating more slowly since starting GLP-1 treatment. Mavis raised the topic by asking if it was coincidental that she eating more slowly, all in g2 recognised this association.

> Mavis: Is it coincidence since I've been on this drug that um my speed of eating has gone to minimal?
>
> Bob: Slow, I'm the same.
>
> Mavis: ... and it never was ... I cannot believe how long I'm just, just, into my meal and my daughter's taking the plate away.
>
> Laura: I thought that was just me eat slow … my partner finishes his and I'm still eating mine and he has more.
>
> Bob: I'm always last to finish…whether I eat at home, eat out, eat in a restaurant or whatever, I'm always last to finish.
>
> Gerald: Yea I'm the longest to eat in my house.
>
> Lionel: I'm always last.

Adam and Maud had also noticed a change and Bert agreed but Betty thought she ate normally whilst Ruth was not sure about speed of eating, she thought it was related to lack of appetite:

> Adam: Yes, yes, I'm often the last to finish now which I never used to be. As a child I was always told nobody is going to take it away from you don't eat so quickly and now, … but I still do that um but I'm yes eating more slowly…I almost always used to be first and now I'm last.
>
> Maud: Yes, I eat slow anyway. I'm always last to finish, yes no matter how big me portion is I'm always last to finish.
>
> Ruth: I find I don't really get hungry as such until the evening really.

Ruth's thoughts that lack of appetite contributed to speed of eating were mirrored in an exchange in g3. Cath suggested not having an appetite for food and eating more slowly impacted on the portion size, Linda endorsed this with frequent interjections and non verbal signals. However, for Mark conventions of social eating posed difficulties, if he was satiated ahead of other diners with food still on his plate, he would move food around thus he appeared to be eating slowly. Luke did not agree that he ate any slower:

> Cath: Well I think because I'm not hungry I'm not eating so fast anyway and I think that's another contributing factor, the fact that you can't finish what's on your plate, because if you eat slower anyway and you haven't particularly got the appetite for it in the end you say 'I've had enough of that' and you give up don't you?.
>
> Mark: Only that sometimes you're getting towards, if you're out for a meal, you've sort of reaching your limit and you start pushing it round a bit because everybody else is still eating ... not necessarily eating slower but as I say at that stage you don't want to eat you can't but you don't want to just put your knife and fork down. But I don't think I eat any slower.
>
> Roz: What about you Luke have you noticed a change?
>
> Luke: If anything I eat quicker
>
> Roz: You eat quicker?
>
> Luke: Yeah ... yeah then, of course, I can't finish it.

This link between speed of eating, satiety and anorexigenic gut hormone response has been confirmed by Kokkinos and colleagues (2010) who found that eating at a moderate pace has a greater effect on satiety but not hunger, whilst a study retraining obese adolescents to eat at a normal pace reduced weight and had a significant impact on the gastrointestinal hormone response to food (Galhardo *et al* 2011). The experiences related by participants that this dissertation is based on afford some insight into the differing effects of GLP-1 analogues on satiety and hunger.

Mark commented on a positive effect of GLP-1 treatment, he has more enjoyment of food because he is not eating just to satisfy his physical hunger:

> Mark: I think I enjoy my food more now, because previously I was just hungry and it didn't matter what it was I had to eat. Now I feel 'Oh I could quite fancy that tonight,' perhaps it's because... I've been picking and choosing. Whereas if that had been twelve months ago. We'll have to have something for tea, I'd have just looked at what was on the shelf and thought that'll do!

Lowe and Butryn (2007) distinguish eating for pleasure which they term hedonic hunger as opposed to eating to satisfy a physical need. Others in the group especially Linda endorsed this change from a compulsion to eat because of physical need with verbal and non verbal signs. Mark reflected that he felt this was a positive change:

> ... but I think now I stop and think more carefully about what we're going to eat and I think we could have a bit of that and that'd be nice or I could just fancy that. I hadn't really thought of it before but now I do actually pick and chose a lot more about what I eat and what I don't eat.

The remark from Mark also illustrates how the nature of the group discussions appeared to enable participants to both recognise and articulate their experience of how their eating habits had changed after starting GLP-1 treatment.

4.3 The Medical Experience

This theme encompasses contributions relating to practical and medical aspects of GLP-1 treatment, glycaemic control, medications and side effects.

4.3.1 Medications

Polyphamacy for treatment of diabetes, to prevent or ameliorate complications and concomitant conditions is common in diabetes management (UKPDS Study Group 1999). For many of the participants a major benefit of starting GLP-1 treatment was not only improving glycaemic control and losing weight but being able to reduce their other medications, all of which have potential side effects

(Campbell 2011; Barnett *et al* 2007; Bailey 2000). The participants linked their experience of GLP-1 treatment with their day to day management of living with diabetes confirming Anderson and Funnel's (2010, p.278) assertion that not only do people living with diabetes provide 98% of their own care but that:

> The greatest impact on the patient's health and well-being is a result of their self-management decisions/actions during the routine conduct of their daily life.... Diabetes is so woven into the fabric of the patient's life that many, if not most, of the routines of daily living affect and are affected by diabetes and its self-management.

Johnny exemplifies this when he discussing his blood sugar readings:

> ..they were up a little bit last year because of the surgery ...I doctored the medication myself by adding the gliclazide with the metformin, ... that combination is spot on, no hypos, no feelings of having a hypo, ... My sugars can go as low as 4.5 which is great when my sugars are measuring like that I feel great, I'm so full of energy I can't stop.

Johnny's comment reinforces the significance for individuals and their healthcare advisors of managing or avoiding hypoglycaemia. It is a common limiting factor in achieving good glycaemic control (Bailey and Day 2010; Amiel *et al* 2008) and has a significant impact on quality of life and self management but can be overlooked in T2D (Barendse 2012; Farmer *et al* 2011).

Side effects of diabetes medication

Several participants reported nausea and vomiting associated GPL-1 treatment particularly in the beginning but all felt it worthwhile persevering as symptoms subside over time. Johnny and Ruth had been changed from exenatide to liraglutide and found the vomiting improved. Bob and Lionel felt eating too much could trigger nausea or vomiting:

> Bob: I do feel nauseous sometimes in the morning. I've been physically sick twice and that was purely from eating too much.

Cath described a background of nausea but had found a ginger biscuit could help and Johnny found dry cream crackers also helped and were not so sweet, Linda reported the nausea was similar to morning sickness of pregnancy:

> That's how the sickness is with me you know and I have had morning sickness you know, that's what it feels like that morning sickness feeling ... 'Well it's not every single day, it's not all the time, but the majority of it is, … but then it's 'Oh my God' that sickness thing … there's no pattern of it triggering.

Linda who had the least experience with GLP-1 treatment (three months) and of living with T2D (four years) was still struggling to recognize a pattern. She felt pain killers for a back injury and anti-hypertensive medication made her nausea worse. However, as the discussion continued she acknowledged that fatty foods and portion size were contributing factors. Betty, Maud, Bert, Gerald with three to four years GLP-1 use and Mavis seventeen months use were not affected by nausea. Mark found leaving a gap between his exenatide and other medications lessened his nausea:

> I've found the way for me, to deal with that I take my insulin and exenatide and then about 20 minutes later I take the rest of my medication then I move onto the food after that. ... I found by breaking the medications up into two lots that's ... sort of stopped that nausea.

