# DIETARY SELF-CARE IN TYPE 2 DIABETES AND THE ROLE OF NEGATIVE EMOTIONS: A RATIONAL EMOTIVE BEHAVIOUR THERAPY (REBT) PERSPECTIVE

by

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Abstract

This thesis explored negative emotions associated with dietary self-care and the role of rational and irrational beliefs in people with type 2 diabetes, from the Rational Emotive Behaviour Therapy (REBT) perspective. Three studies were conducted using a mixed methods design. The first study employed the Interpretative Phenomenological Analysis approach to explore people's experiences with dietary maintenance and the role of negative emotions. Guilt, anger and frustration, as well as feeling irritated, annoyed and depressed were negative emotions resulting *from* poor dietary self-care and resulting *in* poor dietary self-care. In the second study which employed quantitative methodology, beliefs related to negative emotions (identified from the first study), were used to develop and validate a questionnaire for assessing diabetes-related rational and irrational food beliefs. Rational and irrational food beliefs were held concurrently and also associated with distress about dietary restrictions. Irrational food beliefs were also linked to people's dietary self-care activities and dietary self-efficacy. The third study used the experimental method to further test the behavioural and physiological effects of rational and irrational beliefs, using three categories of food pictures. Although rational beliefs were associated with positive emotions relative to guilt, beliefs did not affect electrocortical processing of food pictures. Relative to feeling content, pleased, or regretful, guilt was associated with high calorie foods compared with low calorie foods, but a further distinction was made between high calorie foods. Biased attention to high fat savoury foods compared with high fat sweet and low calorie foods was reflected in delayed reaction time and enhanced event related potentials. Although irrational beliefs are likely to play an important role in the development of negative emotions associated with dietary self-care in people with type 2 diabetes, the REBT model may not provide a close fit with the available data.

Dedication

*“He has made everything beautiful in its time” (Ecclesiastes 3:11)*

*To my Family,*

*My husband, Alex, for being the best ever. I can’t say anymore!*

*My lovely children, Kweku, Akua and Abena, for bearing with my continuous absence from home and for your immense care and support.*

*To my parents,*

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## 1.1 Type 2 diabetes, treatment and management

### 1.1.1 Overview

Type 2 diabetes is currently an incurable but manageable illness, however, the treatment regimen to optimise blood glucose levels relies heavily on people's self-care behaviours. People with diabetes consider dietary self-care as one of the most difficult aspects of diabetes self-management (Ary, Toobert, Wilson, & Glasgow, 1986; Boehm, Schlenk, Funnell, Powers, & Ronis, 1997; Hentinen & Kyngas, 1992; Hill-Briggs, Cooper, Loman, Brancati, & Cooper, 2003). Negative emotions are one of several barriers identified to interfere with dietary self-care (DeCoster, 2003; Penckofer, Ferrans, Velscor-Freidrich, & Savoy, 2007; Savoca & Miller, 2001; Travis, 1997). However, to date, studies have not focused specifically on the role of negative emotions in dietary self-care.

Psychological distress has been reported to affect diabetes control (Cherrington, Ayala, Sleath, & Corbie-Smith, 2006; Fisher, Thorpe, DeVellis, & DeVellis, 2007; International Diabetes Federation [IDF], 2005; Peyrot, Rubin, & Siminerio, 2006), and dietary-related negative emotions could be a source of psychological distress. Thus it is worth identifying people experiencing negative emotions from dietary self-care, and intervening to prevent these negative emotions from affecting dietary self-care and diabetes control. There is a gap in the literature and hence the need to explore this phenomenon in-depth. This thesis aims at identifying negative emotions and the context in which they occur and to investigate rational and irrational beliefs which

according to the Rational Emotive Behaviour Therapy (REBT) model trigger negative emotions. This first chapter of the thesis defines type 2 diabetes and its management, the barriers to dietary self-care and negative emotions associated with dietary self-care. The chapter also discusses the REBT theory, describing the ABC model of REBT and relating this to dietary self-care. The chapter concludes with the rationale and aims of the thesis, and a summary of the various chapters comprising the thesis.

### 1.1.2 What is diabetes?

Diabetes mellitus is a group of diseases characterised by chronic high blood glucose levels, due to deficiency in insulin secretion, insulin action or both (World Health Organisation [WHO], 2003). The two main categories of diabetes mellitus are type 1 and type 2 diabetes (Diabetes UK, 2012; Smushkin & Vella, 2010). The global prevalence of diabetes (type 1 and 2) was estimated to rise to 285 million adults in 2010 and 439 million adults by 2030 (Shaw, Sicree, & Zimmet, 2010), most of which was to occur in developing countries (WHO, 2003).

In the United Kingdom (UK), the prevalence of diabetes (type 1 and 2) increased from 1.4 million people in 1996 to 2.9 million people in 2011 (Quality and Outcomes Framework [QOF], 2011) and is estimated to increase to 5 million in 2025. Population growth, aging and urbanisation have also been cited as contributing towards this increase in diabetes (Wild, Roglic, Green, Sicree, & King, 2004). In the UK, another reason for the increased diabetes prevalence reported may be the fact that General Practitioners (GPs) are now screening more closely for diabetes in high-

risk people, as part of the QOF financial incentive scheme for GP practices who identify people with diabetes (QOF, 2011).

Diabetes is the fifth leading cause of death worldwide (Roglic et al., 2005), the seventh in the United States (Centre for Disease Control and Prevention, 2011) and accounts for 15% to 16% of all deaths in England (Information Centre, 2011). This disease poses an economic burden especially in terms of healthcare costs. In the UK, the National Health Service (NHS) is estimated to spend 27 million pounds on diabetes treatment each day (Diabetes UK, 2012).

### 1.1.3 What is type 2 diabetes?

Type 2 diabetes is the most common form of diabetes and accounts for 90% of all cases diagnosed (WHO, 2003). In the UK, 90% of adults diagnosed with diabetes have type 2 diabetes (Diabetes UK, 2012) and most of the estimated increase in diabetes will be type 2 diabetes (Diabetes UK, 2012). People with type 2 diabetes have chronic high blood glucose levels due to insulin resistance and being overweight (WHO, 2003). The illness is predominately diagnosed in middle age and among the elderly but more recently, has also been evident in children and adolescents (Centres for Disease Control and Prevention [CDC], 2011). Type 2 diabetes is more prevalent among African Americans, Hispanic/Latino Americans, American Indians, and Asian/ Pacific Islanders (CDC, 2011). For instance, Hispanics are 1.9 times more likely to be diagnosed with type 2 diabetes than non-Hispanic Whites (CDC, 2002).

Type 2 diabetes is associated with factors such as family history of diabetes, obesity, aging, physical inactivity, history of gestational diabetes, and race/ ethnicity (CDC, 2011). Worldwide, nearly 200 million people have been diagnosed with type 2 diabetes although this figure may be higher as some people go undiagnosed (Thoolen et al., 2007). Type 2 diabetes can develop over several years unnoticed until symptoms of hyperglycemia or diabetes complications begin to present (Nolan, 2006). Thus, many are diagnosed either "opportunistically" or during hospital visits or medical examinations for other ailments. Poorly controlled diabetes can lead to long-term complications such as heart disease (cardiopathy), blindness (retinopathy), nerve damage (neuropathy) and kidney damage (nephropathy). Type 2 diabetes is therefore associated with reduced life expectancy due to the onset of complications (Smushkir & Vella, 2010).

### 1.1.4 Treatment and management of type 2 diabetes

Currently, type 2 diabetes is an incurable condition, but it can be treated with the goal of keeping glycemic levels as close to normal as possible (WHO, 2003). Treatment regimen includes maintaining a healthy diet and regular physical exercise, but may also include daily medication (oral and/ or insulin injections) and self monitoring of blood glucose (WHO, 2003). Increasing knowledge about diabetes may improve self-care (Davies et al., 2007; Norris, Lau, Smith, Schmid, & Engelgau, 2002; Norris, Nichols, et al., 2002), but treatment of diabetes also requires developing problem solving and coping skills (Al-Khawaldeh, Ali-Hassan, & Froelicher, 2012; CDC, 2011; Williamson, Hunt, Pope, & Tolman, 2000). Equipping people with goal setting skills

for self-management as part of education is therefore necessary (Ash et al., 2006; Early, Shultz & Corbett, 2009).

Management of type 2 diabetes often requires behavioural changes, mostly through education, care and support, training skills aimed at promoting self-efficacy and counselling, among others (Aljasem, Peyrot, Wissow, & Rubin, 2001; Al-Khawaldeh et al., 2002; Funnell et al., 2009; Sarkar, Fisher, & Schillinger, 2006). Diabetes Self-Management Education therefore enables people to make informed decisions and engage in good self-care behaviours for optimal diabetes control and improved quality of life (Funnell et al., 2009). Healthcare professionals may recommend a treatment regimen, but ultimately the decision to follow this recommendation rests with the individuals who have the illness (Skinner, 2004) to provide 95% of their own care (Anderson, Fitzgerald & Oh, 1993; Anderson, et al., 1995; Travis, 1997). Thus, people's knowledge about diabetes and the process of how to incorporate necessary changes into their existing way of life is crucial to the successful management of this chronic disease (Whittmore, Chase, Mande, & Roy, 2002).

Self-management behaviours may require different knowledge and skills and different levels of motivation and confidence, for the various treatment regimen (Al-Khawaldeh et al., 2012). People have to adopt and maintain multiple self-care behaviours in order to obtain and maintain good glycemic control. For instance, dietary maintenance may place more demand on an individual (such as changing previous eating behaviours) than medication intake. According to Sullivan and

Joseph (1998), most people seem to adjust well to these life changes and the responsibility of managing diabetes while others have difficulties adjusting.

Of the various elements of the diabetes treatment regimen, studies have shown that people find diet and exercise to be more difficult to maintain (Ary, et al., 1986; Boehm, Schlenk, Funnell, Powers, & Ronis, 1997; Hernández-Ronquillo, Téllez-Zenteno, & Garduño-Espinosa, 2003; Hentinen & Kyngas, 1992; Hill-Briggs et al., 2003), whereas following medication treatment and glucose testing is much easier (Glasgow, MaCaul, & Schafter, 1986; Hentinen & Kyngas 1992; Peyrot et al., 2005). Although people with diabetes find it important to follow a diet plan, few of them (26.7%) actually do so (Travis, 1997). Often they report that they are more satisfied with their meal plan than they are with their ability to follow it (Ahlgen et al., 2004).

In type 2 diabetes, weight control through good dietary self-care and exercising is a vital part of the treatment (WHO, 2003) because weight gain can result in obesity and increase insulin resistance and the risk of complications related to obesity (American Diabetes Association [ADA], 1998; Ferris, 1993). It is therefore important for people with type 2 diabetes to maintain good dietary self-care.

## 1.2. Dietary self-care in type 2 diabetes

### 1.2.1 Barriers to dietary self-care

Dietary recommendations for people with diabetes are in many ways comparable to that for the general population (Anderson, 2003) because maintaining good health requires healthy eating. People with type 2 diabetes are recommended to maintain a

diet high in fruit and vegetables and low in saturated fats (ADA, 2002). However, good dietary self-care is situation specific (e.g. eating at home, social functions, eating out etc.). Individuals may or may not be successful, especially if they are confronted with unhealthy eating options and do not have control over the situation. For instance, some people may be able to follow their diet at home but not at their workplace (McNabb, 1997) or when on holidays (Hall, Joseph, & Schwartz, 2003; Savoca & Miller, 2001; Travis, 1997; Vijan et al., 2005) or in social situations (Ary et al., 1986; Galasso, Amend, Melkus, & Nelson, 2005).

Studies investigating factors influencing diabetes self-management (examining diet, medication exercise and blood glucose monitoring) and more specifically factors influencing dietary self-care, have identified numerous barriers to dietary self-care. These reported barriers include; inadequate knowledge about the dietary regimen recommended, in terms of its importance, food choices and appropriate meal preparation (Galasso et al., 2005; Nagelkerk, Reick, & Meengs, 2006; Savoca & Miller, 2001; Travis, 1997; Vijan et al., 2005; Vinter-Replaust, Petricek, Katic, 2004); difficulty breaking long-standing eating habits and being bored with the diet (Hill-Briggs et al., 2003; Mathew, Gucciardi, Melo, & Barata, 2012); financial constraints limiting peoples' food choices (Sherman et al., 2000; Vijan et al., 2005; Vinter-Replaust et al., 2004); and feeling restricted or deprived by the food choices available (Mathew et al., 2012; Peres Franco, Santos, & Zanetti, 2008; Sherman et al., 2000).

Other barriers to dietary self-care include going on holidays (Hall et al., 2003; Savoca & Miller, 2001; Travis, 1997; Vijan et al., 2005), social functions and/ or eating out

(Ary et al., 1986; Galasso et al., 2005; Hall et al., 2003; Savoca & Miller, 2001; Travis, 1997; Vinter-Replaust et al., 2004) the temptations of engaging in unhealthy eating behaviours (Savoca & Miller, 2001; Vijan et al., 2005), poor dietary self-efficacy (Ary et al., 1986; Early et al., 2009; Savoca & Miller, 2001) and negative emotions associated with dietary self-care (Beverly et al., 2012; Decoster, 2003; Penckofer et al., 2007; Savoca & Miller, 2001; Travis, 1997).

