The Interaction of Health Value and Perceived Control in Relation to Outcome Behaviours in a Type 2 Diabetes Patient Population in Scotland

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Abstract

Aim: To test the interactive effects of the constructs of Modified Social Learning Theory (MSLT) in relation to predicting health behaviour in Type 2 Diabetes.**Methods:** The study is mixed methods and employs an exploratory sequential design. **Qualitative Phase:** (N=12) Semi-structured interviews with adults with insulin-treated type 2 diabetes, explored how beliefs and values influence self-management behaviour. **Interim Phase:** Thematic analysis allowed development of an adapted Health Value Measure.**Quantitative phase:** (N=107) Valid questionnaires measured Health Value, Health Locus of Control (HLC) and Self-efficacy (SE). Health Value was measured pre and post diagnosis in order to compare any changes with time. Anxiety and depression was controlled for using the Hospital Anxiety and Depression(HAD) scale. Five subscales measured diabetes outcome behaviour: general diet, specific diet, exercise, blood sugar and foot care. Hierarchical Multiple Regression(HMR) analyses consisted of four blocks, including three two-way interaction terms and one three-way interaction term to test the interactive effects of the three-predictor variables on outcome behaviours. ANOVA's were conducted in an effort to add support to HMR results.

Results: The interviews suggest that people may hold terminal (beliefs about desired end states)/instrumental health values (beliefs about desired modes of action) pre-diagnosis but these are mainly instrumental post-diagnosis in order to meet their new needs and maintain quality of life. The qualitative data also drew attention to the way in which LOC and SE beliefs impact on behaviour. Additionally, differing dimensions of various emergent themes highlight the demands Type 2 diabetes places on a person and how this influences beliefs and values.Interim phase results resulted in the new items being removed from the adapted health value measure prior to the quantitative data analysis, as item 5 was deemed problematic.Sensitivity analysis was carried out to increase the robustness of the quantitative findings due to removing 29 cases with missing data from Dataset 1. Dataset 1 includes 78 complete cases and Dataset 2 contains 107 cases, 29 of which had missing values and were replaced using regression imputation. HMRanalyses produced significant results that support MSLT when the three-way interaction variable was added to block 4. ANOVA results produced minimum support for MSLT.

Conclusion: Support for MSLT has been found and can be used to inform interventions to change self-management behaviours of patients with poor diabetescontrol. Change in health value orientation post-diagnosis purports further investigation, as it is supported by qualitative results but not quantitative.

Declaration

I hereby declare that this thesis is my own work and that all contributions from any other persons are properly and duly cited. This work has been submitted for the fulfilments of the requirements of Doctor of Philosophy only.

Linda Elizabeth Nugent

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Table of Contents

List of figures

List of Tables

Glossary

AAA	Acceptance-Adjustment-Adaptation
ADA	American Diabetes Association
AHV	Adapted Health Value measure
APHO	Association of Public Health Observatories
BCLOC	Breast Cancer Locus of Control Beliefs
BGM	Blood Glucose Monitoring
BMI	Body Mass Index
BS	Blood Sugar
CAQDAS	Computer Assisted Qualitative Data Analysis
CHF	Chronic Heart Failure
CHV	Change in Health Value
COPD	Chronic Obstructive Pulmonary Disease
D1	Dataset 1
D2	Dataset 2
DAFNE	Dose Adjustment for Normal Eating
DAP	Diabetes Action Plan
DCP	Diabetes Care Profile
DES	Diabetes Empowerment Scale
DESMOND	Diabetes education & self-management for on-going newly diagnosed
DNA	Deoxyribonucleic Acid
DOH	Department of Health
ELOC	External Locus of Control
GP	General Practitioner
H	Hypothesis
HAD	Hospital Anxiety and Depression Scale
HBM	Health Belief Model
HLC	Health Locus of Control
HMR	Hierarchical Multiple Regression
HV	Health Value
HVP1	Health Value Part 1
HVP2	Health Value Part 2
Hypo	Hypoglycaemia
IDF	International Diabetes Federation
IHLC	Internal Health Locus of Control
IHV	Instrumental Health Value
LN	Linda Nugent
M	Mean
MAR	Missing at random
MCAR	Missing completely at random
MCN	Managed Clinical Network
MHLC	Multiple Dimensional Health Locus of Control Scale
MNAR	Missing not at random
MRR	Multiple Regression Replacement
MSLT	Modified Social Learning Theory

N	Sample size
n	Subset of a sample
nGMS	New General Medical Services Contract
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
OB	Outcome Behaviour
OPD	Outpatient Department
PDDC	Perceived Diabetes and Dietary Competence
PDSMS	Perceived Diabetes Self-Management Scale
PHCS	Perceived Health Competence Scale
PIDPAD	Psychology in Diabetes, Psychology and Diabetes
PMCSMS	Perceived Medical-Condition Self-Management Scale
PMT	Protection Motivation Theory
QOF	Quality and Outcomes Framework
QOL	Quality of Life
RQ	Research Question
SCI-DC	Scottish Care Information – Diabetes Collaboration
SD	Standard deviation
SDS	Scottish Diabetes Survey
SDSCA	Summary of Diabetes Self-Care Activities Measure
SE	Self-efficacy
SIGN	Scottish Intercollegiate Guidelines Network
SCT	Social Cognitive Theory
SLT	Social Learning Theory
SM	Self-management
SPD	Specific Diet
SPSS	Statistical Package for the Social Sciences
Ss	Sum of squares
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
THV	Terminal Health Value
UK	United Kingdom
UKPDS	UK Prospective Diabetes Study
VIF	Variance inflation factor
WHO	World Health Organisation

1 Background To The Research

1.1 Introduction

The focus of this thesis is predicting health behaviour of Type 2 diabetes patients. In it a health behaviour theory is tested with the aim of establishing its significance of predictability of Type 2 diabetes patients' outcome behaviours. The underlying meanings of the theoretical constructs of the theory are explored prior to the theory's statistical testing to ensure that the theory's constructs are measured appropriately. By doing so, this thesis relates to two areas of previous research that have focused on predicting health behaviour and the experiences of living with Type 2 diabetes.

There are severalreasons why this research is particularly salient. Firstly, nationally and internationally diabetes has been recognised as one of the most significant threats to people's health and has been considered an epidemic by some and as a serious clinical and financial threat by others (Bagust et al., 2002, Khunti, 2011, Bain et al., 2011). The recent Association of Public Health Observatories (APHO) (2011) prevalence model has estimated that there are 3.1 million people with diabetes in England. By 2020 an estimated 3.8 million adults, or 8.5%, will have diabetes and by 2030 this is estimated to rise to 4.6 million or 9.5% of the adult population (APHO, 2011). According to the most recent Scottish Diabetes Survey (SDS) there were 247,278 people registered with diabetes in Scotland in 2011. 217,514 (88%) of all people that were registered have Type 2 diabetes compared to 28,272 (11.4%) of people who were registered with Type 1 diabetes (SDS, 2011). Bain et al. (2011) statethat the diabetes epidemic relates particularly to Type 2 diabetes and is set to increase rapidly over the coming decades. This increase is partly due to increased levels of obesity and the adoption of more sedentary lifestyles (Bain et al., 2011).

The second reason this research is particular salient is that the guiding principles to treating Type 2 diabetes consider behaviour change(SIGN, 2010, NICE, 2011). SIGN (2010:9) guidelines state that

> 'helping patients to modify certain behaviours should take account of other factors such as the patient's willingness to change, their perception of their

> diabetes, and factors which may be indirectly related to their diabetes, such as depression and adverse effects on quality of life'.

Whereas NICE (2011:29) guidelines offer five guiding principles of supporting behaviour change of patients with Type 2 diabetes:

1. Helping them understand the short, medium and longer-term consequences of health related behaviour.

2. Helping them feel positive about the benefits and value of health enhancing behaviours and changing their behaviours.

3. Recognising how people's social contexts might affect their behaviour.

4. Helping people plan changes in terms of easy sustainable steps over time.

5. Identifying and planning for situations that might undermine the changes people are trying to make, and planning for coping strategies to maintain changes in behaviour.

Adopting 'good' health behaviour is a critical component in promoting self-management and lifestyle change to patients with Type 2 diabetes. Health behaviour can be defined as

> 'an action taken to maintain good health and prevent illness'(Ogden, 2003:3).

Health behaviours that are particularly associated with Type 2 diabetes include the appropriate management of diet, exercise and pharmaceutical interventions. Adopting health behaviours such as this can help prevent or delay the myriad of macro and micro vascular complications associated with Type 2 diabetes (Wallston et al., 2007). Furthermore, adopting health behaviour has been associated with a significantly improved concept of health and improvements of overall quality of life (Adulv et al., 2010). Despite these potential benefits people with diabetes are at times incapable of adopting and sustaining the necessary 'good' health behaviours for optimal diabetes disease management. As recommended by SIGN (2010) and NICE

(2011) guidelines there is a need to understand patient's willingness to adopt health behaviours in order to help patients adhere to effective behaviour change regimes. This research expects to contribute to two ways of establishing this understanding. Firstly, by exploring the beliefs and values that underpin the practicing of health behaviours and secondly by identifying and testing a theory that could predict Type 2 diabetes patients' behaviours. The results of this research could be beneficial to health professionals supporting behaviour change in practice.

A third reason why this research is particularly salient is that the results of this thesis have the potential to contribute to informing nursing science and practice. This research is an example of nursing science adopting a concept from psychology to explore the phenomena of predicting diabetes patients health related behaviours. The results may offer a method that could be used to identify patients who may be at risk of poor adherence to diabetes regimens.

Few researchers have investigated the interactive effects of the constructs of health value and perceived control (self-efficacy and internal health locus of control) and none according to the researcher's knowledge have examined them in line with modified social learning theory as theorised by Wallston (1992).By testing the interaction of modified social learning theory's (MSLT) constructs of health value, internal health locus of control and self-efficacy this research expects to present a new approach to investigating the phenomenon of interest predicting health behaviour.

The aim of this chapter is to set the scene for this thesis by outlining the biomedical background to Type 2 diabetes, the provision of diabetes care in Scotland and to introduce MSLT. Following on from this the aims and objectives of the research and an outline of the topics covered within each chapter will be provided.

This chapter is structured as follows:

- Section 1.2 Diabetes mellitus
- Section 1.3 Diabetes care in Scotland
- Section 1.4 An introduction to MSLT

- Section 1.5 Aims and objectives
- Section 1.6 Thesis outline

1.2 Diabetes mellitus

Diabetes mellitus is a condition in which there is a chronically raised blood glucose concentration (Williams and Pickup, 2004). This is attributed to an absolute or relative lack of the hormone insulin where insulin is not produced by the pancreas or there is insufficient insulin or insulin action for the body's needs (Williams and Pickup, 2004). In contrast a healthy person's pancreas would produce enough insulin to maintain blood glucose levels.

Diseases with the clinical features of diabetes have been recognised since ancient times. The word diabetes was first used by Aretaeus of Cappadocia in the 2nd century *AD,* it comes from the Greek meaning siphon because the disease is often characterized by excessive thirst and urination(Williams and Pickup, 2004).Hindu physicians from the 5th and 6th century commented on the importance of psychosocial factorsrelevance of both behaviour and affluence as a contributor to diabetes:

> 'It is a disease of the rich and one that is brought about by the gluttonous over-indulgence in oil-flour and sugar' (Williams and Pickup, 2004:6).

In the 16th century a western physician known as Thomas Willis added the word mellitus that means honeyed (Royal College of Physicians Edinburgh, 2011). It was not until a century later, in 1777, that Mathew Dobson proved conclusively that the urine of diabetics contained sugar (Royal College of Physicians Edinburgh, 2011). Then in 1889 a German physician Paul Langerhans discovered the islets cells of the pancreas but he was unable to explain their function. Langerhans discovery led future scientists to discover the function of insulin and its benefits in the treatment of diabetes(Williams and Pickup, 2004).

The treatment of diabetes depends on diabetes classification and the individual requirements of the patient. The World Health Organisation (WHO) classifies diabetes into Type 1 and Type 2 and four other types covering genetic forms, drug or chemical induced, gestational and unknown (Alberti and Zimmet, 1998). All of these categories have guidelines available to support and inform the management of diabetes (Royal College of General Practitioners and NHS Diabetes, 2011). In England the National Institute for Health and Care Excellence (NICE) and in Scotland the Scottish Intercollegiate Guidelines Network (SIGN) make separate recommendations for the effective management of diabetes within the UK. The treatment for Type 1 and Type 2 diabetes differs due to the aetiology of diabetes type.

Type 1 diabetes is due primarily to autoimmune mediated destruction of pancreatic beta cells islets, resulting in absolute insulin deficiency(Tortora and Grabowski, 2003).People with Type 1 diabetes must take exogenous insulin to prevent the development of ketoacidosis and death. Diabetic ketoacidosis results from absolute insulin deficiency and in response the body switches to burning fatty acids and producing acidic ketone bodies that cause most of the signs and symptoms(Tortora and Grabowski, 2003). Insulin resistance and/or abnormal insulin secretion either of which may predominate depending on the individual characterize type 2 diabetes. People with Type 2 diabetes are not dependent on exogenous insulin, but may require it for control of blood glucose levels if this is not achieved with diet alone or with oral anti-hyperglycaemic agents.

The choices of treatment for Type 1 and Type 2 diabetes are characterized by a patient’s level of blood glucose control. Blood glucose control is assessed by measuring the percentage of glycaeted haemoglobin (HbA1c) in the blood. This gives an indication of blood glucose control over the preceding two to three months (Williams and Pickup, 2004). Diabetes UK (2013a)recommend HbA1c levels should be between 48-58 mmol/mol.

The benefits of lowering blood glucose of patients with Type 2 diabetes in order to prevent macro and micro vascular complications are apparent (ADA, 2002). However, there has been some controversy over how ‘tight’ glycaemic control should be, as the use of insulin and some oral glucose lowering agents have been associated with iatrogenic hypoglycaemia (UK Prospective Diabetes Study Group, 1998). In hypoglycaemia, blood glucose levels fall too low to provide energy to the brain which can, but not always, lead to symptoms such as dizziness, nausea and sweating, and eventually can cause a loss of consciousness and death (Williams and Pickup, 2004).

Understanding the biomedical background of Type 2 diabetes, the treatments available and the side effects of the treatments were imperative to this research, especially during data collection and data analysis. This understanding facilitated a thorough interpretation of both the qualitative and quantitative results of this study.

The following section details the processes of delivery of diabetes care in Scotland. It is important to discuss this topic at the beginning of this thesis in order to situate the context of this research.

1.3 Diabetes care in Scotland

Up until the late 1990's diabetes care in Scotland was concentrated mainly in secondary care services. This was perhaps due in part to the complexity of the treatment regimes of diabetes and the associated complications and comorbidities of the disease. The publication of the white paperCaring for People(Department of Health, 1989), introduced the concept of collaboration between primary health care services and secondary health care. In Scotland, in 1998, the Scottish Acute Services Review recognised that it was not tenable for hospitals to provide all the facilities necessary for its catchment area and proposed the development of managed clinical networks (Baker and Lorimer, 2000). Managed clinical networks are linked groups of health professionals from primary, secondary and tertiary care working in a coordinated manner to ensure equitable delivery of high quality care (Baker and Lorimer, 2000). The participants in this study are all cared for within the remit of the Lothian Diabetes Managed Clinical Network (MCN).

Most recent white papers such as the Partnership for Care (The Scottish Government, 2003) and the Delivering for Health (The Scottish Government, 2005) advocated a change in health services for diabetes to mainly primary care services to keep pace with population trends, patient needs and medical advances.The Lothian MCN for diabetes helped to organise the move of the majority of diabetes care into Lothian's primary care services. The diabetes patients that are now treated in hospital include only those requiring specialist diabetes treatments, whilst in primary care the cohort of diabetes patients treated include those with type 2 diabetes not requiring insulin and interim follow up of patients with risk factors once assessed by a diabetes clinic.

There are many strategies of improvement specific to diabetes in place in Scotland. One in particular includes The Quality Strategy for Healthcare (The Scottish Government, 2012),which sets out the measurable and achievable actions that relate to the key drivers of healthcare quality. Another strategy includes the criteria in the diabetes domain of the Quality and Outcomes Framework (QOF) in the new General Medical Services Contract (nGMS)(Department of Health/NHS Confederation, 2003). The QOF initiative was intended to better match payment and existing workload, improve quality of patient care and reduce variation between practices (Grant et al., 2009),however, this protocol driven approach to health care has been met with mixed views. Grant et al. (2009) have argued that care has been more biased towards pharmaceutical interventions and measurable outcomes, whilst others recognise these outcomes as resulting improvements in diabetes care (Kenny, 2013). The most recent planned changes to the QOF for 2013/2014 have also been met with a mixed response due its imposing nature on healthcare professionals (Hadley-Brown, 2013), however, the indicator that requires structured education to be provided to all people newly diagnosed with diabetes should be welcomed by most.

The above section has highlighted the dynamic influences of government policies on diabetes care in Scotland. Despite the number of quality improvement initiatives in place inpatient admissions to hospital of patients with Type 1 and Type 2 diabetes are costing Scotland. The estimated total annual cost for patients with Type 1 and Type 2 diabetes was £26 million and £275 million respectively of approximately 12% of the Scottish inpatient budget (£2.4 billion) (Govan et al., 2011). These findings reinforce the importance of addressing modifiable risk factors for cardiovascular and renal disease through behaviour change in both Type 1 and Type 2 diabetes patients.

The following section introduces modified social learning theory(MSLT) a behavioural theory that is tested in this research to determine its ability to predict health behaviour of patients with Type 2 diabetes.

1.4 An introduction to MSLT

MSLTwas developed by Wallston (1992) and is a rapprochement of Rotter's (1954, 1966) Social Learning Theory (SLT) and Bandura's Social Cognitive Theory (SCT) (Bandura, 1986).

The main tenet of social learning theory (SLT) is that the likelihood of a behaviour occurring in a given situation is a joint function of the individual's expectancy that the behaviour will lead to a particular reinforcement and the extent to which the reinforcement is valued (Conner and Norman, 2009).Rotter (1966) developed the locus of control (LOC) construct as a generalised expectancy and made the distinction between internal and external locus of control belief orientations. Locus of control refers to the extent to which people believe events are controlled by them.People with internal locus of control beliefs believethat events are a consequence of their own actions whereas people with external locus of control beliefs believe events are unrelated to their own actions.

Social cognitive theory (SCT) assumes that human motivation and action are based on three expectancies; situation outcome, action-outcome and self-efficacy (Conner and Norman, 2009). The construct of self-efficacy (SE) from SCT is the expectancy construct of interest to MSLT. Bandura (1995:5)defines self-efficacy as

> 'the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations'.

An important point when introducing the origins of MSLT is to draw attention to the fact that Rotter chose LOC as the first major generalised expectancy construct for SLT.Wallston (1992:184) states that

> 'there is nothing inherent in Rotter's SLT proposition that necessitated locus of control as opposed to perception of control (SE) to be the major generalised expectancy in SLT'.

Wallston et al. (1978) built on the locus of control construct by developing the Multi-dimensional Health Locus of Control (MHLC) Scales which measures expectancy beliefs with respect to health along three dimensions including internal health locus of control beliefs, powerful others and chance. The main prediction from the MHLC scales is that people who score higher on the internal health locus of control (IHLC) subscale should be more likely to engage in health promoting behaviours. The health LOC (HLC) construct has been applied to a wide range of health behaviours such as smoking, alcohol intake, exercise, diabetes related behaviours, nutritional related behaviours, general health promoting behaviours and to peer pressure behaviour in adolescents(a review of studies that include the HLC construct is provided in Chapter 2). Studies linking HLC beliefs to the performance of preventative health behaviour have produced a mixed set of results (Bennett et al., 1997, Bennett et al., 1998, Norman et al., 1997, O'Hea et al., 2005). Overall a number of reviews on the HLC construct have concluded that the relationship between health locus of control and health related behaviour is only modest(Wallston, 1992, Norman and Bennett, 1995). Wallston (1992) has argued that a reason for this is that HLC beliefs should only predict behaviour when people value their own health. Studies which include the HLC and health value constructs have produced some positive results (Lau et al., 1986) whilst others have failed to find such an interaction (Norman et al., 1997, Steptoe and Wardle, 2001). The failure to support the interaction between HV and HLC thus far could be because the perceived health competence construct of self-efficacy (SE) has not been taken into account. Wallston (1992) maintains that even when a person values their health and feels responsible for his/her health (IHLC belief) this does not mean that the person feels capable of taking the right steps to control his/her health status. This is where perceived self-competency (SE) can take an effect.

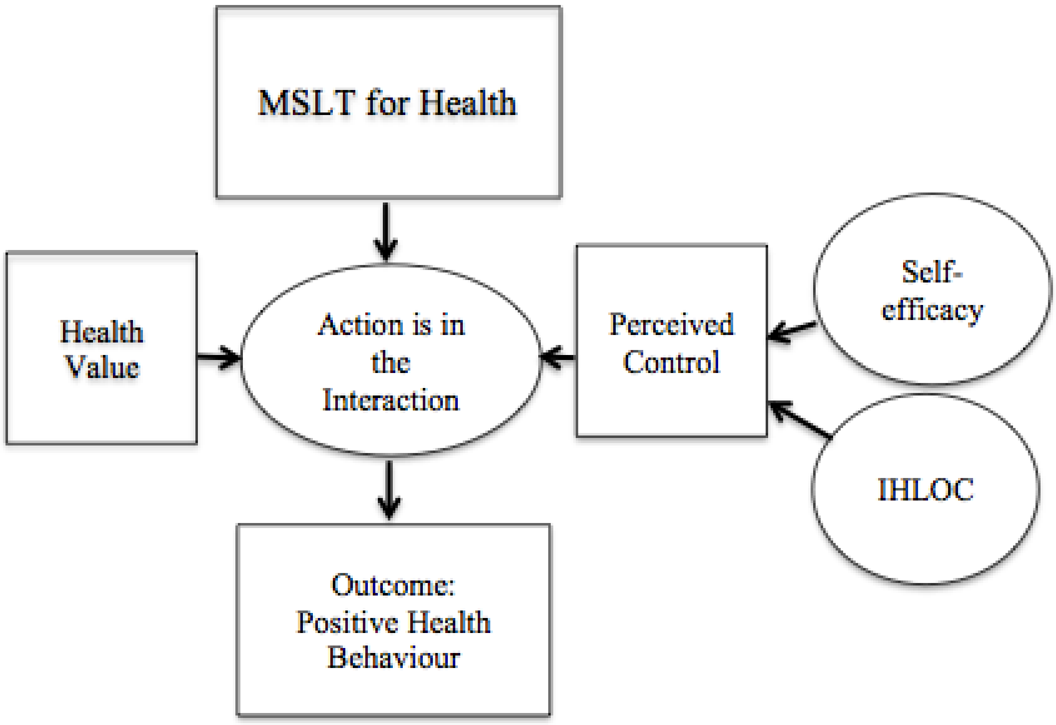
Modified Social Learning Theory for health states that the potential for an individual engaging in a set of health related behaviours is a function of the interaction of health value (HV) and perceived control (IHLC and SE) over health. MSLT not only incorporates one of the most powerful predictors of health behaviour, self-efficacy, but also outlines a role for HLC as a moderator to predicting health behaviour

(Conner and Norman, 2009). MSLT has seen little or no application in the health behaviour field and requires further testing.

By testing MSLT in a health domain the researcher will examine the interactionof HV, HLOC and SE on predicting health behaviours in a Type 2 diabetes population. If what the theory postulates is correct, the researcher will establish that these interactions are more predictive of health associated behaviours than HV, HLOC or SE alone. It is hoped that these potential findings could then be used to inform nursing interventions and diabetes management and prevention programmes in the future.

A diagrammatic illustration of MSLT and its possible interactive effects on health behaviour is illustrated in figure 1.1 below.

Figure 1.1 Diagrammatic representation of MSLT



1.5 Aims and objectives

The primary aim of this study is to test the interactive effects of the constructs of Modified Social Learning Theory (MSLT) in relation to predicting health behaviour in a Type 2 diabetes population. In order to meet the primary aim of the study a primary research objective was formed, that is, through a mixed methods approach of qualitative and quantitative means the researcher will test MSLT in a Type 2 diabetes population. By qualitative means of semi-structured interview and by quantitative means of measurement the researcher will aim to determine the interactive effect of health value and perceived control on predicting health behaviour in a Type 2 diabetes population. The research questions and subsequent hypotheses formulated to explore and test MSLT are presented in Chapter 3 section 3.3 pages 46-48.

1.6 Thesis outline

This thesis is divided into eight chapters. The purpose of Chapter 2 is to critically review the existing literature related to the principal aim of this research. Secondly the literature review aims to highlight the rationale for the proposed research questions of this study. A search strategy for identifying relative literature is defined and following on from this an organised review of the literature is presented.

Chapter 3 begins with an introduction to the rationale for the methodology of this research followed by a description of the purpose of this study. Next the epistemological and theoretical position of the research is presented followed by a critical discussion that validates the choice of research design. Ethical considerations that were made during the research process are then discussed followed by a description of the research process. The inclusion and exclusion criteria for the sample for both the qualitative and quantitative phases of this research are then outlined. Following on from this the differences in sampling strategies for each phase are examined.

Chapter 4 presents the methods of data collection and data analysis of the qualitative phase.Chapter 5 provides a full account of the qualitative findings. The findings from the a priori themes of the constructs of MSLT are presented first followed by the emergent themes from the data. Connections between themes are discussed consistently throughout each section howevereach section interprets the meaning of each a priori and emergent theme separately. The differing dimensions of each theme and the variations in meaning of each theme to participants are also discussed in relative sections. Existing literature that was regarded as important to the interpretation of a theme is presented concurrently to facilitate a deeper understanding of the underlying meaning of that theme.

The interim phase section of Chapter 5 introduces the qualitative findings that contributed to the development of two new research questions and hypothesis that were tested in the quantitative phase of this research. The methods employed to develop the qualitative findings prior to the quantitative phase are also discussed in the interim phase section. The statistical results of the item-total correlations that were used to test the reliability of two new items that were developed and added to a health value scale prior to the scales inclusion in the quantitative phase are also presented here.

Chapter 6 demonstrates the rationale for the quantitative data collection and statistical analysis methods chosen. Chapter 7 presents the statistical results of the quantitative phase of the research. Scale scores present the results of emergent research questions 9 and 10. The results of the hierarchical multiple regression analysis that aimed to test the interactive effects of MSLT are demonstrated. This is followed by the results of three-way independent ANOVAs.

Chapter 8 is the main discussion chapter of this thesis. In this chapter results from all phases of this research are integrated to provide an overall critical appraisal of their meaning and possible impact. Following this critical appraisal of the results the potential clinical application of MSLT is discussed. Succeeding this the significance of the study is presented followed by a discussion on the implications of this research in practice. Next future research recommendations are made and then Chapter 8 ends with a concluding summary of the research.

2 Literature Review

2.1 Introduction

The purpose of this literature review is twofold. Firstly, the review aims to provide an in depth review into each construct of MSLT, that is, health value, self-efficacy and health locus of control. By doing so the individual importance and relevant evidence supporting or opposingeach construct is critically analysed. Furthermore, the literature review focuses on existing literature that has examined the relationships between the constructs of MSLT and their interactions. This enables justification for the research questions that will be examined in this study. Secondly, the literature review considers the current provision of diabetes care, the barriers to this care and as a result how this influences diabetes outcome behaviours.

This Chapter is structured as follows:

- Section 2.2 Search strategy
- Section 2.3 Health value
- Section 2.4 Self-efficacy
- Section 2.5 Health locus of control
- Section 2.6 Investigating interactions
- Section 2.7 Perceived control
- Section 2.8 Traditional theories of health behaviour & MSLT
- Section 2.9 Barriers to diabetes care & outcome behaviours
- Section 2.10 Diabetes self-management& education
- Section 2.11 Summary

2.2 Search strategy

A search strategy was devised that involved defining the research topic, scope of the research topic and possible outcomes of each stage ofthe review.Hart (2003)recommends carrying out this process prior to reviewing the literature as it adds clarity and justification for the literature included in the review. Figure 2.1 demonstrates this process. Having defined the research topic a provisional list of key authors and words was established to facilitate a more extensive search. The key words used to search for literature were divided into common terms/topic. To locate studies that are pertinent to MSLT the key words used included Modified Social Learning Theory and the three individual theoretical constructs of MSLT that are health value, self-efficacy and health locus of control. Additionally, the theoretical construct of perceived control (IHLC and SE) was included as a key word within this search.When searching for relevant articles on diabetes and health behaviour issues key words used included: self-management, predicting outcome behaviour, education and barriers to diabetes care.

In addition to creating key words inclusion and exclusion criteria for literature included in the review was developed. All relevant literature in the English language from any country could be included in the review. Any literature in a different language was excluded due to the lack of resources to translate this literature. Relevant articles and texts were retrieved that had been disseminated between 1954 and 2013. Inclusion of literature within this timeframe allowed for a review of seminal and most recent literature on the research topic. Literature that was not relevant to the research topic or key terms/topics was excluded from the review.

Appendix A Table 10.1 summarises selected key studies referred to in this literature review. Key studies included in Appendix A were chosen based on their contribution to the methodology of this research. The studies presented are contextualised according to the study sample, setting, design, measures, results and strengths and limitations. Key studies are identified in the table using an * sign. There are two studies presented in the table that are not key to this research (Samuel Hodge et al., 2002, Arnold et al. 2005), however, they are integrated here for review.

Figure 2.1 Literature review stages

Stages	**Sources**	**Outcomes**
Define research topic: To test Modified Social Learning Theory in relation to outcome behaviours of Type 2 diabetes patients	Library catalogue Text books	Vocabulary of concepts Provisional list of key authors Developed key words relevant to research topic
Breakdown of research topic into searchable terms/topics: **Individual theoretical constructs of MSLT:** Health Value, Self-efficacy, Locus of Control, Perceived Control. **Diabetes related topics:** Self-management, outcome behaviour, education, barriers to diabetes care.		**Focused review criteria:** **Inclusion criteria:** 1. English 2. Relevant seminal & recent literature conducive to research topic disseminated between 1954-2013 3. Literature relative to defined searchable terms/topics **Exclusion criteria:** 1. Literature in any other language other than English 2. Literature outwith selected timespan 3. Literature not relevant to defined searchable terms/topic
Refined search using inclusion & exclusion criteria	**Electronic bibliographic databases:** Medline, OVID, CINAHL, and PubMed. **Manual search methods:** Reference lists of journal articles, books and online sources were accessed.	Key texts and studies identified and critically reviewed for inclusion in literature review

2.3 Health value

The word value is defined in the Oxford English Dictionary (2011:1598) in various ways. Two definitions were chosen to demonstrate the context with whichhealth as a value will be subjectively and objectively examined in this research. The first definition defines a value as the

> 'regard that something is held to deserve importance or worth' and secondly values can be defined as 'principles or standards of behaviour'.

Thus,this research investigates the level of importance of health to participants in this study and the relation of health value as a guiding principle or standard towards behaviour.

Each person can hold numerous values with varying degrees of importance (Bardi and Schwartz, 2003). Values can be considered a motivational construct as they represent broad goals that apply across contexts and time (Rokeach, 1973, Schwartz, 1996, Bardi and Schwartz, 2003). Values can be difficult to assess as people may act in accordance to their values even when they are not consciously thinking about them (Rohan, 2000, Bardi and Schwartz, 2003). However, Bardi and Schwartz (2003) advocate that values may operate outside of awareness but they are retrievable from memory. Furthermore, a consistent finding amongst value researchers suggests that values are relatively stable motivational characteristics of a person and that they change very little during adulthood (Rokeach, 1973, Schwartz, 1992, Schwartz, 1994, Rohan and Zanna, 2001). The current research examines relations of a particular value, that is health value, to a wide range of diabetes self-management behaviours. The underlying concepts of the construct of health value are critically reviewed in this section.

Rotter's (1954) social cognitive theory indicates that individuals engage in goal directed behaviour only if two conditions are met, firstly, the individual must value the particular goals available and secondly the individual must believe that their actions will be effective in obtaining these goals. Consequently, the theoretical stance of MSLT asserts that the relative value of health and the level of perceived control (LOC and SE) when combined may be better predictors of health behaviour (Wallston, 1992). Therefore, the argument over whether individuals do or do not value their health reflects the common assumption that individuals will engage in a behaviour that they believe will enhance the likelihood of achieving their valued goals (Rotter, 1954, Wallston, 1992). Smith and Wallston (1992) emphasize that the degree to which health is valued independently from other desired outcomes varies among individuals. However, there is a widespread belief that health is so highly valued that there is no reason to assess its value as an individual difference measure

(Wallston et al., 2007). Despite this criticism of measuring the construct of health value (HV)Smith and Wallston (1992:134) state that

> ‘ultimately, the extent to which we value our health is a prime determinant of whether or not we will survive and the quality of our survival.’

HV has not been included in many studies on health behaviour because of the difficulty in measuring the construct. Ranking procedures and Likert scales are the two most common measures used for assessing HV,however, both have their limitations (Rokeach, 1968, Wallston et al., 1976, Lau et al., 1986).Rokeach (1968) examined value differences using anovel value ranking procedure. The study included297 Michigan State University students who differ in their attitudes towards civil rights demonstrations. Rokeach found that the students exhibited statistically significant value differences. Students who considered themselves as liberals valued a world at peace, equality and wisdomsignificantly more than conservatives. Conservatives were found to value social recognition significantly more than liberals. This early research by Rokeach (1968) led to the further development of the value ranking procedure.Rokeach’sranking procedure recognised the concept of a value system and was sub-divided into two systems, an instrumental value system and a terminal value system. Instrumental values can be defined as a person’s mode of conduct whereas terminal values point to a person’s desired end state of existence. Rokeach’s value survey did not include health as a value in its ranking procedure thus, Wallston et al. (1976) adopted Rokeach’s technique and developed a similar measure that included health value.Wallston et al. (1976) initial test of this adopted measure involved examining health related information seeking as a function of health related locus of control and health value in two concurrent comparative studies. N=185 university students from Nashville Tennessee participated in the studies. Results demonstrated support for the assertion that information seeking is a joint function of health locus of control and health value. However, Wallston and colleagues’ (1976) value survey simply consisted of terminal values whereby participants were asked to rank ten terminal values such as happiness, freedom and health in order of importance to them. Using Wallston et al. (1976) value survey to measure HV in this study could have introduced a limitation in the measurement of the HVconstruct, as it does not allow for the measurement of theinstrumental/terminal dichotomy. Likewise, identifying differences in individual value systems could have been limited. The potential to identify these differences amongst participants was considered important to this research in order to ensure that the HV construct was tested adequately in line with MSLT.Furthermore, according to the researcher's knowledge no one has assessed health as an instrumental value.

Consequently, Lau et al. (1986) health value scale was reviewed for suitability to this research.Lau et al. (1986) established reliability and validity of their health value scale by carrying out an initial scaling study followed by a study whereby the concept of health value and health locus of control were examined together to ascertain how both can be empirically and theoretically useful. The initial scaling study included 326 students from Carnegie Mellon University in America. Participants in the study provided test-retest data of the scale. Co-efficient alpha reliability for the scale was .67 and it had a test retest reliability of .78. Although this scale was found to be valid and reliable, a limitation identified by Lau et al. (1986) is that the health value measure does not measure what aspect of health people are referring to when they respond to health value questions. N=1029 students from Carnegie Mellon University participated in the second study that involved completing a questionnaire that focused on a variety of preventative health behaviours. Lau et al. (1986) found that out of the preventative health behaviours examined,'breast self-examination' provided the best test of the hypothesis that relevant health locus of control beliefs should predict the performance of preventative health behaviour only among those who place a high value on health.As a result of this finding Lau et al. (1986) recommend that when measuring health value other beliefs and values should also be measured to help explain the success or failure of any change in health behaviour.

Lau's (1986) health value scale adopts a Likert format and has four items that measure current health value. Following a review of this scale it was concluded that it was suitable for this study as itcould facilitate testing of current health value and the items could be distinguished by the instrumental/terminal dichotomy if required. However, in order to justify whether this method of distinction of items was necessary the instrumental/terminal dichotomy of health value was explored in the qualitative phase of this research prior to the scale's inclusion in the quantitative phase. Chapter 5 elaborates upon the methods used to accomplish this.

The following section discusses the construct of self-efficacy. Firstly, a review of the construct's theoretical origins is provided followed by a critical appraisal of studies that include the construct. Next a brief review of available self-efficacy measures is given. This is then succeeded by the rationale for choosing a self-efficacy measure for this study.

2.4 Self-efficacy

Self-efficacy, or perceived competence as it is sometimes referred to, can be described as the confidence a person has in his or her own ability to perform goal directed behaviours (Wallston, 1992). Self-efficacy is a leading concept in Bandura's (1986) social cognitive theory (SCT), which argues that cognitive, self-regulatory and self-reflective processes are central to human adaptation and change.Self-efficacy has an influence on preparing for action because self-related cognitions are a major ingredient in the motivation process (Conner and Norman, 2009). Self-efficacy levels can enhance or inhibit motivation. People with low self-efficacy harbour pessimistic thoughts about their likely accomplishments and personal development. A person's perceived self-efficacy represents the confidence that one can employ the skills necessary to resist temptation, cope with stress and mobilise one's resources required to meet any situational demands (Conner and Norman, 2009). Furthermore, self-efficacy beliefs affect the amount of effort to change risk behaviour and the persistence to continue striving in the face of barriers and setbacks that may undermine motivation (Conner and Norman, 2009). People's beliefs about self-efficacy can be developed by four main sources of influence (Bandura, 1997). Firstly self-efficacy beliefs can be developed through personal accomplishment or mastery. Success can build a robust belief in one's personal efficacy (Bandura, 1997). The second way of creating and strengthening self-efficacy beliefs is through the vicarious experiences provided by social models. This involves observing a person similar to oneself succeed, thus raising the observer's beliefs that they too possess the capabilities to master comparable activities required to succeed (Bandura, 1997). Thirdly, social persuasion is a way of strengthening people's beliefs that they have what it takes to succeed. According to Bandura (1997) people who are persuaded verbally that they possess the capabilities to master given activities are likely to mobilise greater effort and to sustain it than if they harbour self-doubts and dwell on personal deficiencies when problems arise. Lastly, the fourth way of modifying self-efficacy beliefs is to reduce people's stress reactions and alter their negative emotional proclivities and misinterpretations of their physical states (Bandura, 1997).

When considering health behaviour change a person's perceived self-efficacy may include outcome expectancies, as individuals believe that they can produce the responses necessary for desired outcomes (Conner and Norman, 2009). Outcome expectancies pertain to the perception of possible consequences of one's action and can be organised along three dimensions: area of consequences, positive or negative consequences or short and long term effects of behaviour change. Areas of consequence can refer to physical outcome expectations such as expectations of disease symptoms and the anticipation of what will be experienced after behaviour change takes place.These include both the short and long term effects of behaviour change (Conner and Norman, 2009). For example, a person with Type 2 diabetes who is started on an oral anti-hyperglycaemic agent might expect better glycaemic control (positive consequence) but an increased susceptibility to weight gain (negative consequence). Both outcome expectancies and self-efficacy beliefs play influential roles in adopting new health behaviours, eliminating detrimental habits and maintaining what has been achieved (Conner and Norman, 2009). For most health conditions, the greater patients' self-efficacy beliefs, the greater their health outcomes (Bandura, 1997, Wallston et al., 2007).

The construct of self-efficacy has been applied countless times in health research and has considered diet, exercise, smoking, addiction and disease management behaviours. The majority of studies reviewed for this literature review regarding self-efficacy either explored levels of self-efficacy and its subsequent effects on outcome behaviours or many studies included the construct in an intervention or education programme and investigated its effects through a longitudinal study. Irrespective of the way in which the construct has been examined in the literature it has been consistently supported as a positive behavioural construct in relation to health outcomes.

Mc Auley and Blissmer (2000)carried out a brief review on studies that investigated self-efficacy (SE) determinants and consequences of physical activity. A common finding identified from the review was that self-efficacy is a significant predictor of exercise adoption. Other researchers have reported similar influences of exercise interventions in diseased populations including osteoarthritis, cardiovascular disease, diabetes and chronic obstructive pulmonary disease (COPD)(Kaplan et al., 1994, Lox and Freehill, 1999, Krichbaum et al., 2003). Kaplan et al. (1994) investigated the validity of self-efficacy expectations as predictors of mortality amongst 119 patients with COPD in San Diego, California. Measures included pulmonary and exercise function tests and a self-efficacy questionnaire. Kaplan and colleagues (1994) found that a self-report rating of self-efficacy expectation of COPD is a significant predictor of survival.It could be argued that this self-efficacy finding is unimportant as it only represents disease severity that can also be expressed using physiologic measures. However, Kaplan and colleagues (1994) point out how it is impressive that a self-efficacy rating can compete favourably with standardized laboratory tests as predictors of mortality. Similarly, Lox and Freehill (1999) investigated changes in psychological, physiological, and behavioural performance variables as a function of pulmonary exercise rehabilitation. Forty patients diagnosed with COPD were recruited for participation in a 12-week outpatient pulmonary rehabilitation program in a community hospital in Illinois. Measures used included a quality of life questionnaire, a 6-minute walking distance test, a 6-minute walking distance self-efficacy test and measures of dyspnoea, fatigue and emotional function. Lox and Freehill (1999)found that the pulmonary rehabilitation intervention outpatient program resulted in significant increases in self-efficacy in COPD patients. A limitation of Lox and Freehill’s (1999) study is the lack of a control group as this omits the extent to which psychological and emotional changes are related to the stimulus properties of exercise as opposed to other unknown variables. Krichbaum et al. (2003) conducted a systematic review of existing literature from 1985-2001 to explore the connection between self-efficacy (SE) and effective diabetes self-management behaviour. Krichbaum et al. (2003) review supports the inclusion of SE interventions in diabetes education programs as higher levels of SE associated with diabetes self-management has been found to improve diabetes outcomes (this point is further reviewed in section 2.6 and 2.7 of this chapter).

Closely linked to the findings on the benefits of SE to exercise and disease management outcomes are studies that have examined self-efficacy interventions with addictive behaviours such as smoking, alcohol and drug use.DiClemente (1981) examined self-efficacy and its impact on smoking cessation maintenance. The study operationalized the construct of self-efficacy and applied it to the problem of long term maintenance of smoking cessation. A measure of self-efficacy for avoiding smoking was used to analyse the relationship between self-efficacy and participants' ability to maintain post-treatment abstinence at a five-month follow up. The questionnaire was administered to N=63 participants at an outpatient service in Texas 4 weeks after quitting smoking. Maintenance was then assessed at a five-month follow up. Smokers who maintained their abstinence from smoking over a five-month period showed higher levels of self-efficacy than those who did not. Ilgen et al. (2005) reported similar findings but with patients who have substance addictions. Ilgen et al. (2005) examined the relationship between abstinence self-efficacy and treatment outcomes in N=2967 substance use disorder patients from 15 residential substance use disorder treatment programs in California. Participants were assessed at treatment entry, discharge and one year follow up. Measures included frequency of drug use, level of alcohol use, substance related problems, psychiatric symptoms, a situational confidence and SE questionnaire and abstinence at one year follow up. Results indicated that participants who had full (100%) confidence in abstinence at discharge had the strongest predictor of abstinence at one year above and beyond all other predictors. Ilgen et al. (2005) point out that it is clear that not every patient with high abstinence self-efficacy is abstinent at one-year follow up. However, Ilgen et al. (2005)recommend that treatment providers should focus on obtaining a high level of self-efficacy in relation to abstinence when it comes to treating addiction problems. Focusing attention on this can allow for identification of sub-groups of patients who may be either more or less likely to have positive outcomes following treatment (Ilgen et al., 2005).

It is apparent from the literature reviewed that self-efficacy can be considered a predictor of health behaviour, however, it is also clear that self-efficacy is but one of the many determinants of health behaviour (Wallston, 1992). Self-efficacy will be reviewed in this research as a prime contributor to predicting health behaviour and as a moderator to predicting health behaviour alongside health value and health locus of control.

Many scales were reviewed to ascertain which measure would best assess patients' levels of self-efficacy (SE) in this study(Smith et al., 1995, van der Bijl et al., 1999, Anderson et al., 2000, Wallston et al., 2007). Van der Bijl et al. (1999) Diabetes Management Self-efficacy scale was reviewed for suitability to this study. This self-efficacy scale was developed based on the self-care activities these patients have to carry out in order to manage their diabetes. A panel of experts in diabetes and four self-efficacy experts evaluated the original scalethat contained 42 items for validity and clarity. This evaluation of content validity resulted in a final scale that consisted of 20 items (van der Bijl et al., 1999). N=94 patients with Type 2 diabetes in the Netherlands were invited to complete the 20-item scale twice. The internal consistency of the scale resulted in an alpha of 0.81 and the test-retest reliability of the scale with a five week time interval was $r=0.79$ ($P<0.001$). Although van der Bijl et al. (1999) scale was found to be reasonably reliable with regard to validity it has been shown that the self-efficacy scale does not measure the dimension of strength in relationto four clusters of self-care activities which patients with Type 2 diabetes have to perform to prevent short and long term diabetes related complications. Continuing research with this scale would have to conform or modify these findings (van der Bijl et al., 1999). Additionally, a scale with twenty items may be considered by some as lengthy to complete.Another diabetes self-efficacy scale reviewed included the Diabetes Empowerment Scale (DES), which is a measure of diabetes related psychosocial self-efficacy developed by Anderson et al. (2000). Anderson et al. (2000) calculatedthe psychometric properties of this scale using a sample of 375 patients with Type 1 and Type 2 diabetes from Michigan. To establish validity, DES subscales were compared with two previously validated subscales of the Diabetes Care Profile (DCP). Factor and item analyses were conducted to develop subscales that were coherent, meaningful, and had an acceptable co-efficient alpha. The psychometric analyses resulted in a 28-item DES that has a co-efficient alpha of 0.96 and three subscales that measure managing the psychosocial aspects of diabetes, assessing dissatisfaction and readiness to change and setting and achieving diabetes goals (Anderson et al., 2000). Additionally, consistent correlations in the expected direction between DES subscales and DCP subscales provided evidence of concurrent validity. Anderson et al. (2000) found preliminary evidence that the DES is a valid and reliable measure of diabetes related psychosocial self-efficacy and should be a useful outcome measure for educational and psychosocial interventions related to diabetes. The DES was considered for inclusion in this research, however, it was decided that a scale that specifically measures the construct of self-efficacy would be more beneficial to the testing of MSLT. The perceived diabetes self-management scale (PDSMS) developed by Wallston et al. (2007) is a diabetes specific self-efficacy scale. This scales is an adapted version of an original scale known as the Perceived Health Competence Scale (PHCS) developed by Smith et al. (1995) and the Perceived Medical-Condition Self-Management Scale (PMCSMS) a modified version of the PHC scale.The PMCSMS has been shown to be a valid and reliable tool in numerous studies including Samuel-Hodge et al. (2002) study of perceived diabetes and dietary competence in African American women with Type 2 diabetes and (Arnold et al., 2005) study of the relationship between self-efficacy and self-reported physical functioning in chronic obstructive pulmonary disease (See appendix A for details of both of these studies).Wallston et al. (2007) tested the reliability and validity of the PDSMS in a study with N=398 patients with either Type 1 or Type 2 diabetes from four different healthcare settings in Nashville Tennessee.Diabetes self-efficacy was assessed by the 8-item PDSMS that was made diabetes specific by replacing the word condition with diabetes in each item of the PMCSMS. Additionally, diabetes self-care behaviours were assessed in this study using the Summary of Diabetes Self-care Activities measure (Toobert et al., 2000).Cronbach alpha of the PDSMS was .83. This indicates internal consistency. The scale was found to have construct validity as most of the demographic variables examined in the study had either no association with PDSMS scores or only weak associations. The PDSMS was deemed fit for the purpose of this study as it was found to be valid and reliable. Furthermore, in comparison to the other scales reviewed it was short, concise, measured diabetes specific self-efficacy and did not require further modification or testing.

The following section critically appraises the health locus of control construct. The section begins with a brief review of the construct and its development. Following on from this, existing literature that supports or opposes the construct's use within the health behaviour field is critically discussed. Next,section 2.5 examines the relationship of the HLC construct with SE and HV and ends with ananalytical review of the importance of investigating the interactions of behavioural constructs such as HLC, SE and HV.

2.5 Health locus of control

The health locus of control (HLC) construct has played a key role in the prediction of the physical and psychological adjustment to chronic disease (Wallston, 1992, Cvengros et al., 2005). Many researchers have used the multi-dimensional health locus of control (MHLC) scales developed by Wallston et al. (1978) to examine health specific locus of control expectancies. The MHLC scales have lead to a multi-dimensional conceptualisation of the locus of control construct and provided a way of applying the internal/external dimension of the HLC construct to the health domain. The health domain in this respect is constrained to the subjective interpretation of various phenomena such as health behaviours, health outcomes and health care (Wallston et al., 1978). As previously mentioned in Chapter 1 the term locus refers to the location where control resides, either internal to the individual (based on one's traits or behaviours) or external to the individual (due to other forces or chance) (Cvengros et al., 2005).

Levenson (1972) was the first to challenge the uni-dimensional nature of the locus of control construct by demonstrating that internal and external locus of control were separate dimensions. Additionally Levenson's (1972) research concerning scale development demonstrated that external beliefs consist of separate means of control such as self, powerful others and luck. Following this,Wallston et al. (1978) demonstrated the validity of these three means of control in the context of health beliefs, by developing the MHLC scales. The original measurement of MHLC used two forms A and B that refer to wide areas of functioning, health and medical conditions. Forms A and B were designed to measure healthy individuals rather than patients with current or chronic conditions.Wallston et al. (1994) thendeveloped Form C of the MHLC scale to provide a scale that can be condition specific for individuals with an acute or chronic illness (See appendix A). Form C contains a generic word ‘condition’ that can be replaced with a specific disease such as diabetes. Form C is the MHLC scale of choice for this study. The word condition was replaced with diabetes in the relevant items of the MHLC scale for use in this study. Additionally, the introductory instructions at the beginning of the MHLC scale used in this study were edited to refer to Type 2 diabetesself-management (See Appendix E). The MHLC scales contain three subscales one internal locus of control dimension and two external locus of control dimensions all of which are considered to be orthogonal. According to Wallston and Strudler-Wallston (1982) the internal/external dimensions are important to distinguish, as one can simultaneously hold both internal and external locus of control (LOC) beliefs about control of an event or behaviour. It is important to note thatthe internal and external dimension is assessed in two ways in this research. Firstly, through a subjective exploration of participants beliefs surrounding diabetes self-management and secondly by using Form C of the MHLC scale. This method of exploring and testing the HLC construct expects to provide support to existing literature that recognises the multi-dimensional nature of this construct.

The HLC construct has been widely reviewed with mixed results. Someearly studies found internally controlled medical patients to have better health behaviours such as seeking more information about their illness (Wallston et al., 1976), greater success in weight loss programs (Kincey, 1981) and greater success in smoking cessation programs (Schwebel and Kaemmerer, 1977). Kincey (1981) examined how the locus of control (LOC) construct relates to various aspects of non-compliance with health related advice. A sample of 131 twenty to sixty year old obese women participated in the study following a behavioural weight loss programme. Personal control variables were measured using the Short Eysenck Personality Inventory, a self-acceptance scale and a personal control subscale from Rotter’s internal/external LOC subscale. Participants with higher levels of internal locus of control achieved greater mean weight loss. Kincey (1981) reported that internal control orientation was associated with higher extraversion and self-acceptance, however, neither of these variables correlated with weight loss. Schwebel and Kaemmerer's (1977) study compared college students smoking behaviour focusing on smoking, alienation and LOC. Smokers, ex-smokers and non-smokers completed Rotter's internal/external LOC scale.Schwebel and Kaemmerer (1977) found a predicted significant difference between smokers and non-smokers relationship of LOC beliefs and alienation rather than will power. Alienation in this study refers to 'psychological body alienation' in that smokers considered themselves alienated from their bodies and thus have not internalized their intellectual knowledge that smoking can endanger their bodies. Schwebel and Kaemmerer (1977) findings highlight the usefulness of assessing internal LOC amongst smokers to identify people with low internal LOC that require intervention.

Furthermore, regular physical exercise has been associated positively withinternal health locus of control (IHLC)but negatively with chance and powerful others LOC (Duffy, 1997, Norman et al., 1997).Duffy (1997) examined the extent to which selected demographic modifying factors, health locus of control, self-efficacy and health status explained engaging in six health promotion practices. N=397 employed Mexican American women aged nineteen to seventy years who lived in Texas were included in the study. Methods of measurement included self-administered scales such as the MHLC scale Form A, the health perception questionnaire, a self-efficacy scale and a health promoting lifestyle profile that measured self-actualisation, nutrition, health responsibility, exercise, nutrition, interpersonal support and stress management.Duffy (1997) carried out a canonical correlational analysis. This statistical technique allowed Duffy (1997) to simultaneously examine relationships of two sets of relationships amongst variables by generating pairs of linear combination variables. Duffy (1997) found that women in midlife with high internal LOC and good current health status were more likely to practice exercise, interpersonal support and self-actualisation health promotion behaviours. The homogeneity of the sample of Mexican American women may be perceived as a limitation as it limits generalizability to the wider population. Norman et al. (1997) examined the relationship of health locus of control and exercise behaviour in a sample of over 13,000 adults in Wales. Participants completed a shortened version of the MHLC scales and Lau et al. (1986) health value scale. Results indicated weak but significant correlations between the health locus of control dimensions and exercise behaviour. Norman et al. (1997) found no evidence to support the moderating role of health value in predicting exercise behaviour. Norman et al. (1997) assert that other expectancy beliefs need to be considered when predicting exercise behaviour. Null findings on the HLC construct were reported byCallaghan (1998) who examined social support and LOC beliefs of 114 UK nurses health related behaviours. The nurses studied were attending third level education courses in London and Essex. Measures used in the study includedthe Health and Behaviour Survey, the Six Item Social Support Questionnaire and the MHLC scale. Results demonstrated that social support was not related to any health related behaviour except eating fruit. Participants with high internal LOC reported better dietary habits than those with lower internal LOC beliefs. However, LOC beliefs were not significantly related to any other health behaviour thus Callaghan (1998) concluded that LOC is a poor predictor of health behaviour.

More recent studies have demonstrated support for the IHLC construct in regards to positive health outcomes and behaviour(Burker et al., 2005, Naus et al., 2005). Burker et al. (2005) investigated whether health locus of control beliefs measured pre-transplant predicted survival after lung transplant. N=100 participants completed the MHLC scale before and after transplant. Burker and colleagues (2005) found that patients with medium and high levels of IHLC lived longer after lung transplant than those with low levels of locus of control. Similarly,Naus et al. (2005)reported positive findings from their study of 109 early stage breast cancer survivorswho had high IHLC beliefs. Naus et al. (2005) measured LOC beliefs using Form C of the MHLC scale. Depression and anxiety were controlled for using the Beck Depression and Anxiety Inventory scales. Patients with high internal LOCwere less likely to suffer from anxiety and depression and as a result demonstrated enhanced treatment outcomes(Naus et al., 2005). Despite the limitations of the small sample size of this study and the cross-sectional nature of the design the pattern of results demonstrate support for examining interactions of LOC beliefs with other constructs in patients with serious chronic and terminal health threats.

2.6 Investigating interactions

As previously discussed, although the construct of HLC has received some support other research studies and reviews have not found locus of control to be consistently related to successful health outcomes or behaviour change (Wallston, 1991, Steptoe and Wardle, 2001). Wallston has argued that the reason for these inconsistencies may be that studies examining the construct of control have often examined locus of control to the exclusion of other constructs that may contribute to control (Wallston, 1992, Wallston, 2005a). Wallston et al. (2005a) suggest that studies that simply use a locus of control scale to investigate perceived control may not tap into the construct's multi-dimensionality, particularly if interactions among perceived control (LOC and SE) are ignored. Some studies have tested the interaction between the constructs of health valueand locus of control(Lau et al., 1986, Bennett et al., 1997, Norman et al., 1997, Bennett et al., 1998, Laffrey and Isenberg, 2003, Masters and Wallston, 2005)and self-efficacy and locus of control(Gramstad et al., 2001, Bonetti et al., 2001).Comparable to research on the HLC construct alone these studies have yielded mixed results.

Lau et al. (1986) hypothesised that health locus of control beliefs of university students should correlate with relevant health behaviours only among those who value their health highly. This hypothesis is supportive of MSLT. Results indicated that a combination of believing in self-control over health and placing a high value on health in general predicted the performance of preventative health behaviours (Lau et al., 1986) (See Section 2.3 and Appendix A for in depth details of study). A study by Laffrey and Isenberg (2003) report conflicting findings to Lau et al. (1986), as little support for the health value and locus of control constructs were found when measured together to assess perceived importance of exercise and participation in physical activity during leisure-time. N=70 women from adult education classes in three unrelated Midwest cities in America participated in the study. Measures used to examine perceived importance of exercise and participation in physical activity included a physical activity during leisure questionnaire, Form A of the MHLC scales, a perceived importance of physical exercise scale and an adapted version of Rokeach's terminal value ranking scale was used to measure health value. Results demonstrated that these variables proved to have little effect when leisure was considered as the outcome variable. Laffrey and Isenberg (2003) point out that their findings simply suggest that LOC and health value in this instance may not have tapped into the perceptions of their participants.In contrast to Laffrey and Isenberg's (2003) study a more recent study by Masters and Wallston (2005)states that the relationship between highIHLC and health value is positive. Masters and Wallston (2005) explored advantages of canonical correlation in relation to measures of coping affect and values. N=659 college students who were attending private or public universities in Alabama, Tennessee, Washington, D.C, Iowa and central California participated in the study.Measures used included an enhanced version of Form A of the MHLC scales, the Brief Cope Inventory Scale, the Positive and Negative Affect Schedule and a value survey. Results verified some previous hypothesised relations that external health control relates to passive coping mechanisms. New findings from the study pertaining to the relations between networks of MHLC variables indicate that a positive affectregarding health relates to a collaborative control between self and an external control factor such as God. Additionally,Masters and Wallston (2005) found that perceiving oneself as the locus of health control was significantly correlated with a set of values characterised by happiness and health and negatively by pleasure. This study demonstrates how canonical correlation can provide a greater understanding of relations of HLOC and other multi-dimensional variables than can be obtained through simpler analytic strategies (Masters and Wallston, 2005).