Mark found a really positive benefit of exenatide, was that he rediscovered clarity of thinking and an ability to concentrate:

> When I was on insulin I found, what I describe as hard thinking impossible, I couldn't concentrate, I couldn't really think in straight lines once I got onto exenatide, within days it was like a fog lifted I could think, I could do things, I could plan things which I hadn't been able to do and that was liberating in all kinds of ways and for me it's, just sort of, changed my life from being 'Oh I'm a diabetic' to suddenly I can do things and it's been absolutely brilliant for me.

This effect disappeared when Mark changed to liraglutide but returned when he changed back to exenatide. Betty also thought she felt brighter and more alert after she started exenatide however, none of the other participants mentioned improved cognition although Johnny nodded in agreement.

An association between cognitive dysfunction and diabetes has been recognised, with hypo and hyperglycaemia, micro and macro vascular complications, vascular risk factors, depression and genetic factors all being implicated as contributing to impaired cognition (Blaak *et al* 2012; Reijmer *et al* 2010). Studies of effects of improving glycaemic control have demonstrated improved memory (Ryan *et al* 2006; Mussell *et al* 2004), whilst animal studies with GLP-1 analogues have shown improved learning and memory (Hamilton *et al* 2011; Isacson *et al* 2011; Abbas *et al* 2009), there is a paucity of evidence addressing this issue in humans. Lerche and colleagues (2008) postulated that GLP-1 may limit variations in intracerebral glucose thus providing a neuro-protective effect, these mechanisms are currently being investigated in trials of neurodegenerative and cerebrovascular disorders (Salcedo *et al* 2012). Although liraglutide studies showed improved quality of life there was no significant improvement in cognitive functioning which could not be explained by improved glycaemia (Bode *et al* 2010).

In UK clinical practice GLP-1 treatment is added in addition to metformin, sulphonylurea and increasingly insulin. If improved glycaemic control is achieved with GLP-1 treatments the other medications maybe reduced or stopped (Barnett 2011; Thong *et al* 2011; NICE 2009). As part of their discussion of side effects several participants referred to other diabetes medication particularly metformin and insulin, there is not space within this report to explore these in depth. However, I provide some examples as they elucidate the lived experience of incorporating GLP-1 therapy into the treatment pathway and a personal perspective of balancing iatrogenic effects versus benefit. The revelations provide fresh insight into the daily aspects of living with

diabetes and integrating medications and lifestyle changes into everyday routines (Cobden *et al* 2010; Handley *et al* 2010).

As described in Chapter 2 metformin is recommended as first line medication in T2D, nausea and diarrhoea are recognised side effects particularly if not taken with food (Donnelly *et al* 2009b). Several participants expressed acute physical and social distress as a result of these gastro-intestinal disturbances, they were relieved to be able to reduce metformin after the introduction of GLP-1:

> Mavis: I've been down in the middle of town and get this pain and sometimes if you can't get to a toilet you are in trouble. I mean I had the sweat just dripped off me with pain and anxiety trying to get somewhere safe ...and it just goes on until you say I can't stand it ... Because I get these cramps ... the pain is unbelievable … with Metformin.

A referral to secondary care for medication review and initiation of GLP-1 treatment helped Mavis and Cath:

> Mavis: I was on 2000 a day [of metformin] and he cut it to 1000, which is one in the morning 500 and 500 in the evening…I dropped 500 and just take the morning one and the pains have gone.

> Cath: Well I started off on metformin when I was first diagnosed, but I had awful problems with it, the ordinary metformin. It just made me sick ... I couldn't even go out for a walk, cos usually I needed the loo, I was just in an awful state so the doctor sent me to hospital [secondary referral] and the consultant suggested that I try exenatide and that was literally brilliant.

Although gastrointestinal symptoms of metformin are known, the severity varies from mild disturbance which can be managed with dose titration or change to a slow release formulation, to the extreme symptoms described here. Mark described the work and social consequences of these symptoms and a change to insulin by his GP did not help:

> When I started on metformin I had it bad, I couldn't go to work, I didn't dare go to work, I was throwing up I was rushing to the toilet for several weeks and that's why I got moved onto insulin fairly quickly. But ... I didn't lose the hunger, even though I was throwing

> up and rushing to the loo I still felt hungry, I felt even hungrier in fact.

Despite feeling so ill, Mark still experienced hunger until he started exenatide:

> Everybody was saying to me ... 'stop eating and stop being sick' but I thought I'm hungry, I'm starving that was really, really horrible. But I didn't have that with Byetta, the exenatide. I felt a little bit if nausea but ... when I hit on the idea of spreading them out ... I found it was better.

When treatment with diet and oral agents for T2D fail the addition of insulin is recommended (NICE 2012). However, as discussed in 2.2.4 this can be associated with a spiral of increased weight gain, worsening control (Holman *et al* 2008, 2007) and for some individuals a real sense of lack of control and failure as described in the examples below by Mavis, Johnny and particularly Mark. Mavis, a petite 73 year old was distressed by the weight gain associated with starting insulin and lack of improvement in glycaemic control:

> Mavis: ...because I was really out of control on the insulin it was almost as though I'd gone allergic to it. It was having no effect what so ever I was climbing 17, 18, 19, 26 [home blood glucose readings] and I was flashing ketones which ... I know was bad ... I went up to thirteen stone and now I've dropped down to ten, ten twelve [10st 12 lb] or something like that that.

Her home blood glucose readings are now between five and seven m/mols/l, she reported a recent discussion with her family doctor:

> He said 'blood pressure perfect, cholesterol perfect, weight, perfect'. you know he said to me 'I can't believe the readings'.

Johnny and Mark in a different group from Mavis echoed her relief once starting GLP-1 treatment when they discussed their problems associated with insulin.

> Johnny: ... that's when I went on insulin, then of course that's a snowball from hell ... just kept spiralling, I kept upping my insulin I was taking because my sugars weren't under control, … This doesn't work it makes it worse, the weight just keeps going on and that's when we decided I'd go on the exenatide. I crashed the weight down and I came off the insulin.
>
> Mark: You've touched on something else there; you totally feel in control, because what I was feeling before with just the insulin and

> the metformin was I wasn't in control, I still needed more of it and I'd still feel tired, I'd still be hungry all the time.
>
> Johnny: ... you wanted to sleep all the time?
>
> Mark: Yea and you're not in control of yourself, these things are happening. Once I got onto exenatide, suddenly you're in control, I can regulate it, I can decide am I going to take 15 or 20 units.
>
> Roz: Of your insulin?
>
> Mark: Yes, I can do that and I feel I'm in charge of my life it's not this wretched stuff that I'm sticking into myself and that's been a good feeling.

Worsening control or poor disease outcomes are often attributed to non-compliance or non-adherence to prescribed treatment in chronic disease management, especially diabetes. These examples of physical, social and psychological distress associated with previous medication, relieved by changes in treatment regimes illustrate the importance of listening to the person living with a condition (Cobden *et al* 2010; Handley *et al* 2010; Williams *et al* 2009; Kripalani *et al* 2007).