The aforementioned barriers have been identified from the perspective of people with diabetes, however, other researchers have also investigated barriers to dietary self-care from the perspective of dieticians. Brown, Pope, Hunt, and Tolman (1998) surveyed 862 dieticians in the United States and identified five main barriers to dietary self-care. These included denial or the perception that the disease is not serious, poor understanding of diabetes-diet relationship, misinformation, complicated lifestyle changes and lack of dietary self-efficacy. In a follow-up study, Williamson et al., (2000) interviewed 75 out of the 862 dieticians about factors that contributed to the five dietary self-care barriers identified by Brown et al. Williamson et al., found that feeling overwhelmed with diabetes, the absence of symptoms associated with diabetic complications, lack of education and inadequate follow-up, lack of time, financial difficulties, lack of empowerment and misinformation from family and friends were reported.

### 1.2.2 Dietary self-care and negative emotions

Negative emotions as a barrier to dietary self-care have received very little attention from researchers, considering that it is an established fact that diabetes emotional-

related distress can play an important role in diabetes self-care management (Cherrington et al., 2006; Fisher et al., 2007; IDF, 2005; Peyrot et al., 2006). Emotions do indeed influence eating behaviour and it has been well established that negative emotions increase food intake (Bennett, Greene, & Schwartz-Barcott , 2013; Herman & Polivy, 1975; Peres, Franco, Santos, & Zanetti, 2008; Savoca & Miller 2001) and can result in psychological distress (e.g. Decoster, 2003; Travis, 1997). According to American Association of Diabetes Educators (n.d), experiencing psychological distress indirectly influences motivation to control diabetes. Diabetes-related emotional distress has been linked to depressive symptoms (Fisher, Skaff et al., 2008; Fisher, Mullan et al., 2009) which, in turn, can contribute to decreased physical and mental quality of life (Hosoya, Matsushima, Nukariya, & Utsunomiya, 2012). This suggests that negative emotions associated with dietary intake could impact diabetes control and it is therefore a phenomenon worth exploring by the researcher.

A few studies have identified dietary-related negative emotions. Beverly et al., (2012) interviewed 34 people with type 2 diabetes and 19 physicians to explore challenges with maintaining successful diabetes care. People with diabetes reported feeling depressed that their glyceamic levels were still high in spite of restricting their diet. Penckofer, Ferrans, Velscor-Freidrich, and Savoy (2007) also explored the feeling of depression, anxiety and anger that women living with type 2 diabetes experienced, by conducting focus group discussions with 41 Caucasian and African Americans. Penckofer et al. found that feeling overwhelmed and stressed made the women eat the “wrong” foods and subsequently they felt sad or depressed and angry

for not acting in their best interests. Also, anger was experienced when other people (friends and colleagues) restricted participants' dietary intake and made unwanted comments. Thus, dietary restrictions and poor dietary self-care resulted in negative emotion. This study focused on diabetes and not dietary self-care and investigated specific emotions (depression, anxiety and anger) and this may have limited participants reporting any other emotions they may have been experiencing.

Unlike Penckofer et al., (2007), Decoster (2003) focused on emotions in general, investigating emotions experienced by adults with type 2 diabetes and the source(s) of the emotions. Thirty-seven non-Latino and African-American adults were interviewed. Decoster identified thirty-two different emotions and combined them into seven mutually exclusive emotions; fear, anxiety, sadness, irritation, guilt, anger and happiness. Sources of emotions identified were initial diagnosis of diabetes, self-care management and diabetes complications. Fear, irritation and anger were the most frequently experienced emotions and guilt, the least experienced emotion. Irritation, anger and guilt were the only emotions associated with dietary self-care. Participants felt irritated and angry that food was not fun any longer because they could not eat whatever they wanted and also because family members restricted their dietary intake. However, participants experienced guilt when they ate foods which were not part of their recommended diet (Decoster, 2003). This study explored emotions in-depth using the qualitative method but was diabetes-specific and not diet-specific and therefore may have limited the amount of information that was obtained on dietary self-care.

Travis (1997) also investigated factors influencing dietary self-care in 75 people with type 2 diabetes who completed a dietary-related questionnaire and also provided free-text comments. Emotions were found to negatively affect dietary self-care. Feeling upset, angry and depressed was associated with bingeing, comfort eating and overeating. Although participants provided free-text comments, the absence of the use of interviews may have limited the information obtained. In another study, Savoca & Miller (2001) investigated food choices and eating patterns by interviewing 45 people with type 2 diabetes. They found that participants reported comfort eating when they experienced emotions such as stress and depression. The authors did not specify whether these emotions were diabetes- or diet-related but suggested that negative emotions can impact negatively on dietary self-care.

The above studies did not include negative emotions as a central focus and most of them focused on diabetes self-management rather than dietary self-care. Nonetheless, people associated negative emotions with dietary self-care though these were not explored in-depth to assess the context in which they were experienced. If negative emotions can impact dietary intake, then strategies must be developed to prevent, remove, or adapt these negative emotions to enable people with the disease follow their dietary regimen. Dietary related negative emotions could be a source of diabetes-related distress and, as mentioned previously, diabetes-related distress has been linked to depressive symptoms (Fisher, Skaff, et al., 2008; Fisher, et al., 2009), which, in turn, can contribute to decreased physical and mental quality of life (Hosoya, et al., 2012). This suggests that dietary-related negative emotions could impact diabetes control and therefore it is a phenomenon

worth exploring to understand the role negative emotions can place and hence the need for the use of a psychological model.

Healthcare professionals have recognized the importance of psychological support for people with diabetes to deal with psychological problems related to diabetes management (Snoek & Skinner, 2002). Cognitive Behavioural Therapy (CBT) has been widely used among people with diabetes (van der Ven, Weinger, & Snoek, 2002; Welschen et al., 2007) to treat psychological problems related to diabetes such as depression, anxiety/stress, eating disorders, sexual problems, personal and family problems and self-destruction behaviors (see Adili, Larijani & Haghighatpanah, 2006; Snoek & Skinner, 2002; van der Ven, et al., 2002).

Cognitive behavioural therapy uses a combination of cognitive and behavioural therapy. The general assumption of CBT is that people hold beliefs about themselves, the world and the future. It is these beliefs that shape people's behaviours and emotions. Thus, emotions do not stem from situations but from the interpretation the person makes of the situation. Thus, if a person holds certain types of beliefs, that individual will have either functional emotions and inferences, or dysfunctional emotions and inferences depending on the content of the belief (Beck, 1976; Ellis, 1994). In CBT, irrational or dysfunctional cognitions are identified and modified by challenging the beliefs people hold about the situation and strengthening more rational or functional cognitions. The behaviour component of CBT is structured to modify behavior in order to help deal with challenges and relieve symptoms (Kaltenthaler et al., 2006). Considering that maintaining dietary

recommendations requires life-long behavior change and for people to restructure their thoughts about their dietary intake, CBT is an approach that will be worth employing.

There are several approaches within the rubric of CBT (see Box 1 below). Of these approaches, Cognitive therapy (CT) and Rational Emotive Behaviour Therapy (REBT) are the most influential and widely used approaches (Hyland & Boduszek, 2012). Both CT and REBT emphasize changing the 'here and now' rather than involvement with clients' past. However, CT, albeit to a lesser degree than REBT, stresses future goal seeking and self-actualization (Ellis, 2003a). Cognitive therapy is 'schema-based' and the content of these schemas is what comprises a person's core beliefs. This approach maintains that dysfunctional thinking affects a person's mood and behavior (Beck, 1995). Rational emotive behavior therapy on the other hand is based on the theory that it is the demanding or preferential nature of beliefs that leads to dysfunctional or functional emotions and inferences respectively. Cognitive therapy focuses more on clients' automatic thoughts before getting to their core dysfunctional schemes, while REBT views their automatic thoughts and indifferences as derivatives of underlying 'musts' and therefore as quickly as possible emphasizes these core irrational beliefs more than their derivatives (Ellis, 2003a).

Box 1

**Cognitive behavioural therapy approaches**

Acceptance and commitment therapy (Hayes, Strosahl, & Wilson, 1999)

Behavioural couple therapy (Jacobson & Christensen, 1996)

Cognitive behavioural modification (Meichenbaum, 1977)

Cognitive therapy (Beck, 1976)

Dialectical behavioural therapy (Linehan 1993; Dimeff, & Linehan, 2001)

Functional analysis therapy (Kohlenberg & Tsai, 1991)

Mindfulness based cognitive therapy (Segal, Williams, & Teasdale, 2002)

Rational emotive behaviour therapy (Ellis, 1962),

Reality therapy (Glasser, 1965)

Considering the various CBT approaches mentioned, REBT may be the most appropriate for use in the present study for the following reasons. First, as the phenomenon under study has not been explored in-depth, it is important to employ an approach that could be used to understand the context in which negative emotions occur, their impact on dietary self-care and the underlying source of their impact before proposing the use of such an approach in diabetes. Second, the REBT approach is simple and can be used by healthcare professionals (such as diabetes nurses and educators) with no formal training in psychology. REBT can be learned quickly and applied without ongoing professional assistance and thus would be appropriate in situations where psychotherapy is time-limited (Fuller, DiGuiseppe, O'Leary, Fountain, & Lang, 2010).

### 1.3 The Rational Emotive Behaviour Therapy (REBT) Model

#### 1.3.1 What is Rational Emotive Behaviour Therapy?

Rational Emotive Behaviour Therapy (REBT) was the first cognitive-behavioural approach to counselling and psychotherapy, created by Albert Ellis in 1958. The core hypothesis of the REBT theory is that irrational beliefs result in psychological disturbances. Its theory and practice is based on the ABC model ('A' being the Activating event, 'B' the Belief and 'C' the Consequence) of psychological disturbance which describes the relationship between experience, beliefs and reactions (Ellis, 1958). According to Ellis when a person experiences an activating event, the way he/she interprets the event results in specific beliefs about the event, leading to the experience of certain consequences (see Figure 1.1). Thus, emotional reactions (consequence) do not result from activating events but instead from beliefs (rational or irrational) held about the activating event. Ellis postulates that it is the (irrational) demanding ('must', 'should', 'ought to') or (rational) preferential ('prefer', 'would like to') nature of the beliefs that lead to dysfunctional or functional emotions and inferences, respectively.

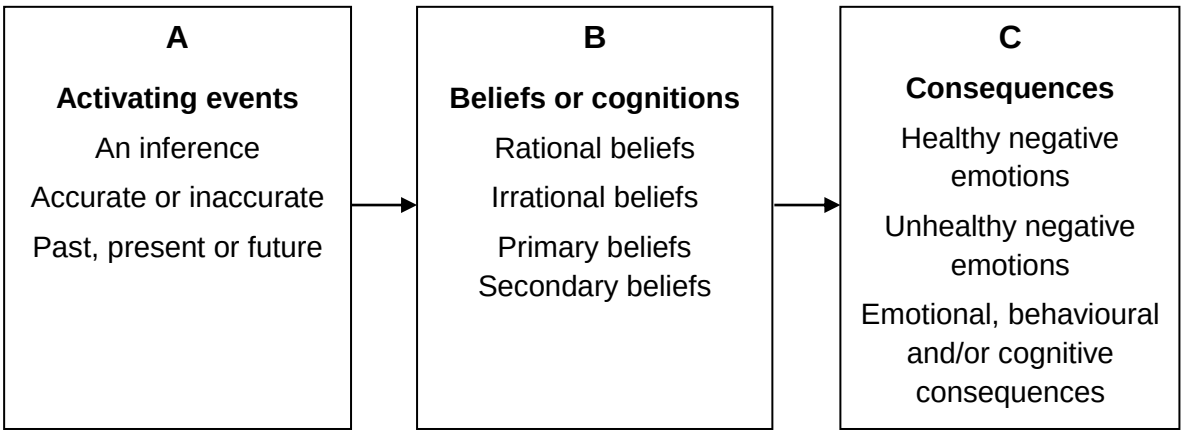


*Figure 1.1*: The ABC of REBT

In REBT, emotional problems are focused on directly, while trying to understand the behaviours, thoughts and beliefs that underlie these emotional problems. Irrational beliefs are the initial focus of treatment. A person is guided to challenge his/her irrational beliefs (Dryden, 2006) with the aim of replacing 'absolute' philosophies which are full of 'musts' (irrational) with more flexible philosophies which are full of 'preferences' (rational). In therapy, a client is made aware of irrational beliefs that create unhealthy negative emotions and helped to replace them with more effective rational beliefs that create healthy negative emotions. The ABC of REBT is described in detail below.

### 1.3.2 The ABC of REBT

Situation

Although the 'situation' is not part of the ABC of REBT, it is worth mentioning because it is the context in which the ABC occurs (Dryden, 2002, 2011) and what precipitates a person's reaction. Situations can be external or internal (Dryden, 2002), but the meaning or inference an individual makes of them determine how the situations will affect him/her. In type 2 diabetes, external situations could be, for example, people feeling restricted with their recommended diet or family and friends restricting their dietary intake, while internal situations could be the lack of dietary self-efficacy to maintain good dietary self-care. These are everyday challenges that people may face, but the meaning they give to these events will determine how it will affect them.

A- Critical A or Activating Events

The critical ‘A’ is distinguished from the ‘situation’ about which an inference is made. Within a specific situation, there is usually a critical or key aspect of the situation that a person has an emotional reaction about, hence the name Critical A or Activating event (also called adversity). In REBT, the ‘A’ is usually an inference a person makes about a situation that has occurred or some aspect of it (Dryden, 2006), and the meaning given to the situation. This inference could be accurate or inaccurate because sometimes they go beyond the apparent truth (Dryden, 2006). Activating events could be functional or dysfunctional, depending on whether a person holds rational or irrational beliefs (Dryden, 2006). They could also be about a past, present or future event (Dryden, 2002) or they could be thoughts, feelings, memories or images (Ellis & Dryden, 1999).