Waller and Bates (1992) examined HLC beliefs and SE beliefs in a healthy elderly sample of 57 people in Ohio, America. Participants completed the MHLC scale, a self-efficacy scale and a health-style self-test for senior citizens. The healthy elderly sample was found to be characterized by high IHLC and high SE beliefs and good health behaviours. Additionally, Bonnetti et al. (2001) investigated the dimensions of the perceived control construct in relation to activity level and mood. The sample included N=106 Scottish students and N=145 Scottish, Spanish and Irish patients. All participants completedthe MHLC scale, a generalised self-efficacy scale and the perceived health competence scale. The patient sample completed a version of the Sickness Impact Profile.Bonetti et al. (2001) foundcorrelations between SE and

IHLC in relation to activity but these were rather low. In some cases, Bonetti et al. (2001) reported that the relations between SE and MHLC scale scores were non-significant. Furthermore, the patient sample had significantly lower expectancies concerning their personal control and significantly higher expectancies concerning the role of other people and chance factors in health specific situations. This finding is consistent with previous research on perceived health competence by Smith et al. (1995). Bonetti et al. (2001) findings indicate that perceived control is a multi-dimensionalconstruct regardless of health and culture and adequate assessment of the construct requires multiple perceived control measures. Moreover, Gramstad et al. (2001) carried out a study that searched for the predictors of quality of life and psychosocial adjustment in a sample of 101 patients with epilepsy from a hospital setting in Norway. The main hypothesis for this study was that negative and positive affectivity, self-efficacy and HLOC are important for psychosocial adjustment in patients with epilepsy. All participants completed the Washington Psychosocial Seizure Inventory, the Positive and Negative Affect Schedule, the MHLC scales, the generalised self-efficacy scale and a scale measuring self-efficacy in epilepsy. Gramstad et al. (2001) findings indicate that correlations between self-efficacy and general health outcomes in patients with epilepsy were stronger than correlations between MHLC and general health outcomes. These findings offer support to theorists who argue that self-efficacy is a more powerful predictor than HLC (Wallston, 1992, Frank et al., 2007, O'Leary et al., 2008).

The argument that SE is a more powerful predictor holds true for MSLT which advocates that the construct of LOC plays a far less significant role in predicting health directed behaviour than does either health value by itself or self-efficacy (Wallston, 1992). The HLC construct in MSLT is viewed as a moderator of health behaviour rather than a major predictor variable. This view led to the development of research question (RQ) 4(see Chapter 3 section 3.3 pages 46-48) for a detailed explanation of RQ’s), which questions whether HLC acts as a moderator of predicating health behaviour in a Type 2 diabetes population. Furthermore, as identified above,the measurement of health value and perceived control (LOC and SE) when taken together requires further investigation that led to the development of RQ5 and RQ6. The theoretical formulation of MSLT states that the interaction of internal locus of control, self-efficacy and health value predicts the potential for an individual to engage in a set of behaviours, this theoretical stance will facilitate the examination of RQ1, RQ4, RQ5 and RQ6(see Chapter 3 section 3.3 pages 46-48 for a detailed explanation of RQ’s).

According to the researcher’s knowledge, the three-way interaction of these variables has not been investigated in the specific way proposed by this research. However, O’Hea et al. (2009) previously investigated the interaction of LOC, SE and outcome expectancy in relation to HbA1c in 109 patients with Type 2 diabetes. Participants were recruited from internal medicine and family practice clinics at a public teaching hospital in Louisiana. Measures used in the study included a demographic questionnaire, Form C of the MHLC scales, the Multidimensional Diabetes Questionnaire and HbA1c results were recorded as biological markers of regimen adherence. O’Hea et al. (2009) used Pearson product moment correlations to determine if any of the continuous demographic variables were significantly correlated with the dependent variable HbA1c. To test the interaction of the independent variables a hierarchical multiple regression (HMR) analysis was performed. The correlation results suggested a moderate correlation between internal LOC and self-efficacy. This finding suggests that each construct taps into a different aspect of perceived control. The HMR results demonstrated that patients who reported low self-efficacy and low outcome expectancy tended to benefit the most from high internal LOC. However, for patients with low self-efficacy and high outcome expectancy, higher scores on internal LOC were related to poorer HbA1c levels. Thesefindings demonstrate support for the three-way interaction of IHLC, SE and outcome expectancy.Although, O’Hea et al. (2009) argued that they were testing MSLT, their study did not include a health value measure. Health value is a key construct of MSLT and is conceived of as a moderator of the relationship between IHLC beliefs and health behaviour.Outcome expectancy assesses the motivation of partaking in health behaviour rather than the value of the behaviour. This research expects to support this finding and add a unique contribution to the literature on the way in which MSLT is tested.

The following section explains how perceived control (LOC and SE) is operationalized in relation to this research followed by a critical review of the importance of the perceived control construct.

2.7 Perceived control

It is difficult to offer a single universal definition of perceived control despite general agreement in the literature that perceived control is beneficial and that a lack of perceived control is detrimental to an individual (Allison, 1991, Wallston, 1992, Bonetti et al., 2001). A reason for this difficulty is that different formulations of perceived control have been incorporated into many theoretical frameworks including social learning theory (SLT) (Rotter, 1966), social cognitive theory (SCT) (Bandura, 1986), the theory of planned behaviour (Ajzen, 1988) and modified social learning theory (Wallston, 1992). The theoretical framework of MSLT determined the operationalization of perceived control for this research.MSLT combines a behavioural expectancy construct known as perceived competence or self-efficacy and an outcome expectancy locus of control, this combination of constructs generates a generalised expectancy belief termed perceived control (Wallston, 1992).

The concept that an individual's beliefs in personal control are related to taking preventative health behaviour is appealing to health professionals. The reason for this is that individual perceptions concerning control over health related factors lead to actions taken to prevent disease or other conditions (Allison, 1991). This argument is compatible with many of the traditional philosophical underpinnings of health behaviour that have emphasized voluntary change and individual responsibility for health (Allison, 1991, Conner and Norman 2005). Despite its attractiveness to health professionals and researchers, the hypothesized perceived control and preventative health behaviour relationship has not been demonstrated to be very strong (Allison, 1991, Wallston et al., 2007). Allison (1991) suggests that this disappointing result may be due to the use of generalized as opposed to specific measures of control and the likelihood that perceived control is one of a number of variables predicting health behaviour. Wallston (1999) points out that perceptions of control moderate or are moderated by, many other constructs, among them individual differences in demographic characteristics, background experiences, situational factors and value orientations. Furthermore, Wallston (1999:56) states that

> ‘without adopting an interactionist perspective, health professionals and researchers will fail to discover the full explanatory power of perceived control’.

A brief review of the traditional theories of health behaviour and MSLT is provided in the following section.

2.8 Traditional theories of health behaviour& MSLT

Traditional theories of health behaviour may assist in the design of behaviour change interventions in various ways, by promoting an understanding of health behaviour, directing research and facilitating the transferability of an intervention from one health issue or healthcare setting to another (Munro et al., 2007). Social cognition models (SCMs) are concerned with how individuals make sense of social situations. The cognitive perspective includes theories such as the health belief model (HBM)(Rosenstock, 1966), social cognitive theory (SCT)(Bandura, 1986), the theories of reasoned action (TRA) and planned behaviour (TPB)(Fishbein and Ajzen, 1975) and the protection motivation theory (PMT)(Rogers, 1975) and MSLT (Wallston, 1992). These theories focus on cognitive variables as part of behaviour change, and share the assumption that attitudes and beliefs, as well as expectations of future outcomes, are determinants of health behaviour (Munro et al., 2007).

Numerous reviews have identified that the SCMs mentioned above have many weaknesses(Michie et al., 2005, Munro et al., 2007, Conner and Norman, 2009).Munro et al. (2007) concluded from their review of SCMs that these theories do not adequately address the behavioural skills needed to carry out ‘good’ health behaviour. Furthermore, Michie et al. (2005) found that little attention is given to the origin of beliefs and how these beliefs may influence other behaviours. This point is relative toMSLT as similar to the other SCMs it does not address the origin of health behaviour beliefs. Nevertheless, MSLT takes into account one’s belief orientation when considering HLC and SE beliefs. MSLT’s theoretical framework aims to enable health professionals to determine a patient’s disposition to act in a certain manner in health related situations (Wallston, 1992).

Despite the limitations of these theories SCMs provide a basis for understanding the determinants of behaviour and behaviour change (Conner and Norman 2009). Munro et al. (2007) recommend that future research should focus not on the development of new theories but rather on the further examination of those already developed.This research expects to contribute to the advancement of an existing theory by testing the theoretical stance of MSLT.

Thus far the literature review has highlighted the dynamic nature of the field of health behaviour. The following section highlights the barriers to diabetes self-care followed by an analytical review of the literature of diabetes studies that examine behavioural constructs and their impact on outcome behaviours.

2.9 Barriers to diabetes care& outcome behaviours

Diabetes is a complex disease which places high behavioural demands on the person living with the illness on a daily basis (Diabetes UK, 2008). Although access to healthcare is a key component of diabetes care, most of the burden of care remains with the individual with diabetes, as they live their lives for more than 99% of their time away from contact with their diabetes team (Diabetes UK, 2008). Recent research has identified that the majority of people living with diabetes fail to achieve optimal blood glucose control leading to poor health outcomes (Simmons et al., 1998, Glasgow et al., 1997, Glasgow et al., 2001, Peyrot et al., 2005b). A possible reason for these negative findings is that barriers of care related to the experiences and perceptions of patients with diabetes remain poorly defined and unstructured (Simmons et al., 1998, Diabetes UK, 2006, Diabetes UK, 2008). A key aspect of diabetes care that relates to patient experiences and perceptions is psychological care. Diabetes UK (2008) ‘minding the gap’ survey investigated 464 diabetes services in the UK and found that 85% of people with diabetes in the UK have either no defined access to diabetes psychological support and care or at best only in the form of local generic services. Another barrier to diabetes care identified in the literature include poor rates of diabetes regime adherence due to numerous factors such as socio-economic and psychosocial influences(Balkrishnan et al., 2003, O'Hea et al., 2005, Peyrot et al., 2005b). Furthermore, high rates of anxiety and depression amongst patients with diabetes has been found to contribute to poor diabetes self-management (Gonzalez et al., 2007).

The term self-management has been reported in literature associated with chronic illness as the activities people undertake to create order, discipline and control in their lives (Clark et al., 1991, Kralik et al., 2004). Many studies looking at barriers to diabetes self-management have focused on the impact of patient beliefs on processes of decision-making or adherence rates. The majority of these studies have found that beliefs can either positively or negatively influence outcome behaviours of patients with Type 2 diabetes. Despite these findings interventions focusing on patients beliefs to assess behaviour change are not widely adopted in practice. This could be as a result of the inconsistencies found within health psychology literature regarding the role of behavioural constructs, such as health locus of control, self-efficacy and health value.

Contradictory evidence regarding HLC is found in the diabetes literature. Gregg et al. (1996)carried out a study to investigate the relationship of the LOC of control construct to physical activity amongst a sample of 580 Pima Indianswith and without diabetes in Arizona, America. LOC was measured using a version of Rotter's internal/external LOC scale and participants' total physical activity from the past year was examined using an interviewer-administered questionnaire. Among both men and women without diabetes individuals with a high internal LOC score were significantly more active than those with a high external LOC score than those participants with diabetes. Gregg et al. (1996) conclude from their findings that by enhancing perceptions of internal LOC this may influence physical activity and thus have implications for diabetes prevention.Auerbach et al. (2002) carried out a study that examined 54 Type 1 and Type 2 diabetic patients'health-related control appraisals and physician–patient interpersonal impact in relation to patients' metabolic control and satisfaction with treatment during regular medical consultations. At the end of the consultation, both patients and the physician completed a measure describing the interpersonal impacts produced in each by the other's control and affiliation behaviors. Findings from Auerbach et al. (2002) study suggest that patients' satisfaction with treatment was unrelated to diabetes control measures. Auerbach et al. (2002) argues that HLC does not predict some aspects of diabetes related outcomes such as metabolic control. Furthermore, Auerbach et al. (2002) stipulate from their findings that a patient's self-reported desire for involvement in his or her healthcare and the transactional fit of patient-physician interpersonal behaviours are potentially important contributors to diabetes outcomes.

Additionally, some researchers have not found a connection between internal locus of control and diabetes outcomes (Kneckt et al., 1999, Bunting and Coates, 2000).Kneckt et al. (1999) evaluated the correlation between dental and diabetes LOC beliefs in predicting oral health behaviour such as tooth brushing, dental visiting, oral indexes, dental status, diabetes compliance, and HbA1c level by using situation specific LOC scales. N=149 insulin dependent diabetics who had their own teeth were included in this Scandinavian study. Dental and diabetes LOC beliefs correlated with each other. Kneckt et al. (1999) results demonstrate that dental locus of control is associated with frequency of dental visiting, plaque index, decayed surfaces, and with root caries, but diabetes locus of control was found to be only weakly associated diabetes adherence self-care regimens and not at all with HbA1c level. Bunting and Coates (2000) examined the stability and predictors of blood glucose levels of 184 people who attended a diabetes clinic in Northern Ireland. Data collected included six aspects of perceived control that was examined using the Diabetes Perceived Control Scales. In addition the type of injection regime, age, gender and years since diagnosis of each patient was recorded. Bunting and Coates (2000) found the explanatory power of LOC to be insignificant and regular attendance at the outpatient clinic was found to have little effect on reducing blood glucose levels in this patient sample.

The dependent variable under investigation in this research is Type 2 diabetes patients' outcome behaviours. Diabetes outcome behaviours are dependent on a range of activities such as self-monitoring of blood glucose, dietary considerations, exercise and foot care (Toobert et al., 2000). These activities require effective self-management. To measure diabetes outcome behaviours self-reported assessment is deemed to be the most practical and cost-effective approach to self-care assessment (Toobert et al., 2000). Patients self-reports are open to bias but can be made more reliable by asking specific, non-judgemental questions in questionnaires (Abraham and Hampson, 1996). The Summary of Diabetes Self-Care Activities Measure (SDSCA) developed by Toobert et al. (2000) was chosen to measure outcome behaviours of patients with Type 2 diabetes in this study. Toobert et al. (2000) reviewed the reliability, validity and normative data of 7 different studies involving a total of 1,988 people with diabetes and provided a revised version of the SDSCA for use in practice. The review involved examination of the means and standard deviations, inter-item and test-retest reliability, correlations between the SDSCA subscales and a range of criterion measures and sensitivity to change scores were presented for the seven different studies. The seven studies that Toobert et al. (2000) examined demonstrated that the SDSCA is a multi-dimensional measure of diabetes self-management with adequate internal and test-retest reliability with evidence of validity and sensitivity to change. Additionally, the small number of significant correlations between the SDSCA subscales and participant characteristics demonstrates that the SDSCA can be generalised to different diabetes subpopulations including insulin, status, sex, number of comorbid conditions and diabetes duration (Toobert et al., 2000). A limitation of this review is the number of inconsistent items and constructs in each of the 7 studies that constitutes a weakness in analysis (Toobert et al., 2000). However, despite this limitation validity and reliability of the scale was found to be stable. On the basis of this review Toobert et al., (2000) devised a revised version of the SDSCA scale (Toobert and Glasgow, 1994). The revised scale consists of a set of 11 core items with an expanded list of 14 additional questions that may be used by researchers or clinicians. The revised version also includes items on foot care and smoking. To simplify the scoring of the SDSCA the items are now measured as days per week. The strengths of the 11 core items of the revised SDSCA include their brevity and ease of scoring (Toobert et al., 2000).

As previously mentioned in section 2.6 studies that have investigated the interactions or combinations of constructs such as HLC and SE and HLC and HV, have not provided the diabetes literature with a solution for best predicting outcome behaviours of diabetes patients. It is anticipated that by testing the interaction of the constructs of MSLT this research may contribute to filling this gap in the literature and provide support to a behavioural theory that could potentially be used in practice to predict health behaviour.

The following section reviews the concept of diabetes self-management education.

2.10 Diabetes self-management education

Diabetes self-management education is the process of teaching individuals to manage their diabetes (National Standards Task Force, 1995). The rationale for reviewing diabetes self-management education was to facilitate an understanding of the possible knowledge and skills gained by participants that would be included in this study. In addition it was anticipated that knowledge gained would aid interpretation of the qualitative data.

The NICE (2003) guidance on the use of patient education models for diabetes recommends that structured patient education is made available to all people with diabetes at the time of initial diagnosis and then as required on an on-going basis, based on a formal regular assessment of need. The national institute for health and care excellence (NICE) has taken responsibility for determining the quality and outcome framework (QOF) indicators (see section 1.3 for further detail on QOF) in an attempt to refocus the scheme on patient outcomes rather than process-based targets (Kenny, 2013). QOF indicator DM014 has been newly introduced in 2013and it requires that structured education is offered to all people with diabetes (NHS Commissioning Board et al., 2013). It is expected that this new indicator may reduce 'ad hoc' practice services for diabetes education and where necessary result in healthcare practices pressing for increased provision of 'what has to be a cornerstone of diabetes care' (Hadley-Brown, 2013:68).

According to Diabetes UK and Department of Health (2005:12) the key criteria that underpin the philosophy ofdiabetes education are that,

> 'it should be evidenced based, dynamic, flexible to the needs of the individual and users should be involved in its on-going development. The programme should have a specific aim and learning objectives, which are shared with patients' carers and family. The programme should support self-management attitudes, beliefs, knowledge and skills for the learner, their family and their carers'.

Currently there are two national group education programmes for adults with diabetes that meet the key criteria for structured education (Diabetes UK and Department of Health, 2005). They are DAFNE for patients with Type 1 diabetes and DESMOND for patients with Type 2 diabetes. DAFNE – Dose Adjustment for Normal Eating, is a skills based education programme in which adults with Type 1 diabetes learn how to adjust insulin to suit their free choice of food, rather than having to work around their insulin dosages (DAFNE Study Group, 2002). DESMOND – Diabetes Education and Self-management for On-going and Newly Diagnosed, is a structured group education programme for individuals with Type 2 diabetes. This structured group education is based on a series of psychological theories of learning including Leventhal's common sense theory(Leventhal et al., 1980), the dual processes theory(Chaiken et al., 1996) and social learning theory (Bandura, 1986).

Due to the nature of the sample of this study the remainder of this section focuses on existing literature of Type 2 diabetes education and its influences on diabetes outcomes. However, it is noted that DAFNE has been found to be associated with a range of benefits in clinical practice. A recent study by Keen et al. (2012)explored the effectiveness of DAFNE with 124 adults with Type 1 diabetes in a routine clinical practice in the UK. Keen et al. (2012) found that DAFNE resulted in an improvement in baseline HbA1c ≥ 81 mmol/mol, a reduced number of reports of hypoglycaemia, a total eradication of diabetic ketoacidosisand lower diabetes related distress. However, Keen and colleagues (2012) point out that these findings underrepresent the most deprived of the clinic population and the levels of clinical depression were unusually low for patients with Type 1 diabetes. It is acknowledged that this population should be further represented in replicated studies of DAFNE.

Prior to the implementation of DESMOND within the NHS in 2005 (James et al., 2005) Type 2 diabetes patients within NHS Lothian received structured group education through health professionals at the diabetes clinic. Following on from this the conversation map approach to Type 2 diabetes education was applied in NHS Lothian from 2007 until 2009when DESMOND replaced it. The conversation map approach involved structured group education and was normally facilitated by a nurse and a diabetes specialist who guided the conversation by ensuring that participants were challenged to think, learn, set meaningful goals and take action (Diabetes Conversations, 2009). This method of diabetes education has currently not been audited within the UK, however, it has been audited and supported in other countries such as Canada and America (Reaney et al., 2012). However,DESMOND has been evaluated in the UK by Davies et al. (2008) to establish its effectiveness as an education programme for people with newly diagnosed Type 2 diabetes. Davies et al. (2008) carried out their evaluation in 207 general practices in 13 primary care sights in the UK. N=824 adults with Type 2 diabetes who had received DESMOND were invited to participate. The main outcome measures used to evaluate DESMOND were HbA1c levels, blood pressure, weight, blood lipid levels, smoking status, physical activity, quality of life, beliefs about illness, depression and the emotional impact of diabetes at baseline and up to 12 months. Their report demonstrated that patients benefited from greater improvements in weight loss and smoking cessation, and positive improvements in beliefs about illness (mainly SE beliefs), however, there was no improvement of HbA1c levels up to twelve months after diagnosis. It is evident from this review of the literature that structured group education is beneficial to patients with Type 2 diabetes, yet, patients willingness to adhere to the goals established during the intervention is not currently assessed prior to the education programme. Perhaps if this was assessed this could facilitate identification of possible barriers to achieving diabetes self-management goals such as having low internal LOC beliefs or low HV.

2.11 Summary

The above literature review has outlined the theoretical background to each of the constructs of MSLT. This review included studies that investigated the theoretical stance of each construct followed by a comprehensive critical review of research that has examined the relationships of these constructs and their interactions. The studies reviewed were mainly quantitative due to the nature of examining these constructs using psychometric scales. It is evident from the literature reviewed that there are inconsistencies regarding the role of health locus of control and health value as moderators to predicting health behaviour. This analytical review concurrently highlights the impetus for the research questions and provides a justification for an investigation into these constructs and testing of MSLT.

Potential measures that could be used to test MSLT were reviewed in Chapter 2. The construct of health value was reviewed in Section 2.3. Lau et al. (1986) health value scale is the health value measure of choice for this study. The health value scale has been found to have good internal consistency and construct validity. In Section 2.3 the concept of the instrumental/terminal dichotomy of health value was introduced. A mixed methods approach to this research will enable this concept to be explored further.

Scales that measure the construct of self-efficacy were reviewed in Section 2.4. The Perceived Diabetes Self-management Scale (PDSMS) developed by Wallston et al. (2007) was chosen to measure the construct of self-efficacy in this study. The PDSMS is an adapted version of the Perceived Health Competence Scale developed by Smith et al. (1995) and has been found to be a valid and reliable scale that measures diabetes self-efficacy.

Form C of the MHLC scales developed by Wallston et al.(1994) was selected as the preferred scale to measure the construct of Health Locus of Control, as it is a valid and reliable scale that can be adapted to be condition specific to the patient sample under investigation. Form C was adapted to be specific to Type 2 diabetes patients in this study (see Appendix E).

To test the interaction of the constructs of MSLT in a Type 2 diabetes patient population outcome behaviours need to be examined. The Summary of Diabetes Self-Care Activities (SDSCA) measure developed by Toobert et al.(2000) was reviewed for suitability to measure self-care activities of Type 2 diabetes patients in this study. It was concluded from the review that the revised version of the SDSCA measure would be a practical choice as it has been found to be a valid and reliable measure that can adequately measure diabetes self-management outcome behaviours.

Moreover, justification for this research was identified through an analytical review of the barriers to diabetes care. It is evident from the literature that a consensus to an approach on the best way to predict outcome behaviours of Type 2 diabetes patients is lacking.

Furthermore, it is clear from this literature review that methods of assessing diabetes patients willingness to adhere to goals of behaviour change facilitated through structured education need to be considered.

3 Methodology

3.1 Introduction

The purpose of this study is to test the interactive effects of Modified Social Learning Theory (MSLT) in relation to predicting health behaviour in a Type 2 diabetes population. MSLT states that the interaction of health value and the perceived control constructs of internal locus of control and self-efficacy, when taken together are better predictors of outcome behaviours than when considered individually. A knowledge gap concerning the health value construct was identified during the literature review. Literature regarding the meaning of health value to people with chronic diseases such as Type 2 diabetes was lacking. Furthermore, uncertainty regarding the instrumental/terminal dichotomy of the construct has been identified by many(d'Houtaud and Field, 1984, Rokeach, 1973, Schwartz, 1992, Smith and Wallston, 1992, Duncan, 2010). In order to ensure that the constructs of MSLT were adequately tested it became apparent that the meaning of the health value construct required further exploration. A mixed methods research study employing an exploratory sequential design was considered as the best approach to facilitate these research requirements.

An exploratory sequential design allowed for an initial qualitative phase that enabled exploration of the health value construct followed by a quantitative phase that facilitated testing of MSLT. Furthermore, the exploratory sequential design permitted an interim phase during the research whereby findings from the qualitative phase were developed to contribute to the methods used in the quantitative phase. This design was seen as an advantageous approach as it supported a thorough exploration of the construct of health value and ensured that adequate methods for testing the constructs of MSLT were identified.

This chapter begins with a summary of the purpose of the study and of each phase of the research design. Following on from this the research questions and hypotheses that were devised based on the theoretical position of MSLT are presented. Succeeding this the implications of the epistemological and theoretical approaches taken to this mixed methods research are discussed. Next an in depth discussion of the rationale and methods of the research design are provided. Following on from this an explanation of the research process and ethical considerations made are discussed.The sample type and sampling strategy applied in this mixed methods research is then discussed.Finally, section 3.11 provides an overall summary of this chapter followed by a detailed description of the presentation of the ensuing chapters for each phase of the research. The three phases of the research are discussed chronologically in relation to methods, findings and results of each phase.

This chapter is structured as follows:

- Section 3.2 Purpose of the study
- Section 3.3 Research questions and hypotheses
- Section 3.4 Mixed methods research and the challenges of this research approach
- Section 3.5 Epistemology
- Section 3.6 Theoretical perspective
- Section 3.7 Research design
- Section 3.8 Ethical considerations
- Section 3.9 Research process
- Section 3.10 Sample & Sampling strategy
- Section 3.11 Summary

3.2 Purpose of the study

This study aimed to test the interaction of the constructs of Modified Social Learning Theory (MSLT) in relation to predicting health behaviour in a Type 2 diabetes population. An exploratory sequential design wasused, in which there were two main phases (qualitative and quantitative) and an interim phase of data collection and analysis. Firstly, the design qualitatively explored the constructs of MSLT with twelve participants who have Type 2 diabetes and are on insulin. The qualitative phase aimed to understand the meaning of health value and perceived control to these participants with the intent of using this information to contribute to the testing of MSLT. From this initial exploration two new research questions and hypotheses were developed which contributed to the interim and quantitative phases. The qualitative data also lead to the development of two new items that were added to a health value measure used in the quantitative phase,however, the two new items were subsequently removed during data analysis as one of the items was deemed problematic. The planned quantitative phase included collecting data to test MSLT from participants with Type 2 diabetes on insulin using five questionnaires that measure diabetes outcome behaviours.

The following section includes the research questions and subsequent hypotheses formulated to explore and test MSLT.

3.3 Research questions and hypotheses

The overarching mixed methods research question to be addressed in this study is:

> Is the potential for people with Type 2 diabetes engaging in a set of health sustaining behaviours a predictor of health value and perceived control (HLOC and SE) as postulated by MSLT?

To answer this question a series of subsidiary research questions will be used throughout the research design. The subsidiary research questions are presented in table 3.1 below. Subsidiary research questions 1, 4, 5 and 6 will be addressed in the quantitative (Quan) phase. Subsidiary research questions 1, 4, 5 and 6 were formulated to address the principle research question that advocates testing of the interactive effects of the constructs of MSLT in relation to predicting Type 2 diabetes health behaviour. Research question(RQ) 1 will test the three-way interaction of health locus of control, self-efficacy and health value. RQ4 will test the significance of the locus of control construct as a moderator to predicting health behaviour. This result will be compared with the constructs of health value and self-efficacy as moderators to predicting health behaviour. Therefore the three constructs' significance to predicting health behaviour will be examined individually and as interactions. RQ5 was formulated to identify whether health value is a necessary predictor of health behaviour in Type 2 diabetes. RQ6 seeks to test the significance of the interactive effect of the three-way interaction of health value, self-efficacy and health locus of control when taken together.

Research questions 2 and 3 seek an in-depth understanding of the constructs of MSLT and are therefore deemed qualitative in nature. The findings from these two questionswill be discussed alongside the quantitative results in Chapter 8.Research question 7 seeks to address the impact of mood on predicting behaviour in Type 2 diabetes. RQ7 is addressed in both the qualitative and quantitative phases of this research.RQ 8 was formulated to facilitate the integration of methods, results and conclusions of this research in the discussion chapter (Chapter 8).

The principal research hypothesis is:

> Health locus of control, self-efficacy and health value when taken together are more proficient predictors of self-management outcome behaviours carried out by Type 2 diabetes patients than when each construct is taken individually.

In order for the researcher to ascertain whether this hypothesis (H) can be accepted supplementary hypotheses will be utilized within the research design to support the principal hypothesis. The supplementary hypotheses support testing interactions of the three constructs when taken together on predicting health behaviour of people with Type 2 diabetes and as individual constructs.

The Subsidiary research questions are presented in table 3.1 in numerical order followed by the supplementary hypotheses. Each research phase that each research questionis addressed in is represented by denotations for qualitative research (Qual) and/or quantitative research (Quan).

Table 3.1 Subsidiary research questions (RQ's) and supplementary hypotheses (H)

RQ/H	Description
RQ1 *Quan*	Does MSLT three-way interaction of HLOC, SE and HV predict the outcome of self-care behaviour in a Type 2 diabetes population?
RQ2 *Qual*	How do people with Type 2 diabetes value their health and perceive control over their condition?
RQ3 *Qual*	How does having Type 2 diabetes impact on a person's beliefs and values and thus self-management of their condition?
RQ4 *Quan*	Does HLOC act as a moderator of predicating health behaviour in a Type 2 diabetes population?
RQ5 *Quan*	Is the measurement of HV a necessary predictor of health behavior in a Type 2 diabetes population?
RQ6 *Quan*	Is the measurement of health value and perceived control (HLOC and SE) when taken together a more proficient predictor of health behaviour in a Type 2 diabetes population?
RQ7 *Qual* *Quan*	Does mood affect a person with Type 2 diabetes potential of engaging in a set of health sustaining behaviours?
RQ8 *Qual*	How do participants' perspectives of health value and perceived control of Type 2 diabetes support MSLT?
H1	The greater the value placed on health the greater amount of Type 2 diabetes self-care behaviours taken.
H2	The greater the perceived control (HLOC & SE) of diabetes the greater amount of diabetes self-care behaviours taken.
H3	The greater the perceived control (HLOC & SE) of diabetes and the greater the value placed on health (HV) the greater amount of Type 2 diabetes self-care behaviours taken.

Emergent research questions and hypotheses that were developed as a result of the qualitative data will be explained in the interim phase (see Chapter 5, Section 5.6)

3.4 Mixed Methods Research

In order to address the research questions described in the previous section a research strategy must be devised (Bryman, 2008).The research methodology chosen for this study is mixed methods research. Mixed methods research adopts a research strategy that employs more than one type of research method (Brannen, 2005). Mixed methods research has been defined in several different ways. A simple early definition from Tashakkori and Teddlie (1998:ix) defined mixed methods as

> 'the combination of qualitative and quantitative approaches in the methodology of a study'.

Johnson et al. (2007:123) sought to provide a consensus on a definition of mixed methods research based on nineteen different definitions provided by twenty-one highly published mixed methods researchers:

> 'Mixed methods research is the type of research in which a researcher combines elements of qualitative and quantitative research approaches for the purposes of breadth and depth of understanding and corroboration'(Johnson et al., 2007:123).

Creswell and Plano Clark (2011:4) state that this definition incorporates diverse viewpoints and relates to the rationale for using mixed methods research. The rationale for adopting a mixed methods approach for this research is to allow for a more robust explanation of the constructs being investigated.The principal research question advocates testing the interaction of the constructs of MSLT. Traditionally behavioural theories have been tested using mainly quantitative methods, as behaviour is commonly measured by health measurement scales (Conner and Norman, 2009). Initially a quantitative method of testing the constructs was considered. However,the literature review conducted prior to this research resulted in an acknowledgement that the construct of health value requires further investigation. Testing of MSLT necessitates the use of a health value measure. The literature review identified one such measure developed by Lau et al. (1986). The health value measure although deemed a reliable and valid measure consists of only four items.

Previous research on values suggests an instrumental/terminal dichotomyof the value construct(Rokeach, 1973, Smith and Wallston, 1992). In order to explore this conceptfurther prior to testing MSLT it was decided that by employing an initial qualitative method a more detailed understanding of the health value construct could be obtained. It was envisaged that by qualitatively exploring health value and the instrumental/terminal dichotomythis may enableidentification of whether or not a new health value measure or new items should be developed to test health value in the quantitative phase of this research.

Furthermore, as the opportunity of subjectively exploring one construct of MSLT was made available it was decided that during the qualitative phase the meaning of the construct of perceived control would also be explored. This mixed methods approach was expected to enhance the understanding and testing of the constructs of MSLT and to make a unique contribution to behavioural research and mixed methods research.

3.4.1 Challenges of Mixed Methods Research

Although mixed methods research has the potential to provide a more holistic understanding of findings of a study (Tashakkori and Teddlie, 2010, Creswell and Plano Clark, 2011) conducting mixed methods research also raises numerous challenges(Mayoh et al., 2011). One such challenge is the feasibility of a mixed methods approach as adopting mixed methods in a study may require extensive skills, resources and time on the part of the researcher (Creswell and Plano Clark, 2011). Research courses were completed in the first year of this research in order to ensure that the requisite skills were gained to carry out both qualitative and quantitative methods of data collection and analysis. Prior to conducting the research a study time plan was developed in order to consider how long it would take to meet the various targets of the research. A timeframe of two years was allocated to complete data collection and data analysis. The time plan of the research targets and dates achieved are displayed below in table 3.2 to illustrate how this research was planned and carried out efficiently to meet the target achievement dates. The research processes associated with access, screeningand recruitment are discussed from section 3.9.1 to 3.9.4.Chapters 4 to Chapter 7 detail the qualitative, interim and quantitative phases of the research.

Table 3.2 Research Time Plan 2011-2013

Time Plan 2011-2013	Target Achievement Date
Ethical Review	21st of September 2011
Ethical Approval	3rd of October 2011
Qualitative Phase	
Access	5th of October 2011
Screening, Recruitment &Data Collection	1st of November 2011 - 23rd of December 2011
Data Analysis	30th of December 2011– 31st of March 2012
Interim Phase	15th of March 2012 –6th of May 2012
Quantitative Phase	
Screening, Recruitment &Data Collection	7th of May 2012-31st of August 2012
Data Analysis	3rd of September 2012-31st of January 2013

Another challenge which faces mixed methods research is the incompatibility thesis (Howe, 1988) which suggests that qualitative and quantitative methods are incommensurate and therefore should not be combined within a single study. These beliefs stem from the reality that qualitative and quantitative methods are each based on different paradigms, which both have a different set of assumptions concerning ontological and epistemological assumptions (Mayoh et al., 2011). The terms paradigm, ontology and epistemology are expanded upon in this section followed by a discussion on three paradigmatic stances that address the incompatibility thesis.

The term paradigm originated with Thomas Kuhn (1962). Kuhn described the meaning of a paradigm as a worldview that embodied the belief of scientists.Mertens et al. (2010) describe a paradigm as an integrated philosophical statement that encompasses positions on ontology and epistemology.Crotty (1998) definedontology as 'the nature of being' and stated how it is concerned with the nature of existence and the structure of reality.Bryman (2008) explains how quantitative researchers are ontologically concerned with objectivism, which implies that social phenomena confront external facts that are beyond human reach or influence.Constructionism is the ontological position held by qualitative researchers and rejects objectivism.

Constructionism asserts that social phenomena and their meanings are continually being accomplished by social actors (Bryman, 2008).

Epistemology is concerned with

> 'providing a philosophical grounding for deciding what kinds of knowledge are possible and how we can ensure that they are both adequate and legitimate' (Crotty, 1998:8).

The epistemological assumption advocated by quantitative research is known as positivism. Knowledge is arrived at through the gathering of facts that provide the basis for laws (Bryman, 2008). Interpretivism is a term given to the contrasting epistemology positivism. This term incorporates the views of qualitative researchers and is predicated upon the view that a strategy is required that respects the differences between people and the objects of the natural science and therefore requires the researcher to grasp the subjective meaning of social action (Bryman, 2008).

Melia (1997:29) states that

> 'the link between what a researcher does and the philosophical position set out to justify the method is often problematic'.

Melia's reflection is a challenge faced by researchers adopting mixed methods research as the methodology to their research. Consideration of what philosophical assumption is best suited to mixed methods research is difficult due to combining elements of two distinct research methods with differing philosophical foundations. One important point to consider when deciding on this is that the terms quantitative and qualitative denote kinds of data, not the epistemologies, methodologies, designs or ontological assumptions that are associated with different research frameworks (Biesta, 2010).

Mertens (2012) claims that there are three paradigmatic stances that answer the argument about incommensurability of paradigms.The three paradigmatic assumptions are dialectical pluralism (Greene and Hall, 2010), the pragmatic paradigm (Biesta, 2010) and the transformative paradigm (Mertens et al., 2010). According to Mertens (2012) the three different paradigms address the incommensurable argument through their characterisation of mixed methods as a methodological approach that is compatible with different sets of philosophical assumptions.

Greene and Hall (2010:124)describe a dialectical stance as:

> ‘A dialectical stance actively welcomes more than one paradigmatic tradition and mental model, along with more than one methodology and type of method into the same inquiry space and engages them in respectful dialogue one with the other throughout the inquiry’.

This stance enables a researcher to adhere to the post-positivist paradigm when conducting quantitative data collection and the constructivist paradigm during qualitative data collection and then to converge the two throughout the study to allow for a deeper understanding of convergent research findings.

Pragmatism focuses on the consequences of research and on the importance of the research questions asked rather than the methods. Johnson and Onwuegbuzie (2004:17) formulate this as the idea that one should

> ‘choose the combination or mixture of methods and procedures that work best for answering research questions’.

Biesta (2010) and Greene and Hall (2010) caution against an overly simplistic approach to pragmatism and point out how due to its methodological flexibilityit has led to researchers adopting mixed method research as a ‘mindless mantra,’ thus raising issues of integration methods and the paradigmatic assumptions being used when making use of pragmatism. However, Biesta (2010) emphasizes that pragmatism offers a very specific view of knowledge claiming that the only way knowledge can be acquired is through a combination of action and reflection. This approach has implications for the status of knowledge in that knowledge according to the pragmatist view is always about relationships between actions and consequences never about a world ‘out there’ (Biesta, 2010).Biesta (2010) argues that pragmatism does not provide a justification for all forms of mixed methods research but helps the field to ask more precise questions about the strength, status and validity of the knowledge claims developed on the basis of particular designs.

The transformative paradigm forms an ethical stance that emphasizes the pursuit of social justice and furtherance of human rights (Mertens et al., 2010). The transformative paradigm arose partially because researchers and members of marginalised communities expressed dissatisfaction with dominant research paradigms and practices and the limitations associated with these paradigms (Mertens et al., 2010). Typically, mixed methods designs will be associated with the transformative paradigm because of the need to capture experiences both qualitatively and quantitatively in order to represent the complexity of social issues and solutions to on-going problems(Mertens, 2012).

The following section provides a rationale for the epistemological assumption upheld by this research.

3.5 Epistemology

The epistemological assumption of this study is a pragmatic one. The pragmatic worldview is problem centred and specifically considers the consequences of actions and their role in real world practice (Creswell, 2003). This research acknowledges that pragmatism should not be understood as a philosophical position but rather as Biesta (2010) puts it as a set of philosophical tools that can be used to address research problems.Freshwater and Cahill (2012) suggest that pragmatism provides criteria by which a researcher can judge which methods cohere in the service of solving particular problems informed by accepted practice. Approaching this research from a pragmatic worldview has enabled a combination of deductive and inductive thinking through the mixing of qualitative and quantitative data. Morgan (2007) refers to this movement between deductive and inductive thinking as abduction. This research practice of abduction enabled the inductive results from the qualitative approach to input to the deductive goals of the quantitative approach. Pragmatism fosters a relationship to the research process that is subjective, objective and inter-subjective, this process emphasizes the interpersonal nature of research (Nastasi Kaul et al., 2010). Furthermore,Morgan (2007)highlights a distinction between qualitative, quantitative and mixed methods on the basis of the inferences drawn from the data. Morgan (2007)emphasizes that with pragmatism the basis of inference is context specific, generalizable and transferable.

Thus pragmatism has enabled this research to identify the commensurability or complementarity of qualitative and quantitative methods within mixed methods research.

3.6 Theoretical perspective

A theoretical perspective in mixed methods research is a stance taken that provides direction for the phases of a mixed methods study (Creswell and Plano Clark, 2011).

> 'A theoretical orientation for a mixed methods study would be the use of an explanatory framework from the social sciences that predicts and shapes the direction of the study' (Creswell and Plano Clark, 2011:47).

MSLT is a social sciences theory and provides a framework to this research that has guided the nature of the questions asked and answered in this study. The theory has been presented at the beginning of this thesis in Chapter 1 (section 1.4) to demonstrate how the theory informed the questions and methods of the study. Section 3.7 of this chapter illustrates how MSLT guides the research design of this study. Chapters 4, 5 and 6 demonstrate how MSLT guides the qualitative and quantitative data collection and analysis methods.

3.7 Research design

Research designs are procedures for collecting, analysing, interpreting and reporting data in research studies (Creswell and Plano Clark, 2011). Decisions about design selection and classification are influenced by considerations of research purpose, the researchers theoretical perspective or worldview and concerns about inference quality (Nastasi Kaul et al., 2010). A pragmatic approach assisted in the decision-making process on which research design would best address the research questions and testing of hypotheses of this study.Creswell and Plano Clark (2011) recommend three procedural considerations for choosing a mixed methods design. Thus particular attention was paid to the timing, weighting and mixing decision of the design.

The timing decision is also referred to as the sequence of the research and refers to the temporal relationship between the quantitative and qualitative components of the study (Greene et al., 1989). Timing within a mixed methods design is classified as concurrent or sequential. Concurrent timing occurs when both the quantitative and qualitative methods are carried out during a single phase of the research. Sequential timing occurs when the methods are carried out in two distinct phases by collecting and analysing one type of data before collecting and analysing the other type of data

(Creswell and Plano Clark, 2011). A decision has to be made on which type of data will be collected and analysed first. This decision is based on the research purpose.

The weighting decision refers to the priority of the quantitative and qualitative methods to answering the research questions (Creswell and Plano Clark, 2011). Morse (1991) suggested that the theoretical perspective of a study or worldview can be used to determine its weighting. Pertaining to a positivist worldview calls for a quantitative priority, a natural worldview calls for a qualitative priority whereas a pragmatic worldview calls for either equal or unequal weighting depending on the research question(Creswell and Plano Clark, 2011).

The third procedure for choosing a mixed methods design is how the quantitative and qualitative methods will be mixed(Creswell and Plano Clark, 2011). Creswell and Plano Clark (2011) conceptualise mixing occurring at four possible points during a study's research process: interpretation, data analysis, data collection and design. The stage of integration of methods also known as the point of interface is a point within the process of research where the qualitative and quantitative phases are mixed (Morse and Niehaus, 2009).

1. Interpretation: The interface point of research during interpretation occurs when the qualitative and quantitative strands are mixed during the final step of the research after data has been collected and analysed for both sets of data. This mixing process involves drawing conclusions or inferences that reflect a combination of results from both phases of the study such as by comparing or synthesizing the results in a discussion (Creswell and Plano Clark, 2011).

2. Mixing during data analysis involves merging the two sets of results together through a combined analysis.

3. Mixing during data collection involves connecting the two phases of the research by using the results of the first phase to shape the collection of data in the second phase by specifying research questions or developing data collection methods or instruments (Creswell and Plano Clark, 2011).

4. Lastly, mixing at the design level can involve mixing with a traditional quantitative or qualitative research design. This process includes embedded mixing, theoretical framework-based mixing, and program objective framework-based mixing (Creswell and Plano Clark, 2011).

There are numerous mixed methods research designs to choose from. In order to simplify this choice mixed methods research design typologies were first reviewed. Selecting a typology-based design provides the research design with a framework and logic to guide the implementation of the research methods to ensure that the resulting design is rigorous, persuasive and of high quality (Creswell and Plano Clark, 2011). Leech and Onwuegbuzie (2009) provide an integrated typology based on a review of published mixed methods research. A three-dimensional typology is proposed which considers the potential variations in level of mixing that is whether the mixing is partially or fully, time orientation (concurrent or sequential) and the emphasis of qualitative and quantitative methods produced (weighting). The difference between partially and fully mixed methods is that fully mixed methods involves the mixing of methods within or across one or more stages of the research whilst with partially mixed methods the phases are not mixed within or across stages (Leech and Onwuegbuzie, 2009). Partially mixed methods involves carrying out both the qualitative and quantitative methods either concurrently or sequentially in their entirety before being mixed at the data interpretation stage (Leech and Onwuegbuzie, 2009). ConsideringLeech and Onwuegbuzie (2009) three-dimensional typology it was decided that this mixed methods researchis fully mixed, the timing is sequential and the weighting given to the phases of the research is unequal.

The research design of this study is considered fully mixed because the point of interface is carried out across stages and during interpretation. Integration of methods occurs during data collection as the results of the qualitative phase are expected to contribute to the development of a health value measure and thus influence data collection methods in the quantitative phase. Additionally, mixing occurs during the interpretation of results in the discussion section of this thesis. The timing of the design is sequential, as the research is carried out in two distinct phases. First the qualitative phase is carried out followed by the quantitative phase. The weighting of this study design is considered unequal as the principal research question advocates testing of MSLT. For this reason the quantitative phase is deemed the weightier phase of the research. Figure 3.1 illustrates the three-dimensional typology of this mixed methods research.

Considering the typology of the design facilitated the decision making process of the specific type of design that will guide this research. The exploratory sequential design was chosen as it meets the criteria of a fully mixed, sequential, unequal status design. Additionally, this design was specifically chosen because it is based on the premise that an initial exploration is required to investigate variables or develop an instrument or measure(Creswell and Plano Clark, 2011).

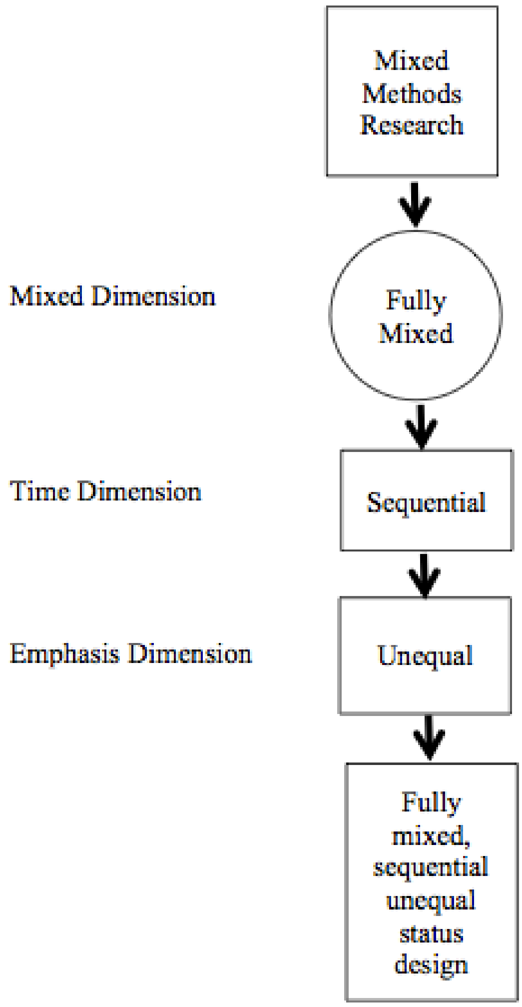


Figure 3.1 Mixed Methods Research Design Typology

Morse (1991) a nurse researcher developed a notation system for depicting the type of methods (Qual,Quan), mixing (sequential, qual➔quan) and weighting (supplemental method - qual, dominant method - QUAN) given to the methods of the study. The weighting and timing of this research design using Morse's notation system is qual➔QUAN.Table 3.3 depicts the exploratory sequential design procedure of this study using this notation system.

The exploratory sequential design begins with the collection and analysis of qualitative data using semi-structured interviews to explore a phenomenon in this case health value and perceived control. The design builds on the results of the qualitative phase by developing an instrument and by stating research questions that have resulted from the qualitative results. The second phase, the quantitative phase then uses these results to alter or add to data collection and data analysis methods.

Creswell and Plano Clark (2011:87) argue that

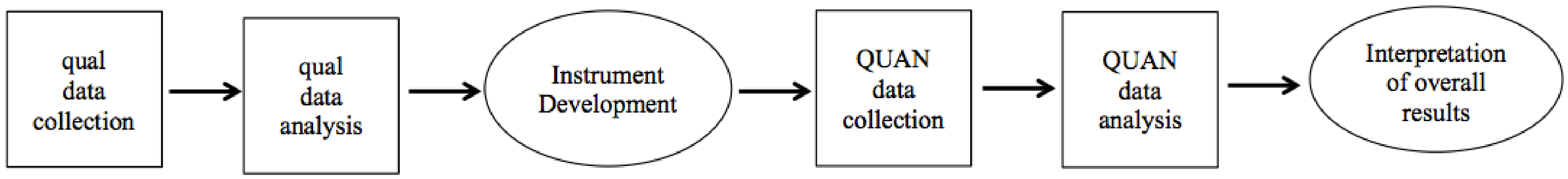
> 'since the exploratory design begins qualitatively the research problem and purpose often call for the qualitative strand to have a greater priority within the design'.

However, as previously mentioned the purpose and questions of this research advocate a greater weight to the quantitative phase of this study when testing MSLT. This change to the traditional approach of the weighting of the design was influenced by the pragmatic approach to this research.

There are several strengths to using the exploratory sequential design. Firstly, the phased design adds to the generalizability of the results. Secondly, separate phases make the exploratory design straightforward to describe, implement and report (Creswell and Plano Clark, 2011). Lastly, a new instrument can be developed (Creswell and Plano Clark, 2011) or a current instrument adapted as one of the potential products of the research process.

Table 3.3 Diagram of Exploratory Sequential Research Design

Qualitative Phase **Interim phase** **Quantitative phase**



Procedures: Semi-structured interviews N=12	**Procedures:** Coding Thematic development	**Procedures:** HV theme reviewed to consider development of items to add to HV scale	**Procedures:** N=107 Demographic data 5 questionnaires HVP1&HVP2 MHLOC, PDSMS, SDSCA, HAD scale	**Procedures:** Hypothesis testing	**Procedures:** Summarise findings Discuss validity
Products: Interview Reflections Transcripts	**Products:** Initial themes Reviewed themes Final themes	**Products:** New Research questions Two items added to HV scale & scoring system devised Validity of adapted HV scale	**Products:** Numerical Item scores	**Products:** Scale Scores Correlations HMR Two three-way ANOVA	**Products:** Description of themes New HV items removed Interaction of MSLT constructs

The phase in which the research builds on the qualitative results to develop or adapt an instrument is termed the interim phase. During this phase of the researchCreswell and Plano Clark (2011) recommend deciding on which data to use from the qualitative phase to develop a quantitative instrument orto generate quantitative measures. Also procedures should be undertaken to ensure the instrument and the scores developed on the instrument are valid and reliable (Creswell and Plano Clark, 2011). Chapter 5 Section 5.6describes the steps taken to adhere to these recommendations and discusses the methods used during the qualitative and interim phase.

Therefore the rationale for adopting the exploratory sequential design is fourfold. Firstly, a construct of MSLT, health value requires further investigation prior to statistical testing. Secondly, as a result of the first rationale this design provides the opportunity to subjectively explore another construct of MSLT, perceived control. Thirdly, this method of exploration is expected to enable development of a more reliable instrument to measure health value rather than just relying on previous research (Creswell and Plano Clark, 2011). Fourthly, this design will contribute to a more holistic exploration and testing of the constructs of MSLT.

3.8 Ethical considerations

Approval from the Lothian regional research ethical committee and from Lothian hospitals research and development department was obtained for the research project to proceed. The purpose of the research ethics committee is to safeguard the dignity rights and welfare of research participants(COREC, 2005). In order to safeguard the rights of participants two important procedures were considered during the research process which were obtaining informed consent and maintaining confidentiality and anonymity.

Informed consent involves ensuring that participants have adequate information regarding the research, comprehend the information, and have the power of free choice, enabling them to consent to or decline participation voluntarily (Polit and Tatano Beck, 2010). Participants have the right to privacy through various confidentiality procedures and maintaining anonymity (Polit and Tatano Beck, 2010). The consent forms and participation information sheets administered during recruitment of both phases of the study included a description of these rights and how they would be fully maintained during the research process (see Appendix A). Separate consent forms and participation information sheets were devised for each phase as both phases differed in research purpose and methods. A signed consent form was received from participants prior to their participation in the research. Any questions or concerns were also addressed at this point.

A master list was used to code participants. This method of coding was used to maintain anonymity. The master list was kept on a password locked computer where the researcher only had access. To protect participant identity pseudonyms were used in the qualitative phase whilst numbered codes were used for the quantitative phase. Initial demographic data was documented on a demographic questionnaire. This data was then transferred to an anonymous coded participant pro-forma (see Appendix B). The demographic questionnaires were then disposed of in a confidential manner along with the master list.

3.9 Research process

3.9.1 Research setting

The research setting was a diabetes outpatient department (OPD) in an acute National Health Service location in Lothian Scotland. The diabetes OPD provides specialist diabetes care. Patients attending the department include:

- Type 2 diabetes patients requiring insulin,
- Most patients with Type 1 diabetes,
- Women with diabetes who require pre-conceptual care,
- Pregnant women with diabetes,
- Children and adolescents with diabetes,
- Patients developing complications who require specialist care,

- Patients with a complicated risk factor profile (NHS Lothian, 2010).

The health professionals who provide specialist care to these patients include consultant physicians, consultant diabetologists, diabetes specialist nurses, staff nurses, dieticians, podiatrists and ophthalmologists.

3.9.2 Access to outpatient department

The head consultant physician of the diabetes department grantedaccess to the outpatient departmentafter he was given information on the purpose of the research and assurance that any patients included in the study would be safe-guarded by appropriate ethical considerations. Permission to access the department and begin the research was received on the 5th of October 2011. The clinical supervisor of this research is a consultant in the department and prior to the commencement of the research a blanket email was sent out to all staff informing them of the researcher's impending presence and research purpose. Furthermore, a verbal presentation was given to the various health professionals in the OPD to introduce the researcher and create staff awareness of the research being carried out. This provided staff with an opportunity to ask the researcher questions and leaflets were handed out that detailed the research proposal (see Appendix C).

This introductory presentation enabled the researcher to develop a rapport with the nursing team who ran the diabetes clinics. The research nurse in the department provided a desk and computer for the researcher to use during data collection. This computer was used for screening for participants for both phases of the study.

The screening, recruitment and data collection processes during the qualitative and quantitative phases were carried out concurrently. The screening and recruitment processes used for both phases of the research are discussed in this chapter in sections 3.9.3 and 3.9.4. The methods of data collection for the qualitative phase are discussed in Chapter 4 and for the quantitative phase see Chapter 6.

3.9.3 Screening

Screening of patients was carried out to identify potential participants who met the inclusion criteria of the study (see section 3.10 for sample inclusion criteria). Screening involved registering with SCI-DC (Scottish Care Information – Diabetes Collaboration) a network used in the OPD which allows for the identification of all people with recorded diagnosis in the area and is supportive of the Scottish Diabetes Survey (SDS) (The Scottish Government, 2013). Clinic lists were provided at the discretion of the OPD secretaries. The clinic lists enabled screening of suitable participants to recruit on that day. Accessing the SCI-DC network and use of clinic lists to screen patients for inclusion in this study was in keeping with the ethical considerations discussed in section 3.8. Participants were screened for participation in both the qualitative and quantitative phases of this research in the same manner.

3.9.4 Recruitment

The researcher is a staff nurse elsewhere not in the department recruited from for this study.The researcher's experience as a staff nurse enabled efficient adaptation to the OPD's clinic routine in order to recruit patients for the study. Furthermore, the rapport developed between the researcher and nursing team was essential to the recruitment process of the research as it was at the nurses' discretion to allow the researcher to intercept the patient during their clinic appointment. Recruitment of participants involved initially identifying the patient as they entered the clinic. Nursing staff would then ask the patient if they would be interested in speaking to a researcher present in the clinic. If interest were shown the nurse would then inform the researcher who would then intercept the patient. The researcher agreed a time of interception with the nursing team that was least disruptive to the patient and running of the clinic. This time for both phases of the study was after the patient had seen the nurse for routine checks such as blood pressure, weight, blood glucose test, HbA1c test, urine test, and general health assessment. This time to intercept the patient was suitable as there was a waiting period after seeing the nurse to see the doctor. In this timeframe a verbal explanation of the research to potential participants was provided with the necessary information to make a decision on whether they would like to partake in the research or not. Potential participants were offered time to consider their participation butgenerally patients approached for both phases would agree or disagree to take part in the study at this moment.

The recruitment process was carried out during clinic times. The outpatient department coordinate four morning clinics and one afternoon clinic each week. The clinics are usually four hours in duration. The recruitment process for the qualitative phase took place over two months between the 1st of November 2011 and the 23rd of December 2011. Within this timeframe screening, recruitment and data collection took place over ten days and required approximately forty hours of the researchers time. The recruitment process for the quantitative phase was carried out over four months between the 7th of May 2012 and the 31st of August 2012. Within this timeframe screening, recruitment and data collection took place over twenty days and required approximately eighty hours of the researchers time. For a clear presentation of timeframe dates see section 3.4.1, table 3.2.

3.10 Sample

A primary inclusion criterion for the study was that participants were diagnosed with Type 2 diabetes (see Chapter 1 for rationale). As diabetes is a heavily researched area it was decided that the sample selected for both phases of the research would include a group of participants not under research in the OPD at that moment in time. A group of patients not under research in the OPD at the time of both phases of this study included those who were diagnosed with Type 2 diabetes and were on an insulin regime. Choosing this sample ensured that the study was not interrupting other research in the OPD at that time. It was also beneficial to this research, as the timeframe of recruitment of participants would not be disturbed by other research in the OPD. Due to the specific nature of the sample it is acknowledged that this sample is not representative of all patients with Type 2 diabetes, however, specifying the sample could be viewed as advantageous.Type 2 diabetes is a heterogeneous condition whereby patients can receive differing treatments depending on the extent of progression of diabetes (see Chapter 1 section 1.2). The rationale for including a homogeneous sample of Type 2 diabetes patients who are on insulin may be considered a strength for data analysis purposes, as interpretation of results was eased with a clear sample that are at a certain stage of Type 2 diabetes disease progression. Other inclusion and exclusion criteria are displayed in table 3.4.

Table 3.4 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
• Type 2 diabetes on insulin • Any age is acceptable • Length of diagnosis: one year or more • Speaks English • No clinical history of cognitive impairment • Regular and reliable attendance at outpatient clinic	• Does not have Type 2 diabetes or is not on insulin • Length of diagnosis less than one year • Does not speak English • Has clinical history of cognitive impairment • Does not attend clinic

The rationale for including patients who are diagnosed for one year or more is that the interviews and questionnaires will involve questions about diabetes self-management behaviours. Allowing for one year since diagnosis anticipated that participants had substantial experience of managing Type 2 diabetes. It was expected that this experience would contribute to answering the research questions.

The nature of the interview questions and questionnaires required participants to recall previous personal experiences. This can introduce recall bias to the study. Recall depends entirely on memory which can often be imperfect and therefore unreliable (Hassan, 2006). According to Sackett (1979) recall bias can be introduced in the data collection stages of investigation.Thus it was deemed necessary to try and reduce the introduction of recall bias to this study. An approach used in this study to reduce recall bias was the exclusion of any person with a clinical history of a cognitive impairment from the study. Luis et al. (2003:438) define cognitive impairment as

> 'impairment in one or more cognitive domains (typically memory), or an overall mild decline across cognitive abilities that is greater than would be expected for an individual's age or education, but that is insufficient to

interfere with social and occupational functioning as is required for dementia syndrome'.