4.3.2 Management of glycaemia

When discussing their improved glycaemic control on GLP-1 treatment the participants referred to blood glucose or sugar levels as well as HbA1c, most were aware of the implications of the results and some were confident adjusting their medication or lifestyle in response to their self monitoring of blood glucose (SMBG) readings. Mark and Johnny explained that they tested either to check to avoid hypos if they were not feeling well or to verify the effect of an unusual meal:

> Mark: I tend to take it if I'm feeling a bit odd or a bit off colour or if we've been out for a meal, something like that when I don't know how much of anything is in there. It's only on those occasions I'd take it.
>
> Johnny: ...when I don't feel spot ... I'll test ... nine times out of ten it's OK but I test when we have been out for a meal 2 or 3 hours after I've had my meal because that's what gives you a more accurate reading what you've been taking in.

Their use of monitoring complies with recommendations by NICE CG87 (NICE 2009) for self monitoring of plasma glucose (SMPG). Rising costs of increased incidence of diabetes have led to an evaluation of cost effectiveness of SMBG and some restriction of diabetes testing strips, particularly in insulin naive individuals (Benhalima and Mathieu 2012; Poolsup *et al* 2009; Towfigh *et al* 2008). However, Fisher, Polonsky and colleagues (2012; 2011, 2010) demonstrated that educating both patient and clinician to test in a structured episodic manner can reduce costs whilst also improving clinical outcomes. Linda reported that she lost motivation after her GP told her to stop testing her blood sugars and offered no dietary support:

> I was really good and I was doing my bloods all the time but the worse thing they ever said at my surgery was “there isn’t a diabetic diet you can have everything you want within a reason and don’t take your bloods”. So ... it went downhill I thought ... I can eat that ...I don’t have to worry about my bloods, because when I was taking my bloods it made me more aware and I’d think actually I’d better not have that bar of chocolate because otherwise .. I was better doing that ... it made me more aware that I was diabetic, but when I stopped that I crept back to where I was before. I’d just eat anything and whatever, didn’t really think about it.

Cath also reported that her GP had told her she was not allowed to test and she now feels disempowered.

4.4 Social, Cultural and Emotional Influences

Delormier (2009) and Crotty (1993) express concern that the science of nutrition and policies to address dietary change too often overlook the social, behavioural and cultural aspects of food. Crotty (1993, p.109) suggests that:

> ... the act of swallowing divides nutrition’s “two cultures”, the post swallowing world of biology, physiology, biochemistry and pathology, and the pre-swallowing domain of behaviour, culture, society and experience.

In sections 4.2 and 4.3 I have explored contributions mainly describing practical and physical aspects of diabetes, medications and eating or the post swallowing

culture. In this section I include comments from participants which elucidate the latter domain.

4.4.1 Emotional and social aspect of living with diabetes

The participants chose to describe significant stages of their diabetes journey to add context to their current experience. I provide a brief selection from many that illustrate how diabetes is woven into all aspects of their individual life and relationships (Anderson and Funnell 2010; Davies 2010).

Impact of diagnosis and symptoms

Reactions to a diagnosis of diabetes are variable with many individuals adapting quickly, others are relieved there is explanation for recent ill health, whilst some experience shock and distress (Vermeire *et al* 2007; Snoek and Skinner 2006; Peel *et al* 2004; Pibernik-Okanović *et al* 1996). Davies (2010, p.607) highlights that whilst coping with the 'lifestyle and intellectual challenges' of a new diagnosis, they must also come to terms 'the emotional consequences of being diagnosed and living with a chronic, progressive condition'. Studies have shown an increased incidence of psychological ill-health with a two to four fold increase in depression (Davies 2010; Ali *et al* 2006), whilst Fisher and colleagues (2012; 2010) have highlighted that DD is in its self an added burden. Within this study Cath, Linda, and Mark described the effect of diagnosis and associated symptoms on their lives, these highlight the emotional distress and social impact of diabetes:

> Cath: ... sleeping all the time it was dreadful, dreadful. When my diabetes first started I was on that metformin and it was just, life was miserable, it really was miserable.
>
> Linda: When my diabetes first started my kids would say '*Mum you are so lazy why are you going to bed all the time?'* and I'd say 'I cannot, I can't literally, I cannot physically stay awake', and for a couple of hours I was out literally out solid.

The value of family support adapting to diabetes, integrating and maintaining lifestyle changes is well documented (Franks *et al* 2012; Gunn *et al* 2012; Vermeire *et al* 2007). Linda felt unsupported and distressed that her children were critical when she was too tired to cope and her mother unsympathetic:

> 'Well you're never going to sleep tonight' my Mum would say to me, ... well I'm awful, useless, I literally could not stay awake it was, I've got to go, I've got to go to bed.

Like Linda, Mark described that his family and friends were critical and did not understand his hunger or exhaustion and Johnny explained that his long term partner, despite being supportive had trouble understanding:

> Mark: I was feeling hungry when I got up and people would say 'what are you doing? You're eating too much you're sleeping all the time, you need to stop this'.
>
> Linda: Yes, I don't think they understand.
>
> Johnny: No, they don't, they don't. My partner even though he's gone through all this diabetic stuff with me for the last ten years he still has trouble sometimes understanding the problems that come with it.

Despite these negative examples focusing on of lack of understanding, there are positive examples of support from partners and family throughout this study. Mavis' daughter, a nurse, regularly visits her and discusses her diabetes management and Betty's carer oversees her overall care. Maud and Gerry have taken charge of managing dietary changes for themselves and their respective partners Bert and Les:

> Maud: When we go out I'll ask for a child's meal ... that's quite satisfactory.
>
> Bert: ...same I do as well.
>
> Gerry: I've stopped ... grazing. It's me I'm the food police really.

Lewis and Alan's wives cook and serve meals but need to be reminded to serve them smaller portions, whilst Adam's wife a diabetes nurse, always has glucose tablets ready for him.

> My wife keeps looking at the expiry dates ... .if I've not got any she's got some to hand. ... Having been a diabetes nurse she's conscious of these things and carries them about.

Realising the severity of diabetes

Adam remembered that adding in GLP-1 injections was an important milestone alerting him to the severity of diabetes and that he felt a failure.

> ..when we first went on ... exenatide ...psychologically I was pretty depressed for a bit that I was now having to do two injections a day... once you are so ill that ... need to keep having injections that's a failure

This sense of failure linked to requiring injections to control his diabetes has been recognised by many authors investigating barriers to insulin initiation and improved diabetes care (Ratanawongsa *et al* 2012; Karter *et al* 2010; Larkin *et al* 2008; Meece 2006). This reluctance by both HCP's and their patients to initiate insulin has been called 'Psychological Insulin Resistance' (PIR) (Woudenberg *et al* 2012; Wang and Yeh 2012; Polonsky 2007b; Polonsky *et al* 2005). Yet Linda felt that starting injections made her accept her diagnosis:

> I know I'm diabetic but because I've had high blood pressure since I was 25 and I've taken all these pills, so you're early diabetic, OK just take another couple of pills, not really being that aware of the fact I was. … I don't even really think about it.... starting on the injection it sort of makes you realise yes I have got it.