For example, when people with type 2 diabetes encounter challenging situations with dietary self-care, such as feeling restricted or giving in to temptations (lack of dietary self-efficacy), their interpretation of these events may go beyond what has happened. Some may for example, interpret their lack of self-efficacy as a sense of failure which could result in feelings of anger and depression (Penckofer et al., 2007). Encountering the challenging situations is therefore not the direct cause of negative emotions but the meaning given to the situations.

B- Beliefs

The ‘B’ in REBT is the beliefs or cognitions a person holds about an activating event. These beliefs could be irrational (unrealistic, illogical, unhelpful and inconsistent with

reality) or rational (realistic, logical, helpful and consistent with reality). Irrational beliefs are categorised as demands, awfulising beliefs, low frustration tolerance (LFT) beliefs and self, other and life depreciation beliefs (Ellis, 1994). Demands are primary beliefs while the other three beliefs are secondary beliefs because they derive from demands (Dryden, 2011).

Demands are rigid and can be directed either towards oneself, others or life condition ("I must always follow my diet"), while awfulising is exaggerating the consequence of events, be it past, present or future events ("I must always follow my diet if not it will be awful"). Low frustration tolerance means an individual cannot bear an event, making the situation intolerable ("I must always follow my diet, I can't bear it if I am unable to follow my diet"). Self, other and life depreciation beliefs is a global negative evaluation of one's self, as a person over generalises a specific behaviour or action (which is seen as worthless) to his/her total person ("I must follow my diet, I am a failure if I am not able to follow my diet").

Rational beliefs are categorised as full preference (primary belief), anti-awfulising beliefs, high frustration tolerance (HFT) beliefs and self, other and life acceptance beliefs (Ellis, 1994). Compared with demands, preferences are flexible and express how a person would like things to be, without demanding them to be that way ("I would prefer to follow my diet"). Anti-awfulising means a person believes that although things may be bad, they could be worse ("I prefer to follow my diet, it is bad if I am unable to but it is not terrible"). High frustration tolerance is the belief that although a preference cannot be met, the discomfort which this brings can be

tolerated (“I prefer to follow my diet, if I am unable to it will be difficult to bear, but I can bear it”). When a person holds self, other and life acceptance beliefs he/she accepts that they may do the wrong things, but do not generalize this to their total being. The individual accepts him/herself unconditionally and also accepts that he/she is a “fallible human being” (Dryden, 2006, p. 31). For example “I prefer to follow my diet, but if I am unable to, I am not a failure but a fallible human being who did not follow his diet on this occasion”.

As mentioned previously, the REBT theory identifies primary and secondary beliefs. Of the four types of irrational and rational beliefs discussed above, demands and preferences are identified as primary beliefs while the other three (irrational beliefs- awfulising, low frustration tolerance, self, other and life depreciation and rational beliefs- anti-awfulising beliefs, high frustration tolerance beliefs and self, other and life acceptance beliefs) are identified as secondary beliefs. These secondary beliefs are termed as derivatives because they are derived from the primary beliefs (Ellis, 1994). Primary beliefs express the demanding (“I must control my diet”) or preferential (“I will prefer to be able to control my diet) nature of the belief that one holds while secondary beliefs (corresponding content of the primary belief ), carries a personal theme that is consistent with how functional (“not controlling my diet will be bad but not awful and I can tolerate it”) or dysfunctional (“not having control over my diet will be awful and I can’t stand it”) the belief is.

According to Campbell, (1985), and Ellis, (1977) (as cited in Bond et al., 1999), a primary belief that communicates a demand (e.g. “I must be able to eat whatever I

want to eat") should have a secondary belief (e.g. "not being able to do so will be unbearable") that refers to a content or theme that is dysfunctional. Similarly, a primary belief that communicates a preference ("I would prefer to eat whatever I want to eat") should have a secondary belief that refers to content or theme that is functional ("but it is not essential. Not being able to eat whatever I want to eat will be difficult to tolerate but not unbearable").

Ellis (1994) believed that primary beliefs lie at the core of healthy and unhealthy responses to situations and maintained that these demands and preferences were sufficient for a belief to be rational or irrational, to affect the functionality of inferences However, other theorists (e.g. Bond & Dryden 1997; Bond & Dryden 2000; Bond, Dryden & Briscoe 1999) purport that a belief should have both primary and secondary components to affect the functionality of inferences. According to Dryden (2001) all negative emotional reactions go with inferential reaction and thus rational and irrational beliefs have to consist of both primary and secondary beliefs. Thus, content is the cognitive component that determines the functionality of inferences (Bond & Dryden 1997).

Several studies have tested the validity of this REBT proposition that the content of rational and irrational beliefs (i.e. secondary belief) do not influence the effect that the beliefs have on the functionality of inferences (i.e. how functional or dysfunctional an inference is). For example, Bond and Dryden (1997 & 1999) have shown that contrary to the REBT proposition, contents of rational and irrational beliefs influence how the beliefs affect functionality of inferences. Thus, primary beliefs alone cannot

affect the functionality of inferences without being attached to secondary beliefs which have functional or dysfunctional contents that corresponds to the rational or irrational beliefs respectively. For example, an irrational primary belief such as “I must be able to eat like everyone else" should be attached to a secondary belief with a dysfunctional content such as “I cannot stand it if I can’t not eat like everyone else.

Further, Bond and Dryden (2000) examined the REBT proposition that rational and irrational primary beliefs would influence the functionality of inferences to a greater extent than secondary beliefs alone. Contrary to REBT theory, both rational and irrational primary beliefs affected the functionality of inferences to the same extent as secondary beliefs, suggesting that primary beliefs do not make up the primary means through which REBT beliefs affect the functionality of inferences; instead they need to refer to secondary belief contents as well. It is therefore necessary that in REBT rational and irrational belief statements contain both primary and secondary beliefs to affect functionality of inferences.

For people with type 2 diabetes, the beliefs they hold about their diet may be determined by the type of emotions they experience. Holding rational beliefs may result in healthy negative emotions (described below) which may lead to accomplishing the goal of dietary self-care, while holding irrational beliefs may result in unhealthy negative emotions which may hinder the attainment of good dietary self-care.

C- Consequences

The ‘C’ in REBT theory represents the consequences of holding a belief about an activating event. There are three major Cs (consequences) that a person can experience; emotional consequences, behavioural consequences and cognitive consequences (Dryden, 2002). However, this thesis will focus on emotional consequences. The REBT theory holds that when faced with adversity, healthy or unhealthy emotional and behavioural responses are determined by the nature of a person’s beliefs. Holding rational beliefs results in healthy (functional) negative emotions while holding irrational beliefs can results in unhealthy (dysfunctional) negative emotions (Dryden, 2009). Although emotions are about activating events, beliefs held, determine the type of emotions a person experiences (Dryden, 2002).

Healthy negative emotions such as sadness, concern, remorse, disappointment, sorrow and healthy anger helps an individual to act in accordance with their desires in the face of adversity. Unhealthy negative emotions such as depression, anxiety, guilt, shame, hurt and unhealthy anger, leads to individuals engaging in dysfunctional, unhelpful behaviours. For example, people with type 2 diabetes who hold rational beliefs about dietary self-care may experience healthy negative emotions such as remorse, sadness, or healthy anger and deal constructively with it. However, holding irrational beliefs may result in unhealthy negative emotions such as guilt, depression or anger which may interfere with dealing constructively with dietary self-care. This suggests that unhealthy negative emotions as described by the REBT model may play a role in the lives of people living with type 2 diabetes.

Rational emotive behavior therapy has been used primarily in clinical and counselling settings by researchers to investigate its effect on psychological illnesses such as depression, anxiety, stress, and anger management (e.g. Adelman, McGee, Power, & Hanson, 2005; Flanagan, Allen, Henry, 2009; Fuller et al., 2010; David, Szentagotai, Lupu, & Cosman, 2008) and treatment of addiction (e.g. Bishop, 2000). It has also been used in the treatment of older and disabled people, stress and depression in chronic fatigue syndrome (e.g. Balter & Unger, 1997; Noonan, Lindner, & Walker, 2010).). However, an extensive literature search showed that very little have been done in the area of REBT and chronic health conditions. For example, REBT has been used in coping behaviour in arthritis suffers (Sciacchitano, Lindner, & McCraken, 2009), the treatment of pain in cancer, (Mahigir, Khanehkeshi, & Karimi, 2012) and has been proposed for use in stoke patients (Calabro, 1990; Alverez, 1997), studies have but there have been no empirical studies that have used REBT with patients with diabetes and dietary self-care.

Literature available on REBT and diabetes reports Ellis's (1997, 2003b) personal experience with living with diabetes and also working with people with diabetes. For example Ellis (1997) describes how he used REBT on an insulin-dependent client who had phobia about maintaining her recommended diet. Ellis worked with her by weakening her irrational beliefs that maintaining good dietary self-care was "revolting and horrible", by helping her reduce her low frustration tolerance.

Subsequently, Ellis (2003b) shares his own experiences of living with diabetes and how he used REBT to handle his illness. He discusses how his prior experience of

applying REBT to clients with physical illnesses (including diabetes) gave him insight into applying the therapy to himself. He held irrational beliefs about having diabetes such as, “It’s unfair that my sister and I developed diabetes while my mother, father, and brother did not. It’s awful that I have to incessantly battle against my diabetes! I can’t stand this continuous hassle!” (p. 217). However, with time, he learned to replace these irrational beliefs with more rational beliefs which enabled him appraise his treatment regimen more rationally, and with time, he was in a better position to helped other people with their diabetes regimen. The above reports are however personal experiences and not research studies. Thus to my knowledge, REBT has not been tested empirically in diabetes and dietary self-care or the management of diabetes in general.

### 1.4. Rationale and aims of the study

#### 1.4.1 Rationale for the thesis

The literature reviewed contributes to our understanding of the challenges with dietary self-care and suggests the possibility that negative emotions can be experienced with dietary intake, and the probable impact of these negative emotions. However, only a few studies (e.g. Beverly et al., 2012; Decoster, 2003; Penckofer et al., 2007; Savoca & Miller, 2001; Travis, 1997), have reported negative emotions related to dietary self-care and of these studies, negative emotions have not been their principal focus and have therefore been barely defined. Thus, the literature and knowledge base about the role of negative emotions in dietary management among people with type 2 diabetes is limited. This inevitably restricts the targeted use of

psychosocial interventions to ameliorate poor dietary self-care related to negative emotions.

This current thesis seeks to address the gap in literature by drawing on the REBT theory to gain a better understanding of negative emotions and the role of rational and irrational beliefs in dietary self-care among people with Type 2 diabetes. First, experiential accounts will be obtained through the use of a qualitative method which will offer participants the opportunity to share in-depth experiences of dietary self-care. Once negative emotions are acknowledged, the next step will be to investigate how these negative emotions can be identified among people with type 2 diabetes, by recognising underlying rational and irrational beliefs about dietary intake.

Assessing people for negative emotions using mood scales may inform health-care providers about the presence or absence of emotions but this may not provide information about the underlying causes of these negative emotions. There are other aspects of diabetes such as the initial diagnosis (e.g., Cherrington et al., 2006; Decoster, 2003; Peres et al., 2008; Whitteman et al., 2002), diabetes complications (e g., Decoster, 2003; Peres et al., 2008) and poor relationship with health-care professionals (e.g. Beverly et al., 2012) which can also cause negative emotions. Thus, it will be useful to assess people with dietary self-care challenges for the possible presence of negative emotions, by identifying underlying rational and irrational beliefs about dietary intake. To this effect, a questionnaire will be developed to assess rational and irrational food-related beliefs which may underlie negative emotions. This will provide a robust and valid measure of assessing beliefs

among people with dietary challenges and will be more ideal for use by healthcare professionals compared with interviewing every person with diabetes who shows signs of dietary challenges.

Finally, the role of beliefs in dietary intake will be tested further by investigating the extent to which holding rational and irrational beliefs can affect how people with type 2 diabetes respond to different food types with different calorific content. This will be explored by conducting an experimental study which will test whether beliefs can affect electrocortical processing of food pictures and emotional responses to the pictures.

By conducting the above studies, the role of negative emotions and their underlying beliefs will be explicitly outlined and an understanding of how these can impact dietary self-care will be elucidated. Health-care professionals will be informed about this phenomenon which will contribute to improved care and education in dietary self-care and optimal diabetes control.

### 1.4.2 Aims of the thesis

The primary aim of this thesis is to explore and understand the negative emotions related to dietary self-care among people with type 2 diabetes and the role of rational and irrational beliefs, using the REBT model. To achieve this aim three empirical studies are conducted; 1) a qualitative study that explores in-depth negative emotions experienced by people with type 2 diabetes, 2) develop and validate a tool that can be used to assess rational and irrational beliefs related to dietary intake and

3) test the effect of holding rational or irrational beliefs about dietary intake on Event Related Potentials (ERPs) and emotional responses, during food picture ratings.

To achieve the aims of this thesis, a mixed methods design will be used, employing three different methodologies; qualitative, quantitative and laboratory studies. The nature of the research questions determines the type of studies to be conducted and how best to sequence and combine the methodologies to be used (Spratt, Walker & Robinson, 2004). What is learned from the first study will inform the conduct of the subsequent ones (Morgan, 1998). Dietary maintenance will be assessed from the perspective of people with type 2 diabetes (dietary self-care activities), rather than matching their dietary activities with healthcare professionals' dietary recommendations to determine dietary maintenance (Goodall & Halford, 1997; Hampson, Glasgow, & Toobet. 1990; McNabb, 1997). Studies conducted to achieve these aims are briefly outlined below.