This definition was kept in mind during screening of participants for both phases of the study. Other approaches used to reduce recall bias will be discussed in the interim and quantitative phase of this research.

3.10.1 Sampling strategy

The sampling strategy for this study considers the type of sampling used for both the qualitative and quantitative phases, the relationship between the samples, the time orientation of the samples and the size of both samples.

The exploratory sequential design generally uses two different samples within its phases of data collection (Creswell and Plano Clark, 2011). Onwuegbuzie and Collins (2007) assert that if the objective of the research is to gain an insight into a phenomenon then the researcher purposefully selects individuals for the research that maximizes understanding of the underlying phenomenon. Both phases of this research share a common objective that is to understand the phenomenon of predicting health behaviour in a Type 2 diabetes population using MSLT. Thus purposive sampling is the sample method of choice for this research. It can be used in both qualitative and quantitative research and it is a practical approach to obtaining a sample as participants are chosen that will best contribute to the information needs of the study (Polit and Tatano Beck, 2010).

Determining the relationship between samples in a mixed methods study is important as it can highlight the objective and differences of the two samples. According to Onwuegbuzie and Collins (2007) these relationships can either be identical, parallel, nested or multi-level. The relationship of the samples used in both phases of this research can be considered parallel. A parallel relationship indicates that the samples for the qualitative and quantitative components of the research are different but are drawn from the same population of interest (Onwuegbuzie and Collins, 2007). A sampling design in mixed methods research considers time orientation and relationship of the samples (Onwuegbuzie and Collins, 2007). Thus the sample design for this study can be described as sequential with a parallel relationship. In addition to selecting the type of sampling and sampling design of this research the size of each sample for each phase needs to be determined.

3.10.2 Qualitative sample size

There are no rules for sample size in qualitative research, sample size is usually determined based on informational needs (Polit and Tatano Beck, 2010). A guideline in sampling for qualitative research is known as data saturation. This is sampling to the point that no new information is obtained and redundancy is achieved (Polit and Tatano Beck, 2010). Data saturation was sought in this study in relation to the a priori themes of health value and perceived control (Health Locus of Control and Self-Efficacy). Furthermore, data saturation was sought in relation to the emergent themes that influence participants' health value and perceived control and impact on diabetes self-management behaviour (See Chapter 5, Section 5.1, p89). Data saturation in this study became apparent following the tenth interview. It was evident that no new themes were emerging and repetition in relation to the deductions made from the a priori themes was occurring. In order to validate that data saturation was reached the researcher carried out two further interviews. The data from the final two interviews did not create new information and it was concluded that redundancy of themes was achieved. Data saturation was reached following sound sampling techniques, data collection decisions, reflexivity and through a thorough thematic analysis (Polit and Tatano Beck, 2010).

Other factors that may impact on qualitative research sample size have been suggested by a number of researchers (Morse, 2000, Ritchie et al., 2003, Mason, 2010). Morse (2000) suggests that the scope of the study, the nature of the study topic and the quality of the data obtained are factors which also contribute to the decision on sample size in a qualitative study whilstRitchie et al. (2003) consider the types of data collection methods used as a factor. Mason (2010) investigated sample size and saturation in PhD studies using qualitative interviews. Mason (2010) found that many PhD students do not fully understand the concept of data saturation and purposely chose large samples to be able to defend their research. In order to fully ensure that the data saturation concept was understood and applied appropriatelyquality criteria for evaluating qualitative research was utilised. The following four criteria proposed byYardley (2000:215) were considered in this study.

1. Sensitivity to context: sensitivity not just to the context of the social setting in which the research is conducted but also to potentially relevant theoretical positions and ethical issues.

2. Commitment and rigour: substantial engagement with the subject matter, having the necessary skills and thorough data collection and analysis.

3. Transparency and coherence: research methods clearly specified, clearly articulated argument and a reflexive stance.

4. Impact and importance: importance of having an impact on and significance for theory, the community on which the research is conducted and the practitioners (Yardley, 2000:215).

See Chapter 4 for details of reflexivity, data collection and analysis methods used and Chapter 5 for the qualitative findings on the a priori and emergent themes.

3.10.3 Power analysis

Through power analysis the researcher estimated the sample size necessary to test the research hypotheses in the quantitative phase(Cohen, 1988, Clark-Carter, 2004). Knowledge gained from an extensive literature review carried out on behavioural research informed the researcher that the typical response rate for participants was 20%, to name but a few(Endler et al., 2001, O'Hea et al., 2005, Jerant et al., 2008, O'Hea et al., 2009). Due to time and resource limitations it was anticipated that access would be given to at least 400 patients in the clinic. Therefore with a response rate of 20% the estimated sample size would be 80 people.

Based on power analysis, a sample size of 80 will produce 80% power at the 0.05 level of significance to detect an effect size of 0.3. A computer program known as Gpower3 developed byFaul et al. (2007) was used to carry out power analysis. Gpower3 is recommended by statistics textbooks in the social, behavioural and biomedical sciences as being a reliable power analysis program(Clark-Carter, 2004, Bryman, 2008).

The type of power analysis used was sensitivity analysis where the critical population effect size is computed as a function of alpha (level of significance), 1-β (power), and n (sample size) (Faul et al., 2007). This type of power analysis was deemed appropriate as it enables the researcher to answer questions on what effect size a study can detect with a power of 0.8 given its sample size and alpha as specified by the researcher(Faul et al., 2007). This allowed the researcher to determine that a minimum effect size of 0.3 is sufficiently sensitive for research and the size of n is realistic (Faul et al., 2007).

Dodeen (2003) recommends increasing the sample size, as suggested by power analysis, as it can be anticipated that missing data will occur. AdditionallyEdwards et al. (2002) found that non-response to postal questionnaires reduces the effective sample size and can introduce bias. In order to reach the target sample and to avoid reducing the effect size and introducing bias 148 participants were recruited for the quantitative phase. The response rate was 72.2% at 107 returned questionnaires. The non-response rate was 27.8% at 41 non-returned questionnaires. It is not known why 41 participants did not return the questionnaires that came with a stamped envelope. It could have been for a number of reasons such as many of the participants were elderly and may have had problems getting to a post box or the fact that completing the questionnaires could be time consuming may have been an issue. Due to researcher resources incentives to return the questionnaires were not offered. The non-response rate could not be followed up by the researcher as regulations for the study set out by the research ethics committee did not enable this.

3.11 Summary

This chapter has highlighted the research design and methods of this mixed methods research study.The research process and sampling strategy for both the qualitative and quantitative phases was discussed.

Chapter 4 presents the qualitative methods of data collection and analysis followed by an analytical presentation of the qualitative findings in Chapter 5. Additionally

Chapter 5 presents a discussion on the methods used during the interim phase to develop and enhance the qualitative findings that contribute to the quantitative phase. The results of the statistical methods chosen to test the outcomes of the interim phase are also presented in Chapter 5. Chapter 6 provides a discussion on the quantitative methods of data collection and analysis used in the quantitative phase of this study.Chapter 7 presents results of the quantitative phase.

4 Qualitative phase

4.1 Introduction

Silverman (2011:17) asserts that the main strength of qualitative research

> 'is its ability to study phenomena which are simply unavailable elsewhere'.

According to Payne and Payne (2004) the core concern of qualitative research is to seek out and interpret meanings that people bring to their own actions, rather than describing any regularities or statistical associations between variables. Qualitative research seeks to answers questions about the what, how or why of a phenomenon rather than questions about how many or how much (Green and Thorogood, 2004). Thetheoretical perspective of this study has guided the research questions of the qualitative phase which ask:

- How do people with Type 2 diabetes value their health and perceive control over their condition? (RQ2)
- How does having Type 2 diabetes impact on a person's beliefs and values and thus self-management of their condition? (RQ3)

These questions aim to facilitate the exploration of the constructs of MSLT. By exploring the constructs in this manner it is anticipated that the underlying rationality for diabetes outcome behaviours can be identified. Green and Thorogood (2004) highlight the importance of an approach such as this to public health and health promotion interventions as they are often associated with changing behaviour.

> 'Without an empathetic understanding of why people behave as they do, we are unlikely to identify the possibilities for change' (Green and Thorogood, 2004:25).

It is difficult to refer to qualitative research as a distinctive research strategy (Bryman, 2008). Many qualitative studies acknowledge a link to one of the qualitative research traditions of inquiry such as ethnography, phenomenology, grounded theory, case studies and narrative analysis (Polit and Tatano Beck, 2010).There are differing methods of data collection and data analysis that are associated with the various traditions of qualitative research. This mixed methods research has adopted a pragmatic approach of inquiry to the qualitative phase that does not fit into a traditional qualitative inquiry typology. Polit and Tatano Beck (2010) assert that a qualitative study such as this can be referred to as a descriptive qualitative study and is based on the premise of naturalistic inquiry. Gubrium and Holstein (1997)describe naturalism as an inquiry which seeks to understand social reality in its own terms and provides rich descriptions of people and interactions in natural settings. Naturalistic inquiry has two preferred methods of data collection, observation or interviews (Silverman, 2011). Interviews were chosen as the data collection method for the qualitative phase. This decision was made as interviews were seen as a sufficient method to enable exploration of the constructs of health value and perceived control. Silverman (2011:166) asserts that the decision on which data collection method to use in a research project depends upon the research topic,

> 'as methods in themselves have no intrinsic value'.

Qualitative researchers Holloway and Todres (2003:347) suggest that it is important to choose a method that is appropriate to the research questions rather than

> 'being too attached to a method for method's sakewhere you are committed to method rather than the topic of the research and questions posed' (Holloway and Todres, 2003:347).

This approach to choosing a method was consistent not only for the data collection method of the qualitative phase but also for the data analysis method. Thematic analysis is the data analysis method of choice as it is a flexible approach that can be used across a range of epistemologies and research questions (Braun and Clarke, 2006).

This chapter is structured as follows:

- Section 4.2 Reflexivity
- Section 4.3 Qualitative participants
- Section 4.4 Data collection

- Section 4.5 Data analysis
- Section 4.6 Summary

4.2 Reflexivity

Although this research is a mixed methods study during the qualitative phase the researcher pertained to the qualitative tradition of reflexivity. Reflexivity focuses upon the researcher's subjectivity of

> 'what I know' and 'how I know it' and entails an on-going conversation about experience while simultaneously living in the moment(Hertz, 1997:viii).

Thus reflexivity requires the researcher to be critically conscious through personal accounting of how the researcher's self-location, position and interests influence all stages of the research process (Pillow, 2003). As a result of the processes involved in reflexivity it has become associated with or used as a measure of legitimacy and validity in qualitative research to guard against personal bias in making judgements (Pillow, 2003, Alvesson and Skoldberg, 2009, Polit and Tatano Beck, 2010).

Reflexivity was used during the qualitative phase of this research to facilitate a process of reflecting critically on the self and of analysing and making note of personal values that could affect data collection and interpretation (Polit and Tatano Beck, 2010). The various methods of reflexivity employed during the qualitative phase include identifying presuppositions prior to data collection, adopting a reflective routine after each interview and the use of memo's during data analysis (see section 4.5 for a detailed description of the use of memos).

The presuppositions and reflection made prior to beginning the qualitative phase is displayed below. The reflection highlights the researcher's critical reflection of the self and the role of the self in her research. It also identifies any biases she may have and how she may deal with those during the research process. In order to think about possible presuppositions the researcher questioned her own beliefs on health value and how health behaviours are experienced in her life.

Reflection dated: September 30th 2011

> LN: 'When thinking about health behaviour and how I value health I believe that I actively engage in health behaviours solely for the purpose of being healthy. I like to think I eat healthily and take regular exercise and go for regular health check ups. I wouldn't agree with people who do not see health as an important value in life, as without health we wouldn't be here. Perhaps health value is influenced in my situation by being a nurse and experiencing how certain lifestyle choices can have detrimental effects on your quality of life later in life. However, at work on a daily basis I care for patients whose lifestyle choices may not be the most socially desirable and could impact hugely on their health, yet, I would never judge them for this. I would only want to assess where the problems are and identify how their behaviour can be changed to benefit them. By doing a holistic assessment of the patient you can see their motives for carrying out such behaviours, their reasoning for having such values and the influences in their life which can lead to poor health such as social deprivation which can affect health value.
>
> Although I am biased in my thoughts on living a healthy life I do not think my bias will affect the way I view and or interpret other peoples outlook on health and its importance during my research. Every individual will have a different view for differing reasons and the importance of understanding these viewpoints is essential to gaining an appreciation of their valued goals in life. This may enable me as a health professional to see the whole patient and possibly integrate their viewpoints into planning care and work around these to achieve what are considered good health outcomes'.

Having identified presuppositions prior to beginning the qualitative phase the researcher decided that she would be introduced to the qualitative participants as a health researcher and not as a nurse. The rationale behind this was twofold. Firstly, the researcher was not acting as a staff nurse within the OPD but as a researcher. Acting as such was in keeping with the ethical considerations of the study. Secondly, by introducing herself as a nurse may have lead to acquiesced responses from the participants in regards to theirself-management of Type 2 diabetes. It was anticipated that by introducing herself as a health researcher she may reduce the acquiescence response bias of participants by being viewed as a health researcher rather than as a nurse doing research. The researcher was clear about her role as a health researcher in the OPD to participants. If participants required information outwith the remit of the study they were referred to an appropriate health professional working in the OPD. This process worked effectively.

The reflective routine adopted after each interview involved writing in a reflective diary. Gibbs (1988) model of reflection was used to facilitate the reflective process. Gibbs's reflective model is clear and precise and allows for description, analysis and evaluation of the experience. This process of reflection highlighted areas for improvement during the interview process such as the researchers interview skills of probing and listening. Gibbs's reflective model prompted the researcher to create an action plan to improve her practice in each ensuing interview. Reflection was also carried out following transcription of each interview and documented in the reflective diary and in memos during the data analysis. This part of the reflective process resulted in an enhanced interview guide prior to the succeeding interviews (see section 4.4.2).

The ensuing sections include a description of the participants of the qualitative phase followed by the qualitative methods of data collection and data analysis.

4.3 Qualitative participants

Twelve participants took part in the qualitative phase of this study. Originally there were thirteen participants, however one participant's interview was removed from the data analysis due to cognitive impairment. This participant was screened for cognitive impairment prior to recruitment, yet there was no documentation to suggest this patient was cognitively impaired, thus that is why he was approached. The patient verbally agreed and consented to interview. During the interview it became apparent that the participant was cognitively impaired through his way of speech and recall. The researcher continued the interview, as the participant was keen to contribute to the research and the researcher wanted to show gratitude for his participation and time. The interview was continued to the point where the researcher thought that the participant felt he had contributedsubstantially to the research. The participant was then thanked for his time but the data collected was deemed void and not included in the analysis.

Table 4.1 depicts characteristics of the twelve participants who took part in the semi-structured interviews. These characteristics are displayed in this section rather than in the qualitative results chapter, as it was deemed necessary to introduce the participants of the qualitative phase prior to the analytic discussion of a priori and emergent themes in Chapter 5. The characteristics displayed include individual characteristics (pseudonym, gender, age and the presence of comorbidities) and clinical parameters (medication regime, BMI and HbA1c result).

Pseudonyms are used to protect participants' identities. Ten males and three females participated in the qualitative phase of this research. Ages ranged from the youngest participant being 46 years old to the oldest participant who was 77 years old. The average age of the participants was 61. All participants had Type 2 diabetes and were on insulin.However, some participants' medication regime included an oral anti-hyperglycaemic adjunct therapy. Participants on a medication regime such as this are described in table 4.1 as insulin+ and those without are described as insulin-. The average length of time since diagnosis of Type 2 diabetes was 13 years and all participants reported having one or more comorbid conditions. Participants' average body mass index (BMI) was 32 .8. This level of BMI is considered obese by the NHS BMI Calculator (2012). HbA1c is a blood test that indicates blood glucose levels for the previous two to three months. Details of participants' HbA1c result taken at the clinic on the day of interview were documented for descriptive purposes. The average HbA1c result was 69mmol/mol which is out with the optimal range of HbA1c 48-58 mmol/mol, as recommended by(Diabetes UK, 2013a).

Table 4.1 Characteristics of qualitative participants

Pseudonym	**Gender**	**Age**	**Insulin +/- Tablet**	**Length of Diagnosis**	**Comorbidities**	**BMI**	**HbA1c**
Mary	F	60	Insulin-	10 Years	Yes	33.43	75mmol/mol
Charles	M	71	Insulin+	20 Years	Yes	29.61	77mmol/mol
Harry	M	57	Insulin-	9 Years	Yes	34.27	87mmol/mol
Roger	M	64	Insulin-	13 Years	Yes	29.39	48mmol/mol
Harriett	F	46	Insulin+	12 Years	Yes	43.5	99mmol/mol
John	M	75	Insulin-	24 Years	Yes	27.83	52mmol/mol
Rosie	F	62	Insulin-	3 Years	Yes	38.69	75mmol/mol
Garry	M	70	Insulin-	10 Years	Yes	31.32	55mmol/mol
Tom	M	50	Insulin-	14 Years	Yes	33.78	92mmol/mol
Sean	M	47	Insulin+	4 Years	Yes	39.45	77mmol/mol
Paul	M	77	Insulin-	16 Years	Yes	23.53	53mmol/mol
Adam	M	55	Insulin-	23 Years	Yes	28.91	49mmol/mol

4.4 Data collection

4.4.1 Semi-structured interview

As previously mentioned the data collection method of choice for the qualitative phase was the semi-structured interview. Mason (2002) affirms that qualitative research operates from the perspective that knowledge is situated and contextual. Therefore the role of the interview is to ensure that relevant contexts are brought in to focus so that situated knowledge can be produced(Mason, 2002). This was demonstrated through the use of a semi-structured interview format. Within this method of interview, interviewers refer to a prepared guide that includes a number of questions (Roulston, 2010). These questions are usually open ended, and after posing each question to the interviewee the interviewer follows up with probes seeking further detail and description about what has been said (Roulston, 2010).

Similarly to other interview structures, researchers using semi- structured interviews must have highly developed listening skills to be able to both ascertain whether the research topics have been addressed by the interviewee and when and how it is appropriate to follow up on accounts given (Arksey and Knight, 1999, Rubin and Rubin, 2005, Roulston, 2010).

4.4.2 Interview guide

Arksey and Knight (1999)maintain that the greater our understanding is in an area whether through extensive literature searching or through our own experience, the better we can connect with the interviewee. An extensive literature review on the research topic was carried out (see Chapter 2). As a result a sophisticated knowledge base on the research topic was acquired enabling the development of a semi-structured interview guide.The constructs of MSLT were considered a priori issues that required exploration. Questions included in the interview guide were composed to address these constructs and included associations to self-management behaviours of Type 2 diabetes. Therefore the interview guide was developed to elicit responses about how health value and perceive control impact on Type 2 diabetes patients' outcome behaviours. In this instanceSrivastava and Thomson (2009) recommend maintaining an open mind and to not force the data to address the a priori issues.

Bryman (2008)presents some basic elements in the preparation of an interview guide. Following Bryman's (2008) recommendations a certain amount of order was created on the topic area of the questions to allow a continuous flow of conversation during the interview. As the interview questions were mainly open broad parameters were provided within which the interviewee's could formulate answers in their own words concerning topics specified by the researcher.

An early version of the interview guide, which was considered a pilot guide, was developed and tested on the first four interviews. Ideas for improvement for the follow up guide were developed after transcribing the first four interviews. The final interview guide is displayed in Appendix D.

4.4.3 Recording equipment

Arksey and Knight (1999) recommend audio-taping as the method of choice for recording an interview. This creates a permanent record that captures the whole of the interview conversation verbatim, as well as the tone of voice, emphasis and pauses(Arksey and Knight, 1999). Whilst recording the interviewer considered some disadvantages to this method, one in particular is that the idea of taping might increase nervousness and dissuade franknessand also transcribing can be a lengthy process(Arksey and Knight, 1999, Willis, 2005).In order to reduce these disadvantages a hand held digital recording device with an omni-directional microphone was used. This device is small in size thus its physical presence is notably reduced in comparison to some recording devices, this may have reduced interviewee nerves. Furthermore, this device interfaces well with computers though a USB connection where interviews can be transferred for ease of transcription.

4.4.4 Interview setting and timing

Interviews took place in the OPD in a consulting room conducive to interviewing. Comfortable seating was available and seating was arranged so that the researcher and interviewee were sitting opposite each other. The recording device was placed near both speakers in order to pick up the best possible sound. During each interview a sign was placed on the interview room door in order to ensure that the interview would not be disturbed. The timing of the interviews ranged between thirty minutes and one hour. This depended on the individual being interviewed and how much they wanted to share or discuss. The total data collection time for the interviews including screening and recruitment was 40 hours over ten days. However, in addition to this many other hours were spent screening and recruiting for other possible participants but who subsequently did not agree to take part. Recruitment for the qualitative phase began on the 1st of November 2011 and ended on the 23rd of December 2011 (See Chapter 3 section 3.9 for further details).

4.5 Data analysis

The purpose of data analysis regardless of the type of data or underlying research tradition is to organise, provide structure to and elicit meaning from the data (Polit and Tatano Beck, 2010). Qualitative data analysis can be particularly challenging as there is an absence of standard analytic procedures(Polit and Tatano Beck, 2010). However, Braun and Clarke (2006) assert that qualitative analytic methods can be identified under two divisions. The first division includes those who are tied to a particular theoretical or epistemological position and the second includes those that are independent of theory and epistemological position and can be applied across a range of traditions. A shared skill of data analysis amongst the two divisions is the generic skill of 'thematizing meanings' (Holloway and Todres, 2003).Boyatzis (1998:4) supports this assumption when he describes thematic analysis as a

> 'process that can be used with most, if not all qualitative methods'.

Thematic analysis was chosen as the analytic method of choice for the qualitative phase due its theoretical freedom that can therefore be considered compatible with mixed methods research. The term thematic connotes the analysis of verbal material and the use of relatively comprehensive units of analysis such as themes (Smith, 1992).Braun and Clarke (2006) describe how a theme can enable a researcher to capture something important about the data in relation to the research question and represents some level of patterned response or meaning within the dataset.

Thematic analysis is widely used but there is no clear agreement on its analytic procedures (Boyatzis, 1998, Tuckett, 2005, Braun and Clarke, 2006). Braun and Clarke (2006) attempted to clarify this gap in the literature by providing recommendations for carrying out thematic analysis and offer a phased guide on the steps which should be undertaken to achieve an effective thematic analysis.

The recommendations include identifying whether the thematic analysis is inductive or deductive as themes or patterns can be identified by either method. As previously mentioned in section 3.5 a process of abductive thinking was adopted for this research. Therefore an abductive approach to the thematic analysis process was carried out, as the theoretical framework of MSLT requires a deductive exploration of the constructs of health value and perceived control and an inductive approach is required to ascertain whether these constructsinfluence Type 2 diabetes patients self-management behaviours. The deductive approach to this thematic analysis involved identifying the constructs of MSLT (health value and perceived control) as a priori themes for exploration.Ryan and Bernard (2000) affirm that themes can be a priori theoretical constructs identified by the researcher prior to thematic analysis. Any other themes identified through the inductive approach to thematic analysis are considered emergent themes. In order to assist this thematic analysis a computer assisted qualitative data analysis software (CAQDAS) was used.

4.5.1 Computer Assisted Qualitative Data Analysis (CAQDAS)

CAQDAS software packages were initially developed to enhance the accessibility of qualitative data by overcoming the physical limitations of paper data records (Richards, 1999, Richards, 2002). There has been much debate about the use of CAQDAS amongst qualitative researchers (Kelle, 1995, Richards, 1999, Weitzman, 2000, Bringer et al., 2004, Wickham and Woods, 2005). The key issue being debated is whether CAQDAS changes the way qualitative data analysis is carried out and to what extent it enhances or detracts from the quality of qualitative research (Bringer et al., 2004). The quality of qualitative research can be reduced through CAQDAS as it has the potential to produce a rigid automated analysis of text that in actuality requires human interpretation (Kelle, 1995, Bringer et al., 2004). In order to avoid detracting from the quality of qualitative research CAQDAS was used in this study to assist in the undertaking of qualitative data analysis and considered as a tool that enables a more efficient organisation of data and its analysis. Interpretation of data was understood to be a process undertaken by the researcher and not CAQDAS this understanding helped to maintain the context and nature of the data during analysis.

The CAQDAS used in this study was NVivo 9 developed by QSR International.There are five principal ways in which NVivo supports analysis of data(Bazeley, 2011):

- **Manage Data:** Data was managed in NVivo by first creating a project and then devising differing files to store raw data from interviews, the transcribed interviews and reflections on each interview. The memo function in NVivo helped to maintain an audit trail of key points and issues arising from the data, thoughts about the meaning or significance of themes and reflections during analysis.

- **Manage ideas:** Ideas for themes were managed through the use of coding. Boyatzis (1998) describes coding as the disaggregation of data into text units that can be categorized within a thematic classification system. A code in NVivo is stored in a node which provides access points for storing coded text. A node structure of the a priori themes was inputted into NVivo before coding began. Contrasting codes to a priori codes are those that are derived directly from the data and are termed in vivo codes. These codesare used to develop emergent themes. Codes can be highlighted within text in NVivo and there are coding stripes that can allow you to select which nodes are most, least or recently coded. These functions helped to manage the coding process. The tree structure in NVivo was also used to manage nodes. The tree structure is a classification system that enables the researcher to identify the relationships between categories and subcategories of themes.

- **Query data:** NVivo provided a flexible way to gather an explore subsets of the data through the query function. Queries provides a search function which enables an efficient way of finding words or phrases within nodes and when required assisted in identifying patterns of coding.

- **Graphically model:**Simple graphic models were used in NVivo to build on ideas and concepts when developing themes. These models are considered thematic maps in this study and will be displayed in the phased discussion of the methods of thematic analysis below.

- **Report from the data:** The ideas and knowledge developed in NVivo from the original data sources were used to report the rationale for the development of themes and the process by which this rationale was reached.

The following section discusses the phased steps of the methods of thematic analysis.

4.5.2 Phases of Thematic Analysis

Braun and Clarke (2006) phased guide on the steps of thematic analysis was adopted in this study to illustrate the phases of thematic analysis in a logical and coherent manner.

Table 4.2 Phased Steps of Thematic Analysis adopted from Braun and Clark (2006)

Phase	Description of the process
1. Familiarizing yourself with your data:	Transcribing data, reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking if the themes work in relation to the coded extracts and the entire data set generating a thematic 'map' of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, generating clear definitions and names for each theme.
6. Producing the report	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

Phase 1: Familiarising yourself with the data

Transcription is the written representation of speech. The transcription process was arduous yet valuable as it facilitated what Bazeley (2011) called 'building knowledge of your data'. The goal of the transcription process was to be as true to the interview conversations as possible. The interviews were transcribed in full. On average each interview took four to five hours to transcribe. During transcription reflections on each interview, ideas of emerging themes and thoughts on the a priori themes were documented using memos in NVivo.

Silverman's (2011) Simplified Transcription Symbols were used to demonstrate the interaction process between the interviewer and the interviewee. The symbols enable ease of reading as they identify features of natural conversation during the interview such as pauses, overlaps or emphasized wording. Not all of Silverman's symbols were used as too many symbols could impede reading effectively. Symbols deemed important to facilitating the interpretation of qualitative data were kept and are displayed in table 4.3 below.

Table 4.3 Silverman's (2011) Simplified Transcription Symbols

Symbol	Transcription
[	Point at which speech is overlapped by other speaker.
(.4)	Numbers in parentheses indicate elapsed time in silence in tenths of a second.
(.)	A dot in parentheses indicates a tiny gap, probably no more than one-tenth of a second.
<u>Word</u>	Underscoring indicates some form of stress via pitch and or amplitude.
WORD	Capitals indicate especially load sounds relative to the surrounding talk.
(( ))	Double parentheses contain author's descriptions rather than transcriptions.
-	Hyphen indicates end of speech by participant.

Other symbols used include:*LN:* Linda Nugent (Interviewer).Each Participants age is included once onintroduction in the qualitative results chapter e.g. (60) = 60 years old.

Phase 2: Generating initial codes

Transcriptions were read countless times to begin the coding process andgenerate initial codes.Codes were theory driven and data driven. Theory driven codes were derived from the a priori themes of health value and perceived control whilst data driven codes included common subjects on self-management behaviours described by Type 2 diabetes patients. The process of initial coding enabled the sorting of data into meaningful groups using nodes in NVivo. Tree nodes further classified these codes into categories where related concepts were gathered. Each code was explored for meaning in relation to MSLT or Type 2 diabetes in keeping with the theoretical perspective and research questions of the qualitative phase. This process of exploration generated an awareness of the richness of the data and the detailed attention to the text helped maintain focus on the text rather than on the preconceptions of the researcher (Bazeley, 2011).

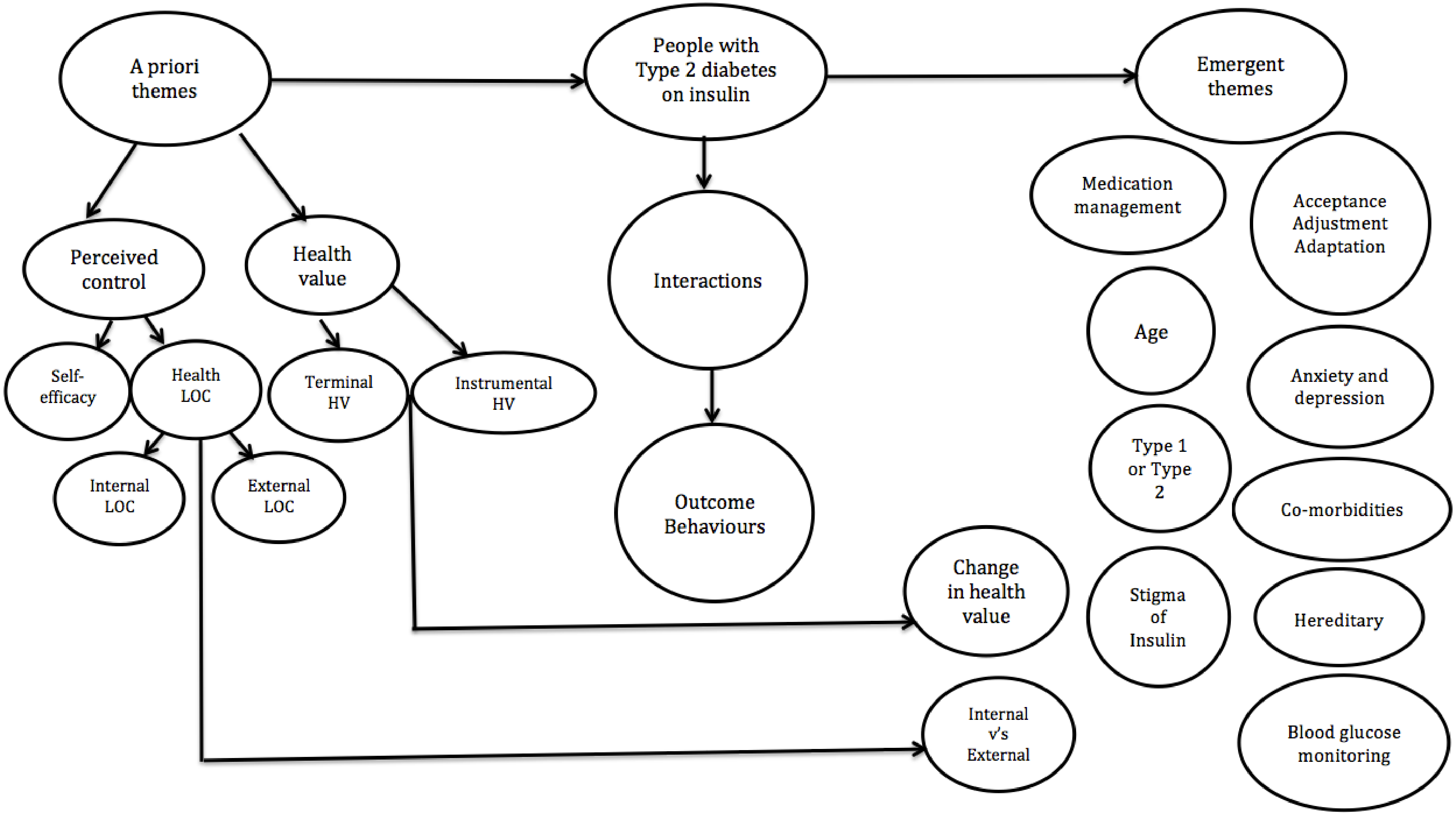
Phase 3, 4 and 5: Searching reviewing and defining and naming themes

Phase three included searching the coded transcripts for relationships of codes and possible themes. Phase three resulted in the conclusion that data saturation had been reached with twelve participants when no more relationships between themes could be identified. During phase four and five all codes were reviewed and collated by topic under the related a priori themes or emerging themes.This process of collation included the use of thematic maps to organise the data into named themes.An initial a priori thematic map was developed, as other new themes emerged these were added to the map. Themes and sub-themes were defined during this phase and definitions for each theme are presented in Chapter 5. The developed thematic map from NVivo is displayed in figure 4.1 to demonstrate the relationships between the main a priori themes and emergent themes.The sub-themes of the a priori themes are also displayed in this map.The a priori themes include perceived control (health locus of control and self-efficacy) and health value. Health locus of control has two subthemes internal locus of control (LOC), external LOC and an emergent subtheme internal versus external LOC beliefs. Health value has two subthemes that are instrumental health value and terminal health value beliefs and an emergent subtheme change in health value. The emergent themes are listed in figure 4.1 under the emergent theme heading.Figure 4.1 demonstrates that the a priori themes and emergent themes are both associated to people with Type 2 diabetes and these themes can lead to interactions that can result in varying outcome behaviours. These findings are discussed in more detail in Chapter 5.

Phase 6: Producing the report

The final step to the thematic analysis involved producing a report that provides sufficient evidence of the themes within the data and an interpretation of the meaning and significance of the themes. Using extracts from the data as evidence reinforced any analytical claims made. It is important to note that the use of extracts in the report went beyond description. Relevant literature and knowledge was accessed to review the underlying meaning of the themes and this process enhanced their interpretation. Furthermore, the interpretation of the data made arguments concerning the relative research questions.

Figure 4.1 Developed Thematic Map



A priori themes
People with Type 2 diabetes on insulin
Emergent themes
Perceived control
Health value
Interactions
Medication management
Acceptance Adjustment Adaptation
Age
Self-efficacy
Health LOC
Terminal HV
Instrumental HV
Anxiety and depression
Internal LOC
External LOC
Type 1 or Type 2
Co-morbidities
Outcome Behaviours
Change in health value
Stigma of Insulin
Hereditary
Internal v's External
Blood glucose monitoring

4.6 Summary

This chapter has described how mixed methods research questions and the theoretical position of this study influenced the data collection methods and data analysis methods chosen for the qualitative phase.A process of reflexivity was adopted throughout the qualitative phase that assisted the researcher in becoming aware of how her sense of self may impact on the data collected and analysed. The data collection method of choice for the qualitative phase was semi-structured interviews. An interview guide focused the interview process to ensure that relevant and situated knowledge was produced. A thorough thematic analysis using NVivo 9 was carried out. The qualitative findings are presented in Chapter 5. The data from the qualitative phase contributed to the development of an adapted health value measure and two new research questions and hypotheses. Chapter 5 section 5.6 details the interim phase and discusses the methods used to address the qualitative findings that contributed to the quantitative phase.

5 Qualitative findings

5.1 Introduction

Chapter five, section 5.2 to 5.5presents the qualitative findings that stemmed from an in-depth thematic analysis of 12 semi-structured interviews. The data in this chapter reveal how subjective data on generally objectively measured psychological constructs can show how beliefs and values influence behaviour. Quotations are used throughout the following chapter to highlight this. The transcribed data is presented using Silverman's (2011) simplified transcription symbols to ease reading. A tabular representation and explanation of these symbols is presented and explained in Chapter 4 section 4.5.2. Explanations on abbreviations are provided in the Glossary. Pseudonyms are used to represent participants and the initial 'LN' is used for the interviewer.

The present chapter discusses results of the a priori themes Health value and Perceived Control (Health Locus of Control and Self-efficacy). When exploring the a priori themes new themes arose such as 'Values in Life', 'The Meaning of Health', 'Change in Health Value', 'Internal versus External Locus of Control beliefs', and 'Acceptance-Adjustment and Adaptation (AAA)'. These themes are discussed in connection with the appropriate a priori and emergent themes throughout Chapter 5.

The semi-structured interviews identified a number of emergent themes that influence participants' health value and perceived control and impact on diabetes self-management:

- Comorbidities and Type 2 diabetes
- Reasons for Type 2 diabetes: hereditary and age.
- Medication Management
- Stigma of Insulin
- Blood Glucose Monitoring

- Type 1 or Type 2 Classification Issues
- Low Mood, Anxiety and Depression

The discussion on the qualitative findings ends with a summary of the qualitative findings in section 5.5 and indicates how these findings contribute to answering a number of the proposed research questions. The data from the qualitative phase that contributed to the interim phase is detailed in section 5.6.The chapter ends with a summary on the interim phase.

This Chapter is structured as follows:

- Section 5.2 **Ascribing Meaning to Values**
  Values in life
  Health and its meaning
  Health value
  Changes in health value
  Acceptance-Adjustment-Adaptation

- Section 5.3 **Perceived Control: Beliefs and their impact**
  Health Locus of Control and Self-efficacy
  Internal LOC versus External LOC
  Beliefs, values and outcomes

- Section 5.4 **Emergent Themes**
  Comorbidities and Type 2 diabetes
  Hereditary reasoning
  Age as a reason
  Medication management
  Stigma of insulin
  Blood glucose monitoring
  Type 1 or Type 2 diabetes: Importance of classification
  Low mood, anxiety and depression

- Section 5.5 **Summary of qualitative findings**

- Section 5.6 **Interim phase**
  Adapting the health value scale and item development
  Adapted health value scale: Structure and scoring
  Validity and reliability of adapted health value scale
  Examining changes in health value
  Summary of interim phase

5.2 Ascribing meaning to values

5.2.1 Values in life

To be able to infer causal sequences from values to other constructs such as locus of control beliefs and self-efficacy it is important to identify whether a value or value system is present prior to or simultaneously with the explanation given by the person. According to Rokeach (1979) if the value is present it is possible to hypothesize that there is a theoretical connection present with other items. In order to identify whether health value is a value held by people with Type 2 diabetes participants were asked questions which prompted them to think about 'what is most valuable to them in their life'.

For John (75) one such value is 'Life itself'. Harris (1987:120) asserts that

> 'our own continued existence is the 'sine qua non' of almost everything and what we want or value depends upon our own continued existence'.

John tells of how his existence is valuable not only to himself but also to his wife,

> 'Well at the moment I have got my wife who is very ill. She's had a stroke and a seizure and she's got a heart problem now. So if I am not healthy I don't know who is going to look after her. So I have got to make sure that I keep as fit as I possibly can, and make sure I can look after her'.

Rosie (62) and Harriett (46) express similar thoughts to John on the value of their lives to their families. For Rosie 'keeping healthy' is imperative to maintaining her quality of life so she can 'see her grandsons growing up'. Harriett's comments show how preserving her health is valuable to her life because if 'you're not well it can affect your family members and they can worry'. These comments highlight the commonalities in human value systems and also the individual differences in the arrangement of their value priorities. Here the relationship of health and family within a value system is apparent. The reasoning for valuing and maintaining health for all three participants is seen primarily as a benefit to their families for differing reasons. For John it was so he could 'look after' his wife. For Rosie it was so she could see her 'grandsons growing up'. For Harriett it was not to 'worry' her family.

Paul (77) was unsure of how to differentiate between the importance of different values to him.

> ‘I have never given any thought about it. I mean family is important, career is important and everything is important you know I don’t think that I can tell you that one should pay more attention to one and neglect the other’.

The above quote highlights Paul’s value system as he describes his values as having equal importance along a continuum. His values may enable him to choose between alternatives and resolve conflicts in life. Rokeach’s (1968:551) seminal paper asserts that

> ‘Given any situation a person may find himself in, it is all but impossible for him to behave in a manner that is equally congruent with all of his values’.

Charles (71) likePaul communicates his value system except it is arranged hierarchically. Health is ‘most’ important to him in his life and then ‘money and other things’ are next on the order of value in his hierarchy.

Sean is a 47-year-old male who was diagnosed with Type 2 diabetes in 2007. Sean is the only participant to allude to not having any values in life. Although, he professes to having no values when asked what is most valuable to you in your life he responded:

> ‘Living day by day mostly that’s it. A lot of folk will think I am cruel but we all come into this world for one thing and we are all going to die some time so (.1) that is my outlook. It could take me in the morning (.) it could take me next week so it doesn’t bother me’. [
>
> LN: [What is important to you in your life?
>
> ‘Nothing, even though I have got the bairns ((children)) I have got no outlook I am getting old so basically I am just waiting on that wee box coming to the front door’.

Here a hopeless picture is depicted. He states that ‘nothing’ is valuable to him in his life that he has no interest in maintaining his health and ‘basically’ he is waiting to die. This statement is inconsistent with his actual behaviour as if he truly did not value his life or his health why was he attending a health appointment at the diabetes clinic?

Sean was then probed with:

> LN: Is your health important to you?

> 'No just as I said I am waiting on that wee box coming for me and that's it. I have been suffering for too long until I get sorted out (.) there is no outlook. I have been trying to get into detox again for about the 5th time. I don't know for how many years'.

Although Sean's outlook on life is morbid and his value appreciation is low his comments are contradictory. He states that his health is un-important but perhaps this is because he feels he has been 'suffering for too long' and he has not been able to resolve his situation 'until I get sorted out there is no outlook'. Sean's case emphasizes how his values despite his 'hopeless' attitude are still present. Perhaps his values are being constrained by his external reality (alcoholism)[1].

Like Sean, Tom's values appear to be constrained by his external reality. He found the question on values in life 'difficult'. Tom is 50 and has recently divorced. He was diagnosed with Type 2 diabetes in 1997 and developed pneumonia in 2002. An admission to hospital for treatment resulted in nephro-toxicity due to an overdose of the antibiotic Gentamycin, and he was left with chronic kidney failure and balance problems.

> 'The most valuable things in my life have been taken away from me. My wife was one and I think my health and my mobility was another. That's not the easiest question to answer'.

Tom feels his values have been taken away from him. However, it is apparent that he still values life, his wife and his health but due to his current situation he is not able to act in accordance to those values.

> 'I have had a major blow to it ((health)) (.) it effects my ability to live everyday life'.

Tom conveys how his quality of life is reduced as a result of his condition

> 'I am pretty much resigned to the fact that I am going to be disabled if you like for the rest of my days'.

Both Sean and Tom are concurrently similar and different. What is similar is the process by which attitudes affect a value system and vice versa. Their value systems

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[1]Throughout this thesis text in brackets within passages represent explanatory comments.

are repressed by the aetiology of their ill health and their current lived experience. Possibly their values have been influenced by their attitude (hopelessness) due to their experience with ill health. Another comparison is the way health is now valued by both men. They view health as enabling them to do things in their life but now that neither have optimal health Sean now has no 'outlook' and Tom is 'resigned to the fact' that he is going to be 'disabled' for the rest of his days. The difference is evident in their lived experiences.

Health as a value was described by many participants as an overarching value that contributes to the quality of that life. For instance, Charles's interview highlights this point.

> LN: Can I ask which statement you agree with the most and why?
>
> Without good health I cannot do the things that I want to.
> My goal is to be as healthy as I can be.
>
> Charles: The first statement.
>
> LN: And can I ask you why you went with the first statement?
>
> Charles: Well I mean I can't walk as much. I used to walk a lot (.) I used to quite like walking and I can't do that now. And general working about the house and things like that ah jobs to be done. I feel in some cases I am not fit to do them you know (71).

Charles expresses how he has valued his heath as he 'used to walk a lot' and 'how he can't do that now' due to ill health. Again apparent here as with Tom and Sean's case is the restriction and changes suboptimal health places on the self and thus values. These findings echo the results of a study by Sagiv and Schwartz (2000) who examined the relations of value priorities and subjective well-being of students from Israel and Germany. They found that people are likely to experience a positive sense of well being when their situation allows them to attain their goals to which their values are directed (Sagiv and Schwartz, 2000). This is relative to the participants discussed above as the restrictions they face such as ill health and alcoholism affects their ability to attain their desired goals and impacts on 'subjective' well-being.

The following sections will focus on the meaning of health to the person with Type 2 diabetes, health value and how health value is influenced by a change in health status.

5.2.2 Health and its meaning

The word 'health' means different things to different people. This was clearly evident throughout the interviews. Participants were asked questions that probed them on the meaning of health to them such as 'how important is valuing your health to you' and 'how would you define health'. All twelve participants' provided comments that highlight the dynamic and subjective nature of health. This finding is consistent with existent qualitative literature that health is defined in a range of different ways but also that these varying definitions of health have implications for behaviour (Bishop and Yardley, 2010, Williams, 1983, Herzlich, 1973, Hughner and Kleine, 2004). A review carried out by Hughner and Kleine (2004) identified three main ways health was viewed by lay people which were 'health as the absence of illness', 'health as the ability to carry out daily tasks' and health as 'maintaining equilibrium'. The participants' views on health in this study reflect these results.

Roger (64) when asked 'What meaning does the word health have for you' answers with

> 'Generally health for your body and how you feel, and also how it affects your daily life'.

Roger then goes on to define health as

> 'Just how you feel ah how your bodily functions function and if you can do things you normally do when you were a bit younger which you can't generally'.

Rogers' definition resonates with The World Health Organisation (1948) who defined health as a

> 'state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'.

A definition from Tom (50) on the meaning of health defines health as the absence of disease but does not fully incorporate the holistic aspect of health to the same extent as Roger.

Tom defined health as

> 'being free from any inherent immediate problems and I do have one and I won't be able to get rid of it so that's how I would define it' (M, 50).

Four other participants were in agreement with Roger's holistic view of health. Health to Roger encompasses his mental well-being 'how you feel', his physical well being 'how your bodily functions function' and it incorporates the psychosocial aspect whereby the psychological, physical and social aspects of health can enable him to do things 'normally'.

Participants perspectives on the meaning of Health are comparable to a proposition by Rogers (1990) that an individual is a unitary human being in which there is a mind-body interrelationship. This interrelationship is evident through a statement from Harriett 'I am talking about the mental and physical'. Furthermore, within this proposition a holistic orientation to health is advocated and as a result the 'absence of illness' is no longer the fundamental condition for health(Hwu et al., 2001). This proposition encompasses the bio-psychosocial model instead of the traditional biomedical model. The bio-psychosocial model is seen as the model of choice today when treating patients with a chronic illness such as Type 2 diabetes as it incorporates the biological, psychological and social factors of health (Peyrot et al., 1999). SIGN guidelines 116(2010) assert that adults with Type 2 diabetes should be offered psychological interventions to improve glycaemic control in the short and medium term. These interventions are mostly unavailable or unaffordable and as a result not all patients can benefit from this. However, improvements are being made in psychological support for people with Type 2 diabetes. In Scotland the Psychology in Diabetes and Psychology and Diabetes (PIDPAD) project is expected to train NHS staff to improve their skills in psychological support and behaviour change (Diabetes Action Plan, 2010).

Many participants shared the assumption that health enables you to do the things that you want to do. This assumption of health as a functionality is supported by

McKague and Verhoef (2003) and Hughner and Kleine (2004) who note that the functional definition of health is that the person can function to his or her expectations. Participants expressed how their 'poor' health has affected their ability to carry out daily tasks and affected the enjoyment of travel. For example John stated

> 'Travelling is always usually a problem if you have not got good health'.

A number of studies have identified that if a person can perform daily functions like going to work then he or she may consider themselves healthy (Papadopoulos, 2000, Torsch and Ma, 2000, McKague and Verhoef, 2003). Three participants revealed how their career influenced their choice to maintain their health.

> John: Oh very much I always tried to be kept healthy. I mean having been in the forces I was kept fit.
>
> Roger: Quite a lot because I was working (.) I was in the police at the time and you really had to keep yourself fairly fit and hence the reason I gave up smoking and other bits and pieces but ya my health was fairly important to me.

Paul mentions the importance of health and 'quality of life' and stated that

> 'if you don't have health you can't work and if you don't have health you don't enjoy your life'.

Paulis a retired surgeon and described the meaning of health to him as a value and emphasized how maintaining his health enabled him to be successful in his career.

> 'As a physician if I am not in good health I can't give my best to my patients you know, I am a diabetic if I am hypoglycaemic or hyperglycaemic I can't think clearly and it not only needs your skill as a surgeon but your brain as a surgeon also you know judgement and all the other things that goes with it'.

Although Paul told of how in his later years he valued his health so he could give 'his best to his patients'he also mentioned how in his earlier years he 'thought that he could do anything you know and he wouldn't fall ill'. Paul's value priority at this point in time was his career. Rohan (2000) suggests that value priorities occupy central positions in cognitive networks of attitudes and beliefs. This is apparent in Paul's description at that point in his life as he felt in order to succeed in his career he would have to 'neglect' other value priorities such as health. Although Paul may have been motivated to value his health due to his personal endeavours and environmental constraints he did not behave in a way that was consistent to his value priorities.

> 'I used to think health was very important, I probably didn't look after my health as I should have done.'

This finding provides an understanding of how value priorities and views of health can impact on behavioural choices and thus outcomes.

The final view of health described by participants incorporated a balance between subjective well-being and an understanding of self. Good health was conceptualized as contributing to a positive sense of well-being and outlook whilst ill health was seen as causing an imbalance in body and mind. Due to Type 2 diabetes and other chronic illnesses the majority of participants described an imbalance between body and mind. Lawton (2003) in her review of lay experiences of health and illness made the point that being healthy is part of one's self concept and illness is a disruption of balance.

The meaning of health to numerous participants involved describing how life is impacted by 'health problems'. Extracts from Mary's (60) interview are presented to demonstrate this.

> 'It stands for a lot because I have a lot of health problems. Apart from diabetes I have high blood pressure high cholesterol (.1) I've got asthma, um (.) a few other things (.) but that's 'gynae' ((gynaecology)) department (.) I have a quite a lot of medical problems'.
>
> LN: How important is valuing your health to you?
>
> 'Very important (.) I need to keep the diabetes under control to control everything else because if that goes to high the blood pressure goes up then the chest plays up which means the asthma so you've got to keep them on a wee steady hopefully on a steady run which I can actually do quite well'.

Mary illustrates how chronic illness places demand on the self to make concessions to accommodate the various imparted restrictions by means of control. The above quotes demonstrate how she maintains 'equilibrium' by 'keeping the diabetes under control to control everything else' and this helps her to 'keep them on a wee steady run'. In contrast to Mary, Tom's 'equilibrium' and meaning of health has been totally altered due to his kidney failure, diabetes and other comorbidities. Tom feels that ‘it’ is his health now that ‘runs’ him ‘as opposed to’ him running it.

The findings in this section have illustrated the individuality in meaning of health to participants and how life’s inconsistencies can impact on the value priority of health at differing points in time in a person’s life.

5.2.3 Health value

Participants’ perceptions on partaking in activities important to maintaining their health were explored in an attempt to understand how health is valued.

> Roger: I was told by the nurse when I first found out I was diabetic that taking insulin was you never skive or you never stop taking insulin you have got to take it so and I was told that very early.

Roger’s reasoning for taking his insulin is ‘you have got to take it’. This behavioural activity implies an underlying value that has been understood to be health value. Rosie feels that

> ‘diet, it is a way to control it, you have to watch what you’re doing, your intake and not eat too much sugar (.) not eat much’.

Adam’s self-management behaviours are also valuable to his health.

> ‘well it is just to keep healthy, you have got to watch with diabetes with your heart and things like that and watch your eating’ (55).

In contrast to those expressed above, Sean’s thoughts suggest that he does not consider taking part in health behaviours valuable.

> LN: Can you describe any activities you adopt on a daily basis to maintain your health and control your diabetes?
>
> ‘I sit and lie on the couch. I have got my beer there and I have got my vodka right in front of me. That is what my days are roughly about’.

Rohan (2000:264)advocates that

> ‘although people may be motivated to live the best way possible, a multitude of personal and environmental constraints mean that people do not always behave in away consistent with their value priorities’.

Most participants pointed out how they are 'motivated to live in the best way possible but health restrictions due to Type 2 diabetes can impact on health value.

> Roger: To a certain extent I mean if I had the choice I wouldn't be diabetic because it does restrict you and now you just get on with it and try and manage it as much as possible the best you can.

> Adam: I mean I am personally not too bad because I control my diabetes quite well and it doesn't restrict me in a lot of things apart from my work for working outside. I work with the rail way and I work in the offices now because I can't work outside in-case I keel over by myself like (.) I have got to be with somebody so that restricts me in one way but basically I manage fine.

The above quotes show how diabetes can cause restrictions in life. The restrictions are described as not 'too bad' and infer how it is important to value your health when you have diabetes otherwise it could 'restrict' you. This point on health value and 'restrictions' is relative to the themes 'Change in Health Value', 'Acceptance-Adjustment-Adaptation' and 'Co-morbidities and Type 2 Diabetes'. The relationships between the themes will be explained in the following appropriate sections.

As previously mentioned in section 5.2.2health was seen to be important to enable participants to 'do things'. This value orientation can be described as a person's mode of conduct or as an instrumental health value. Another value orientation is a terminal value that is an end-state of existence (for a more in-depth description on value orientations please see the Health Value section in Chapter 2 p14). The instrumental and terminal value dichotomy was kept in mind during analysis of this data. Rokeach (1968:551) stated that

> 'all men can have two kinds of value systems – an instrumental value system and terminal value system'.

A quote from John (75) highlights an instrumental health value orientation.

> 'Valuing health is important so that you can do things and you are quite happy in your life and you can get on with your life and you have no drawbacks'.

For John he maintains his health in order to achieve other goals such as happiness and having 'no drawbacks', rather than simply to be healthy.

Harry'shealth value orientation can be viewed as terminal in nature. He states that

> 'health is valuable you have only got one life' (57).

Harry values his health as a desirable end-state of existence. As previously mentioned many participants valued their health from an instrumental point of view. Although the majority of participants reported health value as instrumental some suggested that they valued health bothinstrumentally and terminally in their lives. Others suggested that their health value orientation was terminal before Type 2 diabetes but on diagnosis this changed to a more instrumentally oriented value. Smith and Wallston (1992) suggest that in all likelihood health is probably both an instrumental and terminal goal.

An extract from Roger illustrates this point.He discusses behaviours he carries out to maintain his health and control his diabetes.

> 'Well I try and exercise everyday other than my bad knee (.) But I try and exercise as much as possible to keep my weight down and also just to give myself some exercise because I have generally been active all my life it would be very hard to stop'.

Roger exercises in order to achieve a valued goal that is weight reduction. This can be considered instrumental in nature. However, at the same time he also states how he wishes to exercise 'just to give himself some exercise'. His motivation to do this is solely to maintain his health. This motivation can be considered as a 'desired end state' and therefore terminal in nature.

Additionally a quote from Adam highlights how health value can be viewed as both an instrumental and terminal goal. The first sentence of the extract indicates an instrumental viewpoint whilst the second demonstrates a terminal health value orientation.

> 'Because if you are ill that can restrict you and some work and other things. Whether you have got diabetes or not you still need to have good health you know because there is no use being really unhealthy'.

Even though, health can be viewed as an instrumental and a terminal goal most participants discussed their reasons for maintaining their health and achieving their goals as a means to an end (instrumental) rather than only being equal to having good health (terminal).As a result of this finding it could be suggested that valuing your health as instrumental is a value priority. Or valuing your health as terminal is a value priority. This suggestion entails that values motivate behaviours but this motivation depends on the value priority at that time. The instrumental and terminal dichotomy has received mixed reviews in regards to values and health (d'Houtaud and Field, 1984, Allen et al., 2002, Schwartz, 1994, Lawton, 2003, Duncan, 2010). The significance of this in relation to the findings in this study will be discussed in Chapter 8 section 8.5.

5.2.4 Change in health value

The change in health value (CHV) theme arose through participants' answers to questions such as 'can you think back to before you were diagnosed with Type 2 diabetes''how much did your health mean to you then' and 'has the amount in which you value your health changed since diagnosis'. The CHV theme has three dimensions to it and the findings are presented chronologically. Firstly it explains participants' perspectives on how diagnosis of Type 2 diabetes 'changes' howimportant health is to their functioning in everyday life. Secondly it provides insight into how health value is altered overtime as the length of diagnosis of Type 2 diabetes progresses. Thirdly a 'sense of regret' on lack of health value pre-diagnosis is described by some post diagnosis.

Eight out of twelve participants conveyed how prior to diagnosis of Type 2 diabetes they had not thought about their health much. Harriett tells how she

> 'was a lot younger and didn't really think about it. It isn't until you get diagnosed with a condition that you actually start thinking about it ((health)) you know and you're just trotting along (.) you just don't really think about itthen all of a sudden wham it happens to you'.

Mary described how she 'never really bothered about it' ((health)) before diagnosis of Type 2 diabetes. Interestingly Mary suggests a value difference between having 'high blood pressure' and diabetes when she states

> 'I had the high blood pressure never bothered me had tablets and that. Diabetes is a different thing because you have got to change your life'.

Mary's comments imply that possibly she perceives diabetes as more serious than hypertension and this has caused her to re-evaluate her value priorities in life.

> 'You've got to actually turn right around and look at you have done wrong in the last forty years and then learn well you're not getting many more chances so behave yourself (.) so my chances were running out (.) so now I behave'.

Smith and Wallston (1992)suggest that as a person's health becomes more threatened the value of health to an individual may become more salient and consequently more important. Charles feels that as a result of his diagnosis he now 'wants to look after his health more' as he has 'more things to look after'. John's comments concur with Charles's

> 'Well it had become more of an emphasis to keep healthy and keep my blood sugar levels controlled and so on'.

Now that diabetes is an issue health value is understood to be of a higher priority than before to these participants.

As Rosie states

> 'diabetes is not just going to be for awhile this is for life'.

Sean could be described as a deviant case. Although he has been diagnosed with Type 2 diabetes his health value and health behaviours have not changed due to his current circumstances with an alcohol problem. His alcoholism has not enabled him to address his value priorities as other participants have done on diagnosis of Type 2 diabetes.

> 'That is a bit difficult that question because the fact that I have been drinking for that long. I have never really gave it a thought. I have never sat down and thought about it that way. I have just plodded along and thought that's it'.

A quote from Harriett is used to illustrate the second dimension of the CHV theme which acknowledges how being diagnosed with a chronic illness such as Type 2 diabetes for a period of time can result in becoming a bit 'blasé about it'.