Mark recounted an incident also requiring injections that prompted his acceptance of the severity of his diagnosis:

> I think when it came to me, I grazed my leg …I stepped back into a wall and I grazed it ... never thought anything of it. The next night my leg felt like it was one fire, so I went to a pharmacy to get some antiseptic cream … Fortunately the young lady who was on counter said 'can I see it, make sure there's nothing wrong?' she looked at it and said 'get to hospital now, don't go home, go to hospital and see about it'.

Although shocked at her reaction he was relieved that this prompt advice and subsequent treatment saved his leg:

> I spent six weeks on antibiotics injections and all sorts of things getting it sorted, and they said it's because you are diabetic you

> are get infections much quicker and more severe, it really woke me up to the fact that I was a diabetic.

Working life

Lack of control at work, low status jobs and shift work or irregular hours have been shown to impact on health status and the ability to make healthy lifestyle choices (Smith and Holm 2010; Bisogni *et al* 2005; Devine 2005; Smith and Hart 2002). For people living with diabetes integrating diabetes management including pre-meal injections, tablets with food and SMBG into their life style whilst also making appropriate food choices adds an extra complexity (Anderson and Funnell 2010; Polonsky *et al* 2010). Although socio-economic status was not noted within this study comments by the participants who highlight these work stresses follow this pattern. Linda a community carer, Laura a school cook and Bob a paramedic all mention difficulties managing their diabetes associated with their work:

> Linda: That's when I find it's a problem for me, because I do care in the community and if I don't eat earlier in the evening rather than later it's hopeless that's when I'm really sick and it's a nightmare the later you go into the evening the worse it gets.
>
> Laura: It is sometimes because like at school you've only got quarter of an hour to have dinner. I find it very difficult, you want to get on, you want to eat it as fast as you can and that when you do that you eat slightly more.
>
> Bob: I had to tell DVLA ... I was put on the insulin and they just took all my licenses away completely, except for my ordinary basic car license which is no good to my job.

Being able to transfer to GLP-1 treatment in place of insulin allowed Bob to regain the licences he needed for his work:

> I went back to the DVLA ...said I am now on exenatide ... they just gave it me it all back again.

Adam and Mark, both professionals spoke of the unpredictability but also of autonomy within their work. Mark has integrated his medication routine into his morning work routine:

> I take my insulin and exenatide and then about 20 minutes later I take the rest of my medication then I move onto the food ... that's ... stopped that nausea... I go and do my emails or a phone calls or something in that time.

The other participants some of whom were retired did not mention any conflicts with work and diabetes.

4.4.3 Cultural influences

Eating patterns, portion sizes and norms are thought to be established early in life (Delaney and McCarthy 2011; Wethington and Johnson-Askew 2009; Devine 2005; Herman and Polivy 2005). Family meal experiences were shaped by food shortages and rationing associated World War II, 12 of the 15 participants were born between 1930's to early 1950's. Delaney and McCarthy (2011) assert that 'foundations of enduring dietary habits have been firmly set in childhood' (Delaney and McCarthy 2011, p.117), Adam encapsulates this when he described a deeply entrenched attitude to food and food waste which he attributes to his childhood experience during 1940's and rationing:

> ...as a child in the forties I suppose food was precious and I was always brought up to eat everything that was there...you wouldn't want to throw them away... that's a cultural thing that I still find very hard to change. If somebody dishes me up a plateful of food culturally it's my job to eat it.
>
> Ruth: I'm a bit like you I tend to think...I've got it so I have to eat it.

Cath although in her 60's felt guilty that she was no longer able to follow her mother's advice to eat a 'good' meal:

> My Mum always used to say 'you've got to have a good breakfast', and 'you've got to have a good lunch' and 'you've got to have a good dinner' and when you can't eat it you feel guilty.

Cath did not define a 'good meal' but from the context and later comments it may be a substantial hot meal eaten sitting at table, analogous to a 'proper meal' described by several authors (Bisogni *et al* 2005; Marshall and Anderson 2002; Murcott 1982). Cath describes what she can eat since starting GLP-1

treatment, recognising she is making healthy choices but for her it is not a 'proper meal':

> I can still eat fruit ... but I come to lunchtime and I can't even manage 2 slices of bread and butter with something in the middle as a sandwich, the exenatide has taken my appetite away and I can't even manage that. ...I'll think what am I going to have for dinner?' ... I'm not hungry I can't eat anything so very often I'll end up with scrambled egg on toast or piece of bacon on toast ... whereas before I would sit and eat a proper meal for my dinner, now it's, it's ... picking when you feel hungry.

Johnny comments that he has returned to sitting down to eat at a table draws on this concept that 'a proper meal' involves eating at a table:

> I always make a point of sit at the table to eat, I don't carry it in like I used to ... and watch telly and eat off my lap. I sit down at the dinner table every day for evening meal and for breakfast.

For all of the participants this conflict between their accustomed norms, whether portion size, speed of eating or not wasting food, and changes since starting GLP-1 was evident. Adam concludes his thoughts on food waste with the following:

> ... a cultural thing that I still find very hard to change.... I always feel that my host or hostess would be very hurt if I didn't eat all of the food that had been lovingly prepared.

This contrast is highlighted when Adam, explains that he would previously eat two meals if social politeness demanded:

> ...sometimes I would have a meal, go somewhere not realising that I was going to be fed and then simply perfectly happily eat the meal that was provided by a friend because it would be impolite not to... I might struggle with that now.

4.4.3 Emotional and Social aspects of eating and food

Eating and food choices are part of everyday activities in the home, at work and within relationships (Delormier *et al* 2009). The participants described the impact of their changes in appetite on family meals and social occasions. Luke reported his wife's concern when he cannot finish his meal:

> Luke: I can't finish it and the Missus says 'you're not hungry any more, you feel full up?' and I just say 'yeah'

> Roz: Do you find that difficult that your Missus is perhaps a bit offended or upset?
>
> Luke: Yea, she makes my favourite cottage pie ... big dish and we have like half each with a bit of veg and I can no longer eat it and she gets a bit upset. But I say 'don't worry about it I'll have it another time' and of course it comes to that other time and I don't want it because I'm not hungry.

Linda described tensions when her husband, a fisherman, returns from sea as he likes to take her out for a meal, but she worries the portions will be too big for her and cannot enjoy the occasion:

> I find it's a shame if we go out for a meal. ... there's no way I'm going to eat I know when the portions come out it's going to about a quarter and it's such a waste of money, I know I won't be able to eat it. Because my husband's a fisherman ... he's away a lot and when he comes home he likes to take me out for a meal and ... I don't want to go because what a waste of money.

Others in the group suggested asking for a child's portion or a starter as main course when eating out, but Linda was unsure whether she would feel able to do that. Linda is also experiencing extra stress with her daughter because of lack of interest in food:

> I find it hard, because it's only me and my daughter because my husband's away ... and we argue ... about what we are going to have, because she's quite fussy any way ... neither of us will eat the same and I can't be bothered to cook anyway because I don't fancy it.