### 1.5 Structure of the thesis

All three studies test people with type 2 diabetes and are written up in three chapters of four sections each (introduction, method, results and discussion sections) as detailed below.

Chapter 2 reports the first empirical study conducted which investigates the role of negative emotions in dietary self-care. This is a qualitative research which uses the Interpretative Phenomenological Analysis (IPA) approach. It explores the negative emotions that people with type 2 diabetes experience, the situations that result in

these negative emotions and coping with negative emotions. This study is also conducted to illicit examples of cognitions associated with dietary self-care which will be used in the subsequent studies. In the method section, data organisation and analysis (using the IPA approach) is presented step by step to show the validity, credibility and trustworthiness of the study. The study is evaluated using Yardley (2000) and Smith's (2011) criteria for assessing good quality qualitative and IPA research, respectively. Finally, findings from this chapter inform subsequent studies reported in Chapters 3 and 4.

Chapter 3 is a quantitative study that aims at developing and validating a questionnaire, which measures beliefs related to food intake among people with type 2 diabetes. Items on the questionnaire are developed based on cognitions associated with negative emotions reported in Chapter 2. The new questionnaire, the Food Intake and Beliefs Questionnaire (FIBQ) is correlated with other existing beliefs measures, food-related measures and diabetes-related measures to assess convergent and discriminant validity. The association of the FIBQ with diabetes-related measures is then compared with that of other beliefs questionnaires, the Shortened Generalised Attitude and Beliefs Scale (SGABS) and the Irrational Food Beliefs Scale (IFBS) to establish the FIBQ's validity as a diabetes-related food beliefs questionnaire.

Chapter 4 presents an experimental study which tests the effect of holding rational and irrational beliefs on physiological and psychological response to food pictures. It investigates whether or not priming participants with beliefs (rational or irrational

beliefs) while viewing different categories of food pictures (high fat savory, high fat sweet and low calorie foods) will result in changes in ERPs . Emotional responses are also measured to assess the effect of belief and food type. Electroencephalographic data are recorded and ERPs are analysed from various brain region sites and results are discussed in relation to the cognitive functions of the various ERP components tested. Behavioural data are also analysed and discussed, relating them to the ERP findings.

The final chapter of the thesis (Chapter 5) summarises the findings from Chapters 2, 3 and 4. It draws these findings together and a final conclusion is drawn about the use of the REBT model to address beliefs and negative emotions related to dietary self-care in people with type 2 diabetes. The strengths and weaknesses of the studies, implications of findings for clinical practice as well as implications for future research are also discussed.

# CHAPTER 2: DIETARY SELF-CARE AND NEGATIVE EMOTIONS IN TYPE 2 DIABETES: "*I BREAK THE DIET AND THEN I FEEL GUILTY..... AND THEN I DON'T GO BACK IN CASE I FEEL GUILTY AGAIN"*


## Abstract

The aim of this study was to understand negative emotions in dietary self-care by examining the context within which they arise, types of negative emotions experienced and ways of coping with negative emotions and poor dietary self-care. The Interpretative Phenomenological Analysis (IPA) approach was used to explore in-depth dietary self-care and negative emotions by interviewing thirteen people with type 2 diabetes. Transcripts of interviews were analysed using IPA to generate meaningful themes, resulting in three super-ordinate themes. Negative emotions resulted both *from* poor dietary self-care and *in* poor dietary self-care. Frustration, anger and depression were experienced as a consequence of perceived dietary restrictions, while irritation, guilt, anger and depression were experienced as a result of poor dietary self-care and increased glycaemic levels, creating a cycle of negative emotions and poor dietary self-care. Participants coped with poor dietary self-care and negative emotions by rationalising their actions, and by striving to maintain good dietary self-care for good diabetes control. This study contributes largely to the understanding of negative emotions and dietary self-care in people with type 2 diabetes. It proposes a possible cycle of poor dietary self-care and negative emotions and suggests the need to break this cycle (where one exists) to maintain good dietary self-care.

## 2.1 Background

### 2.1.1 Dietary self-care and negative emotions

Dietary self-care is considered to be an important component in the treatment of type 2 diabetes mellitus and yet the most problematic self management behaviour (Ary et al., 1986; Boehm et al., 1997; Hill-Briggs et al., 2003). People with type 2 diabetes have to adopt and maintain a healthy diet by reducing their caloric intake (less fat and sugar) and increasing fibre intake in order to obtain and maintain good glycemic control, while reducing the risk of short- and long−term diabetes complications. However, maintaining this recommended diet can be challenging and has been associated with feelings of restrictions such as not being able to choose desired foods and the loss of the pleasure of eating (Peres, Franco, Santos, & Zaretti, 2008).

Barriers to dietary self-care may include denial or the perception that the disease is not serious, inadequate knowledge about dietary regimen, the absence of complications symptoms, difficulty making and maintaining lifestyle changes, financial constraint, and feeling restricted or deprived, going on holidays, social functions and/ or eating out, temptations, poor dietary self-efficacy and negative emotions (see Chapter 1). Of particular interest are the negative emotions, such as frustration, guilt, anger, irritation and depression that have been reported, even though they have not been the central focus for many studies.

As described in Chapter 1, people with type 2 diabetes can experience negative emotions (irritation, anger, depression, guilt) from dietary self-care or sometimes when they experience negative emotions it results in poor dietary self-care. If

negative emotions can affect dietary self-care adversely, then it is worth exploring, as this can result in poor diabetes control and cause adverse diabetes complications. Also, the fact that people with type 2 diabetes have linked negative emotions to dietary self-care suggests that it has meaning for them, and dietary self-care being the cornerstone of diabetes treatment makes this phenomenon worth investigating.

As alluded in Chapter 1, the current knowledge on dietary self-care and negative emotions is a by-product of other studies which have focused on the psychological impact of living with diabetes (Penckofer et al., 2007) and challenges with successful dieting (Beverly, 2012), examined the association between emotions and diabetes in general (DeCoster, 2003), and investigated people's perception of factors influencing their dietary regimen (Travis, 1997). To date, no study has focused on people's experience with dietary self-care and the role of negative emotions, neither has any study focused on investigating the context in which dietary-related negative emotions occur.

This gap in the literature requires an experiential and qualitative approach to investigate dietary self-care and negative emotions, to gain a more in-depth knowledge of the experience of people living with type 2 diabetes. The present study focuses on the dietary self-care activities and negative emotions of people with type 2 diabetes. It also focuses on exploring and identifying the situations in which these negative emotions occur, through interviews. Advancing knowledge about the role of negative emotions in dietary self-care may afford healthcare professionals with alternative ways to educate people about their dietary self-care to improve diabetes

control. It may also help to identify poor dietary self-care resulting from negative emotions and inform the psychological support that people may need to adjust and maintain their recommended diet.

The primary aim of this study is to understand the experiences of maintaining good dietary self-care required of people with type 2 diabetes and the meaning of negative emotions in the context of dietary self-care. The secondary aims are to examine (1) the events or situations that result in negative emotions as reported by people with type 2 diabetes, (2) the types of negative emotions experienced, and (3) how people deal with these negative emotions and poor dietary self-care.

## 2.2 Method

### 2.2.1 Design

*Choosing the qualitative method: The use of Interpretative Phenomenological Analysis (IPA)*

The present study used the Interpretative Phenomenological Analysis (IPA) approach, in order to explore, describe and interpret participants' lived personal and social experiences (Smith, 2008). This is a qualitative approach that draws on the philosophy of "phenomenology", "hermeneutics" and "idiography". This approach is "phenomenological" because it explores lived experiences in-depth and "hermeneutic" because the researcher tries to make sense of individuals' lived experiences from the individuals' perspective and his/her own perspective as well. It is "idiographic", as it aims to capture the uniqueness that each individual's experiences bring to the understanding of a phenomenon (Smith, 2008).

IPA requires the use of a fairly homogenous sample, people with shared similar experiences which relate to the phenomenon under study. Participants are therefore selected using a purposive sampling method to represent a viewpoint, rather than a population (Smith, Flowers, & Larkin, 2009). Individual interviews or focus groups can be used to collect data. A small sample size, typically 3 to 8 participants, (Smith et al., 2009) is studied in-depth to understand situations and experiences that people go through in their everyday life (Giorgi & Giorgi, 2008), rather than having large sample sizes and categorizing people's experiences into variables (as in quantitative research) which may results in the loss of unique individual experiences.

A researcher is able to achieve this interpretative act by making sense of individuals' experiences. As people make meaning of (try to understand) their world, the researcher also tries to make meaning of how the people are trying to make meaning of their world, referred to as double hermeneutic "two–stage" interpretative procedure (Smith & Eatough, 2007). The researcher tries to understand the participant from the participant's viewpoint and at the same time questions their actions, thoughts and processes as a way of trying to interpret these experiences.

Since its inception, IPA has become one of the most commonly used qualitative methods in psychology and it has been used widely in the area of physical and mental health (see Smith, 2011a). To understand the experiences of illness, the researcher engages in an analytical process with each experience reported and searches for patterns across individuals' experiences, without losing the uniqueness

of each account, striking a balance between “convergence and divergence” (Smith, 2011a). This qualitative approach was suitable for this present study (which focuses on illness and health) because of its usefulness in examining participants’ experiences of living with a diabetes diet, something of essential importance to participants’ care and health. IPA offered the opportunity to examine each personal case in detail to allow unpredicted and unanticipated information to emerge from the data, in order to contribute to the existing body of literature and where possible illuminate existing theories (Smith, 2004). As very little is known about dietary self-care and negative emotions in people with type 2 diabetes, the aim was to gain an in-depth understanding of participants' experiences and to use this to inform subsequent studies.

*Reflexivity- The researcher as a person in context*

One important aspect of qualitative research is ensuring that the researcher is not influenced greatly by pre-existing ideas as he/she makes meaning of what participants reported (Lyons, 2007). It is assumed that the researcher can influence the study in various ways (Smith, 2008) because he/she is seen as the tool for data collection and the tool for analysis. It was therefore important that as a researcher, I recognised my background in relation to this area of study and set aside any pre-assumptions and biases about this phenomenon before the study begun.

> *I have had some experience of living with people with type 2 diabetes, but I did not let my background as a person who has family members with type 2 diabetes influence the conduct of this study in anyway. I tried to set aside*

*the knowledge I already had in order to be open-minded about the phenomenon under study and be open to new information.*

*As part of my Masters programme in Clinical Psychology I conducted research with people with type 2 diabetes (in Ghana) for my dissertation. This research focused on stress and hyperglycemia, assessing how stress levels impacted diabetes control. Subsequently, people who reported experiencing stress were offered psychological intervention to promote self-management. This intervention included diabetes education, education on the effect of stress and its management etc. Part of this intervention was also drawn from the REBT model as people were taught to recognise their irrational beliefs about diabetes management and replace them with rational beliefs.*

*This dissertation differed from the present study because it focused on diabetes in general and therefore was not dietary self-care specific. Thus, the knowledge I gained in diabetes during that process was not diet-related. Also, the use of the REBT model as part of the intervention focused on diabetes self-management in general and did not relate to dietary self-care. Thus, my prior knowledge of dietary self-care which I brought to this present qualitative research was very minimal, just based on my experience of having family members with diabetes.*

*Having family members with diabetes, I gained an understanding that people with type 2 diabetes felt they had to adhere to a restrictive diet. Family members (in Ghana) who had diabetes restrict their dietary intake to keep their diabetes under*

*control and this was based on the kind of dietary education they had received. Thus, my belief was that although they may have been successful with obtaining optimal glycemic levels, maintaining dietary recommendations was still challenging as they always felt the need to restrict their dietary intake.*

*I observed some family members feel a sense of regret when they attributed their high sugar levels to high calorie foods they had eaten. However, I personally believed that they could have occasional treats as long as this was done in moderation. Besides this feeling of regret, I was not aware of any other emotions that could be associated with (poor) dietary self-care. Until I began investigating dietary self-care in type 2 diabetes, I had not studied the literature on this phenomenon and therefore only held beliefs based on interactions with family members who had diabetes.*

*Thus, I had prior knowledge about the difficulties of dietary self-care, but had limited knowledge about the resulting negative emotions. This enabled me to go to the field with an open mind about the present study. During my literature search, not much information was available in this area of study, thus there was still much to explore. Using the IPA approach, I recognised that data analysis could be characterised by subjectivity as I interpreted participants' experiences and made meaning of them. Thus, in order to obtain accurate knowledge of events, I needed to be plausible and transparent with an unbiased viewpoint (Lyons, 2007) of what participant's shared with me. I sought the help of an expert in this approach during the*

*process of data collection and analysis in order to be as transparent as possible. All this was ensured by constantly being conscious about my prior knowledge, beliefs and assumptions and always setting them aside during every stage of this research.*

### 2.2.2 Participants

*Inclusion/Exclusion criteria*

People aged ≥40 years (the typical age at which type 2 diabetes appears, Diabetes UK, 2012), diagnosed with type 2 diabetes mellitus for ≥1 year were eligible for inclusion. This duration of the diabetes diagnosis was selected to provide enough time for people to adjust to the condition, to adopt the lifestyle changes associated with it, and to have some experience of living with and managing diabetes (Penckofer et al., 2007). Diagnosis was ascertained by clinicians, based on WHO criteria of fasting blood glucose of 7mmol/L or random blood glucose of 11.1mmol/L or greater and symptoms presented (WHO, 2006). In the absence of symptoms, a second positive glucose measurement was required (where a glucose tolerance test was done, fasting blood glucose > 7mmol/L and/or 2 hour value > 11mmol/L). Participants were excluded if they had recent (< 6 months) major changes in their diabetes treatment regimen (e.g. transfer to insulin or additional injection of insulin) or other major co-morbidities (e.g. cancer, chronic pain) or medical conditions such as allergies which may influence their food intake. Convenience sampling was used to obtain the participants.