> 'I started getting a bit blasé about it and saying I'll not bother and stuff. I suppose when you are first diagnosed and that you are maybe more keen to sort of go <u>RIGHT</u> but once you have it for so long you kind of go a wee bit (.) well I do I get a wee bit blasé about it and go ((Shrugs))'.

Seanstates how he feels ‘bored’ of diabetes and ‘how it is doing his nut ((head)) in’. He also affirms that ‘you think they could just give you a tablet to cure it’. Harriett and Sean’s comments suggest that for them the longer they are diagnosed their health value priority may be reduced.

Some participants mentioned regret in not valuing their health more prior to being diagnosed with Type 2 diabetes. Paul expressed that

> ‘health is much more important now I wish that I had done a little better’

and Adam states ‘I could have done it a lot differently’.

The next section describes the findings of the multi-dimensional theme ‘Acceptance, Adjustment and Adaptation’ (AAA). A brief discussion follows this on the connections between the themes reviewed thus far. The reason the findings are discussed in this manner is that the AAA theme relates to the overall lived experience of the person with Type 2 diabetes andwhen considering AAA as a process it enables identification of the relationships between themes which the person with type 2 diabetes experiences.

5.2.5 Acceptance-Adjustment-Adaptation

Acceptance, Adjustment and Adaptation is an emergent theme. Each of these words could be viewed as themes in themselves however it was deemed necessary to explain their influence as a single theme with various aspects to it. The various aspects relate to the person’s belief and value system. The interviews showed that all participants’ belief and value systems were influenced by a person’s mode of acceptance, adjustment and adaptation. Each aspect within this theme was viewed as an operational factor or attitude. Rokeach (1973:550) defined an attitude as

> ‘an enduring organisation of several beliefs focused on a specific object or situation predisposing one to respond in some preferential manner’.

Attitudes are important factors to consider when exploring the meaning of health value. The reasoning for this is pointed out by Rokeach (1973:550)

> ‘a value unlike an attitude is a standard or yardstick guiding not only attitudes but also actions, comparisons, evaluations and justifications’.

Consequently what became apparent within the data is how values and beliefs impact on the individual with Type 2 diabetes attitudes and how this influenced decisions of self-management behaviours. The extracts below came from Garry (70) and Harriett (46) interviews and are presented to illustrate this theme.

LN: Tell me what it is like to have Type 2 diabetes?

> Garry: It is just like say having a cold where you have got set times to take your medicine and that's how I look at it, as I say latter years of it I have got to watch (.) likes if I am cutting the grass using energy burning up your sugars and you have to be careful you don't get a hypo and well I get a wee reminder I'll maybe sweat a lot or start to get light headed and I say oh and Ill go in and I always carry dextrose and tablets and that brings the sugar back in to your body so you are always conscious of that.

Here Garry demonstrates how he accepts Type 2 diabetes when he says 'you have got to watch' and shows how he has adjusted in his daily life by giving an example of how he uses his knowledge on the condition to manage his diabetes

> 'like if I am cutting the grass using energy burning up your sugars and you have to be careful you don't get a hypo'.

He describes how he gets 'a wee reminder' such as sweating and becomes light headed which are two of the symptoms of hypoglycaemia. He then acknowledges how he has adapted to this possible situation by 'always carrying dextrose and tablets' because he knows that this 'brings the sugar back in to your body'.

Harriett also comments on what it is like to have Type 2 diabetes.

> 'It's like somebody who's become very physically disabled in some way when all their life they have been ok and then something happens to them they have got to sort of learn to adjust and say as you say well this part of my life now I have to get on with it and just do what I have to do sort of thing'.

Harriett accepts that 'well this is part of my life now' and states that she has got to 'learn to adjust' by describing how she has to 'get on with it' and adapt to her situation by acknowledging that she needs to 'just do what I have to do'.

The AAA theme can be linked to the concepts of biographical disruption and transition. Charmaz (1983) recognised that living with a chronic illness such as diabetes means being challenged by changes in ones daily life and body. The work of

Bury (1982) on biographical disruption focuses on the concept of reconstructing meaning during illness. Whereas transition has been used within the literature to describe the process of change in life's developmental stages or alterations in health and social circumstances (Kralik et al., 2004, Meleis et al., 2000, Meleis, 2010, Kralik et al., 2006, Kneck et al., 2011, Kneck et al., 2012). In the present study descriptions of experiences of being diagnosed with diabetes demonstrated changes in daily living required for disease management and adaptation. Due to the necessary adaptation required of participants' varying means of acceptance and adjustment were described. The process to adaptation was an individual experience. This finding resonates with previous research (Murphy and Kinmonth, 1995, Idler et al., 1999, Corbin, 2003, Mol and Law, 2004, Johansson et al., 2009).

For many the 'disruption' of diabetes to their life caused an 'evaluation' of values and value priorities. This evaluation was seen to cause a change in the way people valued their health and to change priorities of health in order to meet their new diabetes self-management requirements. This change in health value resulted in participants' viewing their health value as mainly instrumental in nature. Valuing health instrumentally can be described as viewing health as enabling functionality in every day life. This finding is line with Corbin's qualitative work on 'the body in health and illness' (Corbin, 2003). Corbin's (2003) data suggested that depending on the extent of the experience of illness and as a result a person's ability to carry on with daily living activities if one does not experience too drastic a change then the person may not necessarily perceive themselves as ill. Olshansky et al. (2008) called this experience 'normalizing the process' of managing a condition.

The initial evaluation at diagnosis did not resolve there, as some participants commented on how as the timespan since diagnosis progresses a continued struggle of maintaining values against the emotional burdens of the condition is experienced. This finding is supported by King et al. (2003) who examined the nature of resilience of people with chronic disabilities. King and colleagues research identified factors that help or hinder people at 'turning points' in life. Turning points similar to the concepts of 'transition' and 'biographical disruption' cause a shift in the meaning, purpose or direction in a person's life (King et al., 2003).

The qualitative findings have so far highlighted how although health is valued by most and the majority of participants wish to adhere to diabetes self-management behaviours; values are but one of the many factors which impact on behaviour (Wallston, 1992).

5.3 Perceived control: Beliefs and their impact

The perceived control construct was explored within the qualitative data in keeping with MSLT. This involved taking into account the internal/external dimension of the locus of control construct and focusing on participants' accounts of self-efficacy in self-managing Type 2 diabetes.

A recurring theme was noted when participants discussed their locus of control (LOC) beliefs. Participants' described conflicts between their internal and external LOC beliefs when discussing their self-management behaviours of Type 2 diabetes. This theme will be discussed under the heading 'Internal Locus of Control Beliefs versus External Locus of Control Beliefs'.

The Acceptance-Adjustment and Adaptation theme will also be referred to throughout section 5.3 to acknowledge the relationship this theme has with a person's perceived control, values and the impact this has on self-management behaviours.

The section is completed with a presentation of findings that recognize the complexity of the mechanisms by which perceived control and health value operate to influence health behaviour.

5.3.1 Health locus of control and self-efficacy

Participants' self-efficacy and locus of control beliefs were understood during analysis through descriptions of how and why health behaviours are carried out.

Harry believes he has sufficient coping abilities (self-efficacy) to manage his diabetes when he states 'my ability is fine'. However, he attributes this coping to

> 'never ever having a hypo' and 'just taking life as it goes'.

This suggests an external locus of control belief orientation as he relates what happens in his life to chance.

Harriett's perspective on her perceived control over her diabetes self-management differs to Harry. She illustrates internal locus of control beliefs when she states

> 'I know what I need to do to manage it'.

Nevertheless, she has low self-efficacy in that she does 'not' believe that she is 'good' at doing what she 'should do'.

John demonstrates how a person can have internal LOC beliefs and external locus of control beliefs.

> 'Ithink at the moment it seems to be very good (internal belief) they're quite happy in fact they're over the moon with it (external belief)'.

He also shows good levels of self-efficacy here due to his internal/external LOC beliefs. The effects of this combination are apparent in his outcome behaviour

> 'my blood sugar levels are excellent'.

Tom's perception over his condition illustrates low perceived control.

> 'Sometimes I fail to understand what's going on. Sometimes my sugars will be high for no reason and sometimes my sugars will be too low for some reason'.

He lacks self-efficacy in that he has no confidence in his ability to manage his diabetes even 'after all these years'. This situation makes him feel 'unhappy' in that he doesn't understand what is going on or why. It is clear that Tom's perceived control is the way it is because of his external locus of control belief when he states

> 'Sometimes things happen and you are not entirely sure. I just don't know (.) but unfortunately I have to deal with it'.

Sean's perceived control is 'bad'. He admits to sometimes 'forgetting' to take his insulin 'when I am drinking'. For Sean his low self-efficacy and LOC belief is external due to his alcoholism. His unconventional manner of diabetes control is apparent when he mentions how

> ‘I’ll waken up in the morning at 5 or 6 o’clock I’ll says in my mind that’s my bodies way of telling me I need the tablets or I need the insulin and as soon as I have done that then it’s fine and I just go back drinking again’.

Several participants emphasized how life’s irregularities can impact on perceived control beliefs and their ability to self-manage diabetes effectively. John felt his perceived control was ‘quite well’ when he was on ‘normal tablets’ he didn’t ‘seem to have a lot of problems’. Then he felt his perceived control was altered when he was

> ‘changed on to insulin and started getting into a lot of hypos’.

As a result of this John ‘felt totally out of control’.John’s self-efficacy in managing his new medication was understood to be low. This was perhaps due to his external LOC beliefs because

> ‘he felt that nobody can actually say this is what you take there is no set ways of doing it and it varies very much so on your activities’.

John went on to elicit how he accepted-adjusted and adapted to the situation

> ‘there was no other way to control it so I am coping with it’.

For Rosie good perceived control ‘involved a ‘healthier diet’. Rosie felt that due to being separated from her husband ‘everything went up in the air’. However, her internal LOC beliefs outshone her personal problems when she states

> ‘but now I am back on track with eating properly and just watching what I am doing’.

Her internal locus of control beliefs and self-efficacy show how they impact on her diabetes self-management when she states

> ‘instead of ignoring it and feeling sorry for myself (.) when I can’t eat a bar of chocolate (.) you know it’s not good for you so you shouldn’t eat it’.

Paul mentions how although he was a surgeon and

> ‘it wasn’t always easy to eat or to exercise you know properly for what is needed for diabetes control’

he felt he still had ‘good control’ because his‘A1c is always between 6 and 7’.

5.3.2 Internal locus of control versus external locus of control

Extracts from various participants' interviews are used to explain the internal and external LOC conflict in beliefs experienced and the impact this has on the self-management of diabetes.

Mary displays high internal LOC beliefs and 'good' levels of self-efficacy when she discusses her love for chocolate.

> 'What's the point in taking it? All I'm doing is putting the sugar levels up. It's not worth the risk. They all know Granny doesn't get sweeties, but I have the odd bit but it's not worth it'.

Also apparent within this extract is Mary's mode of acceptance, adjustment and adaptation. The conflicts she faces with self-management can be defined within this theme. The struggle within her belief system results in low self-efficacy and acceptance ability in her taking the 'sweetie' and becoming hyperglycaemic.

> 'You get sweats and you start getting warm and you want to take your clothes off but you ken ((know)) fine you took the chocolate and that's what put it up'.

This quote is interesting as it illustrates how her attitudes conflict with her belief system. The internal struggle of her belief that she can avoid 'sweeties' impacts on her level of self-efficacy when she has 'the odd bit' however she realises 'it's not worth it'. The resultant outcome behaviour is hyperglycaemia. Through observing Mary's perceived control it was possible to identify how she struggles with her belief system and self-efficacy in managing her adaptation to control diabetes.

Charles describes internal locus of control beliefs and 'good' levels of self-efficacy when he discusses his insulin management. However when he mentions that part of his perceived control is due to

> 'being told that my readings ((blood sugar)) are satisfactory'.

It is clear that there is a conflict in his LOC beliefs. He relies externally on health professionals to inform him about his diabetes management. Roger faces a similar conflict in beliefs in regards to his 'diabetes control'. He feels that it is

> 'very hard to understand how good it is until you come to clinic and then they tell you that your diabetes control is quite good'.

For Roger knowing and receiving reassurance from the diabetes clinic that his control is 'quiet good' reinforces his internal LOC beliefs outwith the clinic. The following quote describes how outwith the clinic Roger's internal LOC beliefs take precedent over his external beliefs.

> 'Well the thing is if you take your blood on a regular basis its a matter of knowing when to decrease it or increase it as the days go on or the weeks go on and also where you're going to go and what you're going to be doing social wise'.

For Tom Type 2 diabetes is 'frustrating' because it has become a 'problem that it shouldn't be'. It is apparent that his external LOC beliefs conflicts with his internal LOC beliefs when he states he 'does not know how he got it'. This implies that he does not believe being diagnosed with Type 2 diabetes was a consequence of his own actions. However, internally he believes that now

> 'I have got it I have got to deal with it'.

Although he believes internally that he has 'got to deal with it' it is clear that he is still in conflict with his 'situation' when he states

> 'I am now in a situation where medical conditions run my life as opposed to the other way around'.

5.3.3 Beliefs, values and outcomes

The following section describes the relationships between the a priori themes perceived control (locus of control and self-efficacy) and health value. The way in which these themes influence diabetes self-management behaviours is reviewed.

A quote from Mary highlights how she values her health as an instrumental priority. She discusses the importance of this to her health when she says 'it doesn't stop me doing anything'. To Mary her perceived control over her diabetes depends on

> 'sticking to a normal routine and taking tablets and insulin in the morning and watching what you're eating'.

Mary's LOC beliefs were understood to be internal and her levels of self-efficacy were thought to be satisfactory. This reflection on Mary's beliefs stemmed from her descriptions of her behaviour.

> 'And basically just watch what your doing you learn over the years what you can and can't do with diabetes and I think I have learnt over the years what you can and can't do'.

An extract from John's interview shows how 'the immediate shock' of being told 'you are not as healthy as you think you are' caused him to think about his health value and accept and adjust to the condition.

> 'I think that's it and then I mean after a while you have just got to say well ok I have got diabetes and I have got to control it'.

The final sentence in this extract 'I have got to control it' points to John's perceived control over his condition. It is suggested that his LOC beliefs are internal here and as a result he has confidence in his level of self-efficacy to 'control it'. John conveys his thoughts on insulin management and provides evidence for the above interpretation of his beliefs. The quote clearly demonstrates the complexity of diabetes management and how internal LOC beliefs influence self-efficacy in carrying out the behaviour when he states

> 'I mean you have got a lot of choices to make because as I say there is no laid down or written in stone way of doing your insulin because it varies on so much you know if you do lots of activity you have got to mind what you are trying to do and that burns up your sugar and everything else.'

John's value priority is instrumental here as he is carrying out specific diabetes self-management behaviours in order to attempt to live without problems.

The subsequent extracts illustrate how various aspects in a person's life can impact on perceived control and ability to self-manage diabetes appropriately. Mary talks about how she 'keeps it all under control now' but 'before' she found it hard to 'watch' her diet because she was buying food for herself and for her husband. However her perceived control over her diet has improved because

> 'My husband is now diabetic and now we are on an even keel because he has got to eat everything I eat, I refuse to eat what he eats'.

Mary's comments on her spouse influencing her eating habits and subsequently impacting on her diabetes control is supported in the literature. A study by Trief et al (2003) on 'Couples Living with Diabetes' found that a spouse's eating patterns could negatively impact on self-management behaviours of diet by preparing inappropriate food and modelling bad eating habits.

Sean discusses his wife's input in his diabetes care. His comments highlight how his perceived control is poor. His wife manages his medication 'she takes control of my drugs'. Searle et al (2007) study illustrates comparable findings to this. Searle et al. (2007) study concluded that partners can mediate the relationship between a person's perspective of their diabetes control and their self-management behaviours. Sean asserts that the reason his wife does all his tablets is

> 'because if she didn't I would have to go to the hospital everyday to get my tablets'.

Sean was probed with the question; do you not feel you could do it yourself?

> 'No because I am on that many tablets I am on about 25 in the morning ah, 3 in the afternoon and 10 or 11 tablets before I go to bed so I have that many tablets in a day'.

Paul and Harriett refer to diabetes management as 'annoying' and a 'pain'. This feeling towards it 'at times' can result in lowered perceived control. Paul states how it is

> 'very annoying because it is very important to have good control of diabetes in order to function well'.

This point shows that his health value priority is instrumental and his LOC belief is internal. However he feels that diabetes 'limits' him in that

> 'you can't eat or you can't drink the way you want to sometimes'.

And similar to Mary's struggle with chocolate he likes 'a single malt in the evening' but then he will 'forgo something in exchange for the gallows'. He states that he does this because he knows 'diabetes has to be well controlled' and this indicates his level of self-efficacy in managing his condition.

Harriett also values her health but feels that it is her way of thinking that impacts on her perceived control. She admits to sometimes missing her insulin. However she acknowledges that when she does 'take it' (insulin) she sees the benefits of her positive behaviour 'because I can see it by my blood sugar results'.

Tom's multiple comorbidities impact on his perceived control and health value and thus his self-management behaviours. He manages to do 'a little exercise' and states that his 'diet is fairly ordinary'. His external LOC beliefs, health value and level of self-efficacy is apparent when he discusses how his self-management behaviours are impeded by his various ailments.

> 'I used to be able to go swimming and the gym and stuff but I have not been for a while since I have had the catheter put in'.

However, it is clear that he has a good level of self-efficacy in managing his condition and values his health but due to uncertainties in his life his perceived control is lowered.

> 'I am a bit scared to go back ((to the gym)) until I know what is going to happen I am still finding out what's happening with possible kidney transplant and things'.

The constructs of Perceived Control and Health Value were explored and understood through participants' perspectives of how they manage Type 2 diabetes. These themes were a priori and were incorporated into the interview guide through questions that aimed to influence the participant to think about their perceived control beliefs and health value. This provided subjective data that highlighted how a persons belief system impacts on behavioural outcomes.

Participants demonstrated how a 'conflict' in LOC beliefs could influence self-efficacy and health value. It was evident that participants with higher internal LOC along with lower external LOC beliefs had an acceptable interaction with self-efficacy and health value and this resulted in a positive influence on outcome behaviour. Conversely those with higher external LOC beliefs had lower internal LOC beliefs and described having less competence in carrying out effective self-management behaviours. Chapter 8 section 8.3 provides an analytical discussion on the above findings.

5.4 Emergent themes

The emergent themes will be presented with reference to the acceptance-adjustment and adaptation theme and the a priori themes of perceived control and health value. This will enable a more complete discussion of the findings.

5.4.1 Comorbidities and Type 2 diabetes

Participants' descriptions of experiences of living with Type 2 diabetes were associated with other comorbidities. Comorbidity has been defined by Valderas et al. (2009:359) as

> 'the presence of additional diseases in relation to another disease in one individual'.

Comorbidities are common amongst people with diabetes and account for much of the illness these patients face (Piette and Kerr, 2006). Some participants in this study reported having multi-morbidities. Multi-morbidities can be defined

> 'as the presence of multiple diseases in one individual' (Valderas et al., 2009:359).

A related concept is that of complication that can be described as a disease or condition that arises during the course of or as a consequence of another disease (Ferran, 2003). Participants' descriptions did not distinguish between comorbidity and complication. Therefore it has been understood that both constructs are synonymous in meaning to the person living with various comorbidities and/or complications.

The comorbidities and Type 2 diabetes theme has two dimensions with different influences on behaviour. Firstly, participants describedperceptions of death or deterioration in quality of life due to subsequently acquiring comorbidities or complications if they did not self-manage their diabetes appropriately. Secondly co-morbidities and complications were seen to influence participants' ability to self-manage their diabetes.

Piette and Kerr (2006) examined the impact of comorbid conditions on diabetes care and as a result developed a model that identifies the general dimensions of comorbid conditions. These dimensions of comorbidity were observed for during analysis of the qualitative data. Figure 5.1 displays an adapted version of Piette and Kerr (2006) model. The model has been adapted to display and explain the typologies of comorbidities experienced by participants in this study.

Dimensions of Comorbid Conditions of Participants n=12

Clinically Dominant Conditions
Definition: Comorbid chronic conditions that are so complex or serious that they eclipse the management of other health problems (in the short term or long term).

> **End Stage Disease**
> Chronic Renal Failure
> **Severely Symptomatic**
> Severe Depression
> Memory Loss
> **Recently Diagnosed**
> Rheumatoid Arthritis

Concordant versus Discordant Chronic Conditions
Definition: A concordant condition represents parts of the same overall pathophysiologic risk profile and relate to the same disease and self-management plan. Discordant conditions are opposite to concordant.
Concordant with diabetes
Hypertension, Cardiovascular Disease, Peripheral Vascular Disease and Retinopathy
Discordant with diabetes
Alcoholism, Asthma, Hypertension

Figure 5.1 Adapted General Dimension Model of Comorbid Conditions Piette and Kerr (2006)

Mary revealed that her biggest fear is eye complications due to Type 2 diabetes. She is afraid that this may affect her quality of life in the future. Diabetes can affect sight by causing glaucoma, cataracts or damage to blood vessels in the eye known as retinopathy (Tortora and Grabowski, 2003).

> ‘my only fear is what the diabetes can do to my eyes’. I was at the opticians and I was told that I have got the start of cataracts in both eyes’.

John and Tom also worry about the possible complications associated with Type 2 diabetes.

> John: The trouble is the longer you have diabetes the more problems you start getting. You get problems with your feet and you get problems with your eyes.

> Tom: When done in conjunction with the other medical conditions it probably can exacerbate if it is not controlled so it is something I have to deal with.

Even though Harry has had a heart bypass in the past that caused him to re-evaluatehis health value he does not think complications or comorbidities associated with Type 2 diabetes will affect his quality of life in the future.

> 'I don't think so if I'm doing as well as I am doing the now it shouldn't be any difficulty in the future'.

Harry appears to have a conflict in his belief system. He is aware that his health issues are a consequence of his own actions yet he attributes some of the blame to external factors such as 'drinking' and 'going through a divorce'.

> 'I would say partly it was through myself because I was a heavy drinker and that so I think that might have escalated it'.

Extracts from Rosie and Roger demonstrate how awareness of the possible complications of Type 2 diabetes can influence perceived control and health value and thus outcome behaviours.

> Rosie: It could, hopefully not with taking safe guards it shouldn't be more than what it is just now if I am careful with my diet if I take care of my feet and my blood pressure and anything like that.
>
> Roger: Blood sugar, general health, getting your eyes checked every so often and getting your feet checked every so often. Well I think it's all in one, I think all in the end if you don't keep your blood sugar at a reasonable level it affects everything else.

Roger's perception highlights how he values his health and is aware of the complications associated with diabetes. As a result he is influenced to carry out diabetes self-management behaviours such as eye care, foot care and blood glucose monitoring. Even though Roger is aware of the complications associated with Type 2 diabetes and wishes to partake in behaviours to avoid these, his ability to do this is at times hampered by his arthritic knee.

> 'Well I try and exercise everyday other than my bad knee'.

Rosie's ability to exercise is also affected by arthritis

> 'I have arthritis in my hip so I try and walk but I have to stop and sit on a wall for five minutes and then I can just get up again and carry on'.

Sanders et al. (2002) study of older people who have arthritic joints suggests that these patients experience a poorer quality of life than those without.

Although it is clear Harriett values her health she suffers from depression and at times this affects her ability to self-manage her diabetes appropriately.

> 'I mean I have had depression on and off since I was 16 and that can really affect your day to day. I would say to me that my depression is more debilitating than my physical illnesses because my depression can stop me doing things when I am not feeling well'.

This finding on how depression can dominate self-care is a recurrent topic in diabetes research and will be elaborated upon in section 5.4.8.

From an early age Garry has valued his health. He feels this is because of having asthma as child.

> 'I think health always had a place (.) I mean with having the asthma from so young'.

Recently Garry has found his memory 'slipping'. He finds that it is affecting his ability to take his medication safely and on time.

> 'I find with having diabetes my memory is starting to go and I says oh did I take that ((insulin))'.

The following extractillustrates how Garry's health value, internal LOC beliefs and level of self-efficacy have influenced him to act in away to try and overcome his problem with memory loss. Garry has devised a strategy of organising his medication in advance of the next day, as he is aware that his memory may inhibit his management of this. This method of recall has been described as 'intentional memory' as it is aimed at helping accomplish one's plan (Purdie and McCrindle, 2002).

> 'I have got two injections a day. I take the two needles and I put them in my wee box and I have seen myself having to go and look in the box and see if ((laughs)) (.2).The first one is easy because that is first thing in the morning but you are away doing things for the second one which is round about the evening meal and that's the one at times I have missed it.That side of it is a

> bit of a downer. But you can forget and you say am I going doolaly ((crazy))? I used to remember loads of things now I have to think really <u>really</u> hard so we will just see in future years'.

The above quote echoes findings of previous research which suggests that self-efficacy beliefs of older adults are particularly influenced by cognitive functioning (Purdie and McCrindle, 2002). Several authors have pointed out that older adults with Type 2 diabetes may have difficulty in distinguishing between performed and imagined activities of medication taking (Hashtroudi et al., 1991, Purdie and McCrindle, 2002). It is important that the development of self-efficacy beliefs in this population is explored further and attention given to help them to find ways in dealing with the effects of cognitive aging.

Tomhas multi-morbidities, which affect him in his every day life. Unlike other participants Tom's health is clinically dominated by another condition chronic renal failure.

> 'I have got to be conscious of taking various medications. Twice or three times a day I have got to take my insulin, I have got to do my blood sugars and I have got to do my dialysis for eight hours at night so medical issues dominate my day'.

His self-management behaviours at the moment are being carried out in keeping with both dimensions of the comorbidity theme. He must carry out self-management behaviours on a daily basis in order to survive and maintain his quality of life and his comorbidities affect his ability to carry out self-management behaviours.

> 'I walk if and when I can although that is difficult some days'.

Sean describes how accounting for various morbidities impact on his quality of life and as a result his ability to carry out self-management behaviours of Type 2 diabetes.

> 'Just you have too many ailments. I can't take certain foods because it affects my gout, certain stuff affects my thyroid, and certain things affect my diabetes. And it's having to try and manage if you're not allowed have one or the other for each ailment it is a pain in the back-side'.

The qualitative data on comorbidities has highlighted the way in which various morbidities are perceived and handled by participants in conjunction with diabetes self-management behaviours. Evidently, management of comorbidities are not only influenced by disease related characteristics, but by the number of morbidities a person has, their severity and by individual behavioural characteristics. This finding replicates previous research which has found that the presence of some comorbid conditions is associated with poor physical functioning and less adherence to diet and exercise regimes (Clark et al., 1991, Bayliss et al., 2003, Brod et al., 2006, Piette and Kerr, 2006, Valderas et al., 2009). Furthermore, Tom and Sean's cases have thus far highlighted how the impact of an overwhelming comorbid condition such as alcohol addiction and chronic renal failure can take precedent over managing a condition such as Type 2 diabetes. The significance of this finding in relation to MSLT is discussed in Chapter 8 section 8.8.

5.4.2 Hereditary reasoning

Previous research has highlighted the importance of views about causation for the meanings assigned to disease and illness and the consequent actions required to deal with symptoms (Bury, 1982, Williams, 1983, Charmaz, 1983). Many participants commented on the hereditary aspect of Type 2 diabetes as a causation of the illness. This theme was seen to influence beliefs and values of participants'.

Roger used to 'wonder why me' when it came to blaming something or someone for diabetes.

> 'I haven't got a clue why no one ever told me. I have diabetes on both sides of the family (.) it is maybe hereditary you know'.

John recounted how he should have expected it.

> 'my grandmother was diabetic and my mother's side of the family were all diabetic so I shouldn't have been surprised'.

Despite the 'surprise' John highlights how he accepts and adjusts to Type 2 diabetes.

> 'I was quite active and then all of a sudden you know what's this? So you just have to accept the fact and get on with it'.

Adam also attributes the cause of Type 2 diabetes to his genetic makeup.

> 'I am 55 unfortunately I have had diabetes since 89 that's when I was diagnosed and basically I would put that down because my mother was

> diabetic and her sisters were diabetic as well. My sister has diabetes as well so that is how the diabetic thing came up'.

Mary possibly viewed the hereditary aspect of Type 2 diabetes as an advantage as she felt she could have looked to her brother for support but unfortunately he died.

> 'My brother had diabetes but he died so I couldn't ask him'.

Also important to highlight is how hereditary factors may contribute to self-efficacy behaviours in regards to treatment and personal responsibility for the management of Type 2 diabetes. Adamwas asked when you were started on insulin therapy did this change the way you see your control over your diabetes?

> 'No not at first because I didn't like it because my mother being diabetic she used to take insulin I just couldn't ken ((know)) at first why my levels were going up this was after sixteen years sort of thing (.) because my pancreas was still producing it ((insulin)) but not as much. I think it was six months until the Doctor persuaded me to go on ((insulin))'.

Results demonstrate how exploring the constructs of MSLT subjectively can enable the discovery of factors that may influence beliefs and values and thus outcome behaviours of people who have Type 2 diabetes. These findings show that genetic attributions have the potential to negatively influence patient's perceptions of Type 2 diabetes. The concept of hereditary factors of Type 2 diabetes influencing health beliefs and values needs to be explored further.A recent research proposal by (Cho et al., 2012) aims to assess the clinical utility of disclosing the results of DNA. Cho et al. (2012) anticipate establishing whether providing type 2 diabetes patients with genetic risk information can help improve patient's clinical outcomes, risk perception and their engagement in health behaviour change.

5.4.3 Age as a reason

Some participants attributed age to the reason why they have Type 2 diabetes and/or how they self-manage their diabetes. Garry mentioned the difference in his attitude from when he was younger to now and finds that having morbidities is acceptable due to his age.

> 'I am beginning to feel it now as I get older fitness wise when you're young and you're up and your full of energy, whereas in old age it just comes on ya'.

Charles makes reference to how he 'used to be able to do things' that he can't do now and he puts it down to 'getting older'. Charles general practitioner (GP) reinforces his belief that this is not unusual for his age.

> 'I go to my GP he says well you're getting older we can't expect you to be doing too much'.

Younger participants did not attribute age to their reasoning to why they have Type 2 diabetes. Type 2 diabetes was viewed as an 'inconvenience' for some.

> Harriett: I totally blame myself I keep saying to myself if you had got control of it ((health)) quicker you wouldn't be having this.

Furthermore, younger participants 'didn't really think about diabetes' until diagnosis. This point is demonstrated by Tom when he states how his health value

> 'wasn't an issue, well it wasn't a major one, I wasn't as conscious of any problems before this happened'.

Bury's (1982) influential work on 'biographical disruption' drew attention to the concept that chronic illness is a stereotype of older people. Older people use this stereotype as an explanation to the onset of illness. Additionally, Bury (1982:171) highlights how younger participants in his study described a 'biographical shift' from

> 'a perceived normal trajectory through relatively predictable chronological steps to one fundamentally abnormal and inwardly damaging'.

The view of illness as synonymous with older age could possibly disguise the needs of those with Type 2 diabetes. This study exemplifies this through participants' experiences of discussing their ailments with health professionals and when 'normalising' their individual experiences of symptoms. Similarly, Pound et al. (1998) found that patients who experienced a stroke also 'normalised' their symptoms in an effort to reduce its impact and to maintain stability in their lives. The way in which an illness is 'normalised' is important to consider for young and old patients. Olshansky et al. (2008) recommends that patients' should view the lifestyle changes required by diabetes as 'healthy living changes' that are carried out by people with and without diabetes. Olshansky and colleagues (2008)assert that this will have positive implications for interventions encouraging healthy lifestyles among people with diabetes rather than emphasising that people with diabetes are different from the general population.

5.4.4 Medication management

Medication management was a recurring theme amongst participants for various reasons. Harriett described how ‘the medication side’ of diabetes self-management is the most important to her

> ‘I know there is other aspects to it but if I am not taking my medication it sort of counter goes against anything else I do so I have got to do it all’.

Although Harriett states that this is the most important aspect of self-management to her it is the one she is least competent in due to her depression.

Roger suggests why medication management is the most important aspect of diabetes care to him.

> ‘Well if you don’t do it you die so you don’t really have much of a choice you know it’s a matter of if you do it or you don’t you are going to be ill so there was no choice’.

Participants’ comments on medication management suggest that their health value priority is terminal. They all valued this behaviour in that it enabled them to remain healthy.

Charles discussed how the doctor influences his medication management.

> ‘Well if the doctor says don’t do that (.) the doctor she asked me what I felt about one of the tablets I’m taking (.) I don’t think they are doing me any good I honestly don’t. I mean one doctor put me on that who am I to say. This doctor has taken me off one tablet and put me on another’.

Charles’ perceived control is affected by this influence. It seems that Charles welcomes the doctor’s input but this has created a conflict in his LOC beliefs in that they are internal and external in nature.Harry is also aware of the doctors influence to his medication management.

> ‘I manage it myself as it goes. But if the doctor tells me something else I’ll just go and do it I wouldn’t contradict him’.

However, comments from Harryand Roger suggest that they possibly feel more competent in their ability to manage their condition than Charles.

> Harry: But if I find some sort of effects of it ((medication)) I would come back.

> Roger: I think since I became diabetic my management hasn’t changed that much so there is no real reason for them to give me advice. If that changed an awful lot I would take their advice.

The data above shows how individual differences in beliefs and levels of self-efficacy impact on medication adherence. Earlier research has acknowledged that several factors including demographic, patient knowledge and belief variables can impact on patient adherence to medication (Donnan et al., 2002, Balkrishnan et al., 2003, O'Hea et al., 2005). A specific factor identified in this study is the influence of health professionals input on locus of control beliefs and self-efficacy. Some participants found this input disconcerting, as they could not appreciate the benefit of the medication. Others welcomed advice and described a good balance of internal/external LOC beliefs and levels of self-efficacy as a result. This finding supports research by Pound et al. (2005) who advocate that it is not because of failings in patients, doctors or systems that medication adherence can be poor but because of concerns about the medications themselves. Understanding this may help improve adherence to medication.

Another point on medication management that was apparent within the data is how a change in medication type or dose can affect a person’s perceived control. Treatment options may need to change from oral medication to insulin therapy as Type 2 diabetes progresses as the body produces insufficient insulinto maintain glycaemic levels within normal ranges (Phillips, 2007).

John described how he ‘felt totally out of control’ when he was changed on to insulin in comparison to when he ‘was on tablets’. He conveyed his worry to the doctor.

> ‘Well unfortunately they couldn’t do anything other than that was the tablets and that was sort of the end of the regime and I had to go onto insulin’.

However, John was not the only person to find the changeover to insulin troublesome. As this came up within the interviews it was explored further and participants' reasons for finding the changeover troublesome were acknowledged as a recurring theme that was named 'Stigma of Insulin'. The following section discusses the various aspects of insulin management that 'troubled' participants' and thus influenced their beliefs and outcome behaviour.

5.4.5 Stigma of insulin

Extracts from interviews are displayed in this section to distinguish between the various aspects of the theme the 'stigma of insulin'. Discussing the changeover to insulin produced words in the interviews such as worried, apprehensive, serious, frightened, unhappy, no problem, needles and injections. The stigma of insulin for Charles stemmed from

> 'films and things from the past'

He described how he 'had visions of <u>big</u> long needles'.

Harriett had similar thoughts on commencing insulin therapy.

> 'I was a bit frightened you know.The nurse is showing you what to do and you think God I have to inject myself it's a bit frightening'.

Tomand Garry were also apprehensive about injecting. Garry said how he 'didn't like jags' and Tom stated

> 'I don't like sticking needles in myself unnecessarily but this is necessary so I have just got to get on with it'.

Tom's comments on how this 'is necessary' resonate with John (see below). Both men indicate how there is 'no other choice' but to accept, adjust and adapt to insulin management despite the stigma surrounding the change.

> John: Well I wasn't too happy at first but unfortunately I had been on the tablets for something like twenty years and the blood in the body obviously was getting immune to them so we had to go for some other treatment which unfortunately the only other treatment was insulin.

Harry in contrast stated how he 'didn't have any difficulty at all in the change over to insulin' and how he took to it 'like a duck to water'.

Harriett and Garry explained the difference in being on tablets to insulin.

> Harriett: Taking the tablets is nothing because I have got other medication to take anyway so popping a wee pill is nothing really but it is a hassle (.) insulin.

> Garry: Oh insulin is a bit serious where you think tablets, you never associate too much with tablets health–wise but when the insulin started I suppose I looked after myself a wee bit better I watched obviously with having your sugar counts that you had ah watch what you weren't doing.

Both Harriett and Gary associate tablets as less 'serious' than insulin. Other participants articulated this too and described how insulin required more management than tablets. An extract from John serves as an example to explain the complexities of insulin management and lifestyle.

> 'If you are going somewhere and doing certain things then you have got to be very careful because that can mean a change in insulin (.) what do I have to do (.) am I doing too much? So if you are doing too much then what you have actually got to do is reduce the amount of insulin you take. Well you have got to have a rough idea. It is quite difficult to plan ahead you know sometimes something crops up'.

Harriett describes how she had trouble adjusting her insulin doses and required support from the clinic to help her improve her self-efficacy in doing this. She mentioned how she had spoken with the doctor that day about her high blood glucose results and he asked her

> 'do you know how to adjust your insulin? I went no ((laughs)) I'm not sure so he gave me a wee bit of paper and which kind of explains it but he says phone in and speak to one of the nurses and he says we will see if that will maybe help get things under control'.

Participants' stated how you 'get used to' taking insulin.

> Adam: ah eventually I got used to it and accepted it.

> Tom: It is easier now then because I am used to it. I am used to it for a few years now so.

The findings from participants on the stigma associated with insulin are evident within the literature. Some research has suggested that patients can be 'psychologically resistant to insulin' and avoid commencing insulin therapy (Peyrot et al., 2005a, Brod et al., 2009). Participants in this study however were generally ‘psychologically insulin receptive’. Receptiveness towards treatment was described as a result of knowing that Type 2 diabetes had progressed to the point where there was no other treatment option. Due to this participants were accepting of the idea but apprehensive at the same time. These findings support research by Jenkins et al. (2010) that explored patients’ and health professionals’ experiences of initiating insulin as part of the ‘Treating to Target in Type 2 Diabetes (4-T) Trial’. Jenkins et al. (2010)interviewed 45 trial participants and 21 health professionals.Jenkins et al. (2010) findings indicate that participants were generally psychologically insulin receptive. Insulin receptiveness arose largely from personal experiences such as through intensive treatment and through knowledge of deteriorating blood glucose overtime that led to engagement with and acceptance that diabetes was progressive (Jenkins et al., 2010). Similarly to Jenkins et al. (2010) the findings in this study showed that although participants were psychologically receptive to starting insulin most participants suggested they were anxious about injecting. The experiences of study participants highlighted the difficulties involved with managing insulin and how differences in experience can lead to varying satisfaction with treatment. This finding supportsNaegeli and Hayes (2010) study that investigated expectations about and experiences with insulin therapy on diabetes treatment satisfaction with Type 2 diabetes patients. Questionnaires were administered to 240 patients and measured expectations and experiences of insulin therapy. Naegeli and Hayes concluded from their study that expectations may not independently impact treatment satisfaction but the relationship of experiences significantly contributes to it. As a resultNaegeli and Hayes (2010) suggest assessing patient expectation of insulin therapy prior to initiation of treatment to better understand the individual concerns of patients.

5.4.6 Blood glucose monitoring

Self-monitoring of blood glucose is carried out to achieve blood glucose ranges as near to normal as possible in order to prevent complications and to make adequate decisions about diet, exercise and medication. Blood glucose monitoring (BGM) enables a person to evaluate the effects of these decisions and to detect hypo and hyperglycaemia (SIGN, 2010). Diabetes UK (2013b) recommends that a blood glucose level of less than 4mmol/l can be considered hypoglycaemic. Hyperglycaemia can be defined as an excess of glucose in the blood and if not treated can lead to diabetes related complications. The evidence for the benefit of self-monitoring of blood glucose in Type 2 diabetes patients is conflicting.Recent trials and reviews on the benefits of self-monitoring amongst patient groups not on insulin have shown very small effects on glycaemic control (Welschen et al., 2005, Farmer et al., 2007, Evans et al., 2012). SIGN (2010) specify certain groups who may benefit from self-monitoring such as those on sulphonylureas and insulin. The findings from the interviews of this study suggest that self-monitoring of blood glucose was perceived as a beneficial activity by many. Five dimensions of meaning to this activity were identified and are presented below followed by an analytical discussion.

1. Some viewed this activity as valuable to health as it assists participants' in making decisions about insulin dosages and diet.

   > Harry: Well to me you're looking after yourself with taking your blood count and then your regulating how much units of insulin you are going to take.

   > Garry: I found this taking your blood testing was a great thing to do you know like you could have something ((to eat)) and then oh say that had a lot of sugar in it so you started say the likes of meals oh don't put that sauce on because there is a lot of sugar in it.

2. Others articulated how self-monitoring of blood glucose provided them with a means of monitoring against possible complications and maintaining quality of life.

   > Tom: Because it prevents complications and other illnesses stem from it ((diabetes)) so I have been told so I do it because I have to.

   > John: If you are going somewhere and doing certain things then you have got to be very careful because that can mean a change in insulin.What do I have to do (.) am I doing too much?

3. Participants described how it reduced worry of hypoglycaemia and hyperglycaemia.

   > Mary: You don't have to worry about taking a hypo or anything like that. Because if you're keeping your blood sugars fine you're keeping everything ok'.

John: You have got to continually monitor your blood sugar levels if you feel anything at all then you have got to go and check and make sure you are not going into a really bad hypo because that is the big problem'.

4. Several participants' indicated how self-monitoring provided them with a 'psychological' sense of control of their condition in knowing their blood glucose ranges.

   Paul: I think that a lot of it is psychological I mean I get anxious if I see my blood sugar is high and I feel good when my blood sugar is within a normal range.

   Harriett: 'If I am being really good and trying that motivates me to check my blood sugars because I want to (.) I then say to myself look there's the evidence my blood sugars are coming down so there's the evidence that what I am doing is good and it's working. So you can actually see it there in front of you on the screen'

5. Two participants suggested that it wasn't until they experienced a hypoglycaemic attack that they realized the benefit of blood glucose monitoring.

   Rosie: I just couldn't function you just collapse. Luckily it was outside a chemist and I also had my glucose tablets with me so I took them and then I sat for awhile and just once it started kicking in I was ok. It has happened twice but I think it is not eating properly first thing in the morning and I think the sugar level is unsettled I mean it was down at 2 so I have to be very careful what I am eating and when I am eating because I don't want to do that again. It was scary.

   Garry: Now I watch it I don't do that silly thing again I watch it and I say oh well right I will have my meal you can either take your insulin before your meal or within ten minutes of finishing your meal for it to be effective so I watch. Yes it was a rude awakening.

BGM provided participants with an objective way of assessing their diabetes control. This activity for some improved internal LOC beliefs and levels of self-efficacy as participants conveyed how self-monitoring enabled them to manage aspects of their diabetes more efficiently. The second dimension of this theme highlights how participants felt that BGM enabled them to maintain their quality of life. Maintenance of quality of life was similar to dimension one however participants described how this activity enabled them to have flexibility in their daily living as they could adapt their requirements using BGM as a guide. Daily activities described included travel, recreational activities, exercise and job related activities. Using BGM as a means of providing feedback on exercise has been implied as limitedby French et al. (2008). Additionally, participants' sought to prevent complications by self-monitoring and discussed how frequent measurements were required for the detection and prevention of hypoglycaemia. The above findings add to current evidence on the benefits of BGM (Heisler et al., 2005, Malanda et al., 2009, Hortensius et al., 2012).

Cryer (1981) originally termed hypoglycaemia as the commonest side-effect of insulin treatment for diabetes and described it as the greatest barrier to achieving and maintaining good glycaemic control. Hypoglycaemia is higher in those with strict glycaemic control as evidenced by the The DCCT Group (1997) and UKPDS (2005) trials. Participants described hypoglycaemia as 'awful', 'scary' and 'sickening'. Symptoms experienced included shaking, nausea, sweating, dizziness, confusion and in severe cases unconsciousness. BGM reassured participants that their blood glucose ranges were within normal limits and they described feelings of competence in avoiding hypoglycaemia as a result. Participants differed in their perspective of BGM and the actions they took depending on the reading. Hypoglycaemic readings resulted in feelings of panic in some participants. For reassurance some carried glucose tablets with them 'just in case'. Hyperglycaemic readings were met with less anxiety but required competence in ability to adjust medication dosages.

Malanda et al. (2011) found that BGM has the potential to confirm or challenge subjective feelings about hypoglycaemia. This finding was also evident amongst participants' in this study. Dimension three of the BGM theme demonstrates how participants' levels of satisfaction and competence in their glycaemic control were elevated by 'evidence' that their blood glucose ranges were within normal limits. Peel et al. (2004) suggested that patients with Type 2 diabetes might achieve an increased sense of personal control over their condition as a result of seeing the impact of their behaviour on blood glucose levels.

Some participants' described barriers to BGM that resulted in hypoglycaemic attacks. Garry gave a lengthy description of a hypoglycaemic experience. His BGM reading was less than 3 mmol/l and he proceeded to take his full dose of insulin. He described in detail how as a result he went unconscious and his wife called the emergency services to revive him. Rosie's account of hypoglycaemia like Garry depicts a low level of self-efficacy in glycaemic control. The differing experiences have resulted in both participants' trying to adopt better methods of control to avoid a reoccurrence of severe hypoglycaemia.

The findings discussed above have provided an understanding of how BGM impacts on perceived control of insulin-treated Type 2 diabetes patients. Gaining insight and discussing all factors involved with BGM may identify personal barriers to diabetes care and improve quality of life of this patient group. This finding and implication for practice resonates with research by Gonder-Frederick et al. (1997) who developed a biopsychobehavioural model that can be used as a guide to assessing relevant individual problem areas in patients who experience severe hypoglycaemia. Gonder-Frederick et al. (1997) recommend that use of a model such as this can determine individual behavioural risk factors of severe hypoglycaemia and encourages health professionals to consider a wider range of factors in their assessments of patients at risk of hypoglycaemia.

5.4.7 Type 1 or Type 2: Importance of classification

A notable issue raised by some was what their diabetes type was. This question surfaced as a result of being commenced on insulin. This poses serious implications as patients who are unsure of their diabetes classification may seek out the wrong information and education material. The shared confusion stemmed from whether they should still be identified as Type 2 now that they are on insulin.

> Rosie: When I first got told of thatof course I didn't know what diabetes was or diabetes 2 or 1 was so it wasn't until I got educated in that way I knew what to expect and what I am doing'.
>
> Adam: Well see it is hard to say there is still that wee bit between Type 2 although I am classified as Type 2 it is still similar to Type 1 because I am on insulin and I am not sort of overweight although they are changing that nowadays.

The importance of classification type to perceived control and health value and effective diabetes self-management behaviours is evident here. Rosie implies how education improved her perceived control as knowledge on her diabetes type enabled her to identify ways to manage her condition. The issue of diabetes classification on patient perspective and subsequent self-management behaviours requires further investigation in future research.

5.4.8 Low mood, anxiety and depression

Low Mood was not common across all participants'. However, Tom mentioned how

> 'Sometimes you feel unhappy about it all. That's all. Yes I can be in a bad mood from time to time because of the medical things I have got to deal with'.

Garry expressed how he feels he has 'less tolerance' due to diabetes.

> 'Well I think it's the diabetes that control the mood swings aye ((yes)) because I am short tempered with the children. Well if they are noisy I think it possibly is that my blood sugar is starting to get low and your saying they are awfully noisy and things like that whereas there is other times they can blow away the drums. So sometimes less tolerance'.

Frier (2008:89) discussed the effects of hypoglycaemia on mood and stated how

> 'hypoglycaemia induces a feeling of tense-tiredness, and many people feel sad and unhappy with overt pessimism and negative feelings when their blood glucose is low'.

Harriett and Rosie conveyed in their interviews how their lives have been affected by clinical depression and gave their perspective on how this impacts their diabetes self-management behaviour. The self-management aspects of Type 2 diabetes gets Harriett down at times which can affect her ability to 'cope'.

> 'If I feel low I can't be bothered taking my medication and I can't be bothered taking my insulin and if I can't be bothered doing that then my diabetes gets worse. It's a vicious cycle'.

Harriett was asked what helps her to alleviate depressive symptoms?

> 'I just need to get myself into the right place mentally. You know what I mean I need to get myself right I need to say to myself this is at the moment my number one priority (.) so get some exercise eat better take your medication and get your health a bit better and that I should be saying to myself that is your top priority you need to get that'.

Rosie also expressed in her interview how her life has been affected by depression and similar to Harriett she mentions how it can affect her diabetes self-management behaviours. Rosie at the moment seems to have more control over her depressive symptoms and diabetes self-management.

> 'I have to watch my moods because I have got clinical depression because it swings very much so but even that I have to control one thing I am actually controlling the other to help get it on an even keel and the psychiatrist is pleased with me doing that. I have had depression for about twenty years so I know the pitfalls and the highs of that'.

Another similarity to Harriett that Rosie highlights is the coping mechanism they both share by which they try and overcome the depressive symptoms they have in order to keep 'control of one to control the other'. Both women describe saying to themselves or thinking to themselves about their priority in control and then finding personal ways to work this out cognitively and then apply it to action. Heather states how she 'needs to get herself right' and Rosie states how she needs to 'think about what she is doing and where she is at' in order to regain control over depression and Type 2 diabetes.

These findings support previous research that has indicated how depression can impact on a person with diabetes ability to self-care effectively (Park et al., 2004, Ali et al., 2006, Gonzalez et al., 2007, Egede and Osborn, 2010). Gonzalez et al. (2007)recommend that interventions aimed at alleviating depressive symptoms of patients with Type 2 diabetes could result in significant improvements in diabetes self-care.

5.5 Summary

The previous sections on values in life, the meaning of health, health value and change in health value have shown how participants' values can differ in terms of their priorities. Although there were differences there were also commonalities shared between participants about value priorities, value type and value systems. Many participants valued 'life itself'. As a result life for some of the participants was viewed as having precedent over other values within a hierarchical arrangement of a value system. For others health was at the top of their value priorities. Participants' descriptions also highlighted the relationships between values and within value systems. These relationships included health and family and health and career, health and the ‘ability to do things’. The ‘ability to do things’ value is multi-dimensional andwas understood to be describing how various values contribute to behaviour and influences on quality of life. One such value priority that contributes to quality of life is health value. Prior to discussing the theme ‘health value’ participants’ views on the meaning of health and definitions of health were given. Three differing ways of defining health was evident within the data and was critically analysed.

Most participants emphasized how it was only once they were diagnosed with Type 2 diabetes that health became a value priority. It was evident and consistent with seminal literature that health can be valued as an instrumental and terminal value. However, post diagnosis of Type 2 diabetes the majority of participants’ indicated an instrumental value priority towards health. An apparent reason for this was that valuing health instrumentally enables functionality in every day living.

Participants also described a ‘change in health value’ due to the initial diagnosis of the condition. As time progressed participants described how health value can change as you can become ‘blasé’ about health and a sense of regret was admitted by some who did not value there health as much as they would have liked to pre-diagnosis of Type 2 diabetes. The theme AAA demonstrates how values and beliefs impact on the individual with Type 2 diabetesand mayinfluence their mode of AAA and their decisions on self-management behaviours.

Comorbidity influenced behaviours of participants in different ways. Some participants’ described experiencing the various dimensions of the comorbidity theme at once. Hereditary influences and age were attributed by some participants’ as reasons for ‘getting’ Type 2 diabetes. The self-care activities of medication management and blood glucose monitoring highlighted the influence these activities have on beliefs and values. The stigma associated with commencing insulin was considered and the impact this had on participant beliefs was highlighted. Lastly the effects diabetes classification and mood has on beliefs and values and outcome behaviour was considered.

The a priori themes and resultant emergent themes contributed to answering research questions RQ2 and RQ3. Chapter 8 will defendthis statement and link the data that contributes to answering to RQ2 and RQ3 in order to answer RQ8. The qualitative data has also addressed research questions RQ7 (see Chapter 3 section 3.3 for detail of research questions).

Moreover, the data resulted in the creation of RQ9 and RQ10 (see section 5.6.4 of this chapter). The ensuing section 5.6 details the methods and results of the interim phase of this study.

5.6 Interim phase

Having carried out an extensive literature review on the health value construct one scale that measured current health value was identified.The health value scale was developed by Lau et al. (1986) and has been established as a reliable and valid scale for use in practice. A review of the psychometrics of the scale resulted in the decision that a new health value scale was not required to measure current health value but the scale identified could be adapted to meet the research requirements of this study.

As previously mentioned a priori theme of health value was included in the thematic analysis of the qualitative data to explore how people with Type 2 diabetes value health. The results of this theme were reviewed to consider how it might contribute to the adaptation of the health value measure to effectively test the health value construct during the quantitative phase. Two qualitative findings in particular contributed to the interim phase.

Firstly, the results of the instrumental/terminal dichotomy of health value contributed to the development of the adapted health value measure. The original four items of Lau et al. (1986) health value measure were distinguished according to this dichotomy. Following this two new items were added to the already valid and reliable measure and all six items were then distinguished as either instrumental or terminal items. The rationale for adding two new items and distinguishing the nature of existing items will be discussed in section 5.6.1. Following this the methods used to test validity and reliability of the items and the subsequent results are presented in section 5.6.3.

Secondly, the emergent theme of change in health value resulted in the development of two new research questions and hypotheses that contributed to the quantitative phase. The methods used to address the new research questions and hypotheses also contributed to the development of the adapted health value measure. These methodswill be discussed in detail in section 5.6.4: Examining changes in health value.

5.6.1 Adapting the health value scale & item development

The instrumental/terminal dichotomy of health value became apparent through participants' descriptions of how health is valued and what health means to them (see section 5.2.2 to 5.2.3, of this chapter, for details of the qualitative findings on this dichotomy). The qualitative findings on the instrumental/terminal dichotomy suggest that participants' health value orientation is mainly instrumental. The researcher decided to examine this result further in the quantitative phase. The principal research question thatinvolves testing MSLT was reconsidered at this point in the research.

The testing of MSLT requires a health value measure that measures current health value. In order to allow for testing of current health value andto examine whether participants' health value orientation is mainly instrumental it was decided that the items included in the health value measure should allow measurement of current health value and the instrumental/terminal dichotomy. The researcher anticipated that this method of scale administration would enable sufficient testing of MSLT and allow for a concurrent investigation into the instrumental/terminal dichotomy of health value.Consequently, the health value measure needed to be multi-dimensional in its measurement ability. Thus, the objective of the health value measure for this study is to:

1. Measure current health value,
2. Measure the instrumental/terminal dichotomy.

Lau et al. (1986) health value scale has four items that measure current health value.In order to proceed with examining the instrumental/terminal dichotomy it was deemed necessary to adapt the scale by distinguishing these items using the instrumental/terminal dichotomy.Distinguishing whether the items were instrumental or terminal involved consulting a definition of each value orientation (see Chapter 2 section 2.3 for a definition). Items 1 to 4 were then compared with the definitions to distinguish each items value orientation. Item 1 and item 4 were distinguished as terminally orientated health value items whilst items 2 and 3 were distinguished as instrumentally orientated health value items. This distinguishing of the original four items health value orientation resulted in an even number of instrumental and terminal health value items.

To add variability to the testing of the instrumental/terminal dichotomy it was deemed necessary to add two more items to the health value measure one that is an instrumentally orientated health value item and one that is terminally orientated. The researcher developed two new items one of which read as an instrumental health value item (Item 5) and one that read as a terminal health value item (Item 6).

Item development followed a step by step guide provided by (DeVellis, 2003). Firstly, the objective of the measure should be identified followed by generating a pool of items from a data source provided by a method such as interviews or focus groups (DeVellis, 2003). This pool of items should be reviewed by a panel of experts for face and content validity purposes (Streiner and Norman, 2008). Face validity is an assessment of whether a measurement scale looks reasonable whereas content validity considers the extent to which the items measure the relevant subject matter (Bannigan and Watson, 2009). The third step is to consider the format and scoring of the items in the new or adapted scale (DeVellis, 2003). This includes considering the scale type, structure and scoring of items. Other steps recommended by DeVellis (2003) include the administration procedures of the scale. These steps are discussed under section 5.6.2 ‘adapted health value scale: structure and scoring’ and under section 5.6.4 ‘examining changes in health value’.

The results of the qualitative data influenced the structure of the two new items. A pool of items was generated from the theme health value specifically from data extracts that referred to the instrumental/terminal dichotomy. A selection ofwords that referred to the instrumental/terminal dichotomy was pooled from this data. This selection was then narrowed down to formulate structured sentences that could be used as items. The principal words thatreferred to instrumental health value were ‘to do things’ thus item 5 refers to health as valuable in that it enables a person to ‘do things’ that they want to. Item 6 was structured using words from participants’ that described an end-state of existence thus referring to terminal health value. The items were reviewed by an expertin psychometric development and the supervisors of this research to confirm or invalidate the developed items (DeVellis, 2003). The objective of the scale was deemed clear by the experts and the new items were considered relevant to the specific construct of measurement.

All six items are displayed in table 5.1. The table includes a description of each item in order of its appearance on the health value questionnaire used in this study. Item 1-4 are the original health value items followed by item 5 and 6 that are the newly developed items. The table also depicts the nature of the health value item, whether it is instrumental or terminal. Item's 2, 3 and 5 are considered instrumental in nature due to their references to functionality. Item's 1,4 and 6 are considered terminal in nature due to their references to end-states of existence.

Table 5.1 Original Health Value Scale items (1-4) (Lau et al 1986) & the two new items (5 & 6) developed from the qualitative data

Health Value Scale Items 1 to 6	Instrumental or Terminal
1. If you don't have your health then you don't have anything	Terminal health value item
2. There are many things I care more about than my health	Instrumental health value item
3. Good health is of only minor importance in a happy life	Instrumental health value item
4. There is nothing more important then good health	Terminal health value item
5. My health is valuable to me mainly because it allows me to do other things that I want to	Instrumental health value item
6. Without good health my life is meaningless	Terminal health value item

5.6.2 Adapted Health Value Scale: Structure and scoring

The original health value scale developed by (Lau et al., 1986) has a Likert format. To reduce impacting on the psychometrics of the scale the adapted health value measure maintained the Likert format of the original scale. A Likert scale is a psychometric measure whereby respondents specify their level of agreement or disagreement to items on a symmetric agree-disagree scale (Streiner and Norman, 2008). Likert scales are bipolar which means that items can measure either a positive or negative response to a statement (Streiner and Norman, 2008). It is important that a Likert scale has a balanced number of positively and negatively worded items to reduce acquiescence response bias(Rattray and Jones, 2005). Acquiescence response bias can occur as participants agree with statements as they appear. Having negatively and positively worded items should reduce this bias, as acquiescence on positively worded items can be balanced with acquiescence on negatively worded items (Rattray and Jones, 2005).