Ruth and Cath mirror Linda's difficulty to motivate themselves to prepare food just for one:

> Linda: Actually It wouldn't bother me if I didn't have anything at all.
>
> Cath: I'm just the same.

Biscogni and colleagues (2002) highlight that people define themselves by their usual or preferred eating behaviours, a thread which has been evident in comments across all participants speaking of themselves as previously been known as 'enjoying food', 'a good eater', 'someone who likes their food'. Bob

explained he warns friends who knew him as a ‘big eater’ that he now eats much less:

> When I go on away on holiday with friends ... one of them she’s a fabulous cook and you know I’ve said to her please don’t be offended but I just cannot take everything that you cook I will do my best. .. what she does now she puts it on the table and lets me help meself.

Bob and Cath described that the change in their eating pattern causes concern amongst friends and family:

> Bob: When we first went there she would say that’s not enough for you. Same as the wife, she would say you haven’t ate enough ... we didn’t have really big arguments but in the end I just said look forget what I’m eating concentrate on yourself.
>
> Cath**: ...** the family come round and I cook a meal then I sit down with the family and I’ll have one little piece of potato, ... a few green beans and I might have a batter pudding and that’s all I have ... I do a roast dinner for the grandchildren and they say ‘Oh Nan what have you got on your plate?’ and I say well I can’t eat any more.

Despite a trend towards more equality in food preparation (Aarseth and Olsen 2008), participants in this study appear to conform to traditional gender roles of with women taking charge of the family diet and caring (Peel *et al* 2005; Charles 1988; Murcott 1983, 1982). The women participants appear to be making adjustments to their own diet whilst balancing needs of their spouse and family whilst the men rely on their wives to organise the food, similar to other studies of gender roles in diabetes (Broom and Lenagh-Maguire 2010; Peel *et al* 2005). This is particularly evident when both in a couple have diabetes, the women manage their partners’ diet and diabetes. However, Mark is cooking while his wife unwell, Bob enjoys cooking special meals and Johnny does much of the food preparation in his relationship.

4.5 Summary

The participants shared insights from their combined 148 years' experience of living with T2D. The data demonstrates the complexity of the often subconscious balancing act of managing a chronic condition such as diabetes which impacts on every sphere of life. Returning to the two cultures divided by swallowing referred to by Crotty (1993), it appears from the contributions of these participants that the impact a medication which acts on the already altered satiety triggers of people living with T2D blurs these two cultures.

Chapter 5 Reflections

5.1 Introduction

In this final chapter I reflect on the research process, the findings and implications. Knowledge and evidence is acquired in incremental steps which feed into cycles of research, implementation and audit, generating further questions for research. Each significant step forward may have had numerous winding paths of earlier researchers contributing to fresh insights, not all of whom have been acknowledged. The evidence base for treatment and understanding of diabetes has developed and expanded over generations and across many disciplines. New treatments have provided hope and fresh insights into the mechanisms of diabetes but also new challenges and avenues for research. My research aim was to discover with a group of ‘expert patients’ successfully using GLP-1 treatment, whether their experience could inform how changes in appetite induced by GLP-1 treatment influence dietary choices and if they developed successful strategies to moderate side effects.

5.2 Reflections on methods and methodology

The earlier research leading to development and launch of this class of treatment defined the physiological mode of action and clinical outcomes in clinical trials. Quantitative measures of safety and efficacy in large comparison RCT’s are required by regulatory authorities to inform their decision but as Hardy (2009) suggests the personal narrative and the impact for an individual becomes lost in an aggregate of means. A qualitative research methodology enabled an exploration of the experience of some individuals who had participated in one such trial augmented by other participants more recently prescribed GLP-1 analogue treatment.

The purposive sampling strategy of individuals with successful experience of GLP-1 treatment for T2D yielded, by chance, a participant cohort representative in age, gender and ethnicity to the local population with T2D requiring triple therapy. The catchment area is a coastal and rural community dependent on tourism, farming, fishing and light industry, with a high percentage of retired residents. Although similar to many other coastal or rural areas, the cultural and ethnic mix is very different from that found in cities and many other regions of the UK. The results of the study should therefore be seen in the context that the focus groups were conducted in this particular location, time and place. Despite this, the insightful contributions from participants with a combined experience of 37 years (448 months) of GLP-1 treatment use and 149 years living with diabetes may be applicable to a wider group.

The choice to gather data using focus groups has been endorsed by many examples within the groups when contributions from one participant prompted others to reflect and share their own experience. Often, particularly when discussing the effects of GLP-1 analogue or insulin on appetite and eating, participants recognised as a revelation in another's comments something they had not been able to articulate. Individual interviews could have afforded the opportunity to probe and ask for clarity at an individual level but the synergy and dynamism of the group interaction would have been missing. As highlighted in Chapter 3 the dynamics within each group were different, partly because of differing characters and the experiences they brought to the group and partly external forces described. Although group interaction is one of the strengths of focus group research, it can also be a disadvantage, as described in g2 (3.6). A combination of factors affected the power balance, group dynamics and facilitation of group discussions. It could be argued that if problems occur when

conducting individual interviews, only data collected on that occasion is affected, not a whole group.

It has been valuable to reflect on this unintended example of how power and dynamics can be altered by a uniform, presence of a spouse or personal interactions, not only within the research context but also for clinical, work or social situations. When out of uniform, although participants in g1 and g3 knew I was a nurse, I was able to bounce questions addressed to me back to the group, explaining that they were the experts. I stressed my role as a researcher was merely to elicit and draw together any 'gems of wisdom' from their individual experience as the experts living with T2D and a new treatment. It is important to remember the symbolism and connotations engendered by a nurses' uniform, so much part of our working life it is easy to overlook the impact on others. A nurses' uniform can be seen as '... a nonverbal, conscious statement that nurses have the skills and knowledge to care for others' (Spragley and Francis 2006, p.58). Although comforting to patients in an acute setting the uniform has been discarded in many other areas as it is perceived to be a barrier to establishing therapeutic relationships and inclined to foster the dependant patient role of a passive recipient of care (Arif 2012; Shaw and Timmons 2010; Sparrow 1991). Hospital uniforms reinforce hierarchical structures and can be seen as symbols of power and authority or of professional identity (Timmons and East 2011). Thus, as a nurse in uniform in g2, it was difficult for both the participants and myself to ignore the unspoken message of power and existing knowledge the uniform conveyed. Perhaps, my attempt to underplay my professional role to allow the group knowledge to emerge in g2 encouraged one of the participants to fill that authoritative vacuum. The group cohesion may also have been imbalanced by a spouse who

did not have personal experience of GLP-1 treatment, it is possible that the group perceived her be an ‘outsider’ without authority to comment (Allen 2004).