Participants were recruited from the outpatient Endocrinology and Diabetes Centre of the Birmingham Heartlands Hospital, Birmingham, United Kingdom, between September and December 2009. Of the twenty-seven people approached to participate in the study, nine did not wish to take part (not interested =3, due to illness =4, could not be re-contacted =2). A total of 18 participants were thus scheduled for interviews, of whom three did not attend due to illness or lack of interest in the study. Of the fifteen participants interviewed, thirteen interviews were included in the study while two were excluded because participants provided very little information during their interviews which lasted 12 and 18 minutes, respectively. Participants gave written informed consent (see Appendix 1) to participate, and the study was approved by the Birmingham, East, North and Solihull Research Ethics Committee of the NHS, UK (see Appendices 2 & 3).

*Participants' demographic and clinical characteristics*

Participants' demographic and clinical characteristics are displayed in Table 2.1. The median age of participants was 60.0 (*IQR* = 17.0) years. The vast majority of participants were married or lived with their partner and about half were in employment. The median years of diabetes duration was 10.0 (*IQR* = 8.0) and most were receiving oral hypoglycaemic medication and/or insulin. All participants were obese (Body Mass Index [BMI] ≥30) except one (BMI = 26.0). Although their diabetes was poorly controlled (glycoslated haemoglobin [HbA1c] HbA1c ≥8), only three had evident diabetes complications (retinopathy, neuropathy or both).

Table 2.1

*Demographic and clinical characteristics of participants*

| Participants' Characteristics | *N* |
|---|---|
| *Age (years) Median (IQR*)* | 60.0 (17.0) |
| Men | 7 |
| *Marital status* | |
| Married/ Partner | 11 |
| Living alone | 2 |
| *Employment* | |
| In employment | 7 |
| Not in employment | 6 |
| *Diabetes Duration (years) Median (IQR*)* | 10.0 (8.0) |
| *Diabetes Treatment* | |
| Diet only | 1 |
| Oral Hypoglycaemic Medication | 5 |
| Insulin | 2 |
| Insulin + Oral Hypoglycaemic Medication | 5 |
| *Diabetes complications* | |
| One complication | 2 |
| Two complications | 1 |
| *BMI ($kg/m^2$)Mean (SD)* | 34.02 (4.13) |
| *HbA1c (%) Mean (SD)* | 8.63 (2.0) |

* *interquartile range*

### 2.2.3 Materials

*Measures*

The following measures were administered to obtain information to describe the sample.

Demographic, biometric and clinical information was collected using a self-report questionnaire which included age, sex, occupation, marital status, duration of diabetes, diabetes treatment, complications of diabetes, height and weight (to calculate body mass index; BMI) and the most recent HbA1c measures (see Appendix 4). Height, weight and HbA1c measures were obtained from participants' medical records.

Participants also completed the following questionnaires after the interview to assess dietary self-care, diabetes-related emotional distress and diabetes distress:

*Diabetes dietary self-care activity.* The diet specific subscale of the Summary of Diabetes Self−Care Activity Scale *(*SDSCA*;* Toobert & Glasgow, 1994) was used to assess dietary self-care activity retrospectively over a 7−day period, on a 5-point rating scale (see Appendix 5). Higher scores on this subscale indicate better dietary self-care activities. The average inter-item correlation within this subscale is moderate (mean=.40; Toobert, Hampson, & Glasgow, 2000).

*Diabetes-related emotional distress*. This was assessed using the Problem Area In Diabetes Questionnaire (PAID; Polonsky et al., 1995). The PAID is a 20-item

questionnaire with each item representing a unique area of diabetes-related psychological distress (see Appendix 6). Using a 5-point scale (from 0 to 4) it assesses the degree to which each item is perceived as currently problematic. A total score of the item responses reflects the overall level of diabetes-related emotional distress. A minimum score (0) indicates no diabetes-related emotional distress while a maximum score (100) indicates significant diabetes-related distress. This scale has high internal reliability (α=.90; Polonsky et al., 1995).

*Diabetes distress*. The Diabetes Distress Scale (DDS 17; Polonsky et al., 2005) has 17-items which people rate on a 6-point scale, indicating their degree of distress during the past month (see Appendix 7). The DDS yields a total score and four sub-scale scores: Interpersonal Distress, Regimen-related Distress, Physician-related Distress, and Emotional Burden. High scores indicate greater levels of distress. Internal reliability of the DDS and the four subscales is high (α = .87; Polonsky et al., 2005).

*Interview schedule*

A semi-structured interview schedule with open-ended questions and probes was used as a guide for the interviews (see Appendix 8). This schedule was developed by identifying questions on dieting related to participants' thoughts and feelings about their recommended diet, challenges they had with their diet and how they dealt with these challenges. The initial schedule consisted of four main questions on dietary self-care and probes. The probes asked questions about recent occurrences of experiences related to the main questions, how these occurrences made participants

feel and any thoughts linked to emotions reported. These probes were developed, using the Rational Emotive Behaviour Therapy (REBT) model as a guide. This was not used to define the focus of the interviews but rather to serve as a guide to explore negative emotions.

The interview was pilot tested with three individuals, two of whom had type 2 diabetes and one without diabetes but who was working at maintaining a healthy diet because of a family history of diabetes. Two of the main interview questions (questions 1 & 3) were then revised by splitting them into two questions each because they asked two different questions simultaneously. Another main question (question 4) and the fourth probe question were also modified by rephrasing them to improve understanding. The final interview schedule had 6 main questions with probes being the same for each main question. The questions were (1) tell me about your diet, (2) tell me about how your diet affects you, (3) tell me about the challenges that you face when you try to follow your diet, (4) tell me about how you deal with these challenges, (5) tell me about how these challenges affect you and (6) tell me about what happens when you don't stick to your diet (see Appendix 9).

### 2.2.4 Procedure

*Recruitment of Participants*

Eligible participants were approached in the waiting area of the clinic by the researcher who explained the purpose of the study to them. Those who expressed interest were given the Patient Information Sheet (see Appendix 10) and they signed a "consent to be contacted" form (see Appendix 11). They were contacted via the

telephone one week afterwards to confirm their participation and book interview appointments.

*Conducting the interviews: Setting and duration*

Interviews were conducted at the Diabetes Centre in Heartlands hospital. On arrival, the purpose of the study was explained again to the participants and they were given the opportunity to ask questions. Written informed consent was obtained prior to the interviews. Interviews were recorded using a digital voice recorder (Olympus DSS 2300) and lasted between 28 and 56 minutes, with a mean (*SD*) length of 40 (10) minutes. Following the interviews, participants completed the self-administered questionnaires. They were debriefed after their participation and advised to talk to the interviewer, their diabetes doctor or dietician if they were confused or had any questions as a result of the research.

### 2.2.5 Data organisation and analysis of interviews

*Transcription*

Recorded interviews were downloaded onto a personal computer for subsequent analysis. Interviews were transcribed verbatim, including all "false starts, significant pauses, laughs" (Smith, 2008, p. 65), change in direction of speech etc. Where the researcher asked questions and the participants answered, each phrase was typed as a different paragraph with the questions italicised. Participants were given pseudonyms to ensure and maintain anonymity and confidentiality.

*Analytical strategy*

During the analysis stage, the researcher assumed two roles; “stepping into the shoes” of the participants in order to understand their experiences from their own viewpoint, and stepping back from the participants and asking critical questions (Smith & Eatough, 2007), being analytical to make meaning of their experiences. The IPA approach, which is an in-depth analysis, was used to do a line-by-line analysis (Smith et al., 2009) of the transcripts. In this study, the analytical steps involved the following:

1. *Digesting the transcript*: This first step involved reading and re-reading each transcript to understand each participant’s experiences for further analysis. This process was made easier by the fact that transcription was done solely by the researcher and therefore listening to the tape over and over again made later reading and understanding much easier.
2. *Initial coding*: This involved examining the meaning of the content of the transcript and the use of language, and noting what was interesting or significant. The researcher read the transcript line by line, taking one paragraph at a time and underlining important statements that stood out, before making notes in the right hand margin of the transcript. The researcher noted down anything that was thought to be of interest in the transcripts, making comments and being analytical by asking questions as she went along. It involved describing what the participants reported and highlighting what seems to matter to them, paying attention to their use of language (Smith et al., 2009) (see Appendix 12).

3. *Emergent themes*: The next step was to develop emergent themes by transforming the initial coding to themes using the left hand side of the transcript. During this stage the researcher worked with notes from the initial coding and reduced this detailed information to more relevant manageable parts. Emergent themes (representing different portions of the transcripts) which reflected participants experiences were developed (see Appendix 12). The emergent themes were then typed out page by page with quotes, page numbers and line numbers so that if the researcher had to make any changes such as renaming themes, it became easier to refer to the transcript using the table and vice versa (see Appendix 13).
4. *Categorising emergent themes into themes*: Once emergent themes were developed, the next step was to look for connections between these emergent themes and group them. Emergent themes were typed, printed and cut out individually. These strips were then spread out on a table in order to look for patterns and connections among them and to be able to move them around for categorisation (Smith et al., 2009), to get a cluster of themes that were consistent. The end product was having emergent themes in groups of different themes (see Appendix 14).

Once the researcher had exhausted a transcript with these steps (steps 1-4), the researcher moved on to the next transcript to complete the same procedure. Analysis of initial transcripts could influence the researcher, thus care was taken to keep an open mind during the analysis of each transcript in

order to be able to identify new themes that emerged with the analysis of each transcript.

5. *Extracting quotes to support themes*: For each transcript analysed, the researcher created a table with the emergent themes and extracted quotes from the transcript to support these themes. Unlike the procedure in step 3, quotes for common emergent themes were grouped with their page and line numbers (see Appendix 15).
6. *Developing patterns across transcripts*: Once all the transcripts were analysed, a spreadsheet of all the themes across transcripts was created and the researcher looked for connections among these themes, identifying overarching themes across all thirteen transcripts (see Appendix 16). During this process, some themes were moved between categories or renamed and based on the final themes and categories, they were further categorised into super-ordinate themes. Thus, the final product was constructed of sub-themes (emergent themes), themes and super-ordinate themes indicating the representation of each participant (see Appendix 17).
7. *Extracting quotes across transcripts to support themes*: The final step in the analytical process was to develop a table of super-ordinate themes and themes with their corresponding quotes. This step was made easier because there already existed tables with themes and quotes for each participant (see Appendix 18).

*Credibility and validity of the research: data collection, analysis and interpretation.*

As stated earlier, in qualitative research the researcher is the tool for data collection. It is also the researcher who makes meaning of participants' reported experiences

through the data interpretation. Thus, caution was taken to minimize the risk and influence of subjectivity to maintain the validity of this research study through the following:

Using open-ended questions in the interview schedule contributed to the validity of this study. This allowed the researcher to actively engage the participants and it offered a conversational approach rather than an interrogational approach. It allowed the participants the opportunity to share their personal experiences in-depth. The sample size (n=13) used in this research allowed for variation in the sample group and increased the likelihood that all aspects of the phenomenon under study were covered. During transcription, when the researcher was unsure due to the accent of a participant, it was listened to by a colleague to ensure that all interviews were correctly transcribed. The researcher provided an in-depth analysis by spending time on the analysis process (see Appendices 13 to 18 for examples of step by step analysis conducted).

Again, this study is valid because it was "sensitive to context" (Yardley, 2008, p. 246). It investigated a relatively new phenomenon and allowed themes and understanding to develop from data collected instead of fitting the data to preset categories, models or theories (Yardley, 2008). During data analysis, the researcher spent time analysing the first two transcripts to gain and master the skill of IPA analysis, collaborating with a supervisor experienced in IPA. The researcher then went on to analyse the rest of the transcripts, conferring with the supervisor from time to time, and finally when a table of the final themes was available. Again during this process,

portions of a transcript was analysed and discussed with an IPA research group as well as two other doctoral researchers doing IPA. This process helped reduce the level of subjectivity of the analyses, making it more transparent and plausible.

## 2.3. Results

### 2.3.1 Questionnaire analysis

Scores on the PAID showed that all participants scored below 55 (out of 100) with a mean (*SD*) score of 31.3 (11.4) indicating minimum to average levels of diabetes-related emotional distress (see Table 2.2). The mean (*SD*) total diabetes distress (DDS) score of 2.34 (0.71) was less than the cut-off score (≥3), indicative of moderate distress worthy of clinical attention (Polonsky et al., 2005). Results from the DDS sub-scale (see Table 2.2) indicated that very few of the participants reported moderate distress levels for emotional burden (n=5) and regimen-related distress (n=5), even fewer for interpersonal distress (n=3), and none for physician-related distress.