Positively worded items are phrased so that an agreement with the item represents a relatively high level of the construct being measured and negatively worded items are phrased so that an agreement with the items represents a low level of the construct being measured. The negatively worded items of a questionnaire need to be reversed scored before computing an individual's total scale score. Reverse scoring the negatively worded items ensures that the items that were originally negative are consistent with the positive items in terms of what an agree or disagree implies (DeVellis, 2003). As a result of thisitems 2 and 3were reversed scored on data entry due to their negatively worded items.

There were six possibilities for each health value item ranging from strongly disagree to strongly agree.The minimum score possible was 6 and the maximum score possible was 36. There were three ranges of scores that would allow for identification of levels of health value. Scores of 6-16 indicated low health value, scores of 17-26 indicated moderate to high health value and scores of 26-36 could be considered as very high health value. This scoring system was devised in relation to the original scoring system of Lau et al. (1986) health value scale.

5.6.3 Validity and reliability of Adapted Health Value Scale

When adapting or developing a new measure it is important that sufficient pilot work is carried out (Rattray and Jones, 2005). To test validity and reliability of the health value scaleLau et al. (1986) carried out an initial scaling study followed by a larger study. The initial scaling study included 47 people and other measures were included to validate the measure. The health value scale was found to have good internal consistency with a co-efficient alpha of .67 and a test re-test reliability of .78. The larger study included 1,029 people and again results demonstrated that the health value measure was a valid and reliable scale. Having considered this method of piloting the original health value measure, a pilot study of the adapted health value measure would require at minimum fifty participants along with other measures that could be used to validate the measure. This would have set the timeframe for the study's completion back a number of months. Therefore, a separate pilot study for the adapted health value measure was considered not possible. Rather the data collected from the adapted health value measure in the quantitative phase of this study was considered as a method of establishing an initial level of validity and reliability.

Validity in relation to scale development is concerned with the meaning and interpretation of the scale (Bannigan and Watson, 2009). There are many ways of testing validity and it has been suggested that a variety of approaches should be used in testing rather than relying on a single validation measure (Rattray and Jones, 2005, Bannigan and Watson, 2009). As previously discussed in section 5.6.1 the adapted health value measure was tested for face and content validity. These are two closely related forms of validity and are considered the minimum requirements of acceptance of a scale (Streiner and Norman, 2008). Other forms of testing validity include concurrent validity and construct validity. Concurrent validity assesses the extent to which a measurement correlates with an established measurement scale whereas construct validity is tested by assessing to what extent the measurement scale under development correlates with the construct under investigation (Bannigan and Watson, 2009). Due to the principal purpose of this research to test MSLT the researchers resources could not facilitate the testing of concurrent or construct validity during the quantitative phase. However, the adapted health value scale was tested for reliability.

Reliability in relation to scale developmentrefers to the repeatability stability or internal consistency of a scale (Rattray and Jones, 2005). Methods of testing reliability can be tested through measuring internal consistency including the split half technique, Cronbach's alpha (or co-efficient alpha), item-total correlations and the Kuder-Richardson formual (KR-20) (Bryman, 2008, Field, 2009).

Item-total Correlations

Item-total correlations were chosen as the internal consistency method of choice. Cronbach's alpha was considered as an alternative method. However, Cronbach's alpha is influenced by both the number of items as well as the relationships among items (Toobert et al., 2000). The adapted health value measure has six items. This could be considered as a scale that has a small number of items (Toobert et al., 2000). Using item-total correlations to test for internal consistency provides a method that is not influenced by the number of items in the scale (Toobert et al., 2000). SPSS (statistical package for the social sciences) was the statistical software program used to test for internal consistency (for more information on this program see Chapter 6 section 6.2).

The descriptive statistic function was used in SPSS to total each item separately. This method of item totalling can enable identification of the variability of the items through observation of the mean score and standard deviation of each item. Item-total correlations were generated using the bivariate correlation function in SPSS. This function in SPSS computes the most commonly used correlation index that is known as the product moment correlation co-efficient or Pearson's r (Polit and Tatano Beck, 2010). This correlation procedure establishes relationships between the items. The strength of the relationship can be assessed by the value of Pearson's r (see Chapter 6, section 6.2.7). Kline (1993) recommends deleting any scale item with a item-total correlation of <0.3. This method of item-total correlations enables identification of weak items that are uncorrelated with the other scale items and canresult in their subsequent removal. For consistency and readability results of the item-total correlations are reported in the following section.

Results of item total correlations

The results of a 6x6 correlation matrix which was produced to test the internal consistency of the new health value items (item 5 and item 6) that were added to the health Value measure are presented here. Due to missing data (see Chapter 6, section 6.2.3 for further details) a complete data set and a comparative dataset were included in the quantitative data analysis.Dataset 1 (n=78) is considered the main dataset and

Dataset 2 (n=107) is the comparative dataset. Correlation matrices of health value items were produced for Dataset 1 and Dataset 2. Results for both datasets are reported. For ease of readability the tables for Dataset 2 have been assigned to Appendix F.

Health Value Part 2 was used to test reliability of the items as it measures current health value. Item 5 and item 6 were the two new items added to the health value measure (see section 5.6.1 table 5.1). Item 5 was distinguished as an instrumental health value item whilst item 6 was distinguished to be a terminal health value item.

The descriptive statistics indicated that item 5 was problematic. There was little variability in how participants' responded to the item as it had the highest mean (5.1) and lowest SD (.84) (Dataset 1) (Dataset 2 M = 5.1 SD .81) of all six health value items. Furthermore, despite the fact that item 5 reads like an instrumental value statement, the item is uncorrelated with the other two items (Item 2 and Item 3) that are instrumental in nature.

Dataset 1 Item 2: $r = .1$, NS Dataset 2 Item 2 $r = .09$, NS

Dataset 1 Item 3: $r = -.01$, NS Dataset 2 Item 3 $r = -.04$, NS

Instead it is evident that item 5 is correlated with the three items which are terminal in nature (Item 1, 4 and 6).

Dataset 1 Item 1: $r = .30$, $p<.01$ Dataset 2 Item 1: $r = .25$, $p<.05$
Dataset 1 Item 4: $r = .5$, $p<.01$ Dataset 2 Item 4: $r = .45$, $p<.01$
Dataset 1 Item 6: $r = .28$, $p<.05$ Dataset 2 Item 6: $r = .23$, $p<.05$

Consequently, item five was considered redundant as an instrumental Health Value item and is now viewed as terminal in nature. As a result of this four items of the new health value measure were considered terminal (1, 4, 5, and 6) and two items remained instrumental (2 and 3).

In order that the health value scale remained with an even amount of variability with items that were considered terminal and instrumental in nature it was decided that item 5 and 6 would be considered redundant and removed from the analysis. Item 6 was chosen as the terminal item to be removed because removing item 5 and 6 ensured that the remaining four items were the original items that were found to be valid and reliable by (Lau et al., 1986).See Table 5.2 and 5.3 for the descriptive statistics and correlation matrix of health value items of Dataset 1. For Dataset 2 see appendix F Table 10.2 and 10.3.

Table 5.2 Descriptive Statistics Health Value Items Dataset 1

Health Value Items	Mean	SD	N
Item 1	4.42	1.679	78
Item 2	3.81	1.604	78
Item 3	4.18	1.569	78
Item 4	4.82	1.287	78
Item 5	5.1	0.847	78
Item 6	3.56	1.702	78

Table 5.3 Correlation Matrix Health Value Items Dataset 1

Health Value Items	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6
Item 1		.07	.19	.37**	.3**	.55**
Item 2	.07		.43**	.15	.1	.07
Item 3	.19	.43**		.07	-.01	-.18
Item 4	.37**	.15	.07		.5**	.41**
Item 5	.30**	.1	-.01	.5**		.28*
Item 6	.55**	.07	-.18	.41**	.28*	

*correlation is significant at the 0.05 level (2-tailed), ** correlation is significant at the 0.01 level (2-tailed)

The following section discusses the second qualitative result that contributed to the quantitative phase of this research.

5.6.4 Examining changes in health value

The rationale for health value item development was to investigate the possibility that participants are more instrumentally orientated in regards to their health value. This rationale stemmed from the qualitative results.Another qualitative result that contributed to new inquiries in this research originated from participants' descriptions of health value and how this influences their diabetes self-management behaviours. Participants' mainly described how pre-diagnosis of Type 2 diabetes they valued their health from a terminal point of view but post-diagnosis this was mainly instrumental. A terminal health value orientation post diagnosis was viewed by many as impractical due to the aetiology of Type 2 diabetes. Health value was‘changed’ to instrumental as this value orientation enabled participants’ to carry on with their daily activities. Health was valued as a functional aspect in daily life.

The above qualitative findings resulted in new research questions and subsequent hypotheses that could be investigated in the quantitative section. It was established that the principal aim of the quantitative phase to test MSLT would not be affected by the methods included to investigate these two new questions and hypotheses.

Table 5.4 Emergent Research Questions and hypotheses as a result of Qualitative Data

RQ/H	Description
RQ9 *Quan*	Does health value change from pre-diagnosis to post-diagnosis of Type 2 diabetes?
RQ10 *Quan*	Is health valued as an instrumental or terminal value priority post-diagnosis of Type 2 diabetes?
H4	Health Value changes from pre-diagnosis to post-diagnosis of Type 2 diabetes.
H5	Health is valued as an instrumental value priority post-diagnosis of Type 2 diabetes.

The method chosen to investigate RQ9 and to test H4 included administering the adapted health value measure twice. The first administration of the questionnaire involved asking participants to think back to before they were diagnosed with Type 2 diabetes and think about how much they valued their health at that time. This part of the health value questionnaire was called Health Value Part 1 (HVP1).

The second administration of the questionnaire included asking participants to think about how much they valued their health now that they have Type 2 diabetes. This part of the health value questionnaire measured current health value and was called Health Value Part 2 (HVP2).

This approach to measuring health value was expected to yield two differing metrics:

1. Participants’ current health value (as measured by HVP2),
2. The change in their health value brought about by Type 2 diabetes (as measured by comparing scores from HVP1 and HVP2).

This method of scale administration asks participants to rate their health value retrospectively and can introduce certain biases such as recall bias and social desirability bias. Recall bias was defined in Chapter 3 section 3.10.1. Social desirability bias is caused by participants' attempts to construct an account that conforms to a socially acceptable model of belief or behaviour (Bryman, 2008).HVP1 and HVP2 were strategically placed in the questionnaire booklet. HVP1 was placed at the beginning of the booklet and HVP2 was placed at the end (see appendix E). It was anticipated that this method might contribute to reducing recall and social desirability bias.

During this phase of the research it was acknowledged that it may be impossible to ascertaina true depiction of health value pre-diagnosis of Type 2 diabetes in this study due to the length since diagnosis of participants'. The average length of time since diagnosis was around thirteen years in both phases of this study. A study that manages to determine health value of people pre-diagnosis of Type 2 diabetes and then again post-diagnosis could possibly be anenhancedsolution to investigating changes in health value. This point is further elaborated upon in the future recommendations section of this study in Chapter 8 section 8.9. However, this initial attempt to measure a change in health value is considered a starting point to investigating this phenomenon, as it has not been done before.

As previously discussed a health value measure was adapted to ascertain whether there was variability in the way health value is valued. This resulted in the development of RQ10. The methods of investigating this research question and H5 include reviewing the scoring of these items in the quantitative phase. Answering whether participants' health value is mainly instrumental pre-diagnosis compared to post-diagnosis involves comparing the instrumentally scored health value items against the terminally scored health value items. If instrumental health value scores are higher H5 could be met.

5.6.5 Summary

Section 5.6 has detailed the methods used to test the emergent research questions and hypotheses that were devised as a result of the qualitative findings. Methods included adapting a health value measure. Items were distinguished depending on the instrumental/terminal value dichotomy. Additionally two items were addedto the health value measure to add to variability in items for testing of RQ10 and H5. Administration procedures for the scale were devised based on the requirements of testing RQ9 and H4. The rationale for having two parts to the adapted health value measure is discussed. The methods of testing validity and reliability of the new items are also highlighted.

Following this the results of the reliability test for internal consistency are presented.The results of the item-total correlations of the adapted health value measure resulted in the removal of the two new items developed.As a result of removing item 5 and item 6 from the health value data the quantitative data analysis only includes items 1 to 4 of Health Value Part 1 and Health Value Part 2 which are the four original items developed byLau et al. (1986). To facilitate testing of RQ10 and H5 items 1 and 4 are still considered terminal in nature and items 2 and 3 are still considered instrumental in nature. The methods for testing RQ9 and H4 were not affected by these results.

6 Quantitative Phase

Following, the interim phase, the exploratory sequential mixed methods design of this research continues to the quantitative phase. The purpose of the quantitative phase is to test the interactive effects of the constructs of Modified Social Learning Theory (MSLT).

MSLT for health states that

> 'the three-way interaction between (a) internal health locus of control beliefs; (b) self-efficacy for doing the relevant health behaviours; and (c) the value of the outcome that follows doing the health behaviours is what predicts (d) whether or not the health behaviour(s) will be done' (Wallston, 2011:February 2nd, Personal communication).

Testing MSLT involves testing the interaction of the three main predictor constructs on outcome behaviours. The three predictor constructs are internal health locus of control, self-efficacy and health value. The predictor constructs are the causal variables in this study that are being tested to determine the influence of their interaction on predicting outcome behaviours. Causal variables are termed independent variables.Outcome behaviours of Type 2 diabetes patients are the dependent variable under investigation in this study. A dependent variable is the variable in a study that is causally influenced by the independent variables (Bryman, 2008).

Research questions and hypotheses for the quantitative phase were formulated based on the testing requirements of MSLT (RQ's 1, 4, 5, 6 and H 1, 2 and 3). The emergent research questions and hypotheses from the interim phase will also be tested during the quantitative phase (RQ's 9 and 10 and H4 and H5). For readability the research questions addressed in the quantitative phase are displayed in table 6.1.

Table 6.1 Quantitative phase research questions and hypotheses

RQ/H	Description
RQ1	Does MSLT three-way interaction of HLOC, SE and HV predict the outcome of self-care behaviour in a Type 2 diabetes population?
RQ4	Does HLOC act as a moderator of predicating health behaviour in a Type 2 diabetes population?
RQ5	Is the measurement of HV a necessary predictor of health behaviour in a Type 2 diabetes population?
RQ6	Is the measurement of health value and perceived control (HLOC and SE) when taken together a more proficient predictor of health behaviour in a Type 2 diabetes population?
RQ9	Does health value change from pre-diagnosis to post-diagnosis of Type 2 diabetes?
RQ10	Is health valued as an instrumental or terminal value priority post-diagnosis of Type 2 diabetes?
H1	The greater the value placed on health the greater amount of Type 2 diabetes self-care behaviours taken.
H2	The greater the perceived control of diabetes the greater amount of diabetes self-care behaviours taken.
H3	The greater the perceived control of diabetes and the greater the value placed on health the greater amount of Type 2 diabetes self-care behaviours taken.
H4	Health Value changes from pre-diagnosis to post-diagnosis of Type 2 diabetes.
H5	Health is valued as an instrumental value priority post-diagnosis of Type 2 diabetes.

To answer the above research questions and to test the hypotheses quantitative data collection methods were reviewed. Quantitative data collection methods vary along four dimensions structure, quantifiability, researcher obtrusiveness and objectivity (Polit and Tatano Beck, 2010). The research questions dictated which data collection method is best suited to the quantitative phase. The data collection method chosen is structured data collection. In structured data collection the same information is gathered from all participants in a comparable pre-specified way (Polit and Tatano Beck, 2010). A structuredself-report technique of data collection was chosen for the quantitative phase. Questionnaires were deemed an appropriate method, as the testing of the constructs of MSLT requires the use of social-psychological scales. Section 6.1 discusses the various scales used to collect data on the constructs of MSLT.

Data collected was analysed using various statistical procedures. The various statistical methods employed during the quantitative phase will be explained in section 6.2.Statistical methods were used to organise, test, interpret and report conclusions of the quantitative data. Descriptive statistics were used to report demographic characteristics of participants and scale scores whilst inferential statistics were used to test the quantitative research questions and hypotheses.

This chapter is structured as follows:

- Section 6.1 Data collection
- Section 6.2 Data analysis
- Section 6.3 Summary

6.1 Data Collection

Data collection for the quantitative phase began in May 2012 and ended at the end of August 2012. The same method of recruitment for participants was used in the quantitative phase as the qualitative phase of this research.

6.1.1 Demographic data

Data collection methods of the quantitative phase included collecting demographic data. Demographic data collected included age, sex, ethnicity, marital status, employment status, smoking history and years since diagnosis of Type 2 diabetes. Clinical parameters such as BMI, blood pressure, HbA1c levels and whether comorbidities were present were also collected. Demographic data were gathered for descriptive purposes to compare with the statistical results of the questionnaires.

6.1.2 HbA1c

HbA1c results were included in this study for descriptive purposes of glycaemic control and also within the correlation matrices and block 1 of the hierarchical multiple regression (HMR) analyses. See section 6.2 for methods of correlation and HMR analyses.

HbA1c is a blood test that provides a measure of blood glucose levels as an indicator of diabetes control over the last two-three months. HbA1c provides a reliable measure of actual control over diabetes (Tortora and Grabowski, 2003). Diabetes UK (2013a) recommend a cut off for adequate glycaemic control of HbA1c levels at between 48-58 mmol/mol. As a result of the compulsory testing of HbA1c at the diabetes OPD most recent HbA1c levels of participants were available. Accessing these results was in keeping with the ethical considerations discussed in Chapter 3 section 3.8.

6.1.3 Questionnaire booklet

The questionnaire booklet contained five questionnaires (see appendix E). The rationale for including this many questionnaires is due to the constructs under investigation. In the following sectionseach scale that was included in the questionnaire booklet will be explained in relation to the construct it examined. Completing this booklet may have been time consuming for many but the response rate as discussed in section 3.10.1 was high at 72.2% with 107 returned questionnaires.

Using questionnaires to collect quantitative data can be advantageous. Questionnaires can be less costly and require less time and effort in comparison to other methods such as interviews(Polit and Tatano Beck, 2010). However, a disadvantage of the self-completion questionnaire is that there is no one present to help participants if they are having difficulty completing the questionnaire (Bryman, 2008). At the time of obtaining informed consent from a participant the researcher explained in detail the structure of the questionnaire booklet and the completion procedure. This provided participants with an opportunity to address any concerns prior to completing the questionnaire. Additionally, a contact number was provided to participants on the information sheet to contact the researcher if they had any problems filling in the questionnaire outwith the OPD. All participants were supplied with a prepaid stamped envelope to return the questionnaire. However, some found time to complete the questionnaire whilst waiting in the OPD and handed it in to the researcher there and then.

6.1.4 Adapted Health Value Measure AHV

The adapted health value (AHV) measure was developed during the interim phase of this research. The measure is multi-dimensional as it aims to test current health value and value orientation of participants in this study. The AHV is administered in two parts in this study. HVP1 aims to measure health value pre-diagnosis of Type 2 diabetes and HVP2 measures current health value. This method of administration addresses RQ9 and H4. The measure consists of 6 items. Items 1 to 4 are found to be valid and reliable (Lau et al., 1986). Items 5 and 6 were added to the measure to add to variability in items to test RQ10 and H5. Scores ofItems 2, 3 and5 are considered instrumental health value scores and scores of items 1, 4 and 6 are considered terminal health value scores. These scores will be compared to answer RQ10 and H5.

This study will assess the adapted health value measure for initial reliability (results of internal consistency are reported in Chapter 5, section 5.6.3). The AHV has been found to have face and content validity (see section 5.6.3). However, item 5 and item 6 were subsequently removed from the overall quantitative data analysis, as they were deemed problematic. Therefore the AHV results that are reported in chapter 7 willonly include items 1 to 4 of the health value measure.

Scores from HVP2 will be used for testing of MSLTas these results measure current health value.

6.1.5 Scales used to test MSLT

Scales chosen to measure the independent variables areHVP2 of the AHV measure, the Multi-dimensional Health Locus of Control (MHLC) scale form C and the Perceived Diabetes Self-management Scale (PDSMS). The Self-Diabetes-Self-Care-Activities scale(SDSCA) will measure the dependent variable.

MHLC Form C

The Multi-dimensional Health Locus of Control(MHLC) Scale developed by Wallston et al. (1978) was designed to assess a person's beliefs regarding whether his or her health status is determined by the actions of individuals and if so whether the locus of that control is internal or external. This study will adopt Form C of the MHLC scales as it is designed to be a condition specific measure of locus of control and can be used when studying people with an existing health/medical condition (Wallston et al., 1994).

Form C has 18 items and has two independent 3 item subscales doctors and other people. Each item is a belief statement about a specific medical condition with which the patient may agree or disagree. The word condition in each item of the scale was replaced with Type 2 diabetes to make the scale relevant to participants of this study. There are six possible answers for each item. Scores range from 6-16 = low IHLC, 17-26 = moderate to high IHLOC, 27-36 = high IHLC.

PDSMS

Self-efficacy will be measured using the Perceived Diabetes Self-Management Scale(PDSMS) developed byWallston et al. (2007). To test scale reliability Wallston et al. (2007) administered the PDSMS to 398 patients with either Type 1 (n=57) or Type 2 diabetes (n=341). Cronbach's alpha of the 8-item PDSMS was found to be .83 indicating internal consistency. The PDSMS can be considered as a beneficial tool for measuring self-efficacy, as it is a short measure with 8 items that includes positive and negatively worded items (Wallston et al., 2007).

The responses for the PDSMS items range from strongly disagree to strongly agree. Four of the items (1, 2, 6 & 7) are worded such that high agreement signifies low self-efficacy. These four items are reverse scored prior to being added to the other four items. The total PDSMS scores can range from 8 to 40 with higher scores meaning more confidence in self-managing one's diabetes. Scores of 8-18 indicate low SE, 19-29 indicates moderate to high levels of SE and scores between 30and 40 suggest high SE.

SDSCA

The Self-Diabetes-Self-Care-Activities(SDSCA) scale developed byToobert et al. (2000) will be used to measure the dependent variable, diabetes outcome behaviours. The SDSCA measure is a brief self-report questionnaire of diabetes self-management and includes items assessing aspects of patients' diabetes regime such as diet, exercise, blood glucose monitoring, foot care and smoking. Toobert et al. (2000)claim that self-care is multidimensional and it is necessary to assess each aspect separately rather than combine scores across components. Therefore scoring is calculated for each of the five regimen areas assessed by the SDSCA. The five subscales used to assess regimen behaviours include general diet, specific diet, blood sugar, exercise and foot care. Smoking is also included, however, this part of the scale will be used for descriptive purposes only and will not be included in the testing of MSLT. Each subscale asks participants to indicate on a scale of 0-7 the average number of days a week they carry out these diabetes related behaviours.

The strengths of the items of the SDSCA include their brevity and ease of scoring andmake it a practical tool for research. The SDSCA's use in past research provides valuable information on the reliability and validity of this scale (Toobert et al., 2000).

HAD Scale

A measure of anxiety and depression was included in the questionnaire booklet to control for anxiety and depression. The data collected on anxiety and depression will not be included in the statistical analysis that tests MSLT. Results are used for descriptive purposes only. Previous research has indicated that anxiety and depression can impact on Type 2 diabetes outcome behaviours, controlling for this will enable the researcher to compare these descriptive statistics with results on behavioural outcomes. Furthermore, these results will be used for comparison purposes with findings from the qualitative phase on depression and anxiety.

The Hospital Anxiety and Depression(HAD) Scale developed byZigmond and Snaith (1983) will be used to measure anxiety and depression of participants. After careful consideration of various measures of depression, the HAD scale was deemed an appropriate tool for use in this study. The HAD scale was the only scale in this study that required permission for use. All other scales are considered to be in the public domain and free to use for research purposes.Permission to use the HAD scale was obtained from GL Assessment London through an application process that involved explaining the research purpose and a small fee.

The HAD scale consists of 14 questions divided into two subscales. The A-scale represents the subscale for anxiety and the D-scale measures depression. Each scale has seven questions each. Each question is rated by the patient on a four-point scale (0-3). The score for each item indicates the amount of distress encountered by the patient (0= none, 3=unbearable). Items for each subscale are then summated. A score of 11+ on either scale indicates a case of moderate to severe anxiety and/or depression.

6.2 Data Analysis

6.2.1 SPSS

Statistical software packages were developed during the early 1960s for social scientists that wanted to calculate statistics from large data sets (Fielding and Gilbert, 2009). SPSS stands for statistical package for the social sciences and is one of the main statistical packages in use today. Other programs include Minitab, Stata, Statview, Genstat and SAS (Fielding and Gilbert, 2009). SPSS version 20.0 for Mac was chosen as the statistical program for use in this study because the researcher has had statistical training using this particular software package. SPSS enabled efficient data management and data analysis of the quantitative data.

6.2.2 Data entry

A data file was created in SPSS prior to data entry. Individual participants are termed cases in SPSS. There was one row allocated to each case in the data window. These rows were ordered by the identification code given to each participant. Once cases were entered variables were entered next. Each variable entered into SPSS was given its own name. A label can be assigned to each variable. This is a practical function for describing the variable.Data was entered into SPSS using a coding process. Coding is the process of assigning numerical values to the response of a variable in order to create a data file for computer analysis(Fielding and Gilbert, 2009). A value label was assigned to each code as a reminder of its meaning for ease of analysis.

In order to reduce errors during data entry to SPSS a data checking process was devised.Each questionnaire had been manually coded using a coding scheme prior to data collection and data entry to SPSS. The coding scheme detailed the value given to each code and indicated when to reverse score. Furthermore, prior to data entry to SPSS these codes were manually checked for accuracy against the coding scheme devised for each questionnaire. The results from the questionnaires were then entered case by case in order of their allocated case number. To ensure further accuracy after entry of the results from each case into SPSS the questionnaires were manually checked again and compared against the codes given for the data in SPSS and the manual codes given on the questionnaire.

6.2.3 Missing Data

An important issue of data management is how to deal with missing data. Missing data arise when respondents fail to reply to a question either by accident or because they do not want to answer a question (Bryman, 2008). After the data of the 107 cases was entered into SPSS it was noted that 29 cases had missing values from differing questionnaires. The percentage of cases with missing data was 27% at 29 cases. The completion rate details the percentage of cases with no missing values. The completion rate for this study was 73% with n=78 fully completed questionnaire booklets. The partial completion rate details the percentage of cases that have missing values. The partial completion rate was 27% with n=29 partially completed questionnaire booklets.

Estimating the proportion of missing data and the patterns of missing data is important to justify the methods used to overcome this problem. Missing data can take one of three forms: missing completely at random (MCAR), missing at random (MAR) and missing not at random (MNAR) (Potthoff et al., 2006, Myers, 2011). MCAR is when there is no systematic underlying process as to why values are missing for a given measurement. Values MAR are missing because of some potential non-random systematic process. Data are MAR if the probability of missingness for some variable (y) is predictable based on the value of another variable or set of variables (x) (Myers, 2011). Values that are MNAR are missing due to the value of the variable being considered (Myers, 2011). If data are not missing at random then most of the methods of treating the problem are biased for example deleting the missing values might result in a non-representative sample if data are MNAR (Dodeen, 2003). The cases with missing values were explored to establish whether there was a pattern of missing values or whether data was MCAR, MAR or MNAR. The percentages of missing values of scales and the type of missing data were established and are displayed below.

Scales with missing values n=29	**MCAR, MAR or MNAR**
MHLOC: 18/29 cases = 62%	MCAR
HVP1: 6/29 cases = 20%	MCAR
HVP2: 11/29 cases = 38%	MCAR
PDSMS: 4/29 cases= 13%	MCAR

Cases with missing values from the MHLOC scale, PDSMS and health value scales were MCAR. It is impossible for certain to establish which pattern accurately describes the missing data (Myers, 2011). Consequently the conclusion that the missing values in this study are MCAR is an assumption.

Four differing methods of managing missing data were reviewed.

1. List-wise deletion: involves excluding a case from the data analysis if any single value is missing. Values deleted must have been MCAR to use this

method. List-wise deletion causes a loss of power to the sample and can introduce bias.

2. Pair-wise deletion: discards cases on an analysis-by-analysis basis and only when the estimate requires that variable. Pair-wise deletion was regarded as an unsuitable method for this study due to the testing of MSLT that requires hierarchical multiple regression analyses. Using pair-wise deletion would mean that different participants would be included in the estimation of each regression coefficient. This could lead to biased estimates and possibly mathematically inconsistent results (Myers, 2011).

3. Mean substitution: involves imputing the mean of a variable in the place of any case which is missing a value for that same variable (Myers, 2011). This method results in all cases being included in the final analysis. Although this method creates an advantage of a complete dataset it also artificially deflates the variation of a variable (Myers, 2011). Furthermore, as mean substitution is replacing all missing values with average scores this method of handling missing data has the potential to change the value of estimates (Myers, 2011).

4. Multiple regression replacement(MRR): replaces missing values in a variable by regressing it on to several highly related variables(Myers, 2011). MMR has been found to be one of the most effective data replacement procedures for missing data (Ward and Clark, 1991) and has also been found to perform better with highly correlated variables, such as Likert-type data (Kromrey and Hines, 1994).

Having considered all four methods of missing data management a combined method of using list-wise deletion and multiple regression replacement was chosen for this study. Both methods were chosen to reduce the introduction of bias by having missing data. Using both methods resulted in an introduction of the use of two datasets to report results of this study.

List-wise deletion: Dataset 1 n=78

The 29-cases with missing values were deleted using the list-wise deletion technique. This resulted in a complete dataset with no missing data (n=78). This dataset was named Dataset 1.

Multiple regression replacement MRR: Dataset 2 n=107

The procedure used for MRR was carried out using SPPS. SPSS uses an automatic regression imputation function to calculate values for the missing values in the dataset. The type of regression that SPSS uses to do this is linear regression (Dodeen, 2003). In linear regression data are modelled using linear predictor functions and unknown model parameters are estimated from the data (Field, 2009). Having carried out the automatic regression imputation method in SPSS a new data file with imputed missing values was created and named Dataset 2 (n=107).

Sensitivity analysis

The main reason two methods were chosen to manage missing data was due to the uncertainty of introducing bias from both methods. A data analysis method that addresses uncertainty is called sensitivity analysis(Sutton et al., 2000, Meltzer, 2001). This method of analysis varies in level depending on the requirements of the research. This research adopts a sensitivity analysis approach whereby two datasets are tested in the same manner and compared simultaneously throughout data analysis. Dataset 1 and Dataset 2 were compared simultaneously in this study to identify any possible bias introduced to the results due to missing data. Results are reported on both datasets. For ease of reading when reporting results two procedures have been introduced:

1. Dataset 1 (n=78) is considered the main dataset and Dataset 2 (n=107) is the comparative dataset.

2. All results and tables used to describe Dataset 1 are presented in the quantitative results chapter (Chapter 7). However, some tables for dataset 2 are assigned to appendix E for ease of reading.

6.2.4 Scale scores

Scale scores were produced to describe levels of health value, locus of control, self-efficacy, outcome behaviours and anxiety and depression. The scale scores for health value are testing RQ9, RQ1, H4 and H5. Scale scores are reported for both datasets using descriptive statistics such as the mean and standard deviation. The mean is the arithmetic average of a set of values (Field, 2009). Standard deviation is calculated based on every value in a distribution and summarizes the average amount of deviation of values from the mean (Fielding and Gilbert, 2009). A standard deviation can be interpreted as an indication of the degree of error when a mean is used to describe a value or sample (Polit and Tatano Beck, 2010). The results for mean (M) and standard deviation (SD) are reported alongside each other for example M (SD).

6.2.5 Testing the assumption of normality

Data distributions can be described by their shapes and are a good way to organise data and identify patterns (Polit and Tatano Beck, 2010). Data distributions reported in this study were explored through testing the assumption of normality. This involves reviewing the data to see if it is normally distributed.A normal distribution is a function that represents the distribution of many random variables as a symmetrical bell shaped graph (Polit and Tatano Beck, 2010). The bell shaped curve has a mean of 0 and a SD of 1. The x axis of the standard normal curve is expressed in standard deviation units or z units (Fielding and Gilbert, 2009).

Testing the assumption of normality is important to this research as regression models are used to test MSLT and these models assume that errors in the model are normally distributed (Field, 2009). Errors in the model that are not normally distributed are termed outliers and can bias statistics (Field, 2009). Three differing yet connecting methods of testing normality were employed during data analysis. The variables inspected for normality included the independent and dependent variables used in the regression analyses. This included scores from HVP2, PDSMS, and the internal health locus of control subscale scores from the MHLOC scale and all five subscales of the SDSCA.

An initial exploration involved a visual inspection for normality of both datasets using P-P plots and histograms. These were generated in SPSS using the descriptive statistics function.Visually inspecting the P-P plots involved checking where values lie on the plot. If values fall on the diagonal of the plot the variable is normally distributed, but deviations from the diagonal show deviations from normality (Field, 2009). Any deviations from normality were described using values of skew and kurtosis. The values of skewness and kurtosis should be zero in a normal distribution. Positive values of skewness indicate a pile up of scores on the left of a distribution whilstnegative values pile up on the right. Positive values of kurtosis indicate a pointy and heavy tailed distribution, whereas negative values indicate a light and flat tailed distribution (Field, 2009). Due to some outliers being identified using this method z-scores were calculated to test the outliers' significance.

Various statisticians recommend calculating z-scores to test the significance of outliers and comparing them to known values for the normal distribution (Marsh and Elliott, 2008, Fielding and Gilbert, 2009, Field, 2009). Thusz-scores were calculated to establish the significance of skewness and kurtosis. The following formulas were used to establish z-scores(Field, 2009).

$$= \frac{\quad - 0}{\quad} \qquad\qquad = \frac{\quad - 0}{\quad}$$

As previously mentioned a z-score (z-unit) has a mean of 0 and a SD of 1. Within a normal distribution 95% of z-scores lie between -1.96 and 1.96 and are significant at p <.05, 99% of z-scores lie between +/- 2.58 and are significant at p<.01 and 99.9% of z-scores lie between -3.29 and +3.29 and are significant at p<.001. Z-scores with values above 3.29 can be regarded as highly significant outliers(Field, 2009). As a result this method of comparing z scores to the known values for the normal distribution will enable the identification of significant outliers. Some significant and non-significant outliers were identified but not removed from the data. The rationale for this is discussed in the z-score results section (7.4.3).

A final method used to test the assumption of normality is Cook's Distance. Cook's distance is a measure of the overall influence of an outlier on a model (Field, 2009).

Cook's D will be used in the regression analysis to ensure that the remaining outliers are not having a significant impact on the regression model. Cook and Weisberg (1982) have suggestedthat values greater than one may be a cause for concern. Cook's D was calculated using the regression diagnostics function in SPSS.

6.2.6 Assessing the assumption of no multicollinearity

Various techniques were used to assess whether there was collinearity in the data and to prevent collinearity occurring. Multicollinearity exists when there is a strong correlation between two or more predictors in a regression model. High levels of collinearity can impact on regression results such as increasing the standard errors of the *b* coefficients, it limits the size of r and restricts assessing the individual importance of predictors (Field, 2009).

The risk of multicollinearity is increased when testing the interactive effects of variables. Testing the interaction of the constructs of MSLT using HMR analyses involves creating interaction terms. Creating interaction terms to test MSLT involved multiplying the variables by each other to create two-way and three way interaction variables that are included in the HMR analyses. Multiplying variables by each other increases multicollinearity of variables (Aiken and West, 1991). A way of overcoming this problem is to mean centre the variables before multiplying them to create the interaction terms (Aiken and West, 1991).Scores from HVP2, the PDSMS and the internal subscale from the MHLC are the predictor variables that required centring prior to HMR.Mean centring involves subtracting the mean score for the variable from the participant's raw score and this then centres the variable around zero (Field, 2009).The new centred predictor variables were computed in SPSS and named IHLC (scores came from internal subscale of MHLC), SE (scores came from PDSMS) and HV (scores came from HVP2).

The three two-way and one three-way interaction variables were then computed in SPSS by using the following formula:

Two-way Interaction Variables:
Internal Locus of Control x Health Value (IHLC x HV)
Health Value x Self-efficacy (HV x SE)

Internal Locus of Control x Self-efficacy (IHLC x SE)

Three-way Interaction Variable:
Health Value x Internal Locus of Control x Self-efficacy (HV x IHLC x SE)

Another method of ensuring no multicollinearity of the data is to scan the correlation matrix of the predictor variables. Correlations above .80 or .90 are considered to be multicollinear(Field, 2009).

Collinearity diagnostics such as the variance inflation factor (VIF) and the tolerance statistic were used in SPSS when carrying out the HMR analyses to further assess for multicollinearity. The VIF indicates whether a predictor has a strong linear relationship with the other predictor variables. A VIF value greater than ten is a cause for concern (Field, 2009). The tolerance statistic is the VIF statistics reciprocal (1/VIF). As such tolerance values below 0.1 indicate collinearity problems.

6.2.7 Correlation

Pearson product moment correlations were performed to determine if any of the continuous demographic variables and predictor variables were significantly correlated with the dependent variable outcome behaviour, which is analysed through the SDSCA subscales general diet, specific diet, exercise, blood sugar testing and foot care. HbA1c was included within the correlation matrix to ascertain whether there were any significant relationships between HbA1c results and the demographic, independent and dependent variables. Correlations were generated using the bivariate correlation function in SPSS.

The strength of the relationship can be assessed by the value of Pearson's r. The possible values for Pearson's r range from -1.00 through .00 to +1.00. Correlation co-efficients between .00 and +1.00 express a positive relationship whereas correlation co-efficients between .00 and -1.00 express a negative relationship(Polit and Tatano Beck, 2010).

6.2.8 Hierarchical Multiple Regression (HMR) analyses

The choice of statistical procedure to test MSLT was based on the principal research question and hypothesis of this research that requires testing of MSLT. Multiple regression analysis is a way of predicting an outcome variable from one or several predictor variables (Field, 2009). There are three methods of multiple regression to review when considering which method is best suited to an analysis of predictability of variables.

1. Hierarchical multiple regression (HMR): Predictors are selected and entered into the regression model based on a theoretical stance or hypotheses.
2. Forced entry: is a method whereby all predictors are forced into the model simultaneously. The statistical program makes the decision of when and where the predictor is entered into the model.
3. Stepwise regression: The order in which predictors are entered into the model are based on mathematical criteria. The statistical program searchers for the predictor that best predicts the outcome variable by selecting the predictor that has the highest simple correlation with the outcome (Field, 2009).

Hierarchical multiple regression (HMR) was the method chosen to test MSLT due to the fact that the researcher can choose the entry order of predictor variables based on theoretical rationale.The procedure of HMR in SPSS involves entering the predictor variables in blocks. Causal relationships amongst predictor variables should be considered prior to entering the data into the blocks to respect causal flow of the theoretical proposition (Cohen and Cohen, 1983). As recommended by Cohen and Cohen (1983) research questions (RQ's 1, 4, 5 and 6) and hypotheses (H 1, 2 and 3) guided the rationale behind the order of predictor variable entry.

A hierarchical multiple regression analysis consisting of four blocks was performed. Cohen and Cohen (1983) argue that demographic variables are typically good candidates for initial block entry. The first block consisted of demographic variables including age, BMI, years since diagnosis and HbA1c. The second block consisted of the three separate predictor variables, HV, IHLC and SE. This allowed for testing of

RQ4, RQ5 and H1. The third block contained the three-two-way interactions which enabled testing of RQ4, 5, 6 and H1 and H2. The three-way interaction term that tests MSLT was entered into the fourth block. The fourth block tested the principal research question and hypotheses (RQ1 and H3).

The dependent variable for HMR analysis included the five subscales of the SDSCA. Due to sensitivity analysis HMR was carried out on Dataset 1 and Dataset 2 resulting in ten HMR analyses outputs from SPSS. A summary of each HMR modelon each subscale is provided in Chapter 7 section 7.7. Tables from Dataset 2 have been assigned to Appendix F for ease of readability.

The model summary of the SPSS output of each HMR analysis carried out was interpreted. The change in R^2(Δ***R2)*** statistics and its corresponding change in *F* and *p* values are the statistics used to interpret the significance of the HMR models. R^2 is a measure of how much variability in the outcome is accounted for by the predictors. The p values indicate the significance of the change in F. The standard beta coefficients are also reported for the earlier stages of the models as they provide an insight into the importance of a predictor in a model(Petrocelli, 2003). Interpreting HMR summary models involves focusing on the change in predictability associated with predictor variables entered later in the model over and above those entered earlier in the model (Petrocelli, 2003). This is the method of reporting of HMR results used in Chapter 7 section 7.7.

6.2.9 Three-way independent ANOVAs

The HMR results found support for the three-way interaction of MSLT on the specific diet (SPD) subscale and the blood sugar (BS) subscale. These results required further investigation to determine the significance of the interaction effects on these subscales. ANOVA is a statistical procedure used to test differences between several means (Field, 2009). Two three-way ANOVA's were conducted on both datasets of the specific diet and blood sugar subscales to observe the differences in mean among even groups of participants who scored high on the predictor variables and groups who scored low. Three-wayANOVAs were also computed for the non-significant subscales: general diet, exercise and footcare.

In order to support MSLT further it was important that these means demonstrate that the highest means were for participants who scored high on all three constructs (Wallston, 2013). If the highest means are for participants who scored high on HV, SE and IHLOC then MSLT would be better supported.

To conduct the ANOVAs the variables HV, SE and IHLC were split at the median into two groupings of low and high. This enabled identification of means for those who scored low and high for each predictor variable. These groupings of low and high groups were then entered into the ANOVA function in SPSS.ANOVA results were interpreted by reading the three-way ANOVA tables produced using the ANOVA function in SPSS. Means for low and high groups are reported by the sum of squares (Ss) which is a statistic that reports an estimate of total variability of a set of data (Field, 2009). Following this significance statistics of the three-way interaction effects using the F-ratio statistic are reported. The F-ratio statistic demonstrates how well a proposed regression model fits the data(Field, 2009).The ANOVA tables have been reproduced for presentation in this thesis (see Chapter 7, section 7.8).

To visually inspect these results separate interaction plots of the low and high groups of the predictor variables were plotted using the three-wayANOVA plot function in SPSS. Interaction plots were produced for all five subscales. Interaction plots from both datasets for the significant subscales of SPD and BS are displayed in Appendix G.

6.3 Summary

Chapter 6 has presented the data collection and analysis methods used in the quantitative phase to best test MSLT. Various scales were used to collect data on the constructs of MSLT and outcome behaviours. The HAD scale was included in the questionnaire booklet to control for levels of anxiety and depression and as a comparison measure for findings on anxiety and depression from the qualitative phase.

The data analysis section for the quantitative phase details the specific statistical procedures used to manage and test the data. Methods of managing missing data were discussed. Choosing two methods to manage missing data resulted in the creation of two datasets. Sensitivity analysis was carried out on the two datasets whereby each measure taken for one dataset was done so with the other. This enabled identification of any possible bias introduced to the results due to the methods used for managing missing data.

Descriptive statistics are used to describe scale scores and demographic data. Scale scores from the health value measure will be used to answer RQ9, RQ10, H4 and H5. Inferential statistical methods were employed to test MSLT. Prior to implementing these procedures to test MSLT other statistical methods were employed to ensure reliability and validity of the statistical results. These methods included testing the assumption of normality, centring the predictor variables prior to the HMR analyses and use of collinearity diagnostics.

The methods used for HMR analyses discussed how causal priority of the predictor variables was considered prior to block entry, the methods used to interpret the HMR analyses and the way in which these analyses were reported. Finally, the rationale and methods for conducting three-way independent ANOVAs and interaction plots was discussed.

Chapter 7 details the various statistical results from the quantitative phase. Results from the qualitative and quantitative phases of the research are integrated and discussed in Chapter 8.

7 Quantitative Results

7.1 Introduction

The data in this chapter focuses on the results of the quantitative phase. The quantitative data analysis included Dataset 1 and Dataset 2. Sensitivity analysis was carried out to increase the robustness of the quantitative findings due to removing 29 cases with missing data from Dataset 1. Dataset 1 includes n=78 complete cases and Dataset 2 contains 107 cases, 29 of which had missing values and were replaced using regression imputation.Comparative analysis of both datasets is presented throughout this chapter. Dataset 1 is considered the main dataset whilst Dataset 2 is thought of as the comparative dataset. Selected results of Dataset 2 will be highlighted in brackets (D2, result) alongside the results of Dataset 1. Several of the tables that represent the results of Dataset 2 have been consigned to Appendix F for readability.

The chapter begins with a review of participants' demographic data. Succeeding this scale scores are presented. The quantitative data originally sought to test MSLT, however, due to the results of the qualitative phaseRQ9 and RQ10 were formulated. These research questions aimed to add to the rigor of the qualitative conclusions on whether there was a change in HV orientation due to the diagnosis of Type 2 diabetes. HVP1 and HVP2 were thus created to test these research questions. Results on these questionnaires are reported in section 7.3 along with the other scale scores.

The statistical tests for the assumption of normality are then evaluated followed by a brief review of the results of the statistical assumptions of no multicollinearity. Following on from this results from the correlation matrices of demographic, independent and dependent variables are given. Finally the hierarchical multiple regression results are presented followed bythe results of the three-way independentANOVA's results.

This chapter is structured as follows:

- Section 7.2 Demographic data
- Section 7.3 Scale scores
- Section 7.4 Testing the assumption of normality
- Section 7.5 Meeting assumptions of no multicollinearity
- Section 7.6 Correlation results
- Section 7.7 HMR analyses
- Section 7.8 Three-way independent ANOVA results

7.2 Demographic data

Dataset 1 consists of 39 (50%) males and 39 (50%) females. 93.6% of participants described themselves as British and 6.4 % described themselves as other. On average the participants from Dataset 1 were 63 years old (SD 10.8)and had been diagnosed with Type 2 diabetes for an average of 13.5 years (SD 6.3). Participants from Dataset 1 mean BMI was 34.1 (SD 7.2). A BMI above 30 is considered obese(NHS BMI Calculator, 2012). HbA1c levels averaged at 65.4 mmol/mol (SD 18) which is out with the suboptimal range of 48-58 mmol/mol, as recommended by Diabetes UK(2013a). 80.8% of participants in Dataset 1 have another chronic illness as well as Type 2 diabetes, 19.2% do not. 41% of participants were employed, 3.8% were unemployed and 55.1% were retired. 12.8% of participants were single, 55.1% were married, 21.8% were widowed and 10.3% were divorced. Participants smoking status and blood pressure ranges were also recorded (See Table 7.1).

Similar descriptive statistics were seen in Dataset 2. Dataset 2 consists of 63 (59%) males and 44 (41%) females. 93.5% of participants described themselves as British and 6.5% described themselves as other. On average participants from Dataset 2 were 62 years old (SD 10.7) and had been diagnosed with Type 2 diabetes for an average of 13.8 years (SD 6.7). Mean BMI was 34.2 (SD7.2) and participants average HbA1c level was (66.3) (SD18.3). Again these levels are out with the suboptimal range of 48-58 mmol as recommended byDiabetes UK (2013a).80.6% of participants reported having another chronic illness and 19.6% did not. For other demographic data on Dataset 2 see Table 10.4 Appendix F.

Table 7.1Demographic Data Dataset 1

Demographic Data	Mean	SD	%	N		Mean	SD	%	N
Sex				78	***Smoking Status***				
Female			50	39	Smoker			12.8	10
Male			50	39	Never Smoked			70.5	55
					Ex Smoker			16.7	13
Age	63	10.8	50	39					
					Diabetes	13.5	6.3		
Age Groups					1-5			10.3	8
30-45			9	7	6-10			24.4	19
46-55			14.1	11	11-15			25.6	20
56-65			37.2	29	16-20			19.2	15
66-75			29.5	23	>20			20.5	16
76-85			9	7					
86 and above			1.3	1	***BMI Range***	34.1	7.2		
					<18.5			1.3	1
Ethnicity					18.5-24.9			6.4	5
British			93.6	73	25.0-29.9			23.1	18
Other			6.4	5	>30			69.2	54
Marital Status					***HbA1c Levels***	65.4	18		
Single			12.8	10	<48 mmol/mol			7.7	6
Married			55.1	43	48-59 mmol/mol			32.1	25
Widowed			21.8	17	60-69 mmol/mol			26.9	21
Divorced			10.3	8	70-80 mmol/mol			17.9	14
					>81 mmol/mol			15.4	12
Employment Status									
Employed			41	32	***Blood Pressure***				
Unemployed			3.8	3	≥91/65			15.4	12
Retired			55.1	43	≥120/80			16.7	13
					≥130/85			19.2	15
Co-morbidity					≥140/90			48.7	38
Other Chronic Illness			80.8%	63					
None			19.2	15					

7.3 Scale Scores

Participants from Dataset 1 mean score for HVP1 was 17.5 (SD 3.8). A similar mean score 17.2 (SD 3.9) was seen in HVP2. Correspondingly, participants in Dataset 2 mean score in HVP1 was 17.4 (SD 3.8) and their mean score for HVP2 was 17.1 (SD 3.7). These results demonstrate that participants average health value score pre and post-diagnosis of Type 2 Diabetes were the same with very similar standard deviations. The standard deviations are low which indicates homogeneity of the sample's answers. The mean scores for HVP1 and HVP2 demonstrate a moderate to high health value score. The scoring of the scale was adjusted as required due to the removal of items 5 and 6. Thus scores ranged from minimum 6-12, moderate to high 12-18, very high 18-24.

Scores for the instrumental and terminal health value subscales were also comparable. Dataset 1's terminal health value scores pre-diagnosis (HVP1) had a mean of 9.5 (SD 2.1) and post-diagnosis (HVP2) mean scores were 9.2 (SD 2.4). Respectively, Dataset 2 demonstrated that terminal health value scores averaged at 9.4 (SD 2.3) pre-diagnosis and 8.9 (SD 2.6) post-diagnosis. Dataset 1's instrumental health value scores pre-diagnosis have a mean of 7.9 (SD 2.8) and 7.9 (SD 2.6) post-diagnosis. Dataset 2's mean instrumental health value score pre-diagnosis was 8 (SD2.7) and post-diagnosis 8 (SD 2.5). Mean scores were considered moderate to high for terminal and instrumental health value scores in Part 1 and Part 2 and for both datasets. Again scoring for the instrumental and terminal subscales were adjusted as required due to removing items 5 and 6. Thus Scores ranged from minimum 6-8, moderate to high 8-10, very high 10-12. No significant change is seen in either Dataset 1 or Dataset 2 (D2) in regards to how people value their health pre or post diagnosis of Type 2 diabetes. This will be explored further within the discussion section of this thesis.

Scores from the Perceived Diabetes Self-management Scale (PDSMS) indicate that participants mean score 29.8 (SD 5.3) (Dataset 1) (D2 29.3, SD 5.3) have 'moderate to high' levels of self-efficacy.

The Multi-Dimensional Health Locus of Control Scale (Form C) results are reported as five subscales. IHLCscores averaged at 28.5 (SD 6.11) (Dataset 1) (D2 27.8, SD 5.7). These scores demonstrate High IHLC. Scores range from 6-16 which are considered low IHLC, scores of 17-26 are a moderate level of IHLC and scores between 27-36 indicate high IHLC. Participants average scores for the other four scales were Chance 15.1 (SD 6.8) (Dataset 1) (D2 15.5, SD 6.9), Powerful Others 25.6 (SD 6.5) (Dataset 1) (D2 25.2, SD 5.2), Doctors 15.3 (SD 2.4) (Dataset 1) (D2 14.9, SD 2.7) and Other People 10.2 (SD 4) (Dataset 1) (D2 10.4, SD 3.9). These scores suggest that although participants are high on IHLC, the powerful others scale scores indicate that participants believe that doctors and other people influence their ability to manage their diabetes.

The Summary of Diabetes Self-Care Activities Measure demonstrates how effective participants are at carrying out certain health behaviours that influence diabetes management. It is reported through 5 subscales, which measure on average how many days a week these behaviours are carried out. Participants mean score for general diet Dataset 1 was 4.9 (SD 1.7) (D2 4.7, SD 1.8) and for Specific Diet the mean scores for Dataset 1 were 4.1 (SD 1.5) (D2 4, SD 1.5). Exercise mean scores for Dataset 1 were 2.9 (SD 2.4) and for Dataset 2 2.8 (SD 2.4). Blood sugar testing was carried out on an average of 5.7 days (SD 2.1) (Dataset 1) (D2 5.4 days, SD 2.3). Foot Care activities were carried out on average 3.4 days a week (SD 2.4) (Dataset 1) (D2 3.4 days per week, SD 2.4). The last two items of the SDSCA refer to smoking status. 87.2% Dataset 1 (88% Dataset 2) have not smoked in the last seven days. The mean number of cigarettes smoked in the last seven days were 1.4 (SD 4.3) (Dataset 1) (D2 1.7, SD 4.8).

The HAD scale was used to assess for and describe anxiety and depression levels within the sample. These results will not be included within the regression analysis due to the principal aims of testing MSLT that do not necessitate these results. It is noted that 57.7% of participants scored within the normal range on the anxiety subscale and 65.4% scored within the normal range on the depression subscale Dataset 1 (D258.9% normal ANX, 65.4% normal DEP). However a substantial number of people have mild to moderate anxiety Dataset 1 mild: 20.5% (D2

20.6%),Dataset 1 moderate: 16.7% (D2 15%) and depression Dataset 1 Mild: 17.9% (D2 18.7%) Dataset 1 moderate: 12.8% (D2 2.1%). The percentage of participants with severe anxiety (D1 5.1%, D2 5.6%) and depression (D1 3.8%, D2 3.7 %) was low. See Table 7.2 for scale scores of Dataset 1 and Table 10.5 Appendix F forDataset 2.

Table 7.2 Scale Scores Dataset 1

Health Value Scales	**Mean**	**SD**	**% Yes**	**% No**	**N**
Health Value Part 1	17.5	3.8			78
Health Value Part 2	17.2	3.9			78
Health Value Part 1 Terminal Items	9.5	2.1			78
Health Value Part 1 Instrumental Items	7.9	2.8			78
Health Value Part 2 Terminal Items	9.2	2.4			78
Health Value Part 2 Instrumental Items	7.9	2.6			78
PDSMS	29.8	5.3			78
MHLC Subscales					
Internal	28.5	6.11			78
Chance	15.1	6.8			78
Powerful Others	25.6	5			78
Doctors	15.3	2.4			78
Other People	10.2	4			78
SDSCA Subscales					
General Diet	4.9	1.7			78
Specific Diet	4.1	1.5			78
Exercise	2.9	2.4			78
Blood Sugar	5.7	2.1			78
FootCare	3.4	2.4			78
SDSCA Smoking Status					
% smoked a cigarette in last 7 days			87.2	12.8	78
Cigarettes smoked per day	1.4	4.3			
HAD Range of Scores	**Anxiety %**	**Depression %**			
0-7 Normal	57.7	65.4			78
8 - 10 Mild	20.5	17.9			78
11 - 14 Moderate	16.7	12.8			78
15 - 21 Severe	5.1	3.8			78

7.4 Testing the Assumption of Normality

7.4.1 Normality Dataset 1

Normality was inspected visually through analysis of histograms and P-P plots of the main independent variables and dependent variables that will be used in the hierarchical multiple regression (HMR) analyses. The independent variables include the summed scores of HVP2, the PDSMS, the Internal subscale from the MHLC and the dependent variables consist of the 5 subscales from the SDSCA. Below the normality assumption is explored within Dataset 1, n=78.

HVP2 demonstrates a distribution that is negatively skewed -.364 and kurtosis value of -.336. The histogram illustrates a bimodal distribution. 14.1% of participants scored 14 and 14.1% scored 20 on the HVP2 questionnaire. The P-P Plot again indicates deviations from normality.

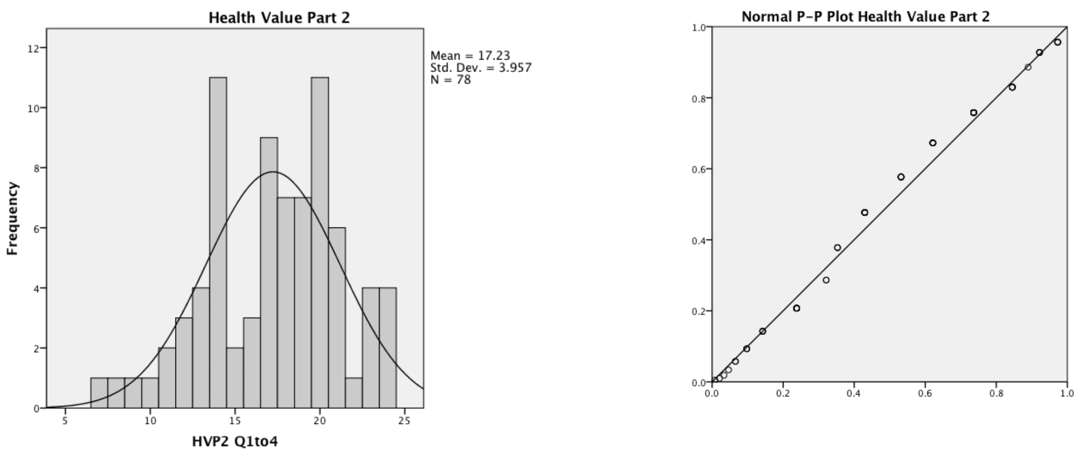


Figure 7.1 Health Value Part 2 Histogram and PP Plot D1

The Internal subscale of the MHLC is negatively skewed -.831 (kurtosis value of .9). There also appears to be an outlier near to 0 which required further investigation (See section 7.4.3). The P-P Plot demonstrates deviations from normality.

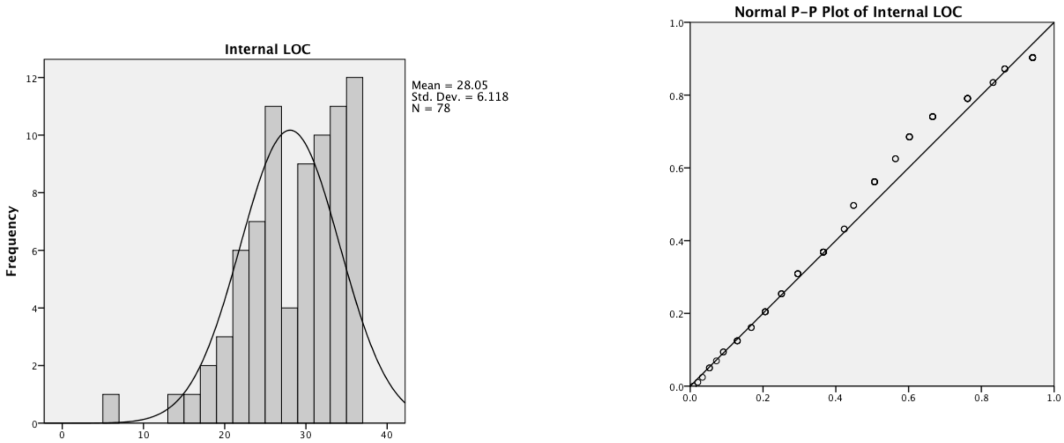


Figure 7.2 Internal LOC Histogram and PP Plot D1

The PDSMS scores are slightly positively skewed .218 (kurtosis value of -.561). This is evident from the P-P Plot and histogram also.