The excellent quality audiovisual recordings endorsed the value of discrete modern recording equipment. All verbal and nonverbal interactions within the groups were captured electronically facilitating repeated observation of the subtleties of individual nonverbal reactions and group dynamics throughout the discussion to be integrated into the analysis. The richness this has added and potential for fuller analysis would recommend more widespread adoption in research of discrete digital audiovisual recording. Contrary to Al-Yateem’s (2012) findings, I found no reluctance to consent for recordings and discussions were very open. However, explicit permission for use of the visual data which is more difficult to anonymise, needs to be included in the consent process and consideration as to how this source data should be stored. The rapid development of high quality digital image capturing technology on smart phones and discrete devises offers potential opportunities for less obtrusive, or even covert data capture presents potential opportunities and challenges regarding confidentiality and consent (Cleland *et al* 2007).

5.3 Reflections on the process

As described by Shepherd (2011) despite years of nursing experience, stepping into the world of social science research can make one feel a novice and challenges preconceived ideas. Designing the project, identifying and consenting participants then organising and conducting the focus groups, was similar to my clinical role. Listening to and watching the recordings to transcribe data, then immersing myself in data to code and analyse was initially daunting but as I have always been fascinated by peoples stories, I enjoyed the challenge. Exploring relevant literature from a broad range of sources and

disciplines to weave together the various threads into a coherent whole has been a revelation.

The most demanding aspect has been finding a voice to write the thesis and maintaining the discipline of keeping to the task of writing. Part of my research nurse role has been to read and internalise clinical literature and study information to explain to potential participants and relatives in lay terminology, allowing the opportunity to ask questions or raise concerns. I recognise on reflection, that my method of gaining trust whilst eliciting the extent of background knowledge and preferred terminology has been to instinctively mirror opening conversations. I have found synthesising information from background reading of basic science, clinical research, diabetes, dietetics, sociology and psychology literature to write in the first person yet maintain an academic style has been a constant battle. My instinct being to mirror the style of the written evidence or to translate into lay terminology. The task of transformation from a clinical research nurse into a nurse researcher has been a fascinating journey.

The individual participants reported having enjoyed being involved in the research project, to have learnt from talking to others in the group and expressed a hope that their experience would be useful. Several commented that, hearing others express symptoms or feelings similar to their own provided reassurance that they were not unusual. Advice and support was offered from within the group to avoid or alleviate symptom or problems. Many expressed a view that they felt valued that their opinions and ideas had been sought.

5.4 Implications for practice

Just as effective self-management of diabetes or other chronic conditions requires integration with all aspects of the routines of daily living (Anderson and Funnell 2010; Forbes and While 2009), so also are food and eating woven into the social, cultural and emotional fabric of life (Delormier *et al* 2009). The incretin hormone based therapies for T2D provide new treatment options for T2D which improve glycaemic control without risk of hypoglycaemia or weight gain often associated with escalation of established T2D treatments. Individual responses to incretin based therapies have been varied, insights from this group of their successful adaptation to satiety clues may inform support and advice for other people prescribed GLP-1 treatment.

5.4.1 Practical advice for individuals commencing incretin based therapies

The shared experiences of the incretin response in T2D of the participants revealed common themes of potential value to others.

- ***Perception of adequate meal size***
  The enhanced satiety resulting from treatment often enabled participants to re-evaluate their habitual meal paradigm of an adequate portion size. Initially if these satiety clues were ignored, nausea followed. Many adapted to a smaller plate size at home, whilst in a social setting practical suggestions included requesting a child's size meal or starter in restaurant or warning friends if eating socially outside the home.

- ***Curtailment of the eating experience***
  Slowing of gastric emptying and restoration of meal related satiety significantly altered both the duration of eating time and the number of courses which could be enjoyably consumed. Many participants no longer had puddings or snacks between meals, although some reported they were pleased to be able to act on healthy eating advice, others found difficulty adapting to these changes particularly in the family or social situations.

- ***The social and emotional aspects of eating***
  The potential beneficial effects of shared preparation and enjoyment of meals has been highlighted (Franks *et al* 2012; Delaney and McCarthy 2011; Delormier *et al* 2009) and should not be underestimated. Amongst the fifteen participants the few who described the most difficulty adapting were women who were no longer preparing family meals or who were living alone. Some also described being disturbed that they were not eating what they perceived to be a 'proper meal'. Persons living alone

may be disadvantaged by lack of social support adapting to the effects of GLP-1 based treatments.

- ***Beneficial accessory effects***
  A number of participants expressed enormous relief at being liberated from the spiral of increased insulin dosage, accentuation of hunger and increased weight often with no obvious improvement in blood glucose levels.

- ***Unwanted accessory effects***
  Metformin is recommended for treatment of overweight or obese individuals with T2D, resulting in nausea, abdominal cramps and diarrhoea in varying degrees in some recipients, as described by several participants. These symptoms overlap with potential side effects of incretin analogues, particularly at inception, careful re-balancing of the combination of treatments may be essential in some cases. Comments from these participants highlighted the value of persevering as these symptoms are transitory and much less severe than that experienced with metformin.

- ***Hypoglycaemia***
  Co-prescription of incretin analogues with sulphonylurea or insulin may lead to hypoglycaemia. Therefore access to hypoglycaemia awareness training and targeted blood glucose monitoring is important to enable prompt reduction of concomitant glucose lowering treatments as required. However, some participants reported that they had been denied blood glucose monitoring equipment by their primary care provider.

5.4.2 Broader Implications

Rich data collected from listening to the ‘patient experience’ can improve many aspects of care. The open and frank discussions by some participants explaining the impact of extreme lethargy when first diagnosed, of real physical and social distress precipitated by side effects of metformin, feelings of lack of control taking insulin or associated with worsening glycaemia despite increased medication are important learning points for any HCP’s involved with people living with diabetes. Establishing a dialogue to ensure that changes in medication have been effective and well tolerated may improve quality of life and compliance whilst also improving outcomes, in many chronic diseases. The descriptions of a previous insatiable appetite and a drive to eat anything, to satisfy that hunger which made it difficult to implement dietary advice may be relevant in the treatment of obesity as well as T2D.

In a broader context, perceptions of appropriate portion size and what constitutes ‘a proper meal’ are socially and culturally determined and learnt over a life-course. Younger HCP’s will need to be aware of the rapid changes that have occurred in food and eating patterns during the life of our ageing population if they are to support healthy lifestyle interventions. In an increasingly culturally and ethnically diverse society, an awareness of the relevance of life-course experiences when supporting dietary change is applicable across a range of healthcare disciplines and conditions. The strategies adopted by the participants to overcome difficulties encountered when medication enforced changes in long established eating habits may be useful for others.

5.5 Dissemination and further research

Interim results of data analysis were presented at Diabetes UK Professional Conference (Paisey *et al* 2012) and Plymouth University Postgraduate Society Annual Conference 2012. Insights from the participant responses have been shared with colleagues in the research and diabetes clinical teams and translated into support for people living with diabetes or other relevant situations within the diabetes research team. Articles to present findings are in preparation for submission to professional journals. A meeting to thank the participants, feedback of results and to discuss future research plans is planned for autumn 2013. I intend to seek participant permission to use short clips of audiovisual recordings describing aspects of living with diabetes and changes in appetite on GLP-1 treatment for multi-disciplinary teaching sessions and presentation at multi-disciplinary meetings.