Table 2.2

*Diabetes-related problems and regimen adherence of participants (N=13)*

| Questionnaire | Mean*(SD)* | Normal levels (*N*) | Moderate distress (*N*) |
|---|---|---|---|
| *Problem Area In Diabetes* | 31.3 (11.4) | | |
| *Dietary Self-care Activity* | 3.69 (0.60) | | |
| *Diabetes Distress Scale* | | *<3* | *≥3* |
| Total Diabetes Distress | 2.34 (0.71) | 11 | 2 |
| Emotional Burden | 2.69 (0.66) | 8 | 5 |
| Physician-Related Distress | 1.57(0.74) | 13 | 0 |
| Regimen-Related Distress | 2.71( 0.89) | 8 | 5 |
| Interpersonal Distress | 2.10 (1.31) | 10 | 3 |

### 2.3.2 Qualitative analysis

#### 2.3.2.1 Selecting quotes from transcripts to support themes.

A detailed analysis of each transcript was undertaken by the researcher. Several themes emerged from these analyses of the transcripts (e.g. negative emotions during initial diagnosis, physical effect of poor dietary self-care) however, only themes that answered the research questions were retained. Quotes that represented the emergent themes (which were the focus this the present study) were selected based on their commonality as well as their individuality among participants (Smith et al., 2009), reflecting the variability in the experiences reported.

As reported in the analytical steps (see section 2.2.5 in thesis), quotes representing the emergent themes were pooled together across participants. Several quotes were identified but not all of these could be presented in the results section (or the appendices). Thus, quotes that were common among participants were noted and at least two quotes that best represented the themes were presented in the results section. In instances where participants used striking metaphors to describe their experiences, these quotes were also presented in the results, and finally, where a quote was not common across participants (individuality) but was considered to be significant because it summarised a complete theme, this quote was also presented, which helped to maintain the idiographic focus on individual experience (Smith et al., 2009).

#### 2.3.2.2 Super-ordinate themes, themes and sub-themes

Three super-ordinate themes were derived from the various themes identified during data analysis which were interrelated and represented in each of the transcripts, although participants differed in their discussions. These were (1) Dietary self-care, a constant challenge, (2) Negative emotions, a cause or a consequence, and (3) Coping with negative emotions and learning to live with 'the diet'. These themes relate to the difficulties involved in maintaining good dietary self-care in order to obtain good diabetes control. Although this study focused on negative emotions and dietary self-care, it was important to understand the context in which these occurred and how participants coped with negative emotions, hence the importance of identifying the first and third super-ordinate themes. Figure 2.1 illustrates each super-ordinate theme and its themes in rectangles and round edge rectangles,

respectively. Figures 2.2, 2.3 and 2.4 further illustrate super-ordinate themes with their themes and sub-themes in ovals, rectangles and round edge rectangles, respectively.

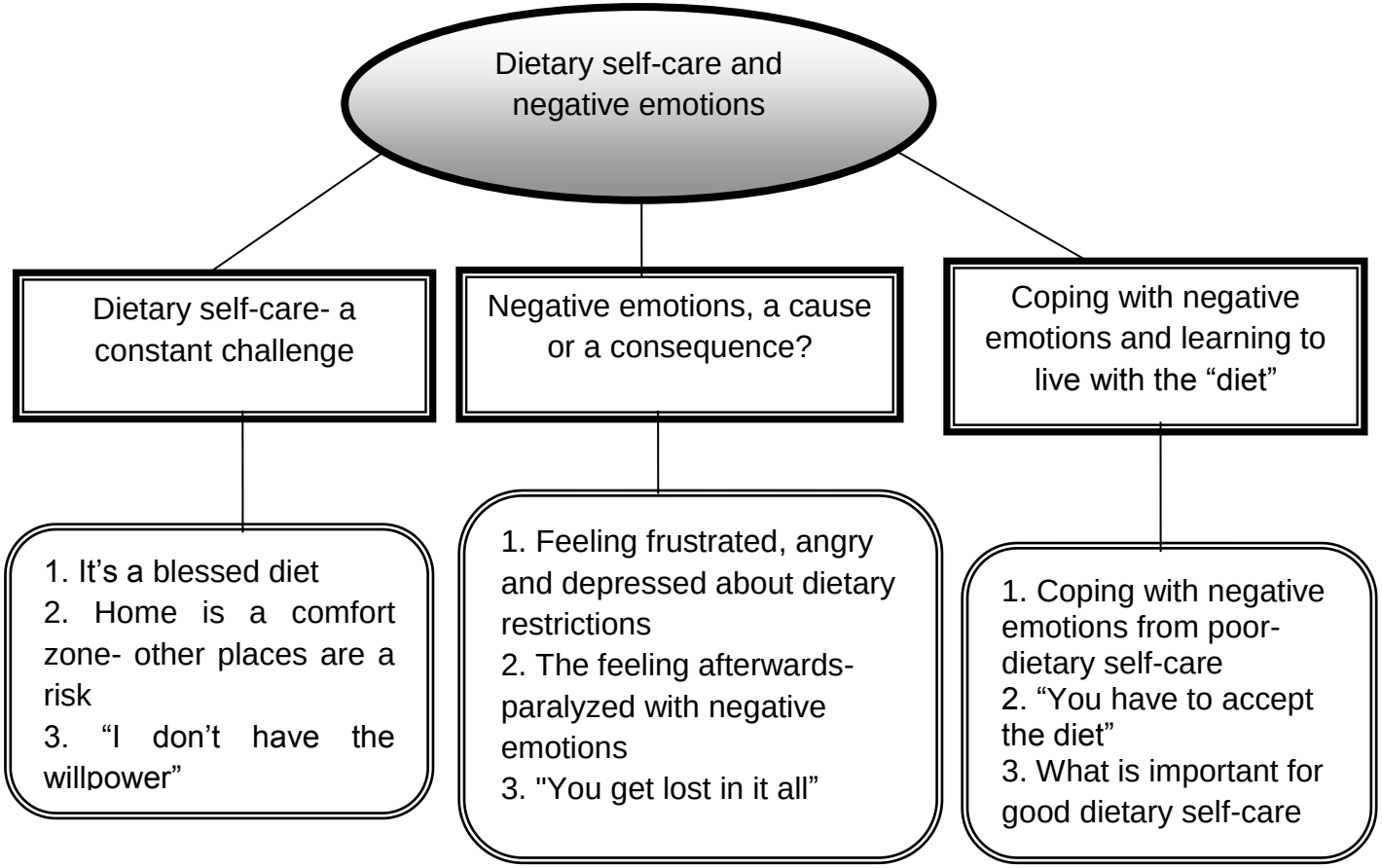


*Figure 2.1*. Research question with super-ordinate themes and themes

*Super-ordinate theme 1: Dietary self-care, a constant challenge*

The first super-ordinate theme comprises three themes: 1) “It’s a blessed diet”, (2) Home is a comfort zone- other places are a risk and (3) “I don’t have the willpower”. Participants acknowledged the need to maintain good dietary self-care to control their diabetes but this was a difficult task. They discussed the difficulties of maintaining a recommended diet and the challenges they face. Figure 2.2 illustrates sub-themes representing the three themes.

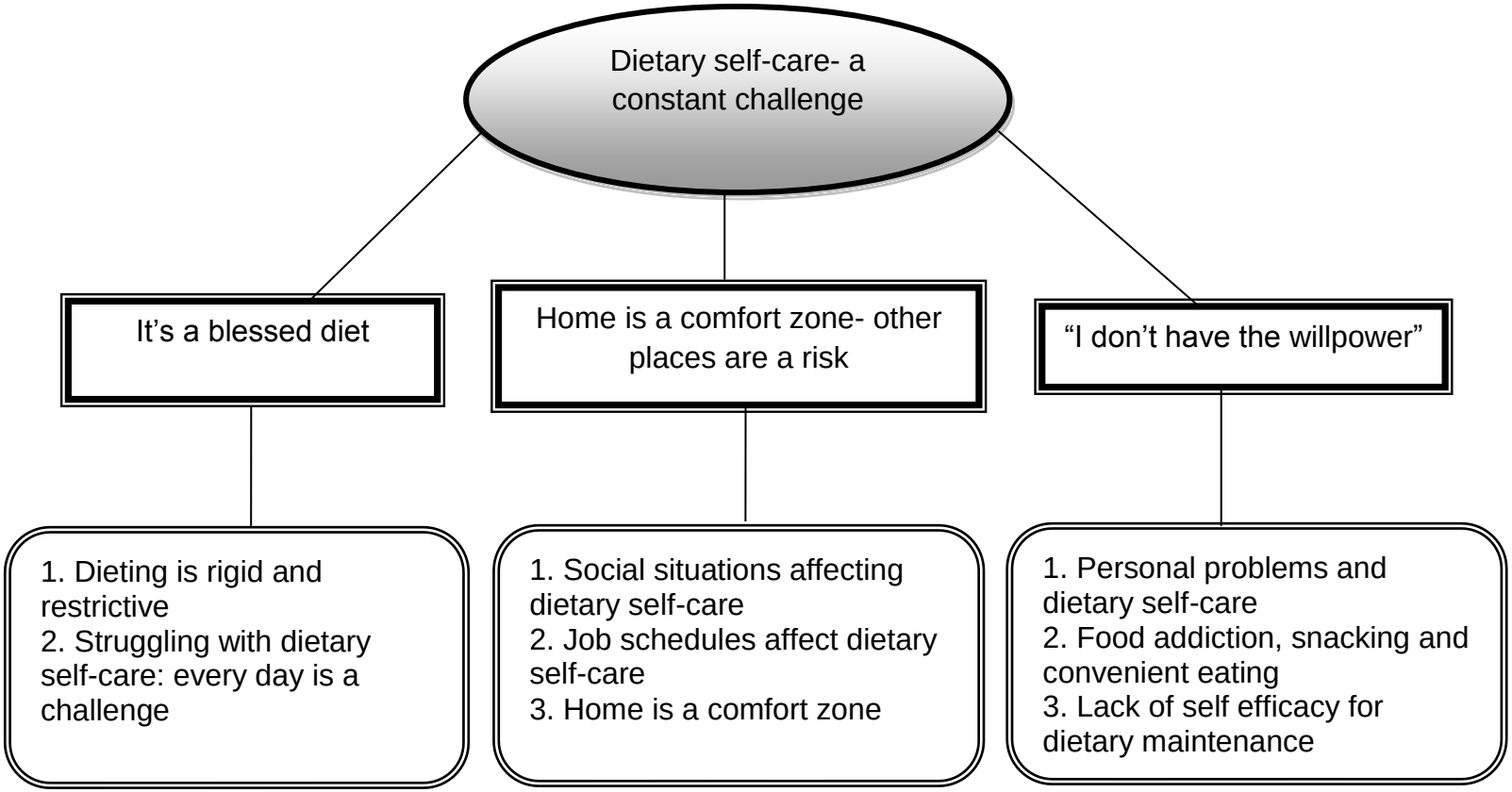


*Figure 2.2*. Super-ordinate theme 1: Dietary self-care- a constant challenge

*Super-ordinate theme 2: Negative emotions, a cause or a consequence?*

This second super-ordinate theme also comprises three themes; (1) Feeling frustrated, angry and depressed about dietary restrictions, (2) The feeling afterwards-paralyzed with negative emotions, and (3) “You get lost in it all”. Struggling to maintain a recommended diet resulted in negative consequences. Perceived dietary restrictions resulted in negative feelings. Some participants felt different from people without diabetes, while others felt frustrated. Participants reported that when they ate foods contrary to their recommended diet, they experienced negative emotions as represented in Figure 2.3.

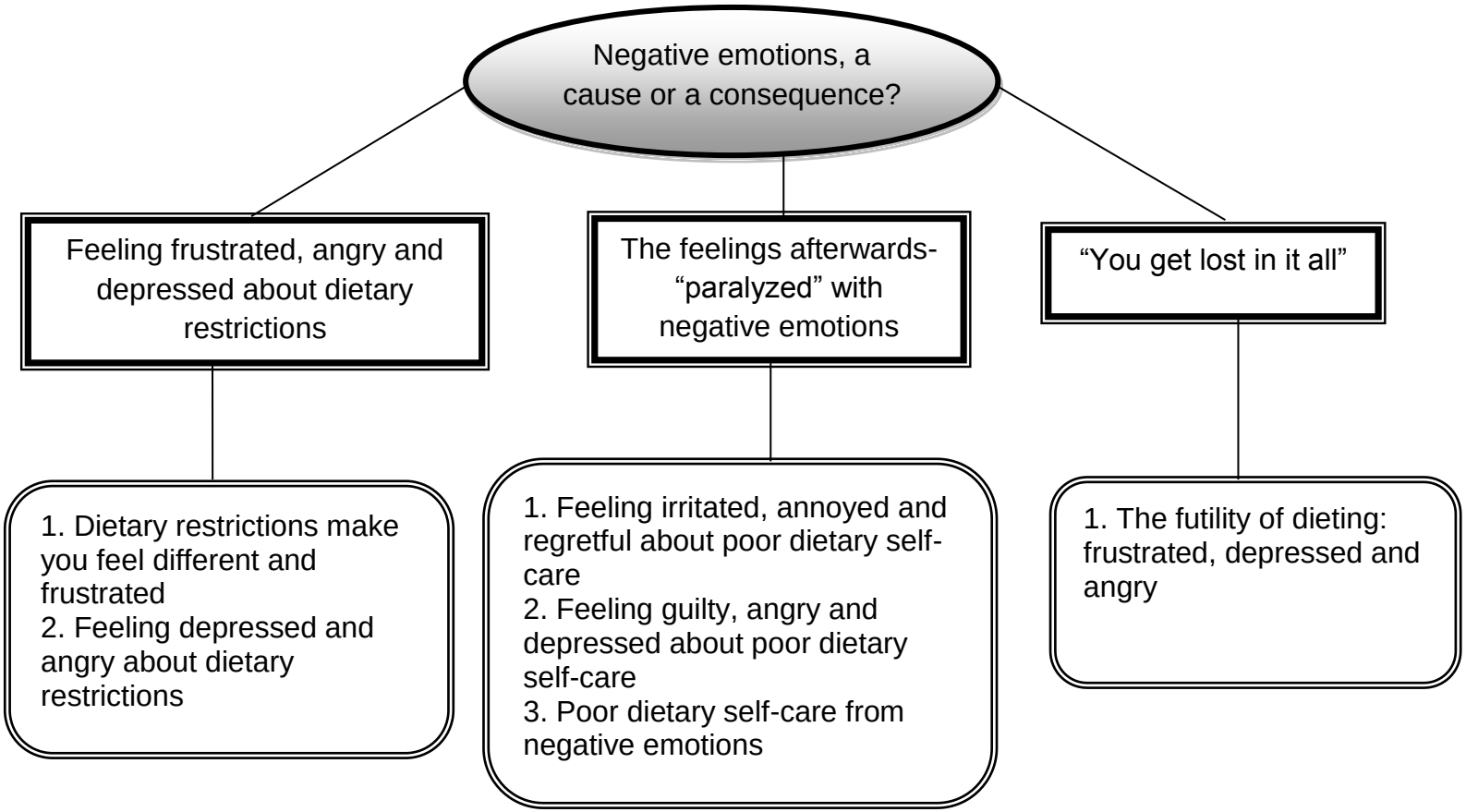


*Figure 2.3*. Super-ordinate theme 2: Negative emotions, a cause or a consequence?