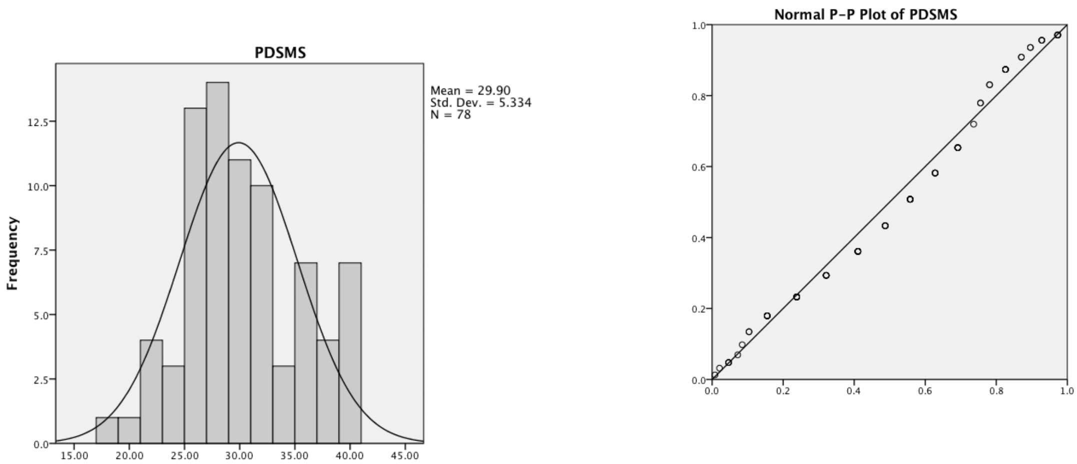


Figure 7.3 PDSMS Histogram and PP Plot D1

The scores for the SDSCA subscales are seen to deviate from the assumption of normality except for scores on foot care. General Diet has a negatively skewed distribution (skewness -.938, kurtosis .512), Specific Diet has a negatively skewed distribution with a skewness of -.899 and kurtosis value of .807. General diet and Specific Diet appear to have outliers. Specific Diet is multimodal. 15.4% of participants followed a specific diet for four days, 15.4% for 4.5 days and 15.4% for 5 days out of a week. Exercise is relatively normal with a slight positive skew of .268 and kurtosis value of -1.198. Blood sugar values are negatively distributed with a skew value of -1.4 and kurtosis value of .874. Foot Care is the most normal distribution with a skewness value of .030 and a kurtosis value of -1.198 this is also evident from viewing the bell curve of the histogram and the line of values on the P-P plot. All histograms and P-P Plots for the five subscales are displayed below.

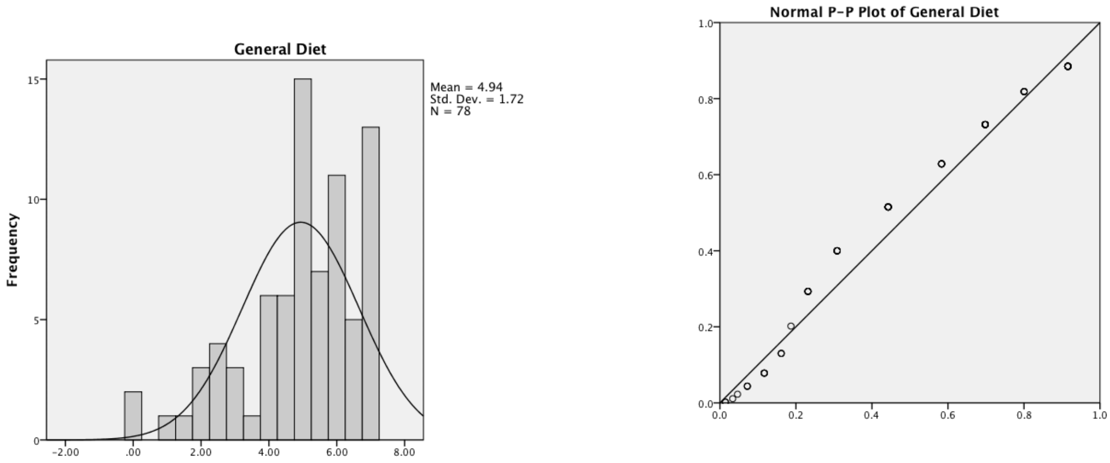


Figure 7.4 General Diet Histogram and PP Plot D1

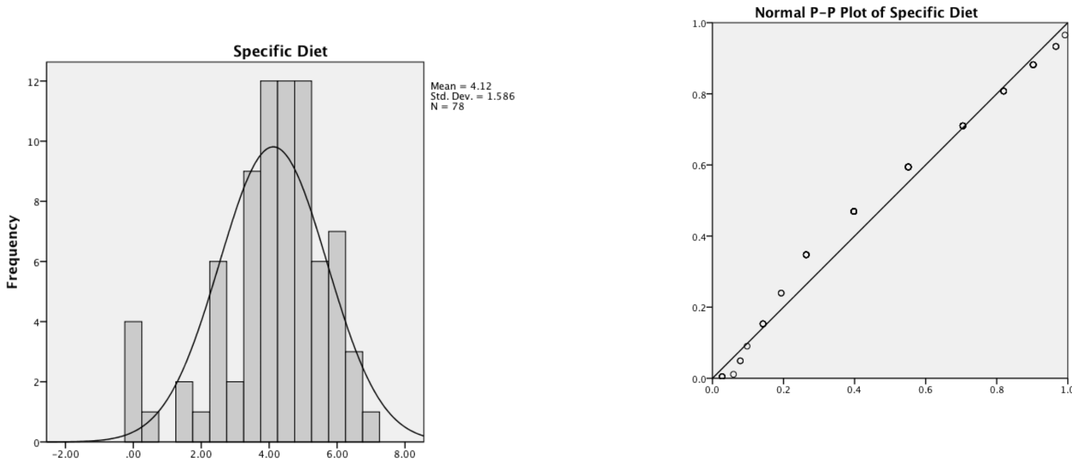


Figure 7.5 Specific Diet Histogram and PP Plot

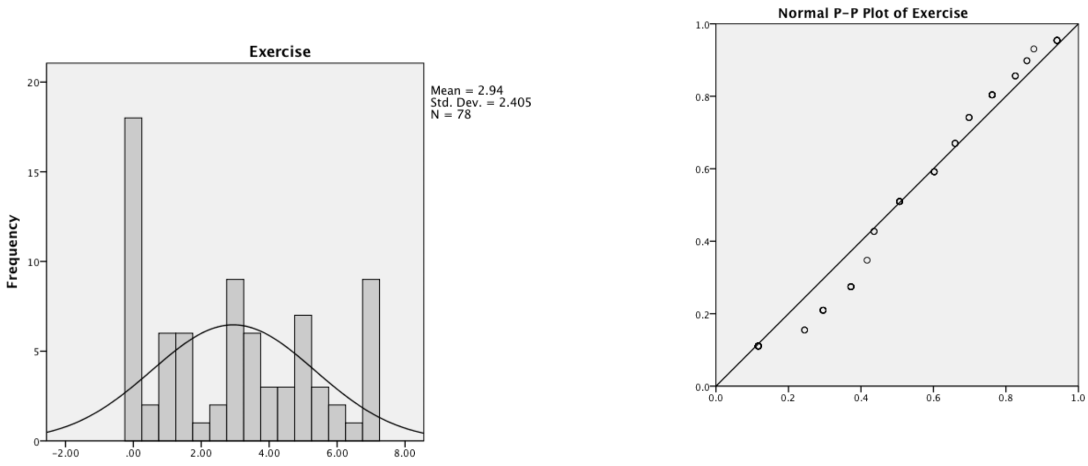


Figure 7.6 Exercise Histogram and PP Plot D1

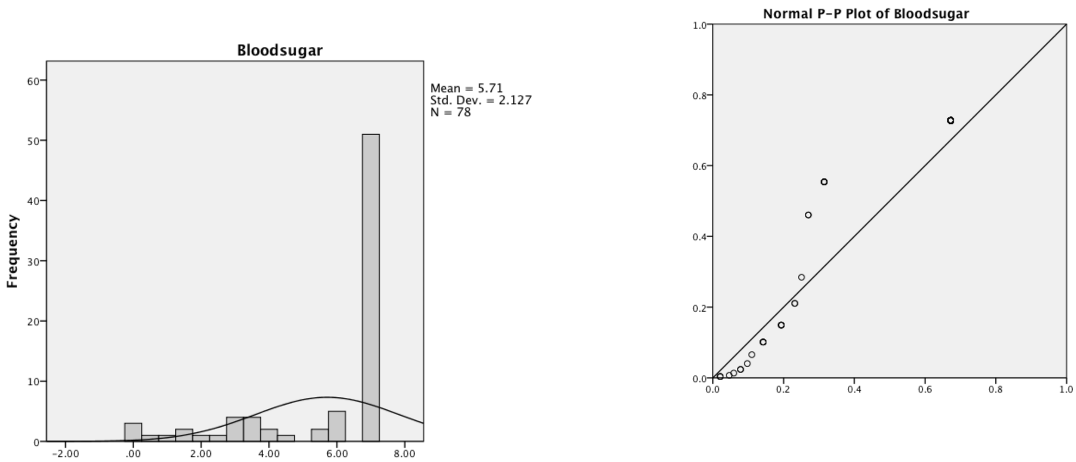


Figure 7.7 Blood Sugar Histogram and PP Plot D1

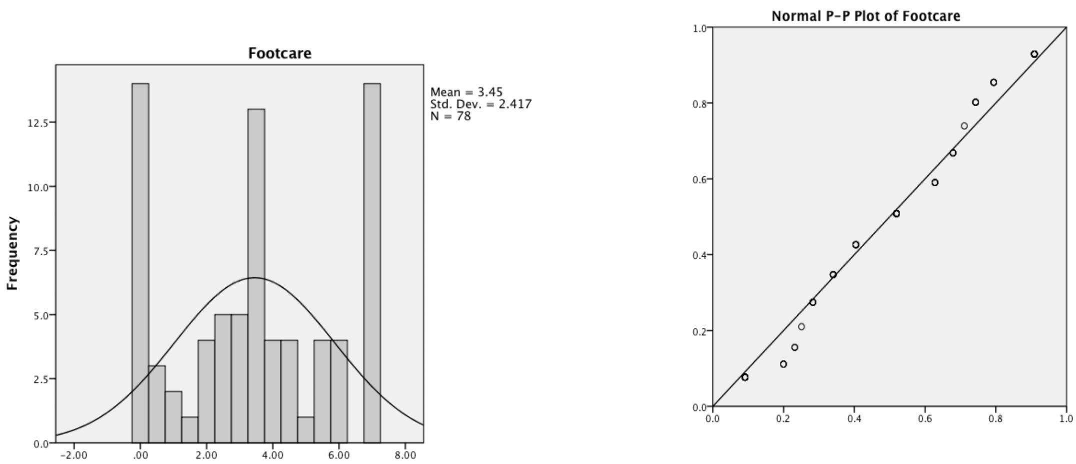


Figure 7.8 Footcare Histogram and PP Plot D1

7.4.2 Normality Dataset 2

HVP2 scores are negatively skewed -.307 (kurtosis -.321) this is indicative of Dataset1. The skewness and deviations from normality are apparent in the histogram and P-P Plot below. Dataset 2 HVP2 is also bimodal with 14% scoring 14 and 14% scoring 20.

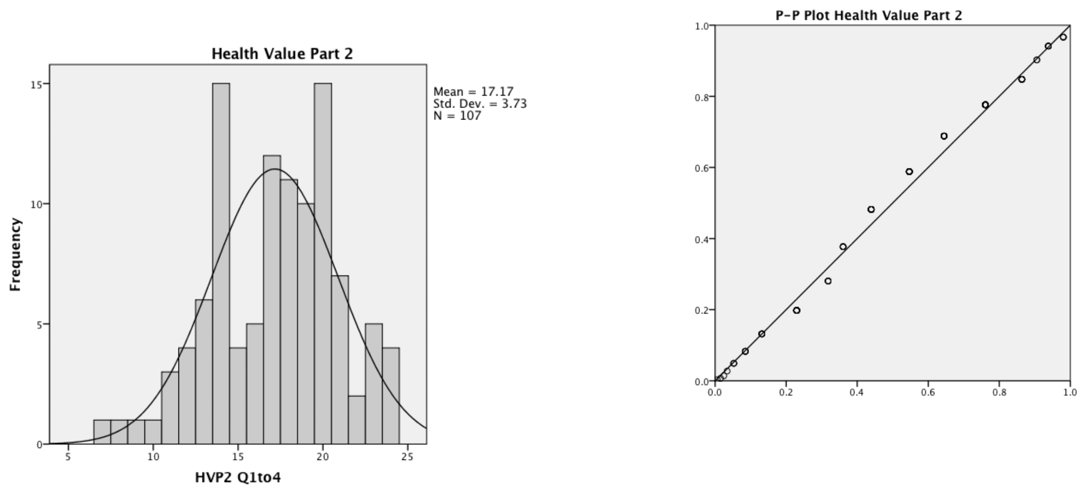


Figure 7.9 Health Value Part 2 Histogram and PP Plot D2

The IHLC scores are negatively skewed -.728 and have a kurtosis value of .855. Again the histogram as seen in Dataset 1 depicts an outlier close to zero that will be investigated further in section 7.4.3. The P-P Plot demonstrates data that deviate from normality.

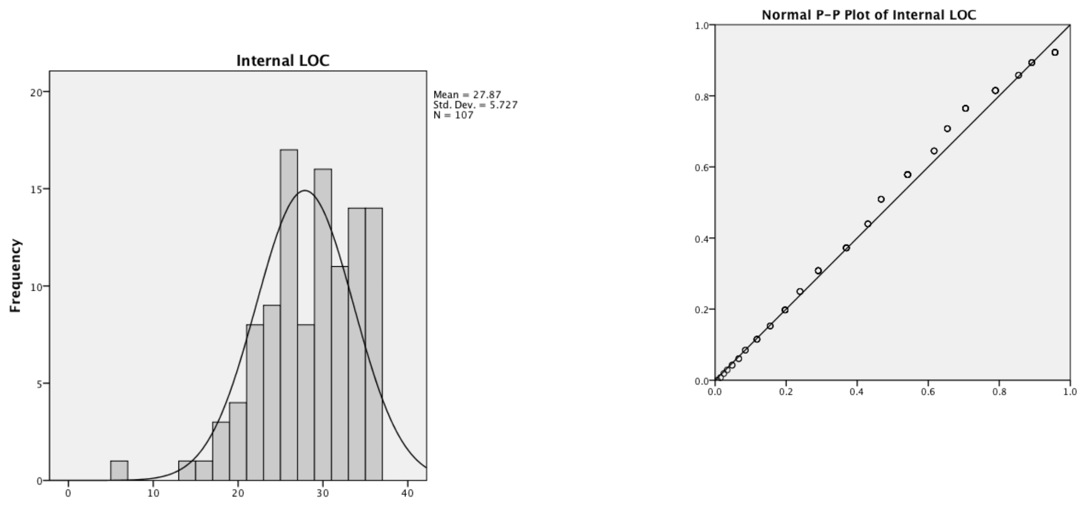
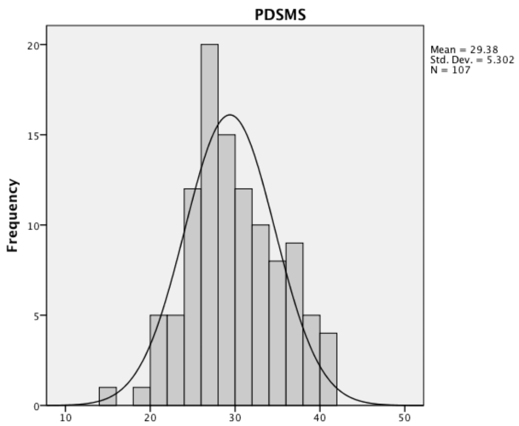


Figure 7.10 Internal LOC Histogram and PP Plot D2

The PDSMS scores are positively skewed .134 (Kurtosis -.331). This is evident from the histogram and P-P Plot. There also appears to an outlier within these scores that was not evident in Dataset 1. The significance of this will be tested through calculation of z-scores.



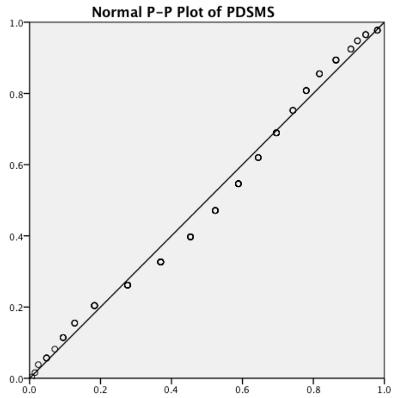


Figure 7.11 PDSMS Histogram and PP Plot D2

The SDSCA subscale scores from Dataset 2 demonstrate similar assumptions for normality as Dataset 1. This similarity is evident in the skewness and kurtosis of the distributions and through visual inspection of the histograms and P-P Plots. General Diet is negatively skewed -.776 (kurtosis -.043). From the histogram of General diet there appears to be no outlier, this is different to the histogram for Dataset 1. Perhaps this outlier was created in dataset 1 due to the deletion of cases with missing values. This will be investigated through an examination of z-score significance. Specific Diet is negatively skewed -.757 (kurtosis value .682). This is similar to Dataset 1 and there are obvious outliers displayed on the histogram, which is also indicative of Dataset 1. Exercise is positively skewed .346 (kurtosis -1.217). Blood sugar scores deviate from normality and are negatively skewed -1.156 and have a kurtosis value of -.251. Foot Care as seen in Dataset 1 can be considered the most normally distributed subscale with a skew of .044 (kurtosis -1.213). All histograms and P-P Plots for the five subscales are displayed below.

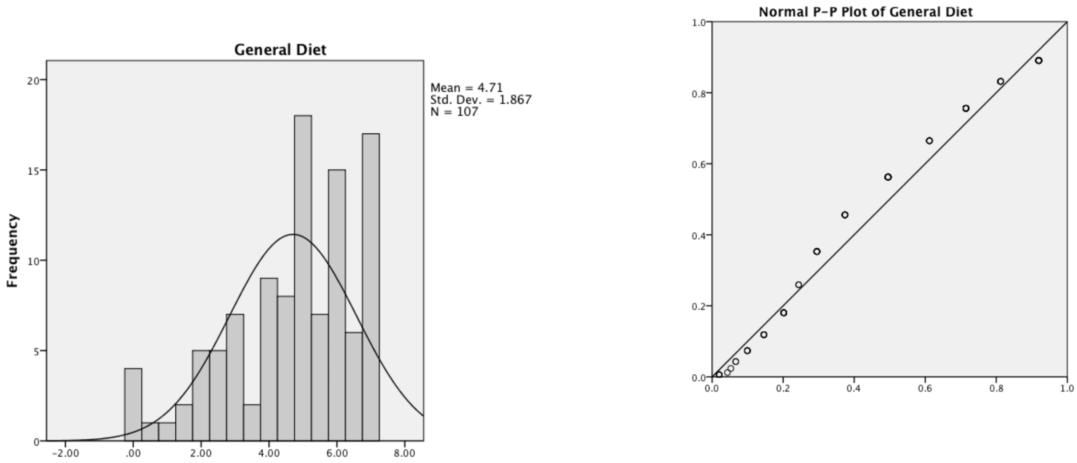


Figure 7.12 General Diet Histogram and PP Plot D2

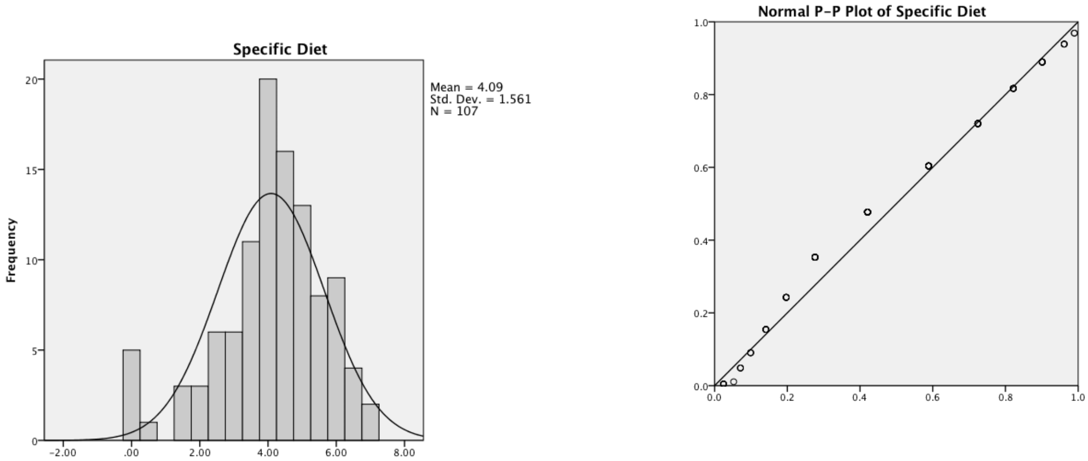


Figure 7.13 Specific Diet Histogram and PP Plot D2

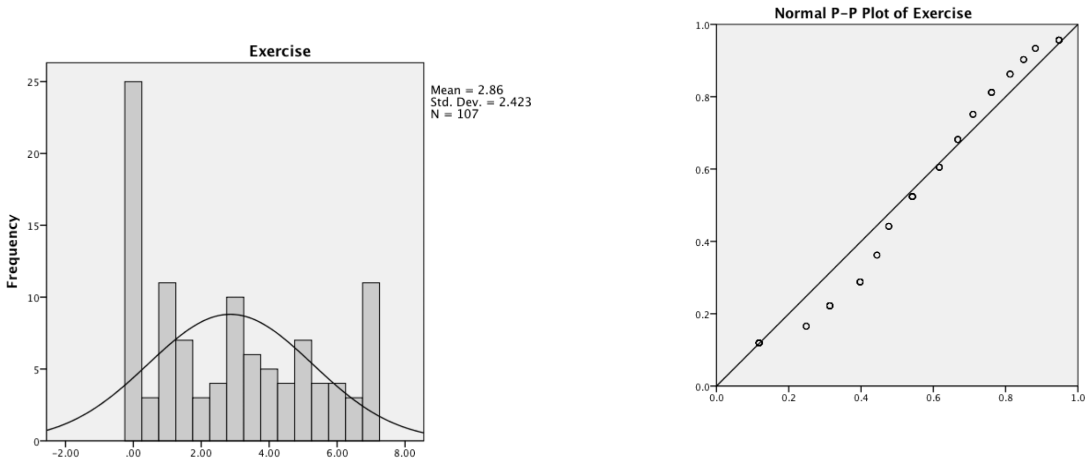


Figure 7.14 Exercise Histogram and PP Plot D2

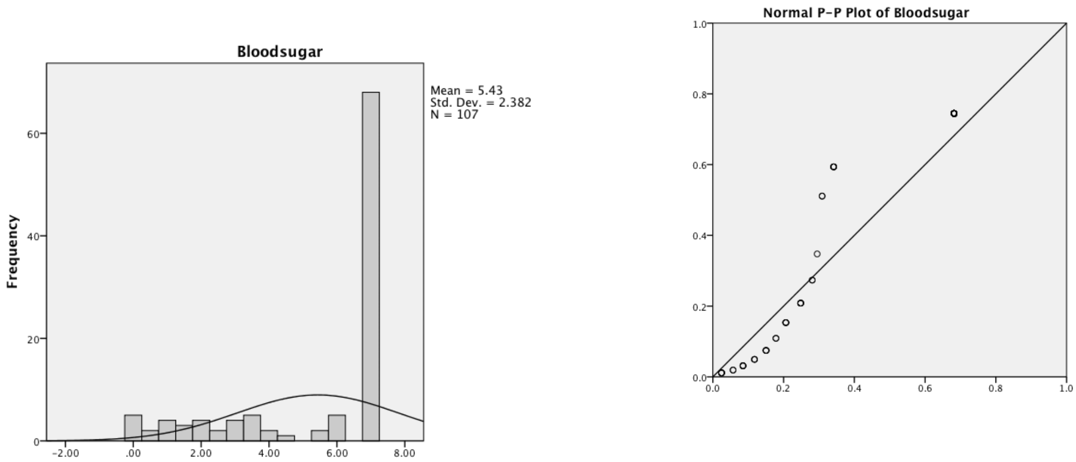


Figure 7.15 Bloodsugar Histogram and PP Plot D2

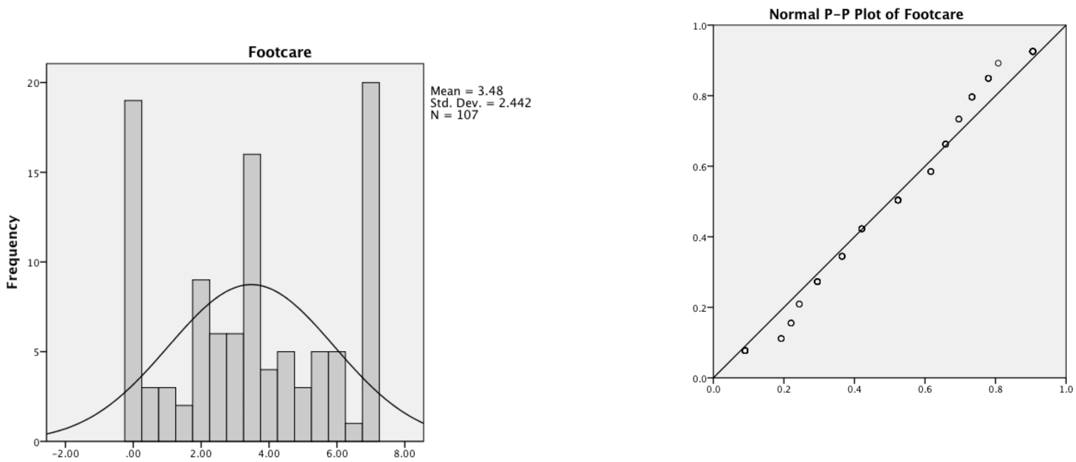


Figure 7.16 Footcare Histogram and PP Plot D2

7.4.3 Z-scores

Table 7.3 and 7.4 demonstrate the calculated z-scores of Dataset 1 and Dataset 2. The scales that are included in the tables are the independent and dependent variables that will be used in the HMRanalyses.

Table 7.3 Skewness and Kurtosis z-scores Dataset 1

Scale	Skewness	zSkewness	SIG	Kurtosis	zKurtosis	SIG
HVP2	-.364	-1.3	NS	-.338	-.62	NS
Internal LOC	-.831	-3.05	p < .01	.9	1.67	NS
PDSMS	.218	.8	NS	-.561	-1.04	NS
General Diet	-.938	-3.4	p < .001	.512	.95	NS
Specific Diet	-.899	-3.3	p < .001	.807	1.5	NS
Exercise	.268	.98	NS	-1.198	-2.2	p<.05
Blood Sugar	-1.475	-5.4	p < .001	.874	1.6	NS
Foot Care	.03	.11	NS	-1.148	-2.13	p<.05
Significance: Value > or < 1.96 sig p < .05, Value > or < 2.58 sig p < .01, Value > 3.29 sig p < .001, NS= Not Significant						

Table 7.4 Skewness and Kurtosis z Scores Dataset 2

Scale	Skewness	zSkewness	SIG	Kurtosis	zKurtosis	SIG
HVP2	-.307	-1.3	NS	-.321	-.69	NS
Internal LOC	-.728	-3.11	p < .01	.855	1.84	NS
PDSMS	.134	.57	NS	-.331	-.71	NS
General Diet	-.776	-3.31	p < .001	-.43	-.09	NS
Specific Diet	-.757	-3.23	p < .01	.682	1.47	NS
Exercise	.346	1.47	NS	-1.217	-2.6	p<.01
Blood Sugar	-1.156	-4.9	NS	-.251	-.54	NS
Foot Care	.044	.18	NS	-1.213	-2.61	p<.01
Significance: Value > or < 1.96 sig p < .05, Value > or < 2.58 sig p < .01, Value > 3.29 sig p < .001, NS= Not Significant						

The Internal LOC subscale z-score for skewness Dataset 1 is 3.05, p<.001 and z-skewness 3.11, p<.001 for Dataset 2. The outlier was identified from the histogram and frequency output in both datasets in SPSS as being a single score of 6. Data entry was reviewed to ensure a mechanical error was not made. This was confirmed and decided that the outlier would not be removed or changed as the z-scores for skewness are below the upper threshold for skewness which is 3.29, p<.001 (Field, 2009). Additional diagnostic tests such as Cook's Distance are used during regression analysis to justify this decision (see section 7.4.4).

General Diet was identified as having outliers with a z-score for skewness in Dataset 1 of 3.4, $p<.001$ (D2 z-skewness 3.31, $p<.001$) and Specific Diet Dataset 1 had a z-score for skewness of 3.3, $p<.001$ (D2 z-skewness 3.23, $p < .001$). The z-skewness scores for Specific Diet in Dataset 2 were below the upper threshold of 3.29, $p<.001$. The outliers were identified in the frequency output and histogram from SPSS and it was clear that this was due to participants scoring a zero for the amount of days that they followed a general healthy eating plan or a specific diet plan. For this reason these outliers will be left unchanged as removing them would bias and alter the data. This is further justified when recognising that there was an increase in skewness in Dataset 1 as a result of removing cases with missing Data from the dataset. In order to ensure the validity of this decision Cook's Distance will be used in the regression analysis to ensure that the outliers are not having a significant impact on the regression model(Field, 2009).

Furthermore, Blood Sugar was found to have a z-score for skewness of -5.4, $P < .001$ Dataset 1(D2 z-skewness 4.9 $P < .001$). Individual blood sugar scores can vary immensely and due to the clinical reasoning for carrying out a blood sugar test it would be very difficult to obtain a normal curve for this data with a sample population. As a result theseoutliers were not changed and as previously stated the assumption of normality will be tested within the regression analysis.

The z-scores for kurtosis of exercise and foot care in Dataset 1 and Dataset 2 indicate significant kurtosis at $p<.05$ and $p<.01$ however these scores are below the upper threshold of 3.29, $p<.001$ and therefore will be left unaltered.

7.4.4 Cook's D

All cases within each dataset were examined using Cook's D and were found to be <1. This resultfurther justifies the decision not to remove outliers that were identified through an inspection of normality and through calculation of z scores, as itindicates that the remaining outliers are not significantly impacting on the regression model.

7.5 Meeting assumptions of no Multicollinearity

The correlation matrices for all five subscales of the dependent variable were examined for multicollinearty. None of the predictor variables correlated highly. Correlations above .80 or .90 are considered to be multicollinear (Field, 2009).

All VIF values for all ten-regression analyses were below ten and all Tolerance values were above 0.1. It was noted that the highest average VIF value was 1.3 in Dataset 1 and 1.2 in Dataset 2. This indicates there may be some collinearity present. Taking into account that the predictor variables were centred and the correlation matrices show no multicollinearity this was not investigated further.

7.6 Correlation

Table 7.5 Dataset 1 and Table 7.6 Dataset 2 display the correlations among the demographic, independent and dependent variables that will be included in the HMR analyses.

Results showed that HbA1c was significantly correlated with age in Dataset 2 ($r = -.26$, $p<.01$) (Dataset 1, $r = -.21$, NS) this demonstrates that older participants were more likely to have lower HbA1c levels. Age was positively correlated with blood sugar testing in Dataset 1 ($r = .27$, $p<.05$) and Dataset 2 ($r = .29$, $p<.01$). This suggests that older participants check their blood sugars more regularly than their younger counterparts. Dataset 1 shows a moderate correlation with BMI and general diet ($r = -.34$, $p<.01$)(D2 $r = -.18$, NS). This correlation indicates that asadherence to a general diet decreases, BMI increases. In Dataset 2 years since diagnosis indicates a positive moderate correlation with blood sugar testing ($r = .21$, $p<.05$) (Dataset 1, $r = .2$, NS) and foot care checks (Dataset 2, $r = .25$, $p<.01$) (Dataset 1, $r = .12$, NS). This suggests that the longer people are diagnosed with Type 2 Diabetes the more regular are their blood sugar checks and foot care checks.

Health value has a weak negative correlation with blood sugar in Dataset 2 ($r = -.21$ $p<.05$) (Dataset 1 $r = -.16$, NS). Health Value showed a weak and non-significant correlation with HbA1c Dataset 1 ($r = .01$, NS) Dataset 2 ($r = -.04$, NS). Internal Health Locus of Control shows a weak relationship with HbA1c Levels (Dataset 1, r

= -.01, NS) (Dataset 2 r = -.03, NS). However, Internal Health Locus of Control has a weak but significant correlation with exercise in Dataset 2 (r = -.16, p<.05) (Dataset 1, r = .1, NS). The construct of self-efficacy is represented by scores from the PDSMS and is shown to have a strong positive correlation with general diet (Dataset 1 r = .51, p<.01) (Dataset 2 r = .5, p<.01). This correlation indicates that having good levels of self-efficacy in management of Type 2 Diabetes results in greater adherence to a general healthy eating diet. Furthermore, self-efficacy is weakly but significantly correlated with specific diet in Dataset 2(r = .19, p<.01)(Dataset 1 r = .11, NS). Self-efficacy shows a moderate to strong negative correlation with HbA1c levels in Dataset 1 and 2(D1 r = -.42, p<.01)(D2 r = -.38, p<.01) which demonstrates that participants who have moderate levels of self-efficacy are more likely to have lower HbA1c levels.

Correlations between predictor variables for both datasets were non-significant.

Dataset 1	Dataset 2
Internal LOC and SE (r = .067, NS)	Internal LOC and SE (r = -.016, NS)
Internal LOC and HV (r = .003, NS)	Internal LOC and HV (r = .052, NS)
SE with HV (r = -.035, NS)	SE with HV (r = -.006, NS)

Table 7.5 Correlation Matrix of Study Variables Dataset 1

D1 N=78	General Diet	Specific Diet	Exercise	Blood Sugar	Foot Care	HbA1c
Age	.15	.13	.13	.27*	.15	-.21
BMI	-.34**	-.01	-.21	.01		-.05
Years diagnosed	.03	-.13	.11	.2	.12	-.05
HVP2	.08	.1	-.01	-.16	.11	.01
Internal LOC	.01	.04	.1	-.04	-.13	-.01
PDSMS (SE)	.51**	.11	.08	.09	.12	-.42**

Demographic variables Age, BMI, Date Since Diagnosis, * Correlation is sig at the 0.05 level (2-tailed), ** Correlation is sig at the 0.01 level (2-tailed). Independent Variables * Correlation is sig at the 0.05 level (1-tailed), ** Correlation is sig at the 0.01 level (1-tailed).

Table 7.6 Correlation Matrix of Study Variables Dataset 2

D2 N=107	General Diet	Specific Diet	Exercise	Blood Sugar	Foot Care	HbA1c
Age	.07	.06	.16	.29**	.17	-.26**
BMI	-.18	-.01	-.21*	.07	.04	-.02
Years diagnosed	.1	-.02	.09	.21*	.25**	.01
HVP2	.03	.07	.04	-.21*		-.04
Internal LOC	-.02	-.02	-.16*	-.03	-.07	-.03
PDSMS (SE)	.5**	.19**	.02	.15	.05	-.38**

Demographic variables Age, BMI, Date Since Diagnosis, * Correlation is sig at the 0.05 level (2-tailed), ** Correlation is sig at the 0.01 level (2-tailed). Independent Variables, * Correlation is sig at the 0.05 level (1-tailed), ** Correlation is sig at the 0.01 level (1-tailed).

7.7 Hierarchical Multiple Regression Analyses

Each SDSCA subscale used for HMRanalyses is interpreted independently and compared with the other Dataset. Collaborative conclusions on all ten subscales are then made. The tables of results of HMR analyses of Dataset 1 are presented in this chapter. Appendix F contains the tables of results of HMR analyses of Dataset 2 (See Tables 10.6-10.10).

7.7.1 General diet

The variables BMI and HbA1c have a negative and significant relationship with general diet (BMI β = -.334 P < .01) (HbA1c β = -.242 P < .05) in block 1 of the HMR General Diet Subscale for Dataset 1. This would be expected because as the following of a general diet increases, levels of BMI and HbA1c decrease. These results are consistent with earlier correlations. Similarly, Block 1 of General Diet Subscale for Dataset 2 shows HbA1c levels to have a negative and significant relationship. However, this is not the same for BMI levels. Block 4 Dataset 1 demonstrates a negative significant relationship with BMI levels (BMI β = -.231 P < .05).

When the three individual predictor variables were added to the regression analysis in Block 2 self-efficacy is seen to be the only significant predictor variable of General Diet. This is apparent in both datasets. There was a significant increase in R^2 Block 2 Dataset 1(β = .419 P < .01, ΔR2 .137 P < .01) and Block 2 Dataset 2(β = .515 P < .001, ΔR2 .201 P < .001). Self-efficacy Block 2 accounts for 32.5% (R^2 = .325) of variance in predicting the outcome variable for maintaining a general diet in Dataset 1 and 28.4% (R^2 = .284) of variance in Dataset 2. Self-efficacy has significant beta values for both Datasets in block 2, 3 and 4 (Block 4 Dataset 1, SE β= .400, P < .01) (Block 4 Dataset 2, SE β= .499, P < .001).

The addition of the two-way interaction variables to Block 3 show a non-significant change in R^2 in both datasets. Block 4 of both datasets also demonstrates a non-significant change in R^2 following the inclusion of the three-way interaction variable. However, self-efficacy beta values remain significant throughout all 4 Blocks in both Datasets. This illustrates that self-efficacy is the only contributing predictor variable to general diet outcomes.

7.7.2 Specific diet

Specific Diet Subscales for Dataset 1 and Dataset 2 show a significant change in R^2 in Block 4 (Dataset 1,$\Delta R2 = .069$, $P < .05$) (Dataset 2, $\Delta R2$ .055, $P < .05$). The three-way interaction variable HV x IHLC x SE accounts for 20.8% ($R^2 = .208$) of the variance in predicting the outcome behavior of maintaining a specific diet in Dataset 1 and 16.9% ($R^2 = .169$) of variability in Dataset 2.

The two-way interaction variable IHLC x SE has a positive significant relationship with Specific Diet in both Datasets (Dataset 1, $\beta = .274P < .05$) (Dataset 2, $\beta = .231P < .05$). IHLC x HV has a positive significant relationship with Specific Diet in Dataset 2 ($\beta = .224P < .05$) (Dataset 1, $\beta =253$, NS). Furthermore, it is important to point out that the beta values in both datasets for the two-way interaction variables of IHLC x SE and IHLC x HV are quite similar in value indicating that as a two-way construct they are of an equal level of importance when predicting adherence to a specific diet.

7.7.3 Exercise

There was no significant change in R^2 in any of the four blocks in either Dataset. However, it is noted that in Block 3 Dataset 2 (N=107) BMI and IHLC have significant beta values. BMI again as with general diet has a negative relationship with exercise ($\beta = -.223P < .05$). This would be expected because as levels of exercise increase BMI would decrease. Interestingly IHLC is the only predictor variable to have a significant beta value (Dataset 2, $\beta = .228P < .05$). It also has a positive relationship with exercise. The higher the IHLC the more exercise that is carried out.

7.7.4 Blood sugar

Age appears to have a strong positive significant relationship with Blood Sugar measurement. As age increases so does the number of times blood sugar is checked. Dataset 1 (N=78) shows age to have a significant beta value in Block 1 only ($\beta =$

.262,P < .05). However, Dataset 2 shows age to have significant beta values throughout all four blocks.

When the three-way predictor variable was added to Block 4 a significant change was seen in R^2 Dataset 1(β = -.292P < .05, $\Delta R2$ .055P < .05) and Dataset 2 (β = -.222.P < .05, $\Delta R2$ .038P < .05). The three-way predictor variable accounts for 20.8% (R^2 = .208) of variance for predicting the outcome of blood sugar checking in Dataset 1 and 24% (R^2 = .240) in variability in Dataset 2.

7.7.5 Foot care

The foot care subscale shows no significant change in R^2. The only significant beta value seen is years since diagnosis in Block 2 Dataset 2 (β =.212, P < .05) which has a positive relationship with foot care indicating that as years since diagnosis increase so does regular foot care checks.

Table 7.7 HMR General Diet Dataset 1

Predictors	*B*	*SE*	*β*	*df*	R^2	$\Delta R2$
Block 1						
Sex	-.338	.376	-.099			
Age	.005	.020	.030			
BMI	-.079	.026	-.334**			
HbA1c	-.023	.010	-.242*			
Years since diagnosis	-.015	.032	-.055	72	.187**	
Block 2						
Sex	-.174	.361	-.051			
Age	-.006	.019	-.040			
BMI	-.058	.026	-.244			
HbA1c	-.007	.011	-.074			
Years since diagnosis	-.006	.030	-.022			
IHLC	-.009	.029	.031			
SE	-.135	.039	.419**			
HV	.048	.044	.112	69	.325**	.137**
Block 3						
Sex	-.204	.373	-.060			
Age	-.006	.020	-.036			
BMI	-.058	.027	-.244			
HbA1c	-.007	.011	-.072			
Years since diagnosis	-.005	.031	-.018			
IHLC	.009	.030	.031			
SE	.134	.040	.416**			
HV	.050	.048	.115			
IHLC x SE	.001	.005	.019			
IHLC x HV	.005	.007	.066			
HV x SE	.001	.008	.008	66	.329	.004
Block 4						
Sex	-.114	.374	-.033			
Age	-.005	.019	-.034			
BMI	-.055	.026	-.231*			
HbA1c	-.006	.011	-.063			
Years since diagnosis	.000	.031	.001			
IHLOC	-.004	.031	-.013			
SE	.129	.039	.400**			
HV	.069	.050	.160			
IHLC x SE	.003	.005	.069			
IHLC x HV	.010	.008	.149			
HV x SE	-.002	.008	-.027			
HV x IHLC x SE	-.002	.001	-.191	65	.353	.024

* P < .05, ** P < .01, *** P < .001.

Table 7.8 HMR Specific Diet Dataset 1

Predictors	*B*	*SE*	*β*	*df*	R^2	$\Delta R2$
Block 1						
Sex	.083	.369	.026			
Age	.027	.019	.188			
BMI	-.003	.026	-.014			
HbA1c	-.014	.010	-.155			
Years since diagnosis	-.054	.031	-.216	72	.082	
Block 2						
Sex	.053	.386	.017			
Age	.027	.020	.184			
BMI	-.002	.028	-.010			
HbA1c	-.013	.012	-.147			
Years since diagnosis	-.050	.032	-.203			
IHLC	.003	.031	.010			
SE	.006	.042	.021			
HV	.038	.047	.095	69	.091	.009
Block 3						
Sex	-.062	.389	-.020			
Age	.028	.020	.194			
BMI	-.004	.028	-.019			
HbA1c	-.012	.012	-.140			
Years since diagnosis	-.053	.032	-.215			
IHLC	-.003	.031	-.011			
SE	.004	.041	.015			
HV	.024	.051	.061			
IHLC x SE	.008	.005	.187			
IHLC x HV	.007	.008	.111			
HV x SE	.008	.008	.128	66	.139	.048
Block 4						
Sex	.080	.381	.025			
Age	.029	.020	.198			
BMI	.001	.027	.005			
HbA1c	-.001	.011	-.125			
Years since diagnosis	-.045	.031	-.182			
IHLC	-.022	.031	-.085			
SE	-.033	.040	-.012			
HV	.055	.051	.137			
IHLC x SE	.012	.006	.274*			
IHLC x HV	.016	.008	.253			
HV x SE	.004	.008	.068			
HV x IHLC x SE	-.003	.001	-.326*	65	.208*	.069*

P < .05, ** P < .01, *** P < .001.

Table 7.9 HMR Exercise Dataset 1

Predictors	*B*	*SE*	*β*	*df*	*R²*	*ΔR2*
Block 1						
Sex	-.644	.560	-.135			
Age	.026	.029	.116			
BMI	-.056	.039	-.170			
HbA1c	.010	.016	.075			
Years since diagnosis	-.030	.047	-.079	72	.081	
Block 2						
Sex	-.715	.583	-.150			
Age	.021	.030	.093			
BMI	-.066	.042	-.199			
HbA1c	.009	.017	.068			
Years since diagnosis	-.002	.048	-.057			
IHLC	.058	.047	.147			
SE	-.063	.063	-.007			
HV	.005	.071	.008	67	.101	.020
Block 3						
Sex	-.813	.597	-.170			
Age	.024	.031	.107			
BMI	-.066	.043	-.200			
HbA1c	.009	.018	.070			
Years since diagnosis	-.019	.049	-.050			
IHLC	.057	.048	.145			
SE	-.007	.063	-.015			
HV	.012	.078	.019			
IHLC x SE	.004	.008	.054			
IHLC x HV	.014	.012	.147			
HV x SE	.001	.012	.010	66	.121	.021
Block 4						
Sex	-.647	.594	-.135			
Age	.024	.031	.110			
BMI	-.060	.042	-.182			
HbA1c	.011	.018	.082			
Years since diagnosis	-.009	.049	-.025			
IHLC	.035	.049	.088			
SE	-.016	.063	-.036			
HV	.047	.079	.078			
IHLC x SE	.008	.009	.121			
IHLC x HV	.025	.013	.257			
HV x SE	-.003	.012	-.037			
HV x IHLC x SE	-.004	.002	-.252	65	.163	.041

P < .05, ** P < .01, *** P < .001.

Table 7.10 HMR Blood Sugar Dataset 1

Predictors	*B*	*SE*	*β*	*df*	*R ²*	*ΔR2*
Block 1						
Sex	.247	.490	.059			
Age	.051	.026	.262*			
BMI	.025	.035	.084			
HbA1c	.002	.014	.017			
Years since diagnosis	.040	.041	.120	72	.098	
Block 2						
Sex	.407	.508	.096			
Age	.051	.026	.259			
BMI	.034	.037	.116			
HbA1c	.006	.015	.053			
Years since diagnosis	.031	.042	.094			
IHLC	-.028	.041	-.080			
SE	.033	.055	.082			
HV	-.078	.062	-.145	69	.127	.029
Block 3						
Sex	.417	.518	.019			
Age	.048	.027	.243			
BMI	.036	.037	.122			
HbA1c	.008	.015	.068			
Years since diagnosis	.039	.043	.116			
IHLC	-.022	.042	-.062			
SE	.033	.055	.083			
HV	-.076	.067	-.141			
IHLC x SE	-.007	.007	-.114			
IHLC x HV	.008	.010	.090			
HV x SE	.001	.011	.013	66	.152	.025
Block 4						
Sex	.588	.511	.139			
Age	.048	.026	.247			
BMI	.042	.036	.143			
HbA1c	.010	.015	.082			
Years since diagnosis	.048	.042	.145			
IHLC	-.045	.042	-.128			
SE	.024	.054	.059			
HV	-.039	.068	-.072			
IHLC x SE	-.002	.007	-.036			
IHLC x HV	.019	.011	.218			
HV x SE	-.003	.011	-.040			
HV x IHLC x SE	-.004	.002	-.292*	65	.208*	.055*

P < .05, ** P < .01, *** P < .001.

Table 7.11 HMR Foot Care Dataset 1

Predictors	*B*	*SE*	*β*	*df*	*R²*	*ΔR2*
Block 1						
Sex	-.498	.571	-.104			
Age	.036	.030	.160			
BMI	.026	.040	.078			
HbA1c	.016	.016	.117			
Years since diagnosis	.021	.048	.054	72	.054	
Block 2						
Sex	-.376	.579	-.078			
Age	.035	.030	.157			
BMI	.052	.042	.155			
HbA1c	.027	.017	.200			
Years since diagnosis	.021	.048	.055			
IHLC	-.063	.047	-.160			
SE	.089	.062	.197			
HV	.092	.070	.151	69	.122	.067
Block 3						
Sex	-.418	.583	-.087			
Age	.031	.031	.137			
BMI	.049	.042	.146			
HbA1c	.028	.017	.211			
Years since diagnosis	.011	.048	.028			
IHLC	-.072	.047	-.181			
SE	.093	.062	.206			
HV	.048	.076	.078			
IHLC x SE	.008	.008	.124			
IHLC x HV	-.012	.012	-.128			
HV x SE	.016	.012	.172	66	.169	.647
Block 4						
Sex	-.381	.594	-.079			
Age	.031	.031	.138			
BMI	.050	.042	.150			
HbA1c	.029	.018	.214			
Years since diagnosis	.013	.049	.033			
IHLC	-.077	.049	-.194			
SE	.091	.063	.201			
HV	.056	.079	.091			
IHLC x SE	.009	.009	.139			
IHLC x HV	-.010	.013	-.103			
HV x SE	.015	.012	.161			
HV x IHLC x SE	-.001	.002	-.057	65	.171	.002

$P < .05$, ** $P < .01$, *** $P < .001$.

7.8 Three-way independent ANOVAs

The results for the three-way independent ANOVAs are reported in this section. Descriptive statistics and tests of between subjects effects are demonstrated in table format. The tables for the significant subscales from the HMR analyses(blood sugar and specific diet) are presented here only. For readability purposes the tables for the general diet, exercise and foot care subscales have been allocated to Appendix F.Compared means are reported first. Following on from this the F statistic for the three way interaction variable (HV*IHLC*SE) is reported for each subscale.

Means for the blood sugar subscale demonstrated that participants with Low HV and Low IHLC are highest in blood glucose testing regardless of their level of SE (Dataset 1 Ss for Low SE 6.65, SD .987High SE 6.50, SD 1.414) (Dataset 2 Ss for Low SE 6.46, SD 1.664 High SE 6.50, SD 1.323), while those with High HV and Low IHLC are lowest in blood glucose testing regardless of their level of SE (Dataset 1 Ss for Low SE 5.17, SD 2.634High SE 5.06, SD 2.364) (Dataset 2 Ss for Low SE 4.21, SD 2.848 High SE 4.31, SD 2.720) (See table 7.12). There was no statistical significance between groups as determined by the three way ANOVA for blood sugar (Dataset 1 $F(1,70) = .101$, NS) (Dataset 2 $F(1,99) = .475$, NS)(See table 7.13).

With specific diet, the High-High-High group had the highest mean score (Dataset 1 4.88, SD 1.157) (Dataset 2 4.90, SD 1.089) which is what MSLT predicts, this is minimally better than the mean score for the Low-Low-Low group (Dataset 1 4.77, SD 1.092) (Dataset 2 4.58, SD 1.592), the group that should have the lowest mean score(See table 7.14). There was no statistical significance between groups for specific diet (Dataset 1 $F(1, 70) = 2.032$, NS) (Dataset 2 $F(1,99) = 2.197$, NS) (See table 7.15).

The compared means for the general diet subscale show that participants with High HV, High IHLC and Low SE (Ss for Low SE Dataset 1 5.75, SD 1.035, Dataset 2, 4.82, SD 2.383) score a higher meanthan those with High SE(Ss for High SE Dataset 1 4.65, SD 1.796, Dataset 2 4.33, SD 1.543) (See Appendix F table 10.11). The Low-

Low-Low group overall has higher mean scores than the High-High-High group but only minimally so. Although the Low group is better than the High Group it is important to point out that those with High HV, Low IHLC, Low SE score higher than those in the Low group. Health value is seen to act as a moderator here. There was no statistical significance observed between groups for general diet Dataset 1 $F(1,70)=.876$, NS, Dataset 2 ($F(1,99) =.309$, NS (See Appendix F table 10.12).

The ANOVA results for the exercise and foot care subscale again show that the Low group has higher means (See Appendix F tables 10.13 for exercise and 10.15 for foot care). However, it is important to point out here that the general diet, exercise and foot care subscales were not significant for MSLT as suggested by the HMR results. There was no statistical difference shown between groups for the ANOVAs of Exercise and Foot care. Exercise, Dataset 1 $F(1,70) = .725$, NS, Dataset 2 $F(1,99) = 1.148$, NS (See Appendix F table 10.14). Foot care, Dataset 1 $F(1,70) = .725$, NS, Dataset 2 $F(1,99) = 1.148$, NS (See Appendix F table 10.16).

Table 7.12 ANOVA Blood sugar descriptive statistics

ANOVA			Dataset 1 N=78			Dataset 2 N=107		
Blood Sugar			**Mean**	**SD**	**N**	**Mean**	**SD**	**N**
Low HV	Low IHLC	Low SE	6.65	.987	13	6.46	1.664	13
		High SE	6.5	1.414	8	6.5	1.323	15
		Total	6.6	1.136	21	6.48	1.462	28
	High IHLC	Low SE	5.22	2.399	9	5.11	2.566	14
		High SE	6.06	1.629	9	6.23	1.506	11
		Total	5.64	2.035	18	5.6	2.198	25
	Total	Low SE	6.07	1.808	22	5.76	2.246	27
		High SE	6.26	1.501	17	6.38	1.381	26
		Total	6.15	1.663	39	6.07	1.881	53
High HV	Low IHLC	Low SE	5.17	2.634	9	4.21	2.848	12
		High SE	5.06	2.364	9	4.31	2.720	13
		Total	5.11	2.429	18	4.26	2.724	25
	High IHLC	Low SE	5.25	3.240	8	5.32	2.826	14
		High SE	5.5	2.102	13	5.27	2.382	15
		Total	5.4	2.518	21	5.29	2.558	29
	Total	Low SE	5.21	2.840	17	4.81	2.836	26
		High SE	5.32	2.169	22	4.82	2.543	28
		Total	5.27	2.449	39	4.81	2.662	54
Total	Low IHLC	Low SE	6.05	1.939	22	5.38	2.534	25
		High SE	5.74	2.055	17	5.48	2.331	28
		Total	5.91	1.970	39	5.43	2.406	53
	High IHLC	Low SE	5.24	2.734	17	5.21	2.651	28
		High SE	5.73	1.901	22	5.67	2.078	26
		Total	5.51	2.281	39	5.44	2.381	54
	Total	Low SE	5.69	2.322	39	5.29	2.573	53
		High SE	5.73	1.943	39	5.57	2.194	54
		Total	5.71	2.127	78	5.43	2.382	107

Table 7.13ANOVA Blood sugar tests of between subjects-effects

Blood Sugar	**Dataset 1 N=78**					**Dataset 2 N=107**				
Source	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**
Corrected model	28.567	7	4.081	.894	.516	74.305	7	10.615	1.993	0.63
Intercept	2430.192	1	2430.192	532.116	.000	3117.047	1	3117.047	585.292	.000
HV levels	14.108	1	14.108	3.089	.083	44.607	1	44.607	8.376	.005*
IHLC levels	2.143	1	2.143	.469	.496	.328	1	.328	.062	.805
SE levels	.790	1	.790	.173	.679	2.396	1	2.396	.450	.504
HV levels*IHLC levels	6.812	1	6.812	1.492	.226	22.645	1	22.645	4.252	.042*
HV levels * SE levels	.345	1	.345	.075	.784	2.054	1	2.054	.386	.536
IHLC levels * SE levels	2.143	1	2.143	.469	.496	1.424	1	1.424	.267	.606
HV levels * IHLC levels * SE levels	.462	1	.462	.101	.751	2.527	1	2.527	.475	.493
Error	319.692	70	4.567			527.237	99	5.326		
Total	2892.750	78				3761.750	107			
Corrected total	348.260	77				601.542	106			
	a.R Squared = .082 (Adjusted R Squared) = -.010				* P< .05	a.R Squared = .124 (Adjusted R Squared) = .062				* P< .05

Table 7.14 ANOVA Specific diet descriptive statistics

ANOVA			Dataset 1 N=78			Dataset 2 N=107		
Specific Diet			**Mean**	**SD**	**N**	**Mean**	**SD**	**N**
Low HV	Low IHLC	Low SE	4.77	1.092	13	4.58	1.592	13
		High SE	3.63	1.808	8	4	1.592	15
		Total	4.33	1.478	21	4.27	1.590	28
	High IHLC	Low SE	3.28	2.078	9	3.18	1.739	14
		High SE	4.39	1.816	9	4.59	1.814	11
		Total	3.83	1.978	18	3.8	1.876	25
	Total	Low SE	4.16	1.700	22	3.85	1.786	27
		High SE	4.03	1.798	17	4.25	1.681	26
		Total	4.1	1.721	39	4.05	1.730	53
High HV	Low IHLC	Low SE	3.33	1.225	9	3.42	1.062	12
		High SE	4.17	1.225	9	4.31	1.128	13
		Total	3.75	1.263	18	3.88	1.160	25
	High IHLC	Low SE	3.81	1.963	8	3.75	1.773	14
		High SE	4.88	1.157	13	4.9	1.089	15
		Total	4.48	1.561	21	4.34	1.547	29
	Total	Low SE	3.56	1.580	17	3.6	1.470	26
		High SE	4.59	1.211	22	4.62	1.127	28
		Total	4.14	1.460	39	4.13	1.391	54
Total	Low IHLC	Low SE	4.18	1.332	22	4.02	1.461	25
		High SE	3.91	1.502	17	4.14	1.380	28
		Total	4.06	1.396	39	4.08	1.406	53
	High IHLC	Low SE	3.53	1.980	17	3.46	1.748	28
		High SE	4.68	1.444	22	4.77	1.416	26
		Total	4.18	1.771	39	4.09	1.713	54
	Total	Low SE	3.90	1.655	39	3.73	1.628	53
		High SE	4.35	1.501	39	4.44	1.420	54
		Total	4.12	1.586	78	4.09	1.561	107

Table 7.15 ANOVA Specific diet tests of between subjects-effects

Specific Diet	**Dataset 1 N=78**					**Dataset 2 N=107**				
Source	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**
Corrected model	28.420	7	4.060	1.721	.118	35.110	7	5.016	2.224	.038
Intercept	1226.678	1	1226.678	519.864	.000*	1771.778	1	1771.778	785.529	.000
HV levels	.022	1	.022	.009	.924	.001	1	.001	.001	.981
IHLC levels	.260	1	.260	.110	.741	.023	1	.023	.010	.920
SE levels	4.133	1	4.133	1.751	.190	13.692	1	13.692	6.071	.015*
HV levels*IHLC levels	4.367	1	4.367	1.851	.178	4.971	1	4.971	2.204	.141
HV levels * SE levels	4.430	1	4.430	1.877	.175	2.405	1	2.405	1.066	.304
IHLC levels * SE levels	7.333	1	7.333	3.108	.082	8.365	1	8.365	3.709	.057
HV levels * IHLC levels * SE levels	4.794	1	4.794	2.032	.159	4.954	1	4.954	2.197	.141
Error	165.173	70	2.360			223.297	99	2.256		
Total	1518.750	78				2047.250	107			
Corrected total	193.593	77				258.407	106			
	a.R Squared = .147 (Adjusted R Squared) = -.061 *P< .05					a.R Squared = .136 (Adjusted R Squared) = .075 * P< .05				

8 Main Discussion

8.1 Introduction

The number of people with Type 2 diabetes is rising rapidly worldwide. This rise is associated with economic development, ageing populations, increasing urbanisation, dietary changes, reduced physical activity and changes in other lifestyle patterns (WHO, 1994, IDF, 2011). The management of Type 2 diabetes involves a change in lifestyle patterns for most. Patients are encouraged to review their lifestyle choices, to reduce weight by exercising and to change dietary habits to improve glycaemic control. For some these lifestyle changes may not be enough and as the disease progresses health professionals will place patients on medication regimes that include oral anti-hyperglycaemic agents and/or insulin. Identifying and assisting patients that have difficulty in making these lifestyle changes and adapting to medication regimes is essential to preventing or delaying the onset of complications and/or comorbidities associated with Type 2 diabetes to maintain quality of life. Using a behavioural theory in clinical practice to identify and assess the needs of such patients may be a beneficial tool for health professionals and subsequently patient care.