The lived experience gathered by this cohort of individuals with success on GLP-1 treatment would be complemented if repeated with people who had not responded well to GLP-1 treatment. I am exploring the possibility of extending

the research to encompass a broader range of individual response, and of the newer longer acting GLP-1 treatments. As GLP-1 treatments are now more widely available it would be possible to conduct a larger study if funding and ethical permissions were successful.

An interesting collaboration would be to conduct a similar study in a more culturally and ethnically mixed location, this could capture a broader range of life-course trajectories and thus identify commonalties and divergence of experience. Similar studies could be applicable with other treatments or chronic diseases.

Dietetic support is an important part of standard care when changing or escalating treatments. I propose that RCT's of new T2D medications should recognise this important element of care and fund dietetic advice as part of research costs. Planned embedded studies employing qualitative interviews or focus groups to assess individual participant impact at a selection of investigation sites would enhance the evidence and compliment the quantitative data. Qualitative studies would be particularly valuable in the trials of GLP-1 treatment already being conducted in obese individuals without diabetes. Obesity surgery is now available following NICE recommendations 2002/041 (2002) despite poor evidence of long term outcomes (Dixon *et al* 2012; Søvik *et al* 2010; Buchwald *et al* 2009). However it is known that levels of GLP-1 are rapidly restored following surgery (Mason 2008). A study using GLP-1 treatment in conjunction with lifestyle advice counselling and focus groups to explore response to resultant appetite reduction could be a very helpful precursor to obesity surgery and may help individuals assess they can cope with severe portion restriction on their lifestyle prior to surgery.

5.6 Final thoughts

In the past 50 years in industrialised societies the mass production of energy dense convenience foods and reduced energy expenditure has resulted in an increase in obesity of epidemic proportions in the diverse cultures of the Americas, the Far East, Europe, urbanised Africa and the Middle East. The difference between maintenance of a healthy body weight or adding 2.7 kg over 2 years may be just the equivalent of an extra American cookie (60 Kcal) a day (Katan and Ludwig 2010).

For each individual the influences of upbringing, gender role, genetics, work and family life are woven into the milieu created by the developed society. The three broad themes which emerged from analysis of data discussed in Chapter 4 demonstrate not only the difficulties encountered by many people living with T2D but also that once disturbed the finely balanced human physiological responses to food and energy can have far reaching physical, emotional and sociological consequences. The contributions from this group of individuals shared in the context of research, although specific to their particular life-course and diabetes journey, provide insights into a lived experience which may resonate with many others. Discussions of living with T2D, experience of treatments including GLP-1 as well as difficulties encountered adapting long established dietary patterns or previous experience of hunger and lack of satiety, may be relevant to others living with T2D, obesity or other chronic conditions and healthcare advisors.

Insights gained from exploring the effects of replacing a satiety hormone diminished in T2D and obesity, highlight the complex web of interactions that connect the physiological, biochemical and pathological aspects of nutrition to the behavioural, cultural and societal experience of food and eating. Crotty

(1993, p.109) described these aspects as ‘two cultures’ ‘divided by the act of swallowing’ and called for more qualitative research to inform policy and practice. It appears that incretin hormones and GLP-1 in particular bridge these ‘two cultures’, as a pathological reduction or therapeutic enhancement of GLP-1 has the power to negate or overcome behavioural, cultural and societal influences on food and eating. Using qualitative research methodology to explore individual response has added to an understanding of how individuals navigate a personal path through the myriad of influences which govern nutrition.

Appendices

I. Participant approach letter with reply

II. Participant consent form

III. Participant information sheet

IV. Schedule for focus group

V. Table 1: Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes

VI. Anonymised Participant biographies *(deleted to further protect anonymity)*

VII. Table 5 Participant characteristics by group

Appendix 1 Participant approach letter with reply

Hospital/ research centre logo
address
phone number
(Date)

(Participant Name)
(Participant Address)

Dear (Participant Name)

EAT STUDY – Exploring changes in Appetite and diet with incretin analogue Therapy – Exploring the Patient Experience

You are invited to take part in a research project exploring changes in diet made by people with type 2 diabetes successfully treated with exenatide (Byetta) or liraglutide (Victoza) known as incretin analogue therapy

The study will involve a number of people with type 2 diabetes in the *(name of local)* area who are willing to share their experiences of using either Byetta or Victoza in a small group session called a focus group. There will be one further group feedback session.

We have enclosed a participant information sheet which contains further information about the study

If you are interested in taking part in this small group discussion we would like to invite you to meet Roz Paisey a Diabetes Research Nurse for an informal visit where she will explain the study in detail and if you would like to participate ask you to sign a consent form.

Your participation in this study is entirely voluntary and if you do not wish to do so your current and future treatment will not be affected.

If you would like to take part in this study or discuss it further please contact research nurse *name* on:☎ ***tel*** *number.* Alternatively please complete and return the following slip in the stamped addressed envelope to *(research nurse name)* who will contact you at a convenient time.

Yours sincerely

Name and contact details of research nurse
address
phone number

Re: EAT Study: **please tick**

I am interested in this research study: ☐
(if interested please complete your details below)

Please contact me during the day/evening* on:
(* delete as appropriate) to discuss the study further.

☎.....

Full name: .....

Signature: .....

Please return in stamped envelope provided to:

Research Nurse Name
Address
Phone number

Appendix II Participant consent form

Exploring changes in Appetite and diet with incretin analogue Therapy – Exploring the Patient Experience (Focus Group)

EAT STUDY

Consent form

Name of Participant ..... (Capitals)

Eat Study number.....

Please initial each box

1. I have read the participant information sheet for the above study and have been given a copy to keep. I have had the opportunity to ask questions about the study and am satisfied with the information I have been given. I have discussed the study with a study researcher. ☐
2. I understand that taking part in this research is voluntary and that I am free to withdraw at any time without giving a reason and without my medical treatment or legal rights being affected. ☐
3. I understand that the focus group will be audio visually recorded and that these recordings will be stored in a secure place. I understand that all data from these recordings will be made anonymous. I understand that my identity will not be revealed at any time or in any publication unless previously agreed by myself in writing. ☐
4. I agree that data from the focus group transcripts can be used in future publications. ☐
5. I agree to take part in this study and know how to contact the research team if I need to. ☐
6. I give permission for my medical records to be looked using my personal details and NHS number, and for information from them to be used in strict confidence by members of the research team ☐

Participant's Signature ..... **Date** .....

I confirm that I have fully explained the nature of this study and answered all the questions of the above named volunteer.

Researcher's Signature..... **Date** .....

Appendix III Participant information sheet

Exploring changes in Appetite and diet with incretin analogue Therapy – Exploring the Patient Experience (Focus Group)

EAT STUDY

Information Sheet for Participants

I would like to invite you to take part in a research project. As a research nurse working with people in an earlier study of Byetta (exenatide), I became interested in exploring the patient perspective of this new treatment for type 2 diabetes. I have funding and ethical approval to explore changes in diet made by people successfully treated with incretin analogue therapy Byetta (exenatide) or Victoza (liraglutide). I hope that gathering together small groups of people who are happy to discuss with others and share their experience, will allow me to find ways to support people using this and similar treatments. This project will form part of a research masters degree at the University of Plymouth.