*Super-ordinate theme 3: Coping with negative emotions and learning to live with 'the diet'*

The third super-ordinate theme comprises three themes (1) Coping with negative emotions from poor dietary self-care, (2) “You have to accept the diet” and (3) What is important for good dietary self-care. Despite the challenges and emotions reported, participants acknowledged at the end of their interviews that it was important to cope with the negative emotions and learn to live with “the diet” for good diabetes control. They talked about how they coped with poor dietary self-care and its consequent negative emotions and what in their view was important for good dietary self-care. Figure 2.4 illustrates the themes and sub-themes of this super-ordinate theme.

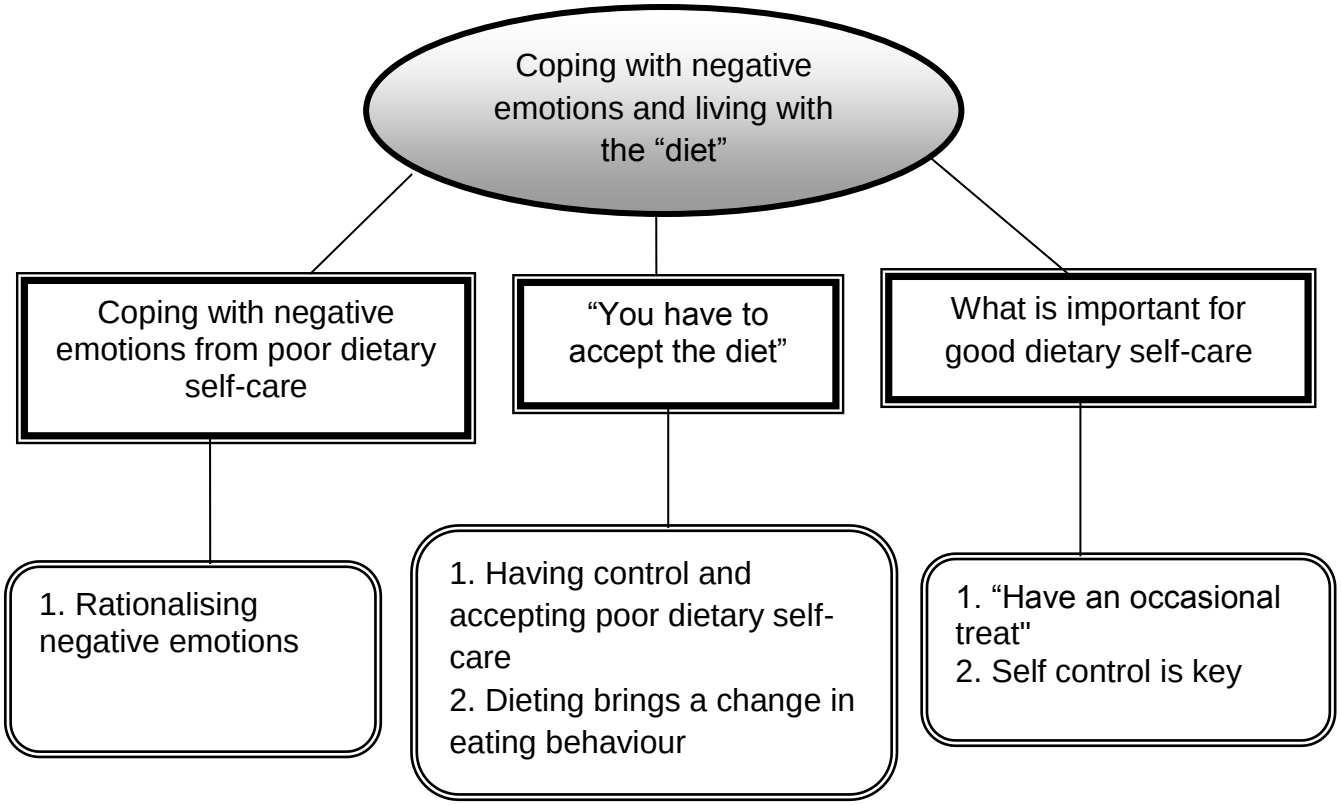


*Figure 2.4*. Super-ordinate theme 3: Coping with negative emotions and learning to live with the “diet”

### 2.3.2.3 Interpretation of super-ordinate themes, themes and sub-themes

Participants' experiences are represented in the three super-ordinate themes which will be illustrated in detail, using verbatim data extracts from transcripts to ensure the analysis represents the lived experiences of type 2 diabetes and dieting. These themes are supported by several extracts from the transcripts but only a selected few are given in this section. Other example extracts colour-coded to represent the different participants are available in appendix 18.

*Super-ordinate theme 1: Dietary self-care, a constant challenge*

This first super-ordinate theme discusses how participants perceived their recommended diet and the challenges they encountered. Although this is not the central focus of this present study, it is worth discussing as it represents the context in which negative emotions are experienced. It is important to understand what precipitated the negative emotions reported in order to understand how they are experienced. This super-ordinate theme represents all thirteen participants' perceptions about their recommended diet, how they struggled to maintain it and what made it challenging.

1. "It's a blessed diet"

Diagnosis of type 2 diabetes meant participants had a dietary regimen to maintain. However, they perceived their recommended diet as rigid and restrictive to the extent that one of them (Sophie) called it "blessed diet", while another (Roxy) felt the word "diet" was synonymous with "restriction". Consistently maintaining this "restrictive" diet was thus challenging. Participants had to watch what they ate and when they ate, whereas beforehand they could eat anything they wanted, at anytime. Having

diabetes therefore limited this freedom, making dietary maintenance feel rigid and restrictive as depicted by the follow extracts.

> *"I just felt as if I was being punished, you know it's not fair……. why can't I eat like anybody else?.....I use to look at other people eating and drinking and thinking- why can't I do that? ….....I just felt confined and restricted and I just didn't like it" (Violet)*

> *"You can't just go about and be normal sort of thing.....you've got to stick rigidly to this diet and routine, it just gets to you sometimes..... I have to weigh everything, analyse everything..... like everything, you get bored with it and you wish it was different (Sophie).*

Sophie had to change from a person who could freely eat whatever foods she wanted, to one who now had to rigidly ruminate over everything she ate, while Violet felt it was not fair for her diet to be restricted. These extracts indicate a loss of freedom for them and six other participants who felt the same way. Seeing the diet as rigid and restrictive led to a constant struggle with its maintenance.

All the participants, except one, stated that dietary self-care was a constant challenge. Changing long-standing eating behaviours was challenging and the perception that it was never-ending made it worse. Some participants felt dietary self-care was a daily challenge while others felt they were involved in a cycle of maintaining the diet and then breaking it every now and then.

*"After three months of doing that, you just go back into bad habits again..... it's like a vicious cycle. I don't think I've ever had a whole year of sort of like eating healthily, there's always been slips up and down" (Roxy)*

*"It might be okay for a few days or a few weeks and I'll be tempted again, but that's what the problem is. You're tempted so you slip back into the old ways quite easily. "Oh I'll start on Sunday" that's what I always used to say to meself, "I'll start eating healthy on Sunday. But sometimes Sunday never turns up does it?" (Kevin).*

Though they felt motivated to start on a healthy diet, Roxy and Kevin had difficulty maintaining and sustaining this lifestyle change. Several challenges such as social situations, personal problems and lack of dietary self-efficacy affected dietary intake.

2. Home is a comfort zone: "other places are a risk"

Participants were asked to give examples of recent occurrences of challenges they faced with their diet, and their responses highlighted the various situations in which dietary self-care was challenging. Eight participants mentioned social situations (going out for a meal, family gatherings and going on holidays) and work schedules as barriers to dietary self-care. In such situations, participants were presented with foods which they found difficult to resist or were not given much of a choice because

"diabetes options" were not available. This brought to the fore the problem of feeling restricted with their dietary intake. As some reported,

> *"On a social event you could get buffet that nobody is going to cater for the diabetic.....you either eat what's there, or you'll go without. So it's catch 22 .....when I go on holidays I don't drink, but probably do worse on me food" (Ian)*

> *There are certain foods in there which yes I've taken because of the nature of my job. If I'm away from home then you sort of eating in hotels or it tends to be the fast food outlets ....." (Dan).*

Social gatherings are events where people like to have fun and enjoy themselves, thus they 'should' feel free to eat whatever they want and how much they want without feeling restricted. However, this was not the case for Ian and five other participants who felt they had a recommended diet to maintain. Similarly, Dan, like four other participants, could not maintain a set routine with his eating because of his busy work schedule. This affected what and when they ate, which in the long run affected their diabetes control. In such instances, participants felt they had no control over the situations and what they ate because they were outside their "comfort zone" (their homes). Thus, one way to cope with their recommended diet was perhaps to reduce/avoid social functions and stay at home where they could have more control over what they ate.

Carl felt that

> *"It's only when you are outside your normal safe environment. It's like going to the zoo, all the animals are behind cages.....So if you are in your own house, everything is not there, it's not on view so you can't see, so you not gonna have it. It's only when you go out into the world, that's when the temptation keeps screaming and swinging things up" (Carl).*

As long as he stayed at home and avoided social functions, he would not be tempted because food outside his recommended diet would not be in sight. Though not explicitly reported, other participants' account of eating outside their homes perhaps indicated they felt similarly to Carl (see appendix 18).

3. "I don't have the willpower"

Personal factors accounted for difficulties with dietary self-care. These were situations in which participants were expected to have control over but found it difficult to do so because they lacked self-efficacy. Eleven participants reported that personal challenges such as feeling addicted to food and sweets, snacking and eating convenient foods, prioritizing personal problems over dietary self-care and the lack of "self-control" disrupted their course of dietary maintenance. Roxy and Ella spoke about their addiction to food.

*"Chocolates is one of my downfall.....It's like food for me is like how people are on drugs or something. It's like you know that it's not good for you but you are still doing this to yourself..... (Roxy)*

*"You get a secret drinker; I think I'm a secret eater, and it is the same kind of thing. I think, it is like alcoholism, I've got foodism .....I always say if chip, Chinese and chocolates were slimming I'd be like a rope" (Ella).*

Roxy and Ella, like others, found it difficult to maintain their diet because they felt addicted to food and also ate foods that did not promote healthy eating. Food seemed to be a source of comfort, making it difficult for them to give up what they enjoyed for good dietary self-care. Comparing their love for food to alcohol and drugs indicated how "addicted" they were to food. They were acting contrary to their dietary recommendations but could not stop themselves, indicating a lack of self-efficacy.

Personal problems and crises also affected dietary self-care activities. Six participants reported that when they were faced with personal problems, dietary maintenance was compromised. Examples are depicted below.

*"Each time we have a crisis I've always got me head in the fridge or the cupboard. But I know I'm doing wrong so why.....When I am stressed, I can sit with a pot of jam and a piece of bread and eat the lot because*

*while you're chewing and while you're eating you're not dwelling on your problems" (*Ella*)*

*"We were more or less eating convenient food, because of a relative of ours we found out had got cancer.....we are just looking after her really and we are not looking after ourselves and my sugar levels have rocketed" (Martin).*

Personal problems took centre stage in Martin and Ella's lives, making dietary self-care a secondary issue and for Ella, food seemed to be a source of comfort. For Martin, taking care of his relative was prioritized over taking care of himself thus dietary self-care was compromised. If personal problems can affect dietary self-care to this extent, then one could anticipate that anytime participants are faced with such problems, their dietary intake would be negatively affected.

Overcoming these challenges (addiction to food and sweets, snacking, eating convenient foods etc.) required some degree of self-efficacy, which was the one thing that seven participants admitted they struggled with most. They acknowledged the likelihood of being tempted but they still found it difficult to say "no". As Kevin mentioned,

*"I keep saying- oh what am I doing now, I should have a bit more willpower that's all.....I give in easily sometimes" (Kevin).*

The above dietary challenges resulted in poor dietary self-care and the consequences of poor dietary self-care was negative emotions as reported below.

*Super-ordinate theme 2: Negative emotions- a cause or a consequence*

This super-ordinate theme focuses on the negative emotions resulting from perceived dietary restrictions and poor dietary self-care.