This research has aimed to test Modified Social Learning Theory(MSLT) a health behaviour theory that considers the interaction of health value and perceived control on behavioural outcomes.Researching how behavioural outcomes of patients with Type 2 diabetes are influenced by psychological constructs is not a new concept. However, this research has highlighted the benefits of exploring and testing health value and perceived control of patients who have Type 2 diabetes and provided evidence that could support MSLT's potential use in practice. By doing so the researcher has filled a knowledge gap in the literature that required support for MSLT and provided further knowledge on the health value construct and its meaning.

Traditionally, health behaviour theories have been examined quantitatively rather than qualitatively due to the nature of testing the predictability of such theories constructs. Consequently, this mixed methods study aimed not only to test MSLT but also to understand the meaning of the behavioural constructs of MSLT to the person with Type 2 diabetes and how this impacts on their self-management behaviour. This study had two separate phases of data collection, whereby the results from the qualitative phase of the study directly influenced the quantitative measures in the second phase. The associations of both phases' results will be discussed concurrently in this chapter.

Subjectively exploring health value and perceived control in relation to outcome behaviours of patients with Type 2 diabetes on insulin has identified how values and beliefs can impact on aspects of diabetes management. Influencing factors included: the stigma of insulin, medication management, blood glucose monitoring, comorbidities, beliefs surrounding age, hereditary aspects of the disease and the classification of diabetes type. This research has also demonstrated the importance of examining the way in which health is valued and whether it is valued from an instrumental or terminal point of view. Furthermore, the way in which changes in health value were explored in this research can be considered as a unique initial attempt at investigating this phenomenon. Finally,the support found for MSLT in the quantitative phase has demonstrated statistically significant results.

This chapter aims to criticallydiscuss the overall study results, their relevance to existing theory and literature and make recommendations for future research. To do this the research questions are re-introduced and answered in relevant sections to present the key findings of the research. The principal research question for this study was:

> Is the potential for people with Type 2 diabetes engaging in a set of health sustaining behaviours a predictor of health value and perceived control (HLOC and SE) as postulated by MSLT?

To answer this research question a number of subsidiary research questions (RQs) were formulated and used at different stages of the research design (See Chapter 3, section 3.3 p48 and Chapter 5, section 5.6.4 for emergent research questions p145).

This chapter is structured as follows:

- Section 8.2 Health Value and Type 2 diabetes
- Section 8.3 Beliefs and Self-management of Type 2 diabetes
- Section 8.4 Support for MSLT
- Section 8.5 MSLT & Instrumental Health Value
- Section 8.5.1 Potential Value and Belief Assessment and Planning Framework
- Section 8.6 Significance of the study
- Section 8.7 Implications for practice
- Section 8.8 Limitations
- Section 8.9 Recommended Future Research
- Section 8.10 Summary

8.2 Health value and Type 2 diabetes

Health Value was explored subjectively and objectively amongst participants with Type 2 diabetes. This mixed methods approach has contributed to the understanding of the health value construct and facilitated its testing of predictability alongside the other behavioural constructs of MSLT. Health value was initially explored through an interview technique which observed for instances in which values guided behaviour. This method of exploring health value conforms with the contemporary method of exploring the values construct from the perspective of the person who evaluates the entities in his or her environment and then attempting to understand the motivations which underlie people's responses to their environments (Rohan, 2000).

RQ2 (Qual): How do people with Type 2 diabetes value their health and perceive control over their condition?

The interviewsprovided data that highlighted participants' value systems and the cognitive structures that it is made up of. It was clear that a person's value system stemmed from 'life itself' and within that life there were various different aspects that motivate that person to distinguish between value priorities. Value systems have been defined in the literature as integrated structures in which there are stable and predictable relations among values(Schwartz, 1992, Schwartz, 1994, Rohan, 2000, Rohan and Zanna, 2001, Bilsky et al., 2010). Participants in this study described relationships among values such as family and health, health and career and health and the ability to do things. These relationships which include health possibly became apparent over other value relationships because of the aim of the interviews, which was to understand the construct of health value.

Furthermore, the way in which value systems are structured amongst participants was recognised. Two structures were apparent. Firstly, some participants discussed their values as having equal importance along a continuum whereby they chose between alternatives to suit their life situation at the time. Secondly, others arranged health as a value hierarchically where it was described as having the utmost importance over other values. These findings contribute to answering RQ2 as they indicate that patients with Type 2 diabetes can value health hierarchically or along a continuum depending on the persons value system.

The concept of health as a value to an individual is widely considered to be highly valued and thus is not commonly thought of as a construct with variability(Lau et al., 1986, Smith and Wallston, 1992). The qualitative findings in this studypropose that there is variability within how the construct is valued by individuals. This proposal is synonymouswith literature on value systems and priorities which suggests that values reflect underlying motivations and these motivations are associated with people's perceptions of the requirements of their existence(Rohan, 2000, Rohan and Zanna, 2001).

RQ3 (Qual): How does having Type 2 diabetes impact on a person's beliefs and values and thus self-management of their condition?

The variations in health value became clear through the way participants described valuing their health. These findings contributed to answering RQ2 and RQ3 as individual differences were demonstrated in which health is valued and how this influences self-management behaviours of people with Type 2 diabetes. Type 2 diabetes and its requirements of self-management were seen to influence a person's value system and value priority in that 'health' became 'even more important' post diagnosis. This finding suggested a change in health value post diagnosis of Type 2 diabetes. The results of RQ2 and RQ3 support Smith and Wallston's(1992)suggestion that as health becomes threatened the value of health becomes more salient and consequently more important. As far as the researcher is aware there is currently no evidence within the literature that health value changes with health status.

Health value was described as changing overtime as the length of diagnosis of Type 2 diabetes progresses.Participants described how 'diabetes was a different thing because you have got to change your life'. Changes in attitude due to length of diagnosis and the inconvenience of self-management lead to becoming 'blasé' about health and its value. Furthermore, the qualitative findings suggest that health value was influenced by changes to medication regimes and as a result of having a hypoglycaemic attack. Earlier research has acknowledged that changes to medication or condition can impact on belief variables (Donnan et al., 2002, Balkrishnan et al., 2003, O'Hea et al., 2005).

The instrumental/terminal dichotomy was kept in mind during the qualitative data analysis. It became apparent that participants valued their health as both an instrumental and terminal health value. However, a commonality shared between participants when discussing health value and diabetes self-management behaviours is that health value was considered instrumental in that it enabled participants ‘to do things’. This result addresses RQ2 and RQ3 as it suggests how a person with Type 2 diabetes values their health and it also highlights the importance of observing health value as a contributor to health behaviour. Participants who valued their health instrumentally also described highly valuing their health and as a result carrying out diabetes self-management behaviours.

The results of RQ2 and RQ3 highlight the importance of health value and how instrumental health value can be perceived as a moderator of health behaviour along with the construct of health value. Wallston (2005b)stated how no one to his knowledge had included the ‘perceived instrumentality’ of the behaviour as a moderator of the relationship between health locus of control beliefs and self-efficacy. The researcher believes that this is still the case in regards to researching this concept. The qualitative results of this study provided impetus for investigating this concept further, research recommendations addressing this result are discussed in section 8.5.

The qualitative data also contributed to what aspect of health people are referring to when they respond to questions on the construct of health value. As described in section 5.2.2 the meaning of health was conceptualised differently by participants but for most it included the physical, mental and social aspects of health.

RQ9 (Quan): Does health value change from pre-diagnosis to post-diagnosis of Type 2 diabetes?

The qualitative data on change in health value was an emergent theme and as a result RQ9 was formulated to test the hypothesis H4(health value changes from pre-diagnosis to post-diagnosis of Type 2 diabetes) within the quantitative phase. HVP1 and HVP2 were positioned strategically within the questionnaire booklet to test this. Despite this attempt the quantitative results do not support H4. No significant change in scale score for level of health value was seen from pre to post diagnosis.Participants scored high on health value in both scales. This indicates that participants' when answering the questionnaires did not think their health value was any lower or higher pre or post diagnosis but remains the same which is moderate to high. Results that contributed to answering RQ9 and H4 may have been influenced by recall bias, social desirability bias and due to the length of diagnosis of participants that was on average 13.5 years. This point is further elaborated upon in recommended future research section 8.9.

RQ10 (Quan): Is health valued as an instrumental or terminal value priority post-diagnosis of Type 2 diabetes?

The qualitative finding that suggested that health is mainly valued from an instrumental point of view resulted in the creation of RQ10. The items of the Health Value Scale were considered to beinstrumental and terminal in nature. There was no observed difference in instrumental or terminal health value scores pre to post diagnosis. The scale scores demonstrated that terminal health value scale scores were higher than the instrumental health value scores pre and post-diagnosis of Type 2 diabetes. However, these scale scores suggest that a person can hold both terminal and instrumental health values at once, which is evident in patients' perceptions in the qualitative data.

8.3 Beliefs and self-management of Type 2 diabetes

The constructs of locus of control and self-efficacy were considered during the interview process in the qualitative phase of this study. Participants were specificallyasked to think about their ability in carrying out self-management behaviours and about their beliefs that may influence this process.The descriptions of participants' self-management behaviours provided an understanding of the dimensions of the locus of control construct and its effect on self-efficacy.

RQ3 (Qual): How does having Type 2 diabetes impact on a person's beliefs and values and thus self-management of their condition?

Descriptions of internal locus of control beliefs highlighted how participants acknowledged that taking control over their condition is their responsibility. Participants descriptions of external LOC beliefs indicated that a health professional was responsible for their care or that their health had deteriorated to the point that they did not believe they were responsible for control. Searle et al. (2008) examined beliefs of patients with Type 2 diabetes and agrees with the latter and highlights how differences in diabetic patients' beliefs are apparent according to their complications.

Gillibrand and Flynn (2001) also used the LOC framework to explore eighteen patients' perceptions of diabetes and its complications. Their results indicate that people with diabetes may inadvertently externalise their control to 'powerful others' which is contrary to the philosophies of holism and promotion of self-management. The qualitative phase of this study also found this but interestingly participants described an internal/external dualism of beliefs when it came to them and their diabetes management and the health professional and their diabetes management. For example participants relied externally on health professionals to inform them of how 'good' their diabetes management is but outwith the clinic their beliefs in internality resulted in their ability to take responsibility for their own care. These findings contributed to answering the qualitative research question RQ3, as they suggest not only how people with Type 2 diabetes perceive control over their condition but also how LOC beliefs impact on SM of diabetes.

The construct of LOC has been found to be valuable but limited (Bennett et al., 1997, Bennett et al., 1998, Norman et al., 1997, Steptoe and Wardle, 2001, O'Hea et al., 2005, Luszczynska and Schwarzer, 2005). O'Hea et al. (2005) highlighted the importance of locus of control as a moderator to predicting outcome behaviours. They compared the five dimensions of the MHLC scale in 109 patients with Type 2 diabetes HbA1c results. HbA1c was considered a medical outcome of behaviour in this study. Their study concludes with support for the locus of control construct, however, they found that poorer adherence to a diabetic regime was related to different combinations of health locus of control beliefs(O'Hea et al., 2005). Findings from the qualitative phase of thismixed methods study support this finding as varying descriptions of differences in LOC beliefs were reflected in participants' descriptions of diabetes self-management behaviours (RQ3).

The MHLC and PDSMS questionnaires investigated the constructs of health LOC and SE respectively.Additionally, results of the HMR two-way and three-way interactions providesupport to previous literature that LOC can be considered a moderator of outcome behaviour (RQ4).

RQ4 (Quan): Does HLOC act as a moderator of predicating health behaviour in a Type 2 diabetes population?

Specifically this study supports the assumption that internal LOC beliefs and external locus of control beliefs are independent of each other and a person can simultaneously hold both beliefs. This finding is in agreement with previous research(Luszczynska and Schwarzer, 2005, O'Hea et al., 2009). The MHLC scale scores support this conclusion in that people scored similarly on the internal HLOC subscale (D1 28.5, (SD 6.1), D2 27.8, (SD 5.7)) and the powerful others subscale (D1 25.6, (SD 5), D2 25.2, (SD 5.2)).

The qualitative and quantitative data has demonstrated that it is possible to contrast people with Type 2 diabetes in terms of their LOC belief orientation and distinguish them in terms of health behaviour they may carry out.

The construct of LOC beliefs appears in the literature to be a less powerful construct than the construct of self-efficacy. Studies by Aljasem et al (2001), Griva et al (2000), Hampson(1990) and Hampson (1995)have found that self-efficacy alone is a significant predictor of diabetes regime adherence. Results of correlations of predictor variables and outcome behaviours in this study are consistent with previous research as self-efficacy showed stronger correlations with diabetes outcome behaviours than IHLC. IHLC showed a weak but significant correlation with exercise,whereas self-efficacy showed a strong positive correlation with general diet.Gramstad et al. (2001) study that investigated the impact of LOC and SE on psychosocial adjustment of 101 epilepsy patients found similar correlation results to this study, as self-efficacy and health outcomes were considered more powerful as a predictor than MHLC alone and health outcomes. Scores from the PDSMS in this study indicated that participants' levels of SE were considered moderate to high. Furthermore, this result is consistent with previous research on LOC and SE beliefs. Waller and Bates (1992)study examined 57 healthy elderly participants beliefs anddemonstrated that most of them were characterized by high IHLC beliefs and high SE and that there were positive relationships amongst the variables.

RQ7: Does mood affect a person with Type 2 diabetes potential of engaging in as set of health sustaining behaviours?

Subjective descriptions in this present study highlighted relationships anddifferences in level of self-efficacy depending on LOC belief orientation. A person's mode of Acceptance-Adjustment-Adaptation (AAA) was influenced by their relationship of SE and LOC beliefs depending on the situation at that time.AAA to diabetes self-management was affected by numerous themes such as co-morbidities, age, hereditary reasoning, stigma of insulin, low mood, anxiety and depression and fear of hypoglycaemia. Most commonly participants described the negative effects co-morbidities, stigma of insulin and low mood had on their self- management behaviours. The negative effects were caused by external LOC beliefs and low SE due to the influence co-morbidities had on life, the fear of injecting, fear of hypoglycaemia or due to depression (RQ3&RQ7). Wu et al. (2004) investigated the associations among HLOC, SE and psychological distress in 159 elderly Chinese women who have chronic physical illness. Comparable to the qualitative results of this studypsychological distress was determined by a low level of self-efficacy as well as a high level of external locus of control.

Naus et al. (2005) examined the relationship between breast cancer LOC beliefs (BCLOC) and depression in early-stage breast cancer survivors. Differences in levels of anxiety and internal BCLOC indicated variability in level of depression. Low levels of anxiety and internal BCLOC indicated low levels of depression, whereas high levels of anxiety and internal BCLOC indicated higher levels of depression. These results when considered in context with the qualitative results of this study perhaps provide asuggestion as to how participants' internal LOC beliefs were affected by anxieties thus affecting levels of self-efficacy in self-management.

8.4 Support for MSLT

The discussion thus far has concentrated on the variability of the individual constructs of MSLT and in relation with one another. However, Wallston has argued over the years that 'the action is in the interaction' (Wallston, 1992, Wallston, 2005b). It is not just Wallston who has argued this point. Many other researchers have demonstrated research which has considered a behavioural construct as a moderator to predicting behaviour alongside anotherconstruct(Norman, 1994, Macrodimitris and Endler, 2001, Laffrey and Isenberg, 2003, Lange and Piette, 2005, Jerant et al., 2008).Nevertheless, it is thought that this is the first formal researchto test the interaction of the constructs of MSLT on Type 2 diabetes outcome behaviours.

The qualitative phase of this researchcontributed to exploring the meaning of the constructs of MSLT to patients with Type 2 diabetes. The qualitative descriptions demonstrated how participants in everyday life use the interaction between their values and beliefs to inform their diabetes self-management behaviour. Apparent within these descriptions was the equal importance attributed to health value, LOC beliefs and self-efficacy in carrying out self-management behaviours.

The quantitative phase was the main contributor to the testing ofMSLT. It was expected that the interactions of the perceived control variables would add significant variance accounted for (ΔR2) in outcome behaviours of general diet, specific diet, blood sugar testing, exercise and foot care. Additionally, it was expected that the combination of the three-predictor variables would demonstrate the strongest relationships amongst the five outcome behaviours.

RQ5 (Quan): Is the measurement of health value a necessary predictor of health behaviour in a Type 2 diabetes population?

Correlations between the predictor variables of internal LOC and self-efficacy, self-efficacy with health value and internal LOC with health value were non-significant. These non-significant correlations demonstrate that these constructs are different entities. This result offers support to O'Hea et al (2009) whose study on the interaction of self-efficacy, locus of control and outcome expectancy demonstrate similar findings on the non correlation of these constructs.

In the hierarchical multiple regression (HMR) analyses Self-efficacy was seen to be the only significant predictor for general diet. The individual predictor variable remained significant throughout all four blocks. This result supports research that has found self-efficacy to be the strongest predictorvariable related to health behaviour(Tolma et al., 2006, Frank et al., 2007, O'Leary et al., 2008, O'Hea et al., 2009).

The exercise and foot care subscales showed no significant change in R^2. Interestingly the exercise subscale showed that IHLC was the only predictor variable to have a significant beta value and it had a positive relationship.This finding differs to Laffrey and Isenberg (2003) who found no support for the construct of internal locus of control, health value and exercise in a group of 70 women with no defined health illness. However, exercise was measured as aleisurely variable and not as outcome behaviour for health. Laffrey and Isenberg (2003) stated that perhaps IHLC and HV were not perceived to be important by their participants in regards to physical activity and leisure.

RQ1 (Quan): Does MSLT three-way interaction of HLOC, SE and HV predict the outcome of self-care behaviour in a Type 2 diabetes population?

The hierarchical multiple regression analyses were carried out to determine if internal locus of control, health value and self-efficacy when taken together would have a stronger relationship with outcome behaviours than alone or as two-way interactions or as a three-way interaction. Results indicated support for the three-way interaction variables and support was seen for some two-way interactions.

RQ 6 (Quan): Is the measurement of health value and perceived control (HLOC & SE) when taken together a more proficient predictor of health behaviour in a Type 2 diabetes population?

The Specific Diet subscale and Blood Sugar subscale showed a significant change in R^2 when the three-way interaction variable of HV x IHLC x SE was added to Block 4 of both datasets HMR analyses. Furthermore the two-way interactionsof IHLC x SE and IHLC x HV had positive significant relationships with Specific Diet in both Datasets and Dataset 2 demonstrated a positive significant relationship for IHLC x HV. The beta values for the two-way interactions are quite similar in value indicating that as two-way constructs they are of an equal level of importance when predicting adherence to a specific diet. These results supportO'Hea et al. (2009)research as they also found support for the two-way interaction of IHLC x SE, IHLC x Outcome Expectancy.

The HMR results are considered to show support for MSLT and have been interpreted to suggest that health value, internal health locus of control and self-efficacy are more proficient predictors of health behaviour when taken together. This result is seen to contribute to answering the principal research question and RQ1, RQ5, RQ6, H3. Although support was demonstrated for MSLT through the Specific Diet (SPD) and Blood Sugar (BS) subscale it is evident that the percentage of variability for SPD (D1, 20.8%, D2 16.9%) and BS (D1, 20.8%, D2, 24%) in predicting these outcome behaviours is low. This finding is further discussed in the Limitation section of this chapter(section 8.8) where considerations are made as to what is accounting for the other 80% of variability in predicting these behaviours. It is not known why specific diet and blood sugar subscales showed significant interaction effects or why the exercise, foot care and general diet subscales did not. However, a potential cause could be that the constructs of health value, LOC and SE may not be relating to the perceptions of the participants in this study in regards to the self-care behaviours of exercise, foot care and general diet.It could also be suggested that this finding reflects the priorities of health care professionals in the outpatient clinic. For example for patients with comorbidities, health care professionals may view improving diet as more realistic than increasing exercise.

Additionally, an emphasis on HbA1c testing and results is placed at every consultation while feet checks are only reviewed once a year if there are no known foot complications. Therefore it seems intuitive that specific diet and blood sugar might feature more importantly than general diet, foot care and exercise in this study. This finding highlights the complexities of predicting behaviour and how further replication of research is needed to ascertain other predictors of Type 2 diabetes patients self-management behaviours (see section 8.9 for recommended future research).

Principal research question: Is the potential for people with Type 2 diabetes engaging in a set of health sustaining behaviours a predictor of health value and perceived control (HLOC and SE) as postulated by MSLT?

The significance of the interaction effects of the Specific Diet and Blood Sugar subscales were investigated further. Two three-way ANOVA's were conducted on both datasets to observe the differences in mean among even groups of participants who scored high on the predictor variables and groups who scored low. In order to support MSLT further it was important that these means demonstrate that the highest means were for participants who scored high on all three constructs(Wallston, 2013).

Participants with Low HV and Low IHLC were highest in blood glucose testing regardless of their level of SE while those with High HV and Low IHLC were lowest in blood glucose testing regardless of their level of SE. With specific diet, the High-High-High group had the highest mean score, which is what MSLT predicts. However, this is just minimally better than the mean score for the Low-Low-Low group.There was no statistical significance between groups as determined by the three-way ANOVA for blood sugar or specific diet.

A factor that may account for this lack of support for MSLT within the ANOVA results for blood sugar testing is the sample that was used to test this theory. All participants in both phases were on insulin and from the qualitative data it is clear that being commenced on insulin lowered participants' IHLC beliefs. Furthermore, participants' average age was 63 (SD 6.3)and had been diagnosed with Type 2 diabetes on average 13.5 years (similar demographics were reported for D2).

Participants' HbA1c levels were out with the suboptimal range as recommended by Diabetes UK (2013a) with levels averaging at 65.4 mmol (SD 18).Age was positively correlated with blood sugar testing ($r = .27$, $p<.05$, D1and $r = .29$, $p<.01$ D2). Taking these demographics and correlations into account it is being suggested that low IHLC, low HV and low or high SE resulted in more frequent blood glucose testing due to the medication regime, length of diagnosis and age of these participants. The qualitative data supports this conclusion in that being started on insulin was seen to change HV, lower IHLC and effect self-efficacy ability.

Other factors might have contributed to frequent blood glucose testing. For example people with low self-efficacy and low IHLC may engage in regular testing of blood glucose at the request of doctors but may not understand why they are doing so or they understand the reasoning behind the task but do not understand how to adjust their insulin dosages independently. This point is reflected in the qualitative findings of this research. In contrast those who test less frequently may have higher levels of self-efficacy and IHLC and test their blood glucose in a more purposeful way for personal reasons such as before exercise or when driving. This finding has implications for patient education and is further elaborated upon in section 8.7.

Additionally, although the qualitative and quantitative data have determined that health was highly valued by most participants perhaps the reason that participants with high HV, low IHLC and low or high SE were lowest in blood glucose testing is the way in which health value was measured. The HV scale used measured current health value but perhaps if it had been measured with just instrumental health value items it may allow a clearer measurement of HV for this sample. This is being proposed because of the qualitative results on instrumental health value that suggested that HV of participants with Type 2 diabetes is valued instrumentally. The proposal raises the question; if HV is measured or explored instrumentally in a sample such as this would it allow a clearer understanding as to the value of self-management activities being carried out? This will be discussed more comprehensively in section 8.5, which critically explores MSLT and instrumental health value.

8.5 MSLT and instrumental health value

Wallston (2005b:629)stated that

> 'not only does the value of health theoretically moderate the relationship between HLOC and health behaviour but so does self-efficacy as well as perceived instrumentality, an outcome expectancy that doing the behaviour will lead to good health'.

The concept of perceived instrumentalityand task value have been defined as an individual's understanding of the incentive for a present behaviour (Husman et al., 2004). If these two concepts are combined with health it gives instrumental health value. The qualitative data has implied that diabetes self-management behaviours are carried out as task values in that the aim is to maintain health in order 'to be able to do things'. This finding is consistent with Macrodimitris and Endler (2001) study where the relationships of both coping strategies and perceived control to psychological and physiological adjustment were investigated in 115 adults with Type 2 diabetes living in Canada. Macrodimitris and Endler used a variety of psychometric measures to examine these relationships such as the Coping with Health Injuries and Problems Scale, the Event Perception Measure and anxiety and depression scales. Macrodimitris and Endler (2001)found that problem-focused (instrumental) coping was related to better psychological adjustment and overall outcomes. However, the cross-sectional nature of their study may be perceived as a limitation. An investigation of the processes of coping over time in Type 2 diabetes patients would have been beneficial. Furthermore,Marrow et al. (2008) explored the life and health goals of 24 older adults with Type 2 diabetes from outpatient clinics in Houston, Texas. The study was qualitative and used in-depth interviews to explore life and health goals. Marrow et al. (2008) results concur with this research in that their participants expressed their goals of diabetes self-management in terms of functional activities. AlthoughMarrow et al. (2008) study allowed for an in depth exploration of preferences and expectations of diabetes treatments the findings are limited, as they cannot provide quantitative estimates for the patterns and associations they observed.

A series of studies carried out bySimons et al. (2000) investigated the effect of perceived instrumentality on goal orientation of 81 adults and 229 high school students from Leuven, Belgium. In studies one and two participants were asked to complete a questionnaire aiming at assessing participants' orientation toward task and performance goals. Study three aimed to differentiate between goal orientations using a scale specifically devised to test these differences. Results showed that emphasizing the future consequence of achieving personal goalsenhanced task orientation and decreased performance orientation both in daily life and in study contexts. Future time perspective theories stress the importance of personal future for motivation and learning(Husman and Lens, 1999). Simons et al. (2000) results indicate that being future orientated or perceiving the instrumentality of a present task for future goals is said to enhance future motivation performance and persistence.

8.5.1 Instrumental Health Value

The qualitative results of this study have demonstrated how participants perceive the outcome of their future as a consequence of their self-management behaviours. This perception came fromtopics of how quality of life may be influenced by Type 2 diabetes in the future. The possible negative effects from resultant co-morbidities due to poor diabetes self-management resulted in a re-evaluation of health value and a more instrumentally orientated view of this value.

8.5.2 Potential Value and Belief Assessment and Planning Framework for People with Type 2 Diabetes using MSLT as the Theoretical Basis of Development

In section 8.4 it was proposed that measuring or exploring instrumental health value of this group of patients may provide a clearer picture of how health value influences self-management outcome behaviours, this point will be addressed in this section.A potential framework for assessment and planning of patient centred care of people who have Type 2 diabetes is presented which incorporates the theoretical basis of MSLT and instrumental health value as a moderator to behaviour management. Thisframework takes into consideration the assertion of Simons et al. (2000) as stated above, the suggestion of Wallston (2005b) on perceived instrumentality as a moderator to health behaviour and also the overall results of this study.The framework is presented diagrammatically followed by an explanation of how it could potentially be applied in the clinical setting. It should be noted that this framework has not been tested in this study or supported in practice but is presented here to demonstrate how the research results have supported MSLT and contributed to thedevelopment of this theory as a potential assessment and planning tool for patients with Type 2 diabetes. This potential framework will be suggested as a future research recommendation in section 8.9.Figure 8.1 illustrates how this framework could be a follow on research proposal from this thesis.

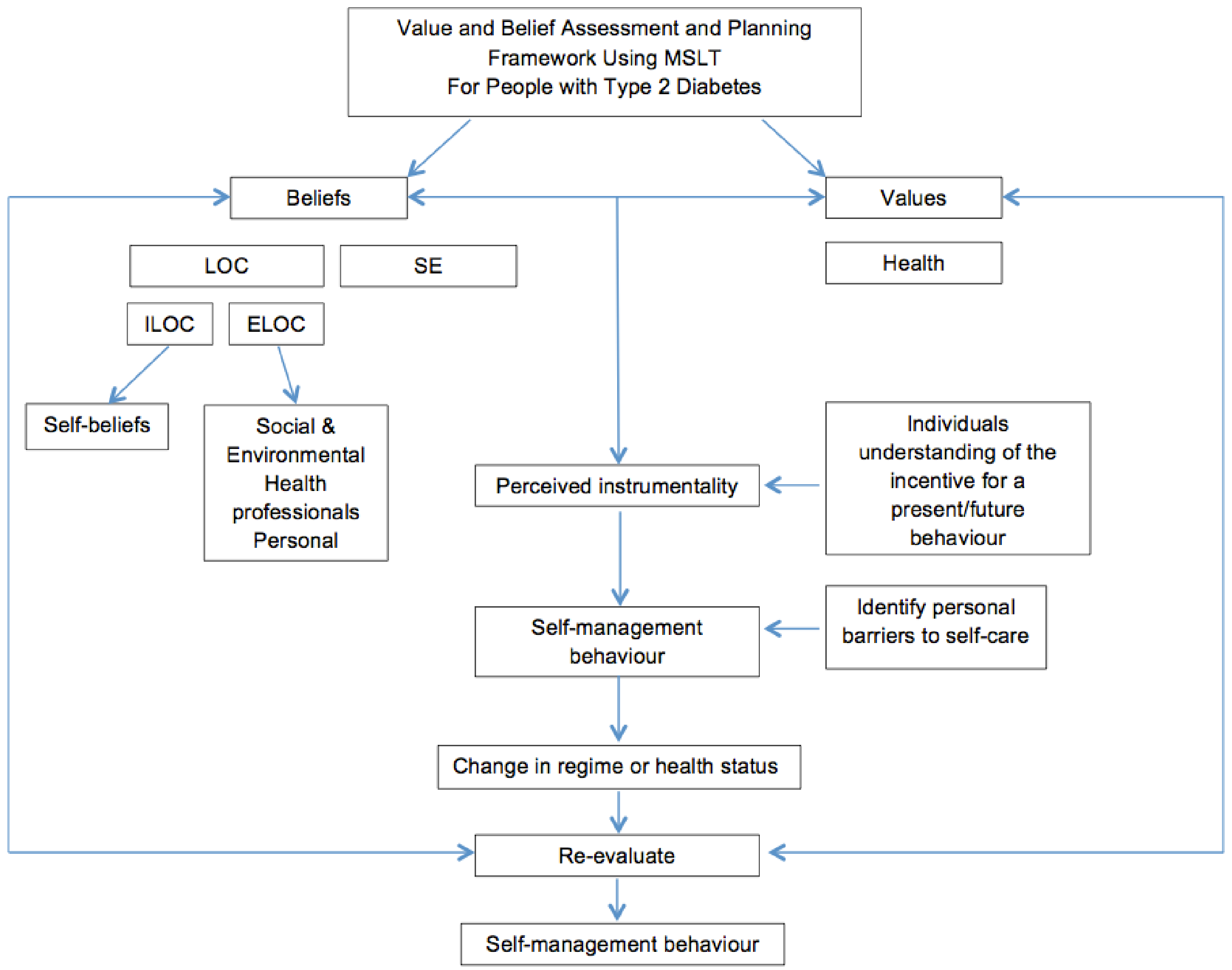
8.5.3 Findings that contributed to framework development

The potential framework incorporates MSLT as the theoretical basis for assessment and planning of patient treatment goals. The potential framework begins with considering a person's belief and value system. It advocates ascertaining whether a person's beliefs surrounding self-management are internal and/or external and whether they are competent in engaging in diabetes related activities. The results of this study highlight the variations in LOC belief and SE of people with Type 2 diabetes and could provide a possible guide to assessment and evaluation of these beliefs towards planning of self-management behaviours. For example patients who described high internality and had ELOC beliefs had sufficient competence in carrying out diabetes self-management behaviours. However, those with low IHLC and higher ELOC beliefs had a greater reliance on external factors and thus poorer levels of self-efficacy. The framework supports MSLT in that the relationships between IHLC and SE should only hold for individuals who value their health.

On the basis of the findings from the qualitative and quantitative phase of this study it was evident that participants valued their health as a terminal value and instrumental value. However, the qualitative data indicated that participants' subjective view of health value was mainly instrumental and was described by most as a moderator of behaviour of diabetes self-management behaviours. As a result of this the concept of perceived instrumentality is included in the model as it enables assessment of an individual's understanding of the incentive of a behaviour.

When the constructs of MSLT and perceived instrumentality have been considered the potential framework guides the professional towards using this information to consider the person's beliefs and values and how this may impact on self-management behaviours. The framework then advocates planning appropriate self-management behaviours for the individual patient and re-evaluating these behaviours if there is a change to a medication regime or to the person's health status. This stage of the framework is supported by the qualitative results of this study whereby changes in health status and medication indicated a change in beliefs and values that can have a negative or positive impact on self-management behaviours depending on the person. In this situation re-evaluation directs the professional back to the beginning of the model again to reassess the patient's needs by exploring their beliefs and values and potentially facilitating that appropriate treatment goals are successfully reached.

Figure 8.1 Potential Value and Belief Assessment and Planning Framework for People with Type 2 Diabetes Using MSLT as the Theoretical Basis of Development


Value and Belief Assessment and Planning
Framework Using MSLT
For People with Type 2 Diabetes
Beliefs
Values
LOC
SE
Health
ILOC
ELOC
Self-beliefs
Social &
Environmental
Health
professionals
Personal
Perceived instrumentality
Individuals
understanding of the
incentive for a
present/future
behaviour
Self-management
behaviour
Identify personal
barriers to self-care
Change in regime or health status
Re-evaluate
Self-management behaviour

8.6 Significance of the study

When considering the impact of the findings of this study the significance is threefold. First, the research hasadded to existing knowledge and understanding of the behavioural constructs health value, locus of control and self-efficacy. Second, the methodology of this study enabled an enhanced investigation of research aims through exploring MSLT subjectively and objectively.Third, the research has added to the theoretical underpinning of MSLT and possibly enhanced MSLT by providing evidence that supports the assumption that instrumental health value is a moderator of health behaviour.

The first contribution of this study is that it adds to existing literature on three important health behaviour constructs. Mixed reviews on each construct as moderators to health behaviour have appeared in the literature throughout the last twenty to thirty years to name but a few(Hampson et al., 1990, Hampson et al., 1995, Waller and Bates, 1992, Bennett et al., 1997, Bennett et al., 1998, Laffrey and Isenberg, 2003, Steptoe and Wardle, 2001, Wu et al., 2004). The results of this study provide evidence which supports the tenet that health locus of control beliefs moderate but do not mediate health behaviour (Wallston, 1992, Norman et al., 1997, Wallston, 2005b, Luszczynska and Schwarzer, 2005, O'Hea et al., 2005, O'Hea et al., 2009). The finding that health was highly valued by most in both the qualitative and quantitative phase was consistent with previous literature on the construct (Lau et al., 1986, Smith and Wallston, 1992). Individual differences of health value when considered with value systems and value priorities point to the variability of the construct this offers a unique contribution to knowledge on the construct. The concept of viewing health as functional is synonymous with the literature (McKague and Verhoef, 2003, Hughner and Kleine, 2004) and was described as a value held by most participants. This was understood to be instrumental health value and provides evidence that perceived instrumentality may act as a moderator to health value and thus influence health behaviour. Self-efficacy was considered to be the strongest individual predictor of health behaviour among the HMR results and participants' descriptions also contributed to this conclusion, which is consistent with previous research (Frank et al., 2007, O'Leary et al., 2008, O'Hea et al., 2009).

Althoughthe mixed methods methodology of this study presented numerous challenges it provided data that was holistic in terms of the experiences of patients with Type 2 diabetes and testing MSLT. The discussion section of this thesis highlights the contribution of results from both phases and demonstrates how integration of these findings enabled transferability, generalizability and identification of the practical significance of the results. Findings from the qualitative phase were transferred to the quantitative phase to add rigor and also to attempt to answer resultant research questions. Data analysis of both phases and integration of results provided results that were either supported or opposed. For example a supporting result was that participants can simultaneously hold internal and external LOC beliefs. An opposing result was that subjectively participants' described their health value orientation as instrumental but objectively it was measured to be more terminally orientated. This comparative analysis of results of both phases enabled identification of the practical significance of MSLT and how it can be generalized for use to explore beliefs and values of people with Type 2 diabetes. Furthermore, this mixed methods study makes a methodological contribution to mixed methods research as it provides an example of the opportunities of this method.

Lastly, this study makes a unique contribution to the testing of MSLT. It is thought that no one has yet formally tested MSLT. The HMR results of this study provide support for the significance of the three-way interaction of the constructs of MSLT. The way in which these constructs were measured is also thought to be unique. As far as this researcher is aware no one to her knowledge has tested MSLT using a health value measure, Form C of the MHLC scale, a measure of SE and a measure of diabetes outcome behaviours. Additionally, the qualitative andquantitative phase's attempt to observe for the instrumental/terminal dichotomy and changes in health value could be viewed as a distinctive method. The qualitative phase's approach to exploring MSLT theoretical underpinning could also be considered as a distinctive research approach.

The implications of this knowledge for practice are discussed in the following section.

8.7 Implications for practice

Nurses and health professionals in diverse practice settings assist people to cope with the change that illness causes to people's lives (Kralik et al., 2006). This assistance specific to diabetes patients is provided through education by imparting the knowledge and skills required to self-manage the condition (Walsh et al., 2011, Trend-UK, 2011). SIGN guidelines (2010:9) recommend that

> 'helping patients to modify certain behaviours should take account of other factors such as the patient's willingness to change, their perception of their diabetes, and factors which may be indirectly related to their diabetes, such as depression and adverse effects on quality of life'.

Although this is a sound recommendation there is no evidence to suggest that this takes place within Lothian Scotland's health care setting (NHS Lothian, 2010). Currently patients' illness perceptions and willingness to adopt 'good' health behaviour is not assessed or included in patients' individualised management plans (NHS Lothian, 2010). This research provides evidence to suggest that MSLT could benefitcurrent health assessment practice of patients with Type 2 diabetes. This is being suggested becausesubjective and objective assessment of beliefs and values using MSLT provided information on individual capability in self-managing diabetes. By adopting MSLT as a theoretical framework to clinically assess beliefs and values information acquired could be used to understand patients 'willingness' and ability to partake in effective self-management behaviours.

This implication provides impetus for the development of nurse education when assessing the psychological needs of patients with Type 2 diabetes. Diabetes Action Plan (2010)emphasizes that one way of improving the spectrum of psychological support for people living with diabetes in Scotland is to enhance the skills of clinical staff. Furthermore, Walsh et al. (2011) makes an important point that the person with diabetes should be confident that healthcare staff are at the required level of expertise of their profession to provide quality care. Currently there are interventions underway to support this such as PIDPAD as discussed previously in section 5.2.2.

The qualitative and quantitative results on blood glucose monitoring recognise that low health value, low IHLC and low or high SE can result in more frequent blood glucose testing. This may be because of numerous factors depending on the person as discussed in section 8.4. This finding has implications for clinical practice and patient education, as it highlights that frequent blood glucose testing does not necessarily suggest that the patient will have good glycaemic control.

8.8 Limitations

While this study contributed to the theoretical underpinning of MSLT and existing knowledge of beliefs and values of patients with Type 2 diabetes it is not without limitations. The sample for this study consists of patients who attend the diabetes clinic for diabetes treatment. This is not a representative sample of all patients with Type 2 diabetes, especially those who are non-adherent, which could be evidenced by not seeking treatment for diabetes. Additionally this sample does not represent those who do not wish to go on insulin despite there being a clinical need for it. A typical population sufficed for the purpose of this study. This limitation should be addressed in future research, as it is important to ascertain how health behaviour can be predicted in a non-adherent population or those who do not wish to follow clinical recommendations.However, it is unlikely that individuals unwilling to engage with care would be willing to participate in a detailed study such as this one and any future research may therefore be subject to similar sampling bias.

The sample consisted only of patients who have Type 2 diabetes and are on insulin. It was evident from the qualitative data that being commenced on insulin lowered perceived control and changed health value of these patients. Furthermore, the quantitative data supports this assumption through the ANOVA results on blood sugar testing. These results illustrate how the sample influenced the results of testing MSLT. Perhaps MSLT would benefit from being tested with a ‘healthy sample’ as this may provide data that is not influenced by the experiences of illness.

The hierarchical multiple regression analysis demonstrated minimal support for MSLT. It is important to acknowledge here the limitations of this result in relation to the complex area of predicting health behaviour. Although, the Specific Diet and Blood Sugar subscales were found to be significant the variability expressed in predicting these two Type 2 diabetes self-care behaviours accounted for only 20% of the variance of the outcome behaviour. Other factors of predicting health behaviour contributed to the additional 80% of variability. Other factors could be defined as numerous entities in a person’s life such as social influences, economic and financial factors and even individual life events. It is evident from the literature reviewed in Chapter 2 and from the results of this research that there may never be one behavioural construct that explains every behaviour a person exudes. However, finding a construct or a combination of constructs that explains a reasonable proportion of behavioural factors at play with a person may contribute to predicting some aspects of their health behaviour. Therefore, a limitation resulting from this research is that the constructs of MSLT could be suitable to predicting health behaviour in some patients but not others.

Furthermore, patients with comorbidities or multi-morbidities may not have responded based on their experience of Type 2 diabetes. Due to Type 2 diabetes being a disease that contributes to comorbidities it would have been incorrect to exclude patients' with comorbidities, as it would not be a true depiction of this population. Duringdata collection participants were directed to respond based on their experience with Type 2 diabetes to try and overcome this limitation as much as possible. It is also possible that these comorbidities may have contributed to the additional 80% variability in outcome behaviour discussed above.

However, the inclusion of patients with comorbidities and specifically dominant comorbid conditions such as alcoholism and chronic renal failure has highlighted a possible limitation of using MSLT in practice. Findings from participants with dominant comorbid conditions in the qualitative phase demonstrate the overwhelming influence a condition such as this can have on health value, IHLC and SE. The significance of managing diabetes is thus reduced in comparison to the dominant condition. It is evident from the results of the qualitative phase that MSLT may have applicability to diabetes but it may not be relevant to patients who have a dominant comorbid condition such as addiction or chronic renal failure or even cancer.

Finally, the health value items adapted to Lau et al. (1986) health value measure in the interim phase of this research were removed from the data due to item 5 being problematic.Although, the items were examined for face validity the time constraint for completing this research resulted in the decision not to pilot the adapted health value measure prior to administering it. As a result ofnot pilotingthe adapted health value measure prior to its administration some disadvantages were introduced to the research. If the measure had been piloted it would have provided the researcher with an advanced warning that the new items added to the measure were problematic. Additionally, if the measure had been piloted practical problems such as the administration procedure used to investigate changes in health value could have been pre-determined. The way in which the Adapted Health Value measure was administered may have introduced recall bias. A pilot study would have foreseen this and could have provided an early solution.These disadvantages limited the variability of examining the instrumental/terminal dichotomy of health value in the quantitative phase of this research. Carrying out a pilot study prior to a main study provides accountability to the research and can ensure the best possibility of research results (Crosswaite and Curtice, 1994). However, conducting a pilot study does not guarantee success in the main study, but it does increase the likelihood of success (van Teijlingen and Hundley, 2002). Therefore, researchers should be encouraged to conduct pilot studies, report issues arising from the pilot study and report in detail the actual improvements made to the study design and the research process as a result of conducting the pilot (van Teijlingen and Hundley, 2002).

While this study was not without limitations these limitations did not negate the value of this study. Rather these limitations provided an impetus for future research in the area of beliefs and values. Further directions for future research in these areas are discussed in section 8.9.

8.9 Recommended future research

Several possible future directions for research became apparent during this study. As mentioned in the limitations section of this study further replication of testing of the interaction of the constructs of MSLT is necessitated. Perhaps with a 'healthy' sampleas this could avoid the influence of illness on beliefs and values and provide a clearer picture of the interaction of the constructs of MSLT.The individual constructs themselves would benefit from further investigation.There is a significant gap in the literature on health value as an individual construct and its impact on health behaviour. This research has contributed to filling this gap and raised new questions about the construct of health value and its variability. Although these questions were initially tested in the quantitative phase of the study further examination of change in health value as a result of change in health status and change to medication regime is required.

Other research methods that allow for testing of changes in health value with people with diabetes need to be considered. Methods that reduce the possibility of recall and social desirability bias would be preferential. Perhaps a suitable research proposal considering this type of research would include a longitudinal study whereby health value is measured with participants who are pre-diabetes and consider themselves healthy (pre-diabetes is the state in which some but not all of the criteria for diagnosing diabetes is met) and then measured again some time later to ascertain whether diabetes was diagnosed and if so measure health value again. This method of investigating health value may enable identification of changes in health value overtime.

This research raised questions about instrumental health value/perceived instrumentality as a moderator to health behaviour. Viewing health instrumentally when considering patients with a chronic illness such as diabetes may support an individual's conception of health as a function in everyday living. Supporting this ideal may be beneficial to interventions that advocate adoption of certain self-management behaviours. Duncan (2010) argues that viewing health care as instrumental may support the purpose and methods of health care delivery. Future research addressing this concept may benefit from a new health value measure with variability in items to examine the instrumental/terminal dichotomy.

The potential value and belief assessment and planning framework requires testing and identification of its applicability to practice. Research of this nature could demonstrate how to translate complex research of interacting variables into practice. Guck et al. (2008) study of using patient reports of psychosocial variables to cluster diabetic patients provides an example of research findings applied to clinical practice. Guck et al. (2008) found that identification of unique psychosocial patient profiles using the MDQ may help busy care providers match patients with practical, beneficial and cost effective interventions that improve patients' ability to meet the demands of diabetes. It is hoped that future research of MSLT may enable this form of holistic care for patients with Type 2 diabetes.

Further research investigating the impact of hereditary factors and the classification of diabetes type is required to understand the implications these concepts have on self-management of diabetes. The influence of comorbid and multi-morbidities on self-management of Type 2 diabetes requires further examination to determine the complex experience of management of multiple conditions and complications and devise suitable interventions to help people deal with such difficulties.

Finally, the possibility that health care professionals perceptions of self-management of Type 2 diabetes influence patient perceptions and thus outcome behaviours requires further investigation.

8.10 Summary

The Scottish Diabetes Survey (SDS, 2011) estimate that the number of people with diabetes continues to increase by about 10,000 people each year, presenting greater organisational and resource pressures. In 2011 217,514 (88%) of all people registered with diabetes had Type 2 diabetes(SDS, 2011). This research has sought to test a psychological theory to demonstrate how beliefs and values impact on patients' with Type 2 diabetes outcome behaviours. The findings have drawn attention to the ways in which patients' with Type 2 diabetes value their health and perceive control over their condition and the influence this has on self-management. The findings provide a unique contribution to the testing of MSLT and demonstrate its relevance and possible benefits of use with patients' who have Type 2 diabetes.

The findings may be considered interestingby professionals working with patients' who have Type 2 diabetes as it provides anunderstanding of how such patients' process a change in health status, a change in medication regime, and overall the difficulties of managing diabetes.

Finally, this research is significantfor researchers and health professionals interested in intervention planning for patients with Type 2 diabetes. As discussed in section 8.7 there is currently no assessment procedure to assess patients 'willingness' to adopt certain self-management behaviours. MSLT requires further testing yet it may provide a means of assessment of psychosocial variables of people with Type 2 diabetesand may contribute to improving the quality of care provided as a result.

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10 Appendices

Appendix A: Table of Key Studies from Chapter 2 Literature Review

Table 10.1 Key Studies

Author (year) Study title (Key Studies are identified with *)	**Sample & Setting**	**Design**	**Measures**	**Results**	**Strengths & Limitations**
* **Rokeach (1968)** The Role of values in public opinion research	N=297 University students from Michigan State University, United States of America.	Experimental	The terminal & instrumental values scale	Rokeach found significant relationships between values & behaviour, and between values and attitudes. Rokeach found that the students exhibited statistically significant value differences. Students who considered themselves as liberals value significantly more than conservatives a world at peace, equality and wisdom. Conservatives were found to value social recognition significantly more than liberals. Rokeach (1968) further developed the value ranking procedure that recognised the concept of a value system and was sub-divided into two systems, an instrumental value system and a terminal value system.	The terminal and instrumental value scale measures differences in value systems. However, it does not include health as a value.
* **Lau et al (1986)** Health as a value: Methodological & theoretical considerations	Study 1 N=326 Study 2 N=1029 Students from Carnegie Mellon University, United States of America.	Experimental	Health Value (HV) Measure & Questionnaire on beliefs & preventative health behaviours	The HV Measure was found to be valid and reliable. Participants in the study provided test-retest data of the scale. Co-efficient alpha reliability for the scale was .67 and it had a test retest reliability of .78. HV is a necessary prerequisite for the performance of certain health behaviours. HV should be measured along with other belief constructs such as HLOC.	The construct of health value is shown to be an integral part of the study of health behaviour. A valid and reliable tool was developed to measure the construct. However, the scale does not measure what aspect of health people are referring to when they respond to health value.

*** Wallston et al (1994)** Form C of the MHLC Scales: A Condition Specific Measure of LOC	N=588 patients with four conditions: diabetes, rheumatoid arthritis, pain & cancer. The sample was drawn from four settings: Endocrinology Practice Nashville Tennessee: Diabetes patients Middle Tennessee: Rheumatoid arthritis patients Pain Management program Milwaukee, Wisconsin: Pain patients Central Illinois: Cancer patients.	Experimental & Intervention in the form of a pain management programme in the pain sample only. Patients from the arthritis sample did not receive the intervention and were considered a control group for the measures of intervention related changes part of the study.	Measures of Locus of Control: Specific Locus of Control Form C & Locus of Control Form B of MHLC scales completed by participants with arthritis. Measures of Helplessness: Arthritis Helplessness Index & Pain Helplessness Index. Measures of Depression: Centre for Epidemiological Studies Depression Scale and Beck Depression Inventory. Measure of intervention related changes in locus of control: patients with chronic pain only.	Following a factor analysis Form C was reduced to 18 items. The final version of the scale consists of two 6-item scales: Internality and Chance and two separate three item scales for Powerful Others. Internal consistency was found for Form C subscales. Test-retest reliability was found to be satisfactory considering psychological changes over time. Construct validity was found for Form C following data analysis that examined for intervention related changes of LOC in patients with chronic pain and arthritis patients at the control group. No significant changes were found in the control group. However, the Pain patients had increased internal LOC and decreased external LOC scores on the Chance, Doctors and Powerful others subscales. Concurrent validity was found in Form C when correlations were observed for with Forms A&B.	Utilising data that covered four diverse medical conditions the items on Form C of the MHLC scales yielded an easily interpretable and highly replicable factor structure representing orthogonal sub-scales: Internality, Chance, Doctors and Powerful Others. The scales were found to be sufficiently internally consistent and valid through intervention methods. Additionally, Form C was deemed a relatively easy instrument to measure and can be adapted to be condition specific depending on the health research. Form B and C were found to measure varying aspects of LOC this may be deemed as a limitation by some as Wallston advises that it may be beneficial to administer both forms at once to ensure adequate testing of the construct to explore the differential utilities of both measures when measuring LOC beliefs.

*** Toobert et al (2000)** The Summary of Diabetes Self-care Activities Measure: Results from 7 studies and a revised scale	Review of 7 studies: a total of 1,988 people with diabetes Study settings: Two in Oregon Research Institute, one in an office of a medical group, one included 39 physicians from 12 medical practices, One from a HMO primary care setting, two studies were conducted via the internet.	Review of 7 studies: 5 intervention studies and 2 observational	Review of normative data (means and SD), inter-item and test-retest reliability, correlations between the SDSCA subscales and a range of criterion measures and sensitivity to change scores.	Participants were typically older patients, having Type 2 diabetes for a number of years with a slight preponderance of women. The average inter-item correlations within scales were high (mean = 0.47), with the exception of specific diet test re-test correlations were moderate (mean = 0.40). Correlations with other measures of diet and exercise generally supported the validity of the SDSCA subscales. The scale was revised to include 11 core items and an expanded list of 14 additional recommendations that can be used by researcher and clinicians. The revised version contains items on foot care and smoking. Scoring of items is now measured as per days per week.	The inconsistent number of questionnaire items and constructs in each of the 7 studies constitutes a weakness of analysis. However, the items were still found to be reliable and stable. The strengths of the 11 core items of the revised SDSCA include their brevity and ease of scoring. The revised questionnaire needs replication in other samples.
Samuel-Hodge et al (2002) Reliability and validity of a measure of perceived diabetes and dietary competence in African American women with Type 2 diabetes	2 samples of African American Women with Type 2 diabetes 7 healthcare settings in North Carolina: N=226 Development sample N=225 Validation sample.	Experimental	Perceived diabetes and dietary competence (PDDC) measure, Adapted Perceived Health Competence Scale (PHC), A measure of self-efficacy, the Perceived Dietary Barriers Assessment and	Three subscales were empirically tested by factor analysis: positive competence, negative dietary competence and negative control. Internal consistency results for all subscales were sufficient. Predicted relationships with validation measures of PHC, self-efficacy, social support and perceived dietary barriers were largely support in construct validation.	The reliability and validity of the PDDC measure was supported in this study of African American women with Type 2 diabetes and the internal reliability of the measure compared favourably with other psychometric measures. However, this study had a number of limitations. The homogeneity of the sample population of African American women limits generalizability to the wider population. Additionally, measures used to validate the PDDC were limited to those developed or adapted for a largely African American population. Despite these limitations this

			the Social Support for Diabetes Regime Adherence in African American Women With NIDDM Measure.		initial assessment of the PDDC measure represents a requisite first step in the evaluation of a newly developed measure. Further research is needed for validation of the PDDC in other populations.
*** Laffrey & Isenberg (2003)** The relationship of internal locus of control, value placed on health, perceived importance of exercise, and participation in physical activity during leisure	N=70 women from adult education classes that were not health related in three Midwest cities of America.	Experimental	Physical activity during leisure questionnaire, Form A of the MHLC scales, a perceived importance of physical exercise scale and an adapted version of Rokeach's terminal value ranking scale was used to measure health value.	The correlation co-efficients for the relationships between amount of physical activity during leisure and IHLC and HV were not significant. The relationship between amount of physical activity during leisure and perceived importance of physical exercise was significant.	Although literature suggests that variables such as health value and internality play a role in an individual's undertaking a health promoting activity, these variables proved to have little effect in this study. It is likely that women did not relate physical activity during leisure to health per se. This study is not suggesting that LOC beliefs and health value are not factors that predict behaviour but simply that they may not have tapped into the perceptions of this client.
Arnold et al (2005) The relationship between self-efficacy and self-reported physical functioning in chronic obstructive pulmonary disease and chronic heart failure	2 samples of patients. N=56 COPD patients & N=65 Chronic systolic heart failure (CHF) patients from two hospitals in the Netherlands.	Experimental	Clinical characteristics, Illness severity, Quality of life measures included: 3 subscales from Rand 36-item Health Survey.	No significant difference was found between groups with respect to social functioning and overall quality of life. With relation to personal control the groups only differed significantly in perceived health competence. Patients with COPD reported lower PHC than those with CHF. In both COPD & CHF patients self-reported physical	Patients with CHF and COPD differed with respect to their self-reported level of physical functioning but the factors that contributed to physical functioning were comparable in both groups. Patients with more self-efficacy maintain function reported better physical functioning. The findings of this study indicate that the relationship between personal control and

			Cantrill's ladder. A measure of perception and personal control: The Pearlin and Schooler Mastery Scale. The PHC scale. A self-efficacy scale and socio-demographic characteristics.	functioning was significantly related to mastery and self-efficacy maintenance function, whereas physical functioning was not significantly related to self-efficacy control symptoms. In both of the groups physical functioning was not related to illness severity. Once all personal control variables were analysed it was evident that self-efficacy contributed to self-reporting physical function.	physical functioning holds true for specific perceptions of control concerning behaviour. This study is limited as it is a cross-sectional design and the causal relationships between the variables in the study cannot be ascertained. Moreover, this study does not provide insight into the longitudinal relationships between illness severity, personal control and physical functioning. Consequently, it cannot be determined whether self-efficacy affects self-reported physical functioning or whether ones actual physical performance affects self-efficacy.
Masters & Wallston (2005) Canonical correlation reveals important relations between health locus of control, coping, affect and values	N=659 college students who were attending private or public universities in Alabama, Tennessee, Washington, D.C, Iowa and central California participated in the study.	Experimental	An enhanced version of Form A of the MHLC scales, the Brief Cope Inventory Scale, the Positive and Negative Affect Schedule and a value survey	Previous hypothesised relations that external health control relates to passive coping mechanisms were verified. New findings from the study pertaining to the relations between networks of MHLC variables indicate that a positive affect regarding health relates to a collaborative control between self and an external control factor such as God. Perceiving oneself as the locus of health control was significantly correlated with a set of values characterised by happiness and health and negatively by pleasure.	This study demonstrates how canonical correlation can provide a greater understanding of relations of HLOC and other multi-dimensional variables than can be obtained through simpler analytic strategies. Wallston and Masters (2005) suggest future researchers employ multivariate conceptualisations and analytic techniques in their examinations of the MHLC scales. A limitation of this study s that the Positive and Negative Affect Schedule was missing an item due to an oversight. However, the internal consistency of the scales remained intact.