What is incretin therapy?

At the beginning of a meal, hormones from the intestine called incretins flow into the blood stream. These hormones slow emptying of the stomach produce a feeling of fullness and improve the action of insulin in lowering blood glucose levels.

Levels of these hormones especially the most important called "GLP 1" are reduced very early in the development of type 2 diabetes. Replacement treatment with analogues (similar molecules) of GLP 1 such as Byetta (exenatide) or Victoza (liraglutide) has been shown to reduce glucose levels and assist in weight loss in people with type 2 diabetes.

What is the purpose of the study?

Over the past four years exenatide known as Byetta has been shown to be a safe and effective therapy in helping people with type 2 diabetes improve blood glucose levels and lose weight. However a survey of this treatment, the Association of British Clinical Diabetologists (ABCD) audit, showed that although the majority of people benefit from either improving glucose control or losing weight, only approximately 30% of those treated had good improvement in both. Successful people may have made changes to their diet or eating pattern. In order to advise future patients more effectively I plan to invite a group of people who have benefited from incretin therapy (Byetta or Victoza) to share their experience with particular focus on changes they have made in their diet since starting this therapy.

What will happen to me if I participate in the study?

I would like to invite you to a focus group to talk about your experiences of taking incretin therapy and how this influenced any changes you made to your diet. A focus group is where people are brought together to discuss a particular issue under the direction of a facilitator, who has a list of topics to discuss. At this group interview I will invite you and others in the group to talk about and share your experiences of this type of diabetes treatment. It is your opinions that I am interested in, there are no right or wrong answers. The information you give is under your control and you are free to decline to answer any of the questions. There will be an independent observer making notes and the interviews will be audio visually recorded to be transcribed later. This will allow me to arrange and

analyse the results of the discussions. All data will be anonymised to protect your identity.

Do I have to take part?

Your participation is entirely voluntary. You have the right to withdraw at any time without giving a reason and without affecting your future treatment or relationship with the staff. If you agree to take part you will be invited to meet me to hear more about the study and sign a consent form.

How long will the focus group last?

The length of the focus group interviews will depend on the issues raised but may be for 1 to 2 hours.

Where will the focus group take place?

The interviews will be held in the Horizon Centre for Innovation Technology and Research at Torbay Hospital, (date, time to be confirmed). Travel expenses will be reimbursed.

Will information about me be kept confidential?

Interview data and all personal information will be treated as strictly confidential and will not be made publicly available. Recordings and transcripts will be kept in a locked office. The only people who will see the transcripts are the researchers, my supervisor *name of supervisor*, myself- *name of research nurse*, the independent note taker nominated by the university and a professional transcriber who will help me transcribe the recordings into a form that can be analysed. The information produced by the study may be published and will be used to develop further research questions, to create a patient questionnaire and to improve clinical practice and services but no details that could identify you will be given.

Who can I contact for help if I become distressed or concerned after the interview?

PALS (Patient Advice Liaison Service) of *research site hospital phone number* or 24 hour *freephone number*

Thank you considering becoming involved.

If you would like to discuss the study please do not hesitate to contact:

Name of research nurse,
Research site address

Telephone: number

E:mail: address of research nurse

Name of supervisor
University address

Telephone: number

E:mail: address of supervisor

Appendix IV Schedule for focus group

Exploring changes in Appetite and diet with incretin analogue Therapy – Exploring the Patient Experience (Focus Group)

EAT STUDY

Schedule for focus group

Welcome and ice breakers
Reminder of confidentiality issues
- Responsibility to other members of group
- Option to use fictitious name group
- Warning of disclosure

Introductions

I am interested to hear of your own experience of using Exenatide/Liraglutide and its effects. I would like everyone to feel they have the opportunity to contribute.
Some of you may have had very different experience from others in the group everyone's experience is important that is why it is good to share ideas within the group.

It maybe that when someone says something it reminds you of something similar or you may feel that it is very different to how you felt. Both are important and will help me understand the variety of experiences.

Open discussion to allow emergent themes
Possible themes which could emerge

- Dietary changes
  - Specific foods
  - Portion size
  - Specific times of day
- Side effects
  - What
  - When
  - Triggers
  - Moderating side effects
- Changes in other medication/
  - Hypos
- Changes over time/
  - adapting
- Forget to take the injection
  - Avoid taking it/Why/How often
  - Option of leaving off the injections at certain times?
- Weight changes
- Benefits/Negatives
- Advice/support
  - useful
  - Who gave it
- Suggestions to help other people?

Appendix V Table 1 Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes

Percentage risk reduction per 1% improvement in HbA1c		
Any diabetes end point	21%	P < 0.0001
Diabetes deaths	21%	P < 0.0001
Myocardial infarction (fatal or non-fatal)	14%	P < 0.0001
Microvascular complications	37%	P < 0.0001
Amputations	43%	P < 0.0001
Deaths from vascular disease	43%	P < 0.0001
Heart failure	12%	P = 0.035*
Stroke	16%	P = 0.021*
***Improvement in blood pressure had a greater effect for heart failure and stroke*		

Table 1 Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (Stratton 2000)

Appendix VI Anonymised Participant biographies

(Removed to further protect participant anonymity)

Appendix VII Table 5 Participant characteristics by group

All names have been changed to preserve anonymity

Name	Decade of birth	Living arrangements	T2DM in years	GLP-1 type	GLP-1 use in months	Change since starting GLP-1		
						Insulin use	weight loss Kg	HbA1c drop %
Group1								
Ruth	50's	lives alone	8	Exenatide changed to Liraglutide	22	no	plus 1.55	1.5
Adam	40's	lives with wife	11	Exenatide changed to Liraglutide	52	no	9.2	1.1
Betty	70's	lives with carer	16	Exenatide	47	stopped	17.9	3.7
Bert	30's	couple living together	10	Exenatide	52	no	26.75	2.1
Maud	30's		22	Exenatide	36	stopped	15.4	plus 0.9
Group2								
Gerald	30's	lives with wife	15	Exenatide	48	no	2.2	0.3
Mavis	30's	lives alone	7	Liraglutide	17	reduced	8.8	1.7
Bob	50's	lives with wife & sons	7	Exenatide	48	stopped	23.6	2.4
Laura	50's	lives with partner	6	Liraglutide	16	no	plus 1	plus 0.3
Lionel	30's	couple living together	6	Liraglutide	13	reduced	10.25	0.2
Gwen			1	diet only				
Group3								
Johnny	30's	lives with partner	11	Exenatide changed to Liraglutide	48	reduced	19	2.1
Cath	40's	lives alone	11	Exenatide	24	n/a	4.7	3.1
Mark	50's	lives with wife	8	Exenatide changed to Liraglutide returned Exenatide	15	reduced	7	0.1
Linda	60's	lives with daughter & partner fisherman away	4	Exenatide	3	no	3	0.4
Luke	60's	lives with wife	6	Exenatide	7	no	7.9	2.8

Table 5 Participant characteristics by group

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