*** Wallston et al (2007)** Psychometric properties of the Perceived Diabetes Self-Management Scale (PDSMS)	N=398 patients with either Type 1 (n=57) or Type 2 diabetes (n=341). Participants were recruited from four sites: The Vanderbilt Eskind Diabetes Service, The Vanderbilt Adult Primary Care Clinics, the Endocrine clinic Nashville and the general internal medicine clinic at the University of North Carolina.	Experimental	Perceived Diabetes Self-management Scale (PDSMS), Perceived Medical-Condition Self-management Scale (PMCSMS) Summary of Diabetes Self-care Activities Measure Body mass index (BMI), HbA1c results	The principal component analysis demonstrated a balanced scale with the same number of positively and negatively worded items. The scale was found to have good internal consistency with a Cronbach alpha of .83. PDSMS scores were uncorrelated with demographic variables but negatively correlated with BMI. PDSMS scores were positively correlated with a number of self-care activities and negatively related to measures of glycaemic control. The PDSMS is found to be a valid and reliable measure.	The PDSMS was successfully adapted to be a valid and reliable diabetes specific measure of self-efficacy that could be used for other specific chronic conditions. This brings some consistency to the manner in which self-efficacy is measured across a myriad of chronic disease conditions. This study was cross-sectional in measurement. The PDSMS would benefit from longitudinal testing of the predictive validity of the instrument to measure changes overtime.
*** O'Hea et al (2009)** The interaction of locus of control, self-efficacy, and outcome expectancy in relation to HbA1c in medically underserved individuals with type 2 diabetes	N= 109 patients with Type 2 diabetes. Participants were recruited from internal medicine and family practice clinics at a public teaching hospital in Louisiana, America.	Experimental	A demographic questionnaire, Form C of the MHLC scales, the Multidimensional Diabetes Questionnaire and HbA1c results were recorded as biological markers of regimen adherence.	Pearson product moment correlation results suggested a moderate correlation between internal LOC and SE. This finding suggests that each construct taps into a different aspect of perceived control. The HMR results show that patients who reported low SE and low outcome expectancy tended to benefit the most from high internal LOC. However, for patients with low SE and high outcome expectancy, higher scores on internal LOC were related to poorer HbA1c levels.	Findings demonstrate support for the three-way interaction of IHLC, SE and outcome expectancy. However, there were some limitations to this study. The sample consisted solely of patients attending a medical clinic for diabetes treatment. Thus this was not a representative sample of all diabetes patients, particularly those who are non-adherent. The cross-sectional nature of this study did not allow for examination of the stability of the patient's perceived control constructs or HbA1c levels.

Abbreviations contained within Table 10.1 are explained in the glossary at the beginning of this thesis.

Appendix B: Consent Forms, Participant Information Sheets, Demographic Questionnaires & Participant Pro-forma

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Participant consent form (Interviews)

Title of Project: The Interaction of Health Value and Perceived Control in Relation to Outcome Behaviours in a Type 2 Diabetes Patient Population in Scotland

Name of Researcher: Linda Elizabeth Nugent

Please tick the boxes to confirm your understanding

I confirm that I understand the information sheet dated .... for the above study. ☐

I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

I understand that my participation is voluntary and that I am free to withdraw at any time without, giving any reason. ☐

I understand that data collected will be confidential and anonymous. ☐

I understand that by taking part in the interviews I will be audio-recorded. ☐

I understand that any information recorded and transcribed will be destroyed in a confidential manner after data analysis. ☐

I understand that by taking part in study interviews direct quotes may be used in the researcher's thesis and future publications will be kept anonymous. ☐

I agree to take part in the above study. ☐

Name of participant	Date	Signature
-----------------------	-----------	--------------------
Researcher	Date	Signature
-----------------------	-----------	--------------------

(When complete, 1 copy for patient, 1 copy for researcher file, 1 (original) to be kept in medical notes.)

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Participant consent form (Questionnaires)

Title of Project: The Interaction of Health Value and Perceived Control in Relation to Outcome Behaviours in a Type 2 Diabetes Patient Population in Scotland

Name of Researcher: Linda Elizabeth Nugent

Please tick the boxes to confirm your understanding

I confirm that I understand the information sheet dated .... for the above study	☐
I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐
I understand that my participation is voluntary and that I am free to withdraw at any time without, giving any reason.	☐
I understand that data collected will be confidential and anonymous.	☐
I understand that any information obtained will be destroyed in a confidential manner after data analysis.	☐
I agree to take part in the above study.	☐

Name of participant	Date	Signature
----------------------	----------	-------------------
Researcher	Date	Signature
----------------------	----------	-------------------

(When complete, 1 copy for patient, 1 copy for researcher file, 1 (original) to be kept in medical notes.)

THE UNIVERSITY *of* EDINBURGH

Participant Information Sheet

The Interaction of Health Value and Perceived Control in Relation to Outcome Behaviours in a Type 2 Diabetes Patient Population in Scotland

This information sheet is to provide participants willing to take part in interviews with information on this part of the study.

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Talk to others about the study if you wish. Contact the researcher if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study?

As a sufferer of Type 2 diabetes you will be aware of the complex effects of the condition. Diabetes is a long-term condition, which requires careful self-management to minimize the risks of physical illness and complications. Diabetes can interfere with your daily routine and can constrain the lifestyle choices you may wish to make. Not surprisingly, the impact of diabetes on your emotional and psychological well being can be profound.

Although there are many interventions available to improve self-management and relieve anxiety and stress there is not any model in use within health care that can help us as health professionals understand you as an individual with Type 2 diabetes. This study will test a psychological theory called Modified Social Learning Theory, which states that a person's health value and perceived control over their condition predict whether or not health behaviour will be carried out.

By testing this theory it is hoped that in future it will be used as a model in practice, which healthcare professionals can use to understand you as an individual with Type 2 diabetes and identify what we can do to support you.

Why have I been asked to take part?

You have been asked to take part as you have been previously diagnosed with Type 2 diabetes and are a patient at Outpatients 2 at the Royal Infirmary Edinburgh.

Do I have to take part?

No, it is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. Deciding not to take part or withdrawing from the study will not affect the healthcare that you receive.

What will happen if I take part?

You will be asked to take part in an interview with the researcher. The interview will be recorded; this is for data collection purposes. It is anticipated that the interviews will take thirty to sixty minutes but may run over this timeline. Any information collected from you will

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remain anonymous. Any information recorded and transcribed will be destroyed in a confidential manner after data analysis. For the purpose of explaining information gained by you quotes from the interview may be used in the researcher's thesis. The researcher would like to talk with you about how you value your health and how you as a person perceive control over your condition. Interviews will take place at The Royal Infirmary of Edinburgh or at The University of Edinburgh. The researcher will ask you your preference of location on consent and establish a date and time which is convenient for you.

What are the possible benefits of taking part?
Your participation will be greatly appreciated by the researcher. By taking part you will contribute to future developments in care for people with Type 2 diabetes.

What are the possible disadvantages and risks of taking part?
It is not thought that there are many disadvantages; however, it is possible that the interview may be time consuming. However the interview can take place at a time and date suitable to you.

What happens when the interviews are finished?
At the end of the interviews the researcher will analyse all of the data and with this information devise a scale that measures health value. This scale will then be incorporated in to the second phase of the study that involves completing questionnaires. If you wish to have information on this phase of the study please inform the researcher. Once the questionnaires are completed they will be analysed and the results will be reported in the researcher's thesis.

Will my taking part in the study be kept confidential?
All the information collected during the course of the research will be kept confidential and there are strict laws that safeguard your privacy at every stage. Your name will be removed from the data so that you cannot be recognised from it.

What will happen to the results of the study?
Study results will be produced within the researcher's thesis and may be published in peer reviewed academic journals. If you wish you can be provided with a report of the study findings and information of how your contribution will benefit future developments in care for people with Type 2 diabetes. This report is provided on request only.

Who is organising the research and why?
This study has been organised by Linda Elizabeth Nugent (PhD Nursing Studies) as the importance of understanding Type 2 diabetes patient control is ever increasing.

Who has reviewed the study?
The study proposal has been reviewed by Dr Graeme Smith, Dr Tonks Fawcett, and Dr Marion Smith of The University of Edinburgh. Furthermore, Dr Zammitt (Diabetologist) has reviewed the study proposal. A favourable ethical opinion has been obtained from South East Scotland REC. NHS management approval has also been obtained.

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If you have any further questions about the study please contact the researcher:

Linda Elizabeth Nugent
PhD Student Nursing Studies
School of Health in Social Science
Medical School
Teviot Place
Edinburgh
EH8 9AG
Tel: 07849077615
Email: linda.e.nugent@sms.ed.ac.uk

If you would like to discuss this study with someone independent of the study please contact:

Dr Graeme Smith
School of Health in Social Science
Medical School
Teviot Place
Edinburgh
EH8 9AG
Tel: 0131 650 3901
Email: graeme.smith@ed.ac.uk

If you wish to make a complaint about the study please contact NHS Lothian:

NHS Lothian Complaints Team
2nd Floor
Waverley Gate
2-4 Waterloo Place
Edinburgh
EH1 3EG
Tel: 0131 465 5708

Thank you for taking the time to read this information sheet

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Participant Information Sheet

The Interaction of Health Value and Perceived Control in Relation to Outcome Behaviours in a Type 2 Diabetes Patient Population in Scotland

This information sheet is to provide participants willing to complete the questionnaires with information on this part of the study.

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Talk to others about the study if you wish. Contact us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study?
As a sufferer of Type 2 diabetes you will be aware of the complex effects of the condition. Diabetes is a long-term condition, which requires careful self-management to minimize the risks of physical illness and complications. Diabetes can interfere with your daily routine and can constrain the lifestyle choices you may wish to make. Not surprisingly, the impact of diabetes on your emotional and psychological well-being can be profound.

Although there are many interventions available to improve self-management and relieve anxiety and stress there is not any model in use within healthcare that can help us as health professionals understand you as an individual with Type 2 diabetes. This study will test a psychological theory called Modified Social Learning Theory, which states that a person's health value and perceived control over their condition predict whether or not health behaviour will be carried out.

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Do I have to take part?
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What will happen if I take part?
You will be asked to complete a booklet of questionnaires. The booklet can be taken home and completed in your own time. The researcher asks if you could return it as soon as possible. A prepaid addressed envelope will be provided for your convenience. Please complete all questions as every question and answer you give is very important to the outcome of this study.

What are the possible benefits of taking part?
Your participation will be greatly appreciated by the researcher. By taking part you will contribute to future developments in care for people with Type 2 diabetes.

What are the possible disadvantages and risks of taking part?
It is not thought that there are many disadvantages; however, it is possible that completing the questionnaire booklet may be time consuming. However the booklet can be taken home and completed in your own time.

What happens when the study is finished?
At the end of the research the researcher will analyse all the questionnaires returned and report her results in her thesis.

Will my taking part in the study be kept confidential?
All the information collected during the course of the research will be kept confidential and there are strict law's that safeguard your privacy at every stage. Your name will be removed from the data so that you cannot be recognised from it.

What will happen to the results of the study?
Study results will be produced within the researcher's thesis and may be published in peer reviewed academic journals. If you wish you can be provided with a report of the study findings and information of how your contribution benefited future developments in care for people with Type 2 diabetes. This report is provided on request only.

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Tel: 07849077615
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If you would like to discuss this study with someone independent of the study please contact:

Dr Graeme Smith
School of Health in Social Science
Medical School
Teviot Place
Edinburgh
EH8 9AG
Tel: 0131 650 3901
Email: graeme.smith@ed.ac.uk

If you wish to make a complaint about the study please contact NHS Lothian:

NHS Lothian Complaints Team
2nd Floor
Waverley Gate
2-4 Waterloo Place
Edinburgh
EH1 3EG
Tel: 0131 465 5708

Thank you for taking the time to read this information sheet.

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Demographic Questionnaire **Participant Code** ☐

(Qualitative Phase)

Participant Details

Name: _________ Date of Birth:__________ Age: ______

Address:_______________

Gender: M F Marital Status: S M W D Ethnicity: _________________

Employment Status: _______________

Smoking Status: Smoker Non-Smoker Ex-Smoker

Clinical Parameters

Weight:_______ Height:_______ BMI:_______

Most recent HbA1c:_______

Health Status

Date of diagnosis of Type 2 diabetes: __________

Suffers from co-morbid conditions: Yes No

If yes list comorbidities: ____

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Demographic Questionnaire **Participant Code** [ ]

(Quantitative Phase)

Participant Details

Name:__________ Date of birth:_________ Age: ______

Address: _______________

Gender: M F Marital Status: S M W D Ethnicity: _________________

Employment Status: _______________

Smoking Status: Smoker Non-Smoker Ex-Smoker

Clinical Parameters

Weight:_______ Height:_______ BMI:_______

Most recent HbA1c:_______

Health Status

Date of diagnosis of Type 2 diabetes: __________

Suffers from co-morbid conditions: Yes No

If yes list comorbidities: ____

Quantitative Phase

PDSMS [ ]

Form C MHLC [ ]

SDSCA: GD [ ] SPD [ ] BS [ ] EX [ ] FC [ ]

HAD [ ]

HVP1 [ ] HVP2 [ ]

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Patient Pro-forma **Participant Code** ☐

(Qualitative Phase)

Participant Details

Age: ______

Gender: M F Marital Status: S M W D Ethnicity: _________________

Employment Status: _______________

Smoking Status: Smoker Non-Smoker Ex-Smoker

Clinical Parameters

Weight:_______ Height:_______ BMI:_______

Most recent HbA1c:_______

Health Status

Date of diagnosis of Type 2 diabetes: __________

Suffers from co-morbid conditions: Yes No

If yes list comorbidities: ____

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Patient Pro-forma **Participant Code** ☐

(Quantitative Phase)

Participant Details

Age: ______

Gender: M F Marital Status: S M W D Ethnicity: _________________

Employment Status: _______________

Smoking Status: Smoker Non-Smoker Ex-Smoker

Clinical Parameters

Weight:_______ Height:_______ BMI:_______

Most recent HbA1c:_______

Health Status

Date of diagnosis of Type 2 diabetes: __________

Suffers from co-morbid conditions: Yes No

If yes list comorbidities: ____

Quantitative Phase

PDSMS [ ]

Form C MHLC [ ]

SDSCA: GD [ ] SPD [ ] BS [ ] EX [ ] FC [ ]

HAD [ ]

HVP1 [ ] HVP2 [ ]

Appendix C: Leaflet for OPD Staff's Information

5 Data collected will aid the development of a Health Value measure.

6 Quantitative- Various measures will be used to test the interactions of the constructs of the MSLT.

Target sample

1. Adults with Type 2 diabetes on insulin

2. Regular and reliable attendance of appointments

To conclude

Acknowledging issues in perceived control and health value in Type2 diabetes will play an important role for patients in longer-term adjustment and response to symptoms.

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THE INTERACTION OF HEALTH VALUE AND PERCEIVED CONTROL IN RELATION TO OUTCOME BEHAVIOURS IN A TYPE 2 DIABETES PATIENT POPULATION IN SCOTLAND

Modified Social Learning Theory (MSLT)

for health states that '*the three way interaction between internal locus of control beliefs, self-efficacy for doing the relevant health behaviour and the value of the outcome that follows doing the health behaviour is what predicts whether or not the health behaviour will be done*' (Wallston 2011).

Health Locus of Control (HLC)

The HLC construct originated from Rotter's (1954) social learning theory. Rotter (1966) developed a scale to measure internal v's external LOC belief orientation. Internals are seen to believe that events are a consequence of their own actions whereas externals are seen to believe that events are unrelated to their own actions and thereby determined by factors beyond their control (Conner and Norman 2005).

Self-Efficacy (SE)

Is the belief that one can determine one's own internal states and behaviour influence ones environment and or bring about desired outcomes (Bandura 1995 p5)

Health Value

MSLT posits that if an individual believes that a specific health behaviour will lead to a valued outcome in a given situation he/she will be more likely to engage in that health behaviour (Wallston 1992).

HLC and SE are constructs of a larger and more important construct, perceived control.

Measuring these constructs alone to examine perceived control of Type 2 diabetes may not fully tap into the construct's multidimensionality particularly if interactions among the different types of perceived control are unexamined (O'Hea et al 2009). By testing the interactive constructs of health value, HLC and SE a theoretical approach to predicting health behaviour could be presented.

Why measure perceived control?

Having a greater sense of control has consistently been found to have adaptive effects. Perceived control is associated with emotional well-being, enhanced ability to cope with stress and a greater likelihood of making difficult behaviour changes. Low perceived control can lead to apathy which depresses the likelihood of any attempts to make positive changes. Patients with diabetes, health may change rapidly and patients often must adjust their self-care to address fluctuations in their physiologic well-being. Perceived control of diabetes is important in understanding patients' motivation to manage their diabetes

Research Rationale

MSLT has had little application in the health care setting and requires further testing.

MSLT has not been tested in this way before.

MSLT could present a theoretical approach to predicting health behaviour.

MSLT has the potential to increase the reliability of determining health behaviours.

MSLT will enable nurses and health professionals to take into account variations between individuals in terms of health value and perceived control and variations in its effect on different health behaviours.

MSLT will have positive implications for future planning of Type 2 diabetes patients care.

Study Design

1. Mixed method approach
2. Qualitative and Quantitative
3. Qualitative: explore patient perceptions of health value and perceived control.

Appendix D: Interview Guide

Interview Guide

Could you tell me about yourself?

What is most valuable to you in your life?

Where would you rate health against the other values in your life?

Is health important to you? And why?

How would you define health?

Can I ask which statement you agree with the most and why?
Without good health I cannot do the things that I want to
My goal is to become as healthy as I can be

How has diabetes affected your life? Tell me what it is like to have T2 diabetes?

Can you think back to before you were diagnosed with Type 2 diabetes how much did you're health mean to you then?

Has your appreciation of your health changed since diagnosis?

Can I ask which statement you agree with the most and why?
Do you see good diabetes control as being equal to having good health?
Do you see good diabetes control as a means to having good health?

How do you perceive the control over your diabetes? To put in other words how do you feel about your ability in managing your diabetes? How do you cope?

Can you explain what aspects of your diabetes management are most important to you?

What are the benefits of good blood sugar control to you? CKD.ED.HD

What motivates you to check your blood sugar control?

Do you see a difference in your health if your blood sugar control is good?

Can you describe any activities you adopt on a daily basis to maintain your health and control your diabetes?

Do you carry out these activities yourself?

Are these activities addressed out of your own will to do so? eg partner, friend or family member?

How do you prioritize which activities are most valuable to your diabetes control?

What is your motivation for choosing to carry out these activities against others for example diet, foot care or exercise?
(Is your motivation to improve your health or for other reasons?)

Do you think Type 2 diabetes may affect your quality of life in the future?

If so has this impacted on how you address your health needs? (Probe How do you feel about this?)

When you were started on insulin therapy did this change the way you see your control over your diabetes? (Probe How did you feel about these changes?)

Did it change how much you appreciate your health?

As your diabetes has progressed, has your attitude to diabetes control changed overtime?

When you were started on insulin did this have any effect on the health choices that you make?

Do you think health professionals influence the choices you make in managing your health?

If your diabetes worsens can you explain to me what determines how soon you feel better again? For example do you rely on yourself or others to improve the situation?

Can you call to mind anytime in which your mood may have affected your diabetes control? How did this affect you?

Did you reflect on this afterwards and think about another way of approaching this situation if it arose again?

Generally does your mood affect your diabetes control?

Appendix E: Questionnaire Booklet

THE UNIVERSITY *of* EDINBURGH

Questionnaire Booklet

- Within this booklet are 5 questionnaires one of which has two parts.
- Please take your time to carefully read the instructions given for each questionnaire before completing each one.
- When you have reached the end of the booklet please return it in the pre-paid envelope provided.
- If you have any questions please contact Linda Nugent the researcher of this study. Contact details are provided on your information sheet

Health Value Questionnaire Part 1

I would like you to think of the time **BEFORE YOU WERE DIAGNOSED** with Type 2 Diabetes Mellitus.

Read the statements below and think about how you would have responded to these at that point in your life.

Beside each statement is a scale that ranges from strongly disagree to strongly agree. For each item I would like you to circle on the scale where your opinion of the statement lies.

1. If you don't have your health then you don't have anything.

Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

2. There are many things I care about more than my health.

Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

3. Good health is of only minor importance in a happy life.

Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

4. There is nothing more important than good health.

Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

5. My health is valuable to me mainly because it allows me to do other things that I want to do.

Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

6. Without good health my life is meaningless.

Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

Multi-dimensional Health Locus of Control Scale

Each item below is a belief statement about how you manage your Type 2 diabetes with which you may agree or disagree.
Beside each statement is a scale that ranges from strongly disagree (1) to strongly agree (6). For each item I would like you to circle the number that represents the extent to which you agree or disagree with that statement. The more you agree with a statement, the higher will be the number you circle. The more you disagree with a statement; the lower will be the number you circle.
Please make sure that you answer **EVERY ITEM** and that you circle **ONLY ONE** number per item. This is a measure of your personal beliefs. There are no right or wrong answers.

1= Strongly Disagree **(SD)** **2=** Moderately Disagree **(MD)** **3**= Slightly Disagree **(SD)** **4**= Slightly Agree**(SA)** **5**= Moderately Agree **(MA)** **6**= Strongly Agree **(SA)**

Statements of Belief	**SD**	**MD**	**SD**	**SA**	**MA**	**SA**
If my condition worsens it is my own behaviour which determines whether I feel better again.	1	2	3	4	5	6
As to my Type 2 Diabetes what will be will be.	1	2	3	4	5	6
If I see my Doctor regularly I am less likely to have problems with my diabetes.	1	2	3	4	5	6
Most things that affect my diabetes happen to me by chance	1	2	3	4	5	6
When ever my diabetes worsens I should consult a medically trained professional	1	2	3	4	5	6
I am directly responsible for my diabetes getting worse	1	2	3	4	5	6
Other people play a big role in whether my diabetes improves, stays the same, or gets worse.	1	2	3	4	5	6
Whatever goes wrong with my diabetes is my own fault.	1	2	3	4	5	6
Luck plays a big part in determining how my diabetes improves	1	2	3	4	5	6
In order for my diabetes to improve, it is up to other people to see that the right things happen.	1	2	3	4	5	6
Whatever improvement occurs with my diabetes is largely a matter of good fortune.	1	2	3	4	5	6

The main thing which affects my diabetes is what I myself do.	1	2	3	4	5	6
I deserve the credit when my diabetes improves and the blame when it gets worse.	1	2	3	4	5	6
Following doctor's orders to the letter is the best way to keep my diabetes from getting any worse.	1	2	3	4	5	6
If my diabetes worsens, it's a matter of fate.	1	2	3	4	5	6
If I am lucky, my diabetes will get better.	1	2	3	4	5	6
If my diabetes takes a turn for the worse, it is because I have not been taking proper care of myself.	1	2	3	4	5	6
The type of help I receive from other people determines how soon my diabetes improves.	1	2	3	4	5	6

Perceived Diabetes Self-management Scale

Each item below is a belief statement about your Type 2 diabetes with which you may agree or disagree. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (5). For each item I would like you to circle the number that represents the extent to which you agree or disagree with that statement. The more you agree with a statement, the higher will be the number you circle. The more you disagree with a statement, the lower will be the number you circle. Please make sure that you answer **EVERY ITEM** and that you circle **ONLY ONE** number per item. **1=** Strongly Disagree **(SD)** **2=** Moderately Disagree **(MD)** 3= Disagree **(D)** **4=** Moderately Agree **(MA)** **5=** Strongly Agree **(SA)**

Statements of Belief	**SD**	**MD**	**D**	**MA**	**SA**
It is difficult for me to find effective solutions for problems that occur with managing my diabetes.	**1**	**2**	**3**	**4**	**5**
I find efforts to change things I don't like about my diabetes are ineffective.	**1**	**2**	**3**	**4**	**5**
I handle myself with respect to my diabetes.	**1**	**2**	**3**	**4**	**5**
I am able to manage things with respect to my diabetes as well as most other people.	**1**	**2**	**3**	**4**	**5**
I succeed in the projects I undertake to manage my diabetes.	**1**	**2**	**3**	**4**	**5**
Typically, my plans for managing my diabetes don't work out well.	**1**	**2**	**3**	**4**	**5**
No matter how hard I try, managing my diabetes doesn't turn out the way I would like.	**1**	**2**	**3**	**4**	**5**
I'm generally able to accomplish my goals with respect to managing my diabetes.	**1**	**2**	**3**	**4**	**5**

The Summary of Diabetes Self-Care Activities Measure

The questions below ask you about your diabetes self-care activities during the past 7 days. Please circle the number of days in which you may have carried out the activities stated below. If you were sick during the past seven days please think back to the last seven days that you were not sick.

Diet

How many of the last SEVEN DAYS have you followed a healthful eating plan?

0 1 2 3 4 5 6 7

On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?

0 1 2 3 4 5 6 7

On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?

0 1 2 3 4 5 6 7

On how many of the last SEVEN DAYS did you eat high fat foods such as red meat or full fat dairy products?

0 1 2 3 4 5 6 7

Exercise

On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity including walking)

0 1 2 3 4 5 6 7

On how many of the last SEVEN DAYS did you participate in a specific exercise session such as (swimming, walking, biking) other than what you do around the house or as part of your work?

0 1 2 3 4 5 6 7

Blood sugar testing

On how many of the last seven days did you test your blood sugar?

0 1 2 3 4 5 6 7

On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your healthcare provider?

0 1 2 3 4 5 6 7

Foot care

On how many of the last SEVEN DAYS did you check your feet?

0 1 2 3 4 5 6 7

On how many of the last SEVEN DAYS did you inspect the inside of your shoes?

0 1 2 3 4 5 6 7

Smoking

Have you smoked a cigarette even one puff-during the last SEVEN DAYS?

0=no

1=Yes. If yes how many cigarettes did you smoke on an average a day? Number of cigarettes [ ]

Health Value Questionnaire Part 2

Now I would like you to respond to the statements below as you **NOW** feel, **NOW THAT YOU HAVE BEEN DIAGNOSED** with Type 2 Diabetes Mellitus.

Beside each statement is a scale that ranges from strongly disagree to strongly agree. For each item I would like you to circle on the scale where your opinion of the statement lies.

1. If you don't have your health then you don't have anything.

Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

2. There are many things I care about more than my health.

Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

3. Good health is of only minor importance in a happy life.

Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

4. There is nothing more important than good health.

Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

5. My health is valuable to me mainly because it allows me to do other things I want to do.

Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

6. Without good health my life is meaningless.
Strongly disagree Disagree Moderately disagree Moderately agree Agree Strongly agree

The HAD Scale

This questionnaire will help the researcher to know how you are feeling. Read every sentence. Place an X on the answer that best describes how you have been feeling during the **LAST WEEK**. You do not have to think too much to answer. Spontaneous answers are more important.

A1. I feel tense or wound up 3 ( ) Most of the time 2 ( ) A lot of the time 1 ( ) From time to time 0 ( ) Not at all	D2. I still enjoy the things I used to enjoy 0 ( ) Definitely as much 1 ( ) Not quite so much 2 ( ) Only a little 3 ( ) Hardly at all
A3. I get a sort of frightened feeling as if something awful is about to happen 3 ( ) Very definitely and quite badly 2 ( ) Yes, but not too badly 1 ( ) A little, but it doesn' t worry me 0 ( ) Not at all	D4. I can laugh and see the funny side of things 0 ( ) As much as I always could 1 ( ) Not quite as much now 2 ( ) Definitely not so much now 3 ( ) Not at all
A5. Worrying thoughts go through my mind 3 ( ) A great deal of the time 2 ( ) A lot of the time 1 ( ) From time to time but not too often 0 ( ) Only occasionally	D6. I feel cheerful 3 ( ) Not at all 2 ( ) Not often 1 ( ) Sometimes 0 ( ) Most of the time
A7. I can sit at ease and feel relaxed	D8. I feel as if I am slowed down

0 ( ) Definitely 1 ( ) Usually 2 ( ) Not often 3 ( ) Not at all	3 ( ) Nearly all the time 2 ( ) Very often 1 ( ) Sometimes 0 ( ) Not at all
A9. I get a sort of a frightened feeling like butterflies in my stomach 0 ( ) Not at all 1 ( ) Occasionally 2 ( ) Quite often 3 ( ) Very often	D10. I have lost interest in my appearance 3 ( ) Definitely 2 ( ) I don' t take as much care as I should 1 ( ) I may not take quite as much care 0 ( ) I take just as much care as ever
A11. I feel restless, as if I have to be on the move 3 ( ) Very much indeed 2 ( ) Quite a lot 1 ( ) Not very much 0 ( ) Not at all A13. I get a sudden feeling of panic 3 ( ) Very often indeed 2 ( ) Quite often 1 ( ) Not very often 0 ( ) Not at all	D12. I look forward with enjoyment to things 0 ( ) As much as I ever did 1 ( ) Rather less than I used to 2 ( ) Definitely less than I used to 3 ( ) Hardly at all D14. I can enjoy a good TV or radio program or book 0 ( ) Often 1 ( ) Sometimes 2 ( ) Not often 3 ( ) Very seldom

Appendix F: Tables of Quantitative Results for Dataset 2 and ANOVA tables for Dataset 1 & 2 General Diet, Exercise and Foot care

Tables 10.2 to 10.10 include selected tables of results for Dataset 2. Tables 10.11 to 10.16 display ANOVA results for General Diet, Exercise and Foot care subscales for Dataset 1 and Dataset 2.

Table 10.2 Descriptive Statistics Health Value Items Dataset 2

Health Value Items	Mean	SD	N
Item 1	4.36	1.671	105
Item 2	3.86	1.579	104
Item 3	4.29	1.53	105
Item 4	4.64	1.414	104
Item 5	5.12	0.812	99
Item 6	3.51	1.718	104

Table 10.3 Correlation Matrix Health Value Items Dataset 2

Health Value Items	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6
Item 1			.09	.47**	.25*	.48**
Item 2			.36**	.08	.09	.08
Item 3	.09	.36**		-.03	-.04	-.25**
Item 4	.47**	.08	-.03		.45**	.34**
Item 5	.25*	.09	-.04	.45**		.23*
Item 6	.48**	.08	.25**	.34**	.23*	

*correlation is significant at the 0.05 level (2-tailed), ** correlation is significant at the 0.01 level (2-tailed)

Table 10.4Demographic Data Dataset 2

Demographic Data	Mean	SD	%	N		Mean	SD	%	N
Sex				107	***Smoking Status***				
Female			41	44	Smoker			13.1	14
Male			59	63	Never Smoked			64.5	69
					Ex Smoker			22.4	24
Age	62	10.7							
					Diabetes years	13.84	6.7		
Age Groups					1-5			10.3	11
30-45			11.2	12	6-10			24.3	26
46-55			14	15	11-15			27.1	29
56-65			36.4	39	16-20			18.7	20
66-75			28	30	>20				21
76-85			9.3	10					
86 and above			1	1	***BMI Range***	34.2	7.2		
					<18.5			0.9	1
Ethnicity					18.5-24.9			6.5	7
British			93.5	100	25.0-29.9			22.4	21
Other			6.5	7	>30			70.1	75
Marital Status					***HbA1c Levels***	66.3	18.3		
Single			11.2	12	<48 mmol/mol			6.5	7
Married			60.7	65	48-59 mmol/mol			27.1	29
Widowed			17.8	19	60-69 mmol/mol			30.8	33
Divorced			10.3	11	70-80 mmol/mol			16.8	18
					>81 mmol/mol			17.8	20
Employment Status									
Employed			42.1	45	***Blood Pressure***				
Unemployed			8.4	9	≥91/65			15.9	17
Retired			49.5	53	≥120/80			14	15
					≥130/85			19.6	21
Comorbidity					≥140/90			50.5	54
Other Chronic Illness			80.4	86					
None			19.6	21					

Table 10.5 Scale Scores Dataset 2

Health Value Scales	**Mean**	**SD**	**% Yes**	**% No**	**N**
Health Value Part 1	17.4	3.8			107
Health Value Part 2	17.1	3.7			107
Health Value Part 1 Terminal Items	9.4	2.3			107
Health Value Part 1 Instrumental Items	8	2.7			107
Health Value Part 2 Terminal Items	8.9	2.6			107
Health Value Part 2 Instrumental Items	8	2.5			107
PDSMS	29.3	5.3			107
MHLC Subscales					107
Internal	27.8	5.7			107
Chance	15.5	6.9			107
Powerful Others	25.2	5.2			107
Doctors	14.9	2.7			107
Other People	10.4	3.9			107
SDSCA Subscales					107
General Diet	4.7	1.8			107
Specific Diet	4	1.5			107
Exercise	2.8	2.4			107
Blood Sugar	5.4	2.3			107
FootCare	3.4	2.4			107
SDSCA Smoking Status					
% smoked a cigarette in last 7 days			88	14	107
Cigarettes smoked per day	1.7	4.8			

HAD Range of Scores	**Anxiety %**	**Depression %**	**N**
0-7 Normal	58.9	65.4	107
8 - 10 Mild	20.6	18.7	107
11 - 14 Moderate	15	12.1	107
15 - 21 Severe	5.6	3.7	107

Table 10.6 HMR General Diet Dataset 2

Predictors	*B*	*SE*	*β*	*df*	*R* ²	Δ*R2*
Block 1						
Sex	-.203	.366	-.054			
Age	-.011	.019	-.065			
BMI	-.046	.025	-.179			
HbA1c	-.022	.010	-.215*			
Years since diagnosis	.029	.029	.104	101	.083	
Block 2						
Sex	.043	.334	.012			
Age	-.024	.018	-.138			
BMI	-.018	.024	-.070			
HbA1c	-.003	.010	-.028			
Years since diagnosis	.044	.027	.160			
IHLC	.006	.029	.018			
SE	.181	.035	.515***			
HV	.026	.044	.052	98	.284***	.201***
Block 3						
Sex	.019	.347	.005			
Age	-.024	.018	-.137			
BMI	-018	.024	-.069			
HbA1c	-.002	.010	-.024			
Years since diagnosis	.043	.027	.157			
IHLC	.006	.030	.019			
SE	.182	.035	.516***			
HV	.025	.047	.051			
IHLC x SE	-.001	.005	-.009			
IHLC x HV	.007	.007	.087			
HV x SE	.000	.007	.002	95	.292	.008
Block 4						
Sex	.074	.345	.020			
Age	-.026	.018	-.148			
BMI	-.014	.024	-.053			
HbA1c	-.001	.010	-.012			
Years since diagnosis	.043	.027	.157			
IHLC	-.003	.030	-.008			
SE	.176	.035	.499***			
HV	.038	.047	.075			
IHLC x SE	.001	.005	.014			
IHLC x HV	.012	.008	.142			
HV x SE	.000	.007	.002			
HV x IHLC x SE	-.002	.001	-.164	94	.313	.021

P < .05, ** P < .01, *** P < .001.

Table 10.7 HMR Specific Diet Dataset 2

Predictors	*B*	*SE*	*β*	*df*	*R* ²	Δ*R2*
Block 1						
Sex	.064	.315	.020			
Age	.006	.017	.042			
BMI	-.005	.022	-.021			
HbA1c	-.012	.009	-.147			
Years since diagnosis	-.010	.025	-.045	101	.028	
Block 2						
Sex	.129	.321	.041			
Age	.004	.017	.024			
BMI	.006	.023	.030			
HbA1c	-.007	.009	-.081			
Years since diagnosis	-.005	.026	-.022			
IHLC	-.011	.028	-.040			
SE	.052	.033	.175			
HV	.028	.042	.066	98	.056	.028
Block 3						
Sex	-.054	.325	-.017			
Age	.004	.017	.025			
BMI	.004	.023	.019			
HbA1c	-.007	.009	-.086			
Years since diagnosis	-.014	.025	-.061			
IHLC	-.017	.028	-.064			
SE	.043	.033	.145			
HV	.010	.044	.023			
IHLC x SE	.009	.005	.193			
IHLC x HV	.009	.007	.134			
HV x SE	.009	.007	.138	95	.114	.058
Block 4						
Sex	.022	.318	.007			
Age	.001	.016	.008			
BMI	.010	.022	.046			
HbA1c	-.006	.009	-.066			
Years since diagnosis	-.014	.025	-.061			
IHLC	-.030	.027	-.109			
SE	.035	.032	.118			
HV	.026	.043	.062			
IHLC x SE	.010	.005	.231*			
IHLC x HV	.015	.007	.224*			
HV x SE	.009	.007	.138			
HV x IHLC x SE	-.003	.001	-.267*	94	.169*	.055*

P < .05, ** P < .01, *** P < .001.

Table 10.8 HMR Exercise Dataset 2

Predictors	*B*	*SE*	*β*	*df*	*R²*	*ΔR2*
Block 1						
Sex	-.566	.475	-.115			
Age	.030	.025	.132			
BMI	-.056	.033	-.168			
HbA1c	.010	.013	.078			
Years since diagnosis	.001	.038	.004	101	.079	
Block 2						
Sex	-.700	.477	-.143			
Age	.024	.025	.108			
BMI	-.076	.034	-.228*			
HbA1c	.007	.014	.057			
Years since diagnosis	.014	.038	.039			
IHLC	.094	.041	.223*			
SE	-.026	.050	-.057			
HV	.040	.063	.061	98	.132	.053
Block 3						
Sex	-.709	.493	-.145			
Age	.025	.025	.112			
BMI	-.075	.035	-.223*			
HbA1c	.008	.014	.063			
Years since diagnosis	.014	.039	.040			
IHLC	.096	.042	.228*			
SE	-.023	.050	-.051			
HV	.047	.067	.073			
IHLC x SE	-.003	.007	-.042			
IHLC x HV	.014	.091	.129			
HV x SE	-.004	.011	-.041	95	.151	.019
Block 4						
Sex	-.662	.495	-.135			
Age	.024	.025	.105			
BMI	-.071	.035	-.212			
HbA1c	.009	.014	.071			
Years since diagnosis	.015	.039	.040			
IHLC	.089	.043	.210			
SE	-.028	.051	-.062			
HV	.057	.067	.088			
IHLC x SE	-.002	.007	-.027			
IHLC x HV	.018	.011	.165			
HV x SE	-.004	.011	-.040			
HV x IHLC x SE	-.002	.002	-.107	94	.160	.009

P < .05, ** P < .01, *** P < .001.

Table 10.9 HMR Blood Sugar Dataset 2

Predictors	***B***	***SE***	***β***	***df***	***R ²***	**Δ*R2***
Block 1						
Sex	.320	.454	.066			
Age	.056	.024	.253*			
BMI	.047	.032	.141			
HbA1c	-.011	.013	-.081			
Years since diagnosis	.050	.036	.142	101	.130*	
Block 2						
Sex	.510	.456	.106			
Age	.054	.024	.245*			
BMI	.058	.033	.175			
HbA1c	-.005	.013	-.040			
Years since diagnosis	.039	.036	.110			
IHLC	-.030	.040	-.072			
SE	.061	.047	.135			
HV	-.114	.060	-.178	98	.180	.050
Block 3						
Sex	.561	.470	.116			
Age	.055	.024	.248*			
BMI	.060	.033	.181			
HbA1c	-.004	.013	-.031			
Years since diagnosis	.042	.037	.119			
IHLC	-.025	.040	-.061			
SE	.067	.048	.148			
HV	-.102	.063	-.160			
IHLC x SE	-.006	.007	-.092			
IHLC x HV	.012	.010	.111			
HV x SE	-.066	.010	-.061	95	.202	.022
Block 4						
Sex	.657	.463	.136			
Age	.052	.024	.234*			
BMI	.067	.033	.203*			
HbA1c	-.002	.013	-.014			
Years since diagnosis	.042	.036	.119			
IHLC	-.041	.040	-.098			
SE	.057	.047	.126			
HV	-.081	.063	-.127			
IHLC x SE	-.004	.007	-.061			
IHLC x HV	.020	.010	.186			
HV x SE	-.006	.010	-.061			
HV x IHLC x SE	-.004	.002	-.222*	94	.240*	.038*

P < .05, ** P < .01, *** P < .001.

Table 10.10 HMR Foot Care Dataset 2

Predictors	*B*	*SE*	*β*	*df*	R^2	$\Delta R2$
Block 1						
Sex	-.544	.469	-.110			
Age	.035	.025	.156			
BMI	.042	.033	.126			
HbA1c	.021	.013	.159			
Years since diagnosis	.071	.037	.197	101	.119*	
Block 2						
Sex	-.471	.478	-.095			
Age	.035	.025	.153			
BMI	.060	.035	.178			
HbA1c	.028	.014	.208			
Years since diagnosis	.076	.038	.212*			
IHLC	-.037	.042	-.088			
SE	.055	.050	.120			
HV	.052	.063	.080	98	.142	.023
Block 3						
Sex	-.540	.491	-.109			
Age	.031	.025	.136			
BMI	.056	.035	.165			
HbA1c	.027	.014	.204			
Years since diagnosis	.070	.039	.195			
IHLC	-.039	.042	-.092			
SE	.051	.050	.112			
HV	.020	.066	.031			
IHLC x SE	.005	.007	.067			
IHLC x HV	-.009	.010	-.086			
HV x SE	.017	.010	.162	95	.170	.028
Block 4						
Sex	-.536	.496	-.109			
Age	.031	.025	.135			
BMI	.056	.035	.166			
HbA1c	.027	.014	.205			
Years since diagnosis	.070	.039	.195			
IHLC	-.040	.043	-.094			
SE	.051	.051	.111			
HV	.021	.067	.032			
IHLC x SE	.005	.007	.068			
IHLC x HV	-.009	.011	-.083			
HV x SE	.017	.011	.162			
HV x IHLC x SE	.000	.002	-.008	94	.170	.000

P< .05, ** P < .01, *** P < .001.

Table 10.11 ANOVA General diet descriptive statistics

ANOVA			Dataset 1 N=78			Dataset 2 N=107		
General Diet			**Mean**	**SD**	**N**	**Mean**	**SD**	**N**
Low HV	Low IHLC	Low SE	4.73	2.037	13	4.81	1.964	13
		High SE	4.06	2.382	8	4.77	2.170	15
		Total	4.48	2.142	21	4.79	2.039	28
	High IHLC	Low SE	5.61	1.364	9	5.14	1.231	14
		High SE	5.39	1.387	9	4.64	1.598	11
		Total	5.5	1.339	18	4.92	1.397	25
	Total	Low SE	5.09	1.810	22	4.98	1.602	27
		High SE	4.76	1.977	17	4.71	1.914	26
		Total	4.95	1.867	39	4.85	1.750	53
High HV	Low IHLC	Low SE	4.78	1.641	9	5	1.610	12
		High SE	4.72	1.603	9	4.15	2.349	13
		Total	4.75	1.574	18	4.56	2.033	25
	High IHLC	Low SE	5.75	1.035	8	4.82	2.383	14
		High SE	4.65	1.796	13	4.33	1.543	15
		Total	5.07	1.615	21	4.57	1.972	29
	Total	Low SE	5.24	1.437	17	4.9	2.025	26
		High SE	4.68	1.680	22	4.25	1.922	28
		Total	4.92	1.583	39	4.56	1.981	54
Total	Low IHLC	Low SE	4.75	1.844	22	4.90	1.768	25
		High SE	4.41	1.970	17	4.48	2.234	28
		Total	4.60	1.882	39	4.68	2.019	53
	High IHLC	Low SE	5.68	1.185	17	4.98	1.868	28
		High SE	4.95	1.647	22	4.46	1.542	26
		Total	5.27	1.491	39	4.73	1.723	54
	Total	Low SE	5.15	1.639	39	4.94	1.805	53
		High SE	4.72	1.791	39	4.47	1.914	54
		Total	4.94	1.720	78	4.71	1.867	107

Table 10.12 ANOVA General diet tests of between subjects-effects

General Diet	Dataset 1 N=78					Dataset 2 N=107				
Source	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**
Corrected model	19.572	7	2.796	.940	.481	10.185	7	1.455	.401	.900
Intercept	1857.690	1	1857.690	624.861	.000	2347.327	1	2347.327	646.788	.000
HV levels	.014	1	.014	.005	.945	1.807	1	1.807	.498	.482
IHLC levels	11.406	1	11.406	3.837	.054	.070	1	.070	.019	.890
SE levels	4.916	1	4.916	1.654	.203	5.860	1	5.860	1.615	.207
HV levels*IHLC levels	2.001	1	2.001	.673	.415	.069	1	.069	.019	.891
HV levels * SE levels	.080	1	.080	.027	.870	1.024	1	1.024	.282	.596
IHLC levels * SE levels	.417	1	.417	.140	.709	.019	1	.019	.005	.942
HV levels * IHLC levels * SE levels	2.605	1	2.605	.876	.352	1.122	1	1.122	.309	.579
Error	208.108	70	2.973			359.292	99	3.629		
Total	2128.000	78				2738.750	107			
Corrected total	227.679	77				369.477	106			
	R Squared = .086 (Adjusted R Squared = -.005) * P< .05					R Squared = (Adjusted R Squared =) * P< .05				

Table 10.13 ANOVA Exercise descriptive statistics

ANOVA			Dataset 1 N=78			Dataset 2 N=107		
Exercise			**Mean**	**SD**	**N**	**Mean**	**SD**	**N**
Low HV	Low IHLC	Low SE	2.65	2.436	13	3.08	2.448	13
		High SE	3.06	2.744	8	2.27	2.219	15
		Total	2.81	2.497	21	2.64	2.321	28
	High IHLC	Low SE	3.72	2.063	9	3.36	2.538	14
		High SE	2.94	2.766	9	2.77	2.621	11
		Total	3.33	2.401	18	3.1	2.537	25
	Total	Low SE	3.09	2.302	22	3.22	2.451	27
		High SE	3	2.669	17	2.48	2.360	26
		Total	3.05	2.435	39	2.86	2.413	53
High HV	Low IHLC	Low SE	2.06	2.007	9	2.5	2.688	12
		High SE	3.33	2.537	9	4.12	2.670	13
		Total	2.69	2.315	18	3.34	2.749	25
	High IHLC	Low SE	3.94	2.638	8	2.93	2.209	14
		High SE	2.35	2.349	13	1.97	2.202	15
		Total	2.95	2.524	21	2.43	2.133	29
	Total	Low SE	2.94	2.449	17	2.73	2.401	26
		High SE	2.75	2.419	22	2.96	2.546	28
		Total	2.83	2.401	39	2.85	2.456	54
Total	Low IHLC	Low SE	2.41	2.239	22	2.80	2.529	25
		High SE	3.21	2.556	17	3.12	2.570	28
		Total	2.76	2.384	39	2.97	2.531	53
	High IHLC	Low SE	3.82	2.277	17	3.14	2.345	28
		High SE	2.59	2.482	22	2.31	2.281	26
		Total	3.13	2.443	39	2.74	2.331	54
	Total	Low SE	3.03	2.337	39	2.98	2.461	53
		High SE	2.86	2.500	39	2.73	2.447	54
		Total	2.94	2.405	78	2.86	2.423	107

Table 10.14 ANOVA Exercise tests of between subjects-effects

Exercise	Dataset 1 N=78					Dataset 2 N=107				
Source	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**
Corrected model	27.668	7	3.953	.662	.703	43.513	7	6.216	1.063	.393
Intercept	682.160	1	682.160	114.286	.000	874.212	1	874.212	149.479	.000
HV levels	.595	1	.595	.100	.753	.002	1	.002	.000	.984
IHLC levels	4.013	1	4.013	.672	.415	1.443	1	1.443	.247	.020
SE levels	.549	1	.549	.092	.762	.909	1	.909	.155	.694
HV levels*IHLC levels	.004	1	.004	.001	.980	10.396	1	10.396	1.778	.186
HV levels * SE levels	.004	1	.004	.001	.980	6.942	1	6.942	1.187	.279
IHLC levels * SE levels	19.389	1	19.389	3.248	.076	9.150	1	9.150	1.565	.214
HV levels * IHLC levels * SE levels	3.338	1	3.338	.559	.457	13.003	1	13.003	2.223	.139
Error	417.822	70	5.969			578.003	99	5.848		
Total	1120.750	78				1494.750	107			
Corrected total	445.490	77				622.505	106			
	R Squared = .062 (Adjusted R Squared = -.032) * P< .05					R Squared = .070 (Adjusted R Squared = -.004) * P< .05				

Table 10.15 ANOVA Foot descriptive statistics

ANOVA			Dataset 1 N=78			Dataset 2 N=107		
Foot care			**Mean**	**SD**	**N**	**Mean**	**SD**	**N**
Low HV	Low IHLC	Low SE	4.08	2.272	13	3.65	2.419	13
		High SE	3.13	2.735	8	1.83	2.152	15
		Total	3.71	2.437	21	2.68	2.420	28
	High IHLC	Low SE	4.39	2.655	9	2.79	2.064	14
		High SE	3.5	2.449	9	4	2.049	11
		Total	3.94	2.520	18	3.32	2.106	25
	Total	Low SE	4.2	2.379	22	3.2	2.241	27
		High SE	3.32	2.512	17	2.75	2.338	26
		Total	3.82	2.445	39	2.98	2.279	53
High HV	Low IHLC	Low SE	3.39	2.619	9	4.42	2.065	12
		High SE	4.17	2.077	9	4.58	2.581	13
		Total	3.78	2.328	18	4.5	2.300	25
	High IHLC	Low SE	3.13	2.200	8	2.86	2.797	14
		High SE	2.08	2.308	13	4.1	2.436	15
		Total	2.48	2.272	21	3.5	2.646	29
	Total	Low SE	3.26	2.359	17	3.58	2.564	26
		High SE	2.93	2.407	22	4.32	2.469	28
		Total	3.08	2.361	39	3.96	2.519	54
Total	Low IHLC	Low SE	3.80	2.384	22	4.02	2.243	25
		High SE	3.68	2.391	17	3.11	2.702	28
		Total	3.74	2.356	39	3.54	2.515	53
	High IHLC	Low SE	3.79	2.463	17	2.82	2.412	28
		High SE	2.66	2.417	22	4.06	2.238	26
		Total	3.15	2.471	39	3.42	2.391	54
	Total	Low SE	3.79	2.386	39	3.39	2.389	53
		High SE	3.10	2.428	39	3.56	2.512	54
		Total	3.45	2.417	78	3.48	2.442	107

Table 10.16 ANOVA Foot care tests of between subjects-effects

Foot care	Dataset 1 N=78					Dataset 2 N=107				
Source	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**
Corrected model	43.921	7	6.274	1.082	.384	88.155	7	12.594	2.292	.033
Intercept	914.224	1	914.224	157.674	.000	1318.221	1	1318.221	239.881	.000
HV levels	6.418	1	6.418	1.107	.296	22.385	1	22.385	4.073	.046*
IHLC levels	3.275	1	3.275	.565	.455	.901	1	.901	.164	.686
SE levels	5.254	1	5.254	.906	.344	1.051	1	1.051	.191	.663
HV levels*IHLC levels	10.899	1	10.899	1.880	.175	18.406	1	18.406	3.349	.070
HV levels * SE levels	2.908	1	2.908	.501	.481	6.681	1	6.681	1.216	.273
IHLC levels * SE levels	3.663	1	3.663	.632	.429	28.055	1	28.055	5.105	.026*
HV levels * IHLC levels * SE levels	4.206	1	4.206	.725	.397	6.307	1	6.307	1.148	.287
Error	405.874	70	5.798			544.037	99	5.495		
Total	1377.500	78				1925.500	107			
Corrected total	449.795	77				632.192	106			
	R Squared = .098 (Adjusted R Squared = .007) * P< .05					R Squared = .139 (Adjusted R Squared =.079) * P< .05				

Appendix G: Significant Subscale Interaction Plots from Three-way ANOVAs

Figure 10.1 Blood Sugar Interaction Plots Dataset 1

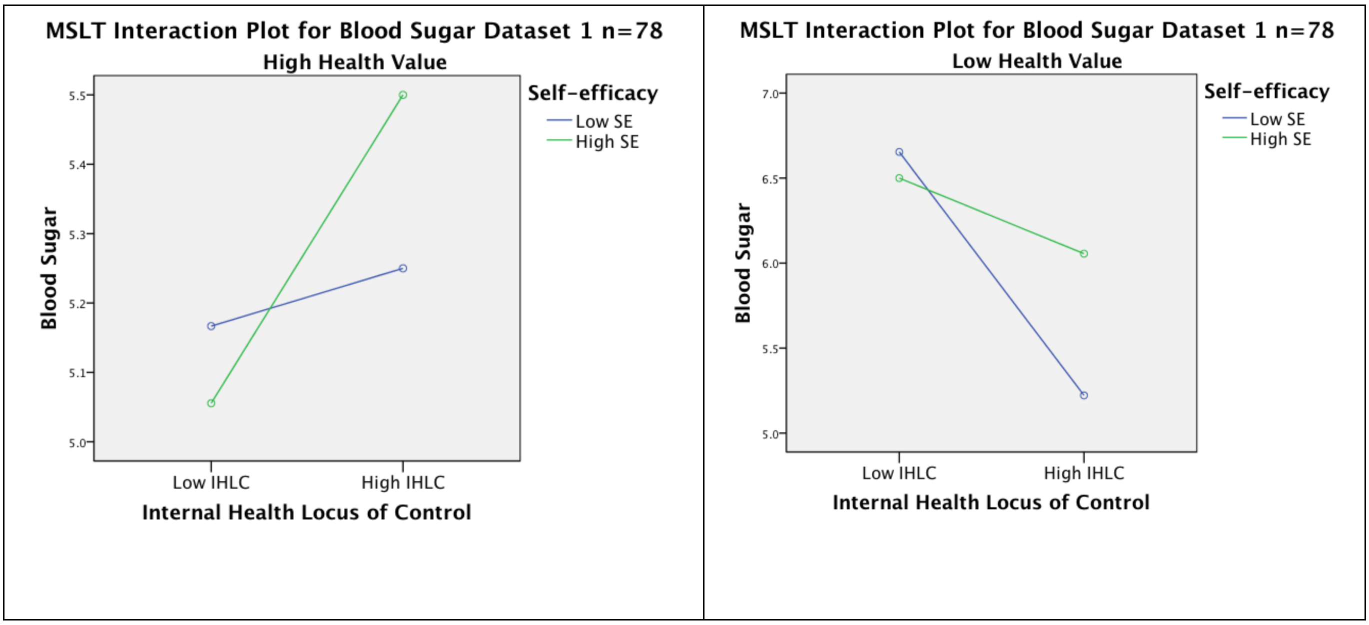

Figure 10.2 Blood Sugar Interaction Plots Dataset 2

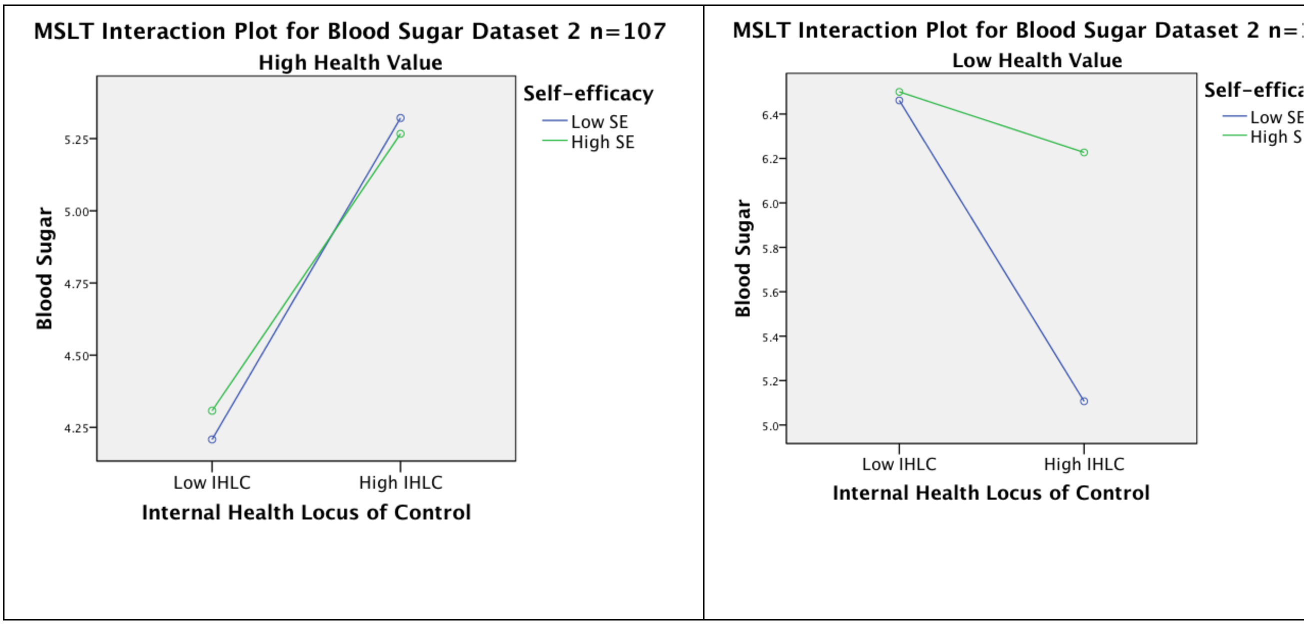

Figure 10.3 Specific Diet Interaction Plots Dataset 1

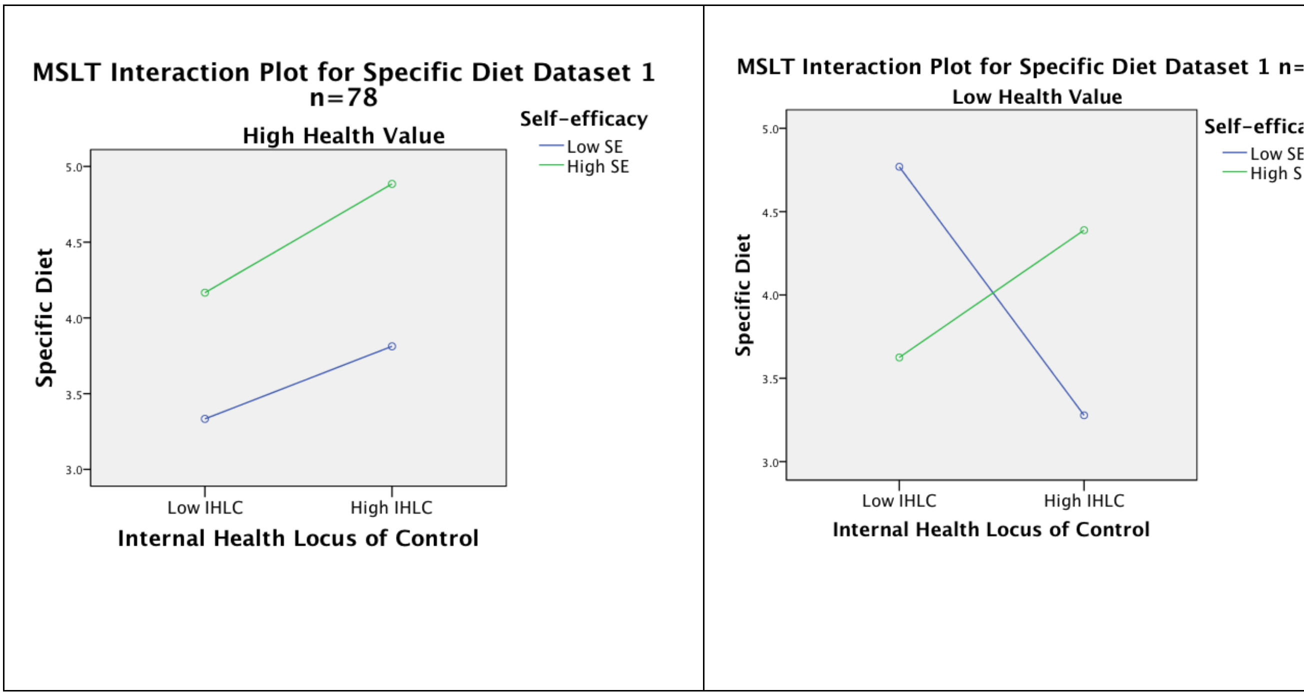

Figure 10.4 Specific Diet Interaction Plots Dataset 2