1. Feeling frustrated, angry and depressed about dietary restrictions

Ten participants reported negative emotions as a result of dietary restrictions. These restrictions made some participants feel different from other people who did not have diabetes while others felt frustrated, angry or depressed. Participants were depressed with their (perceived) restricted diet because it made them feel different from other people without diabetes. Being treated differently by family and friends, for example, depressed Violet and made Dan angry.

> *"I felt down, I felt depressed, I felt different from everybody else I felt fed-up with people telling me, you can't do this and you can't do that and so many things that they were telling me, all because you are diabetic you can't have salt, because you'll be sick- and I'm thinking who qualifies you to be my doctor. I'm thinking- I'm a human being, I haven't done anything wrong" (Violet)*

> *"All of my family, obviously they know that I'm diabetic, they know what I should be eating, they know what I shouldn't be eating. And there are*

*times when I can get angry with them because they are saying "no"..... possibly I'm reducing myself to a child that I'm standing up and I'm saying that "I can afford it, I want it, I'm gonna have it". Then people are saying "no, no, no you shouldn't have it". In some cases I've actually bought things and they've been taken away which- again you get this flare of anger" (Dan)*

Family and friends tried to be supportive by restricting their dietary intake. However, they seemed to be taking away Violet and Dan's freedom of eating whatever they wanted, hence the negative emotions. Perhaps these dietary restrictions were a constant reminder of having diabetes and not being "normal" like other people without diabetes. Apart from perceived dietary restrictions, poor dietary self also resulted in negative emotions.

2. The feeling afterwards- "paralyzed with negative emotions"

Poor dietary self-care resulted in negative emotions as participants reported felt irritated, annoyed, guilty, angry, and depressed. In some instances negative emotions led participants to continue "abusing the diet" creating a cycle of negative emotions and poor dietary self-care.

Guilt was the most frequently reported negative emotion associated with poor dietary self-care. Most of the participants (nine) reported feeling guilty when they did not maintain their diet. They felt guilt for knowing what was right but not doing it. Below is an example of what most of them reported.

*"Guilt, I am guilty stricken, because I know that I've taken these wrong foods, I know I'm damaging my nerves, and then my heart, and then the cholesterol. Guilt- and I know that I can't reverse it. Or I get paralyzed with what I've done and not do anything and wait for the negative symptoms to come on" (Violet).*

The feeling of guilt was an indication the participants recognised they had violated a rule or a standard, in this case good dietary self-care and diabetes control. Participants felt guilty because of what they had eaten and the long term effect of this unhelpful behaviour. They enjoyed the food while eating it but could not avoid the guilt feeling that came afterwards. As Ella described, she could only block the guilt out of her mind just for a moment.

*"You can cut that part of your brain off, the guilty part and you've ate it and the guilt floods in" (Ella)*

Other negative emotions reported were feeling angry and depressed about poor dietary self-care.

*It's when it's eaten then you say I shouldn't have had that, I know I shouldn't have had that and the anger comes in.....The anger thought after is the fact that here am I trying to lose weight and it isn't gonna happen and the reason why it isn't happening is this very thing*

*that I've just done.....,I didn't really need to eat that I could have had something more healthier (Dan)*

*"Depressed about not being able to follow my diet" (Tony)*

Similarly, like other participants, Dan and Tony did not weigh the consequence of their action until they had finished eating. Negative emotions experienced were an indication of admitting they had not acted in their own interest and had acted contrary to good dietary self-care. Some participants reported that these negative emotions further affected dietary self-care. Dwelling on these negative emotions made them feel worse about themselves, causing them to continue in poor dietary self-care.

*"If things are not going right you tend to get like frustrated and agitated and when you get that you can eat those chocolate bars and you just think aahh sod it, you don't care, it goes out of the window, because you're not bothered, and then later on you think no" (Ian)*

*"I break it and then I feel guilty and then I don't go back to it in case I feel guilty again..... I'm frightened to go back to it" (Ella)*

The above extracts reflect a possible cycle of negative emotions and poor dietary self-care. Frustration with dietary self-care and perhaps the lack of successful dieting resulted in poor dietary self-care. Ella was afraid to go back on the diet because she wanted to avoid the cycle of poor dietary self-care and the feeling of guilt. Perhaps

the best way to avoid feeling guilty was for her to forget she had a recommended diet to maintain. As long as she did not think "diet", she would not feel guilty about what she ate.

3. "You get lost in it all"

Eating contrary to their recommended diet resulted in poor diabetes control as measured by blood sugar levels. Participants (n=6) reported that despite slipping from their diet from time to time, they still maintained healthy eating. Unfortunately, this did not reflected in their weight management and diabetes control, resulting in more frustration, anger and feeling depressed for trying so hard and not being successful. As Dan and Carl reported:

> *"If I weigh myself periodically and I'm not losing weight then I can get this inner anger as well, then I can say well "but I'm on this diet", "why am I not losing weight" "why is it not falling off" (Dan)*

> *"You are on the scale every day. You become really depressed because one day you've lost some weight, and then two days later you've gone up 2, 3 kilograms" (Carl)*

Following a recommended diet for Dan and Carl meant they 'had' to lose weight hence the negative feelings about their lack of success. Carl could not maintain a consistent weight loss, while Dan was not losing weight at all. Though they believed

they were maintaining good dietary self-care this may not have been the case, as they had reported earlier on about their work schedule affecting dietary self-care. Sophie on the other hand felt frustrated and depressed that her efforts did not improve her diabetes control.

> *"I've been to seminar at the diabetic clinic ..... and a lot of the stuff they tell you there is a lot of the stuff I'm doing, but I still can't get this HbA1 down below 8 for some reason.....It does dishearten you a bit.....sometimes you think well I'm trying very hard to control it and it's not working .....you get frustrated with it because you think, will you ever get it right. I think well what am I doing wrong?" Sometimes you get depressed about it trying to balance it out" (Sophie)*

Coupled with the frustration of sticking to a "restrictive" diet was dealing with the lack of successful dieting and the consequent frustration of poor diabetes control. Following the recommended diet without success was frustrating and depressing which made Sophie question her ability to get her diet right.

As discussed above, the experience of negative emotions did not only result from poor dietary self-care but also the perceived restrictiveness of the diet which created a cycle of negative emotions and poor dietary self-care. Despite this, participants still recognised the need to keep their diabetes under control and thus had to learn to live with being on a diet and getting it right. As discussed further in the third super-

ordinate theme, participants shared how they coped with the negative emotions and poor dietary self-care.

*Super ordinate theme 3: Coping with negative emotions and learning to live with the "diet"*

This super-ordinate theme demonstrates how participants were learning to live with maintaining a recommended diet in spite of its perceived rigidity and the lack of success. This illustrates how participants coped with the negative emotions and how they were determined to stay focused on the diet for good diabetes care and perhaps to avoid the experiences of negative emotions.

1. Coping with negative emotions from poor dietary self-care

Learning to maintain a recommended diet meant participants had to find ways of dealing with poor dietary self-care and its consequent negative emotions. Thinking about the diet in a different way and rationalising poor dietary self-care and negative emotions were ways some participants (n=8) coped to helped them to feel better about themselves. Ian tried to think about his diet in a less restrictive way, while Martin developed an apathetic attitude as a way of coping.

*"I don't look at it as if I am dieting, I look at it- "no I shouldn't really have that" (Ian)*

*"When I'm not eating right, I do have a don't care attitude" (Martin)*

Giving a different meaning to his dietary regimen was Ian's way of coping with it. Avoiding the use of the word "dieting" and evaluating his diet regimen differently perhaps, made him feel less restricted and better able to accept this permanent

condition. Martin on the other hand maintained an attitude that prevented him from coming to terms with his unhelpful behaviour. This perhaps was his way of avoiding negative emotions. Rationalising was another way of dealing with poor dietary self-care and negative emotions.

> *"I think what you've got to do is pre-empt the guilt feeling by disciplining yourself not to feel guilty..... "I just think to myself, I've been a little bit naughty today and I will be even better behaved tomorrow. So you literally think to yourself I'll keep that one in the balance and tomorrow I've got to be a good boy..... that's what we do by going shopping, we can afford that but we can't afford that, rationalisation" (Carl)*

> *"I'll have this cake, it won't kill me.....Yes I shouldn't be doing it- you think, well I'm having a cake but sod it, it's only one cake, I say that to meself to cancel it out". (Brad)*

> *"I tend to put the feeling of guilt at the back of my mind I don't really think about it too much but I know it's there" (Tony)*

Rationalizing their unhelpful behaviour was perhaps their way of negating the negative emotions to cope with the consequences of poor dietary self-care. Carl played down the consequence of his unhelpful behaviour by convincing himself that he could always make up for his poor dietary intake and this helped him to block out

the feeling of guilt. However, as Tony admitted, although the guilt feeling is suppressed, it is not completely forgotten, which reiterated Ella's report earlier on that the guilt cannot be totally blocked out of a person's mind. This was an indication that the only way to avoid experiencing negative emotions was perhaps to work hard at maintaining the recommended diet.

2. "You have to accept the diet"

Coping with the diet meant having control over dietary self-care and learning to correct poor dietary self-care. Some participants found it important to be in control of their condition so that diabetes did not take over their lives, while others said it was important to change their eating behaviour and move on when they made mistakes.

> *"What you need to do is when you fall, pick yourself back up, dust yourself off, have a start again and keep doing that and then you'll find that things will be better ……... When you fall down, you don't stay down, you get up" (Violet)*

> *"I keep saying to meself "Ella get back on it". It's no good beating yourself up over the fact that you've broke your diet.....you do it now, it's done, just sort it, just keep trying" (Ella)*

Both participants felt that dwelling on their mistakes could only lead to more negative feelings and poor dietary self-care which could make them feel worse about

themselves. What was important was to learn from their mistakes and keep trying until they were successful.

Maintaining good dietary self-care to avoid negative emotions also required changing eating behaviours. Participants reported that they had learned to avoid some foods and reduce the intake of others. Some had learned to stick to a routine with their diet, eating more low calorie and low sugar foods and accepting that this was their new way of life. All of them had changed their eating behaviour in different ways to stay healthy.

> *"I couldn't ever imagine meself eating a raw carrot as opposed to a bar of chocolate in me mind. I just couldn't get me head round it, but now I could" (Kevin)*

> *"There was a stage where I'll have a chocolate bar everyday and I haven't been doing that for a while, so that is one good thing.....I couldn't go past the shop without buying a chocolate.....so I'd say I've improved over the time" (Roxy)*

The need to maintain good diabetes control, made Kevin cut down on sweet foods and snack on low calorie foods while Roxy gave up eating chocolates everyday. This positive change was geared towards good diabetes control and some participants feel good about themselves when they were able to maintain good dietary self-care. They discussed what they believed was important for good dietary self-care.

3. What is important for good dietary self-care

Participants identified various factors which they believed could help with dietary self-care. Among these, having "self-control" to resist temptations and having occasional treats to avoid feeling deprived were key. Having an occasional treat was important because it prevented the frustration of feeling restricted and getting depressed thereafter.

> *"It's easier to live with yourself if you can have an occasional treat. I have tried to be so firm with myself, I think that every now and again, like a binge eater, you binge eat some sweets" (Ella)*

> *"If you don't treat yourself a little bit you could become depressive and my character is I don't wanna be depressed" (Carl)*

For Ella and Carl, and others who shared their view, having occasional treats meant they felt less restricted with their dietary intake because they could look forward to something instead of feeling aggrieved and deprived which could result in negative emotions.

Another key factor was "self-control" which participants had reported earlier on that they lacked. They believed that having self-control could help maintain good dietary self-care as Kevin and Dan acknowledged.

*"You need willpower, whatever the hospital tells you, you've got to stick to it as much as you can. That's why it's willpower". (Kevin)*

*"Ultimately it shouldn't be that's what I want, it should be more, that's what I should have or at least take it in some sort of moderation" (Dan)*

Maintaining good dietary self-care is key to diabetes control, thus, being able to identify what was important for dietary self-care showed participants' willingness to work at maintaining their recommended diet in spite of poor dietary self-care and negative emotions experienced.

## 2.4. Discussion and Conclusion

### 2.4.1 Overview

Three super-ordinate themes emerged, reflecting the context of negative emotions, type of negative emotions experienced and ways of coping. Perceived dietary restrictions and daily challenges (e.g. social situations and personal problems) made dietary self-care difficult to maintain, resulting in negative emotions such as frustration, anger, and feeling depressed. Negative emotions (irritation, guilt, anger and depressed feelings) were also the consequence of poor dietary self-care and vice versa, creating a cycle of negative emotions and poor dietary self-care. Participants coped with negative emotions and poor dietary self-care by rationalising to make themselves feel better, and acknowledging the importance of maintaining good dietary self-care for good diabetes control. These findings showed that negative emotions do play a role in the dietary self-care of people with type 2 diabetes

### 2.4.2 The context of negative emotions

Maintaining the recommended diet was a big challenge for all the participants irrespective of their diabetes control (both well controlled and poorly controlled), with each reporting varying levels and degrees of difficulty and experiences of negative emotions. Perceived dietary restrictions, social and personal problems and lack of dietary self-efficacy were the context in which negative emotions occurred.

Following the recommended diet was perceived as rigid and restrictive. Thus, adhering to a dietary regimen brought forth a negative and restrictive feeling and a sense of deprivation. This finding corroborates previous findings in which women with type 2 diabetes reported restrictions and lack of freedom to choose foods they desired (Peres et al., 2008). Mathew et al., (2012) also reported that even when women were told by their physicians that they could eat anything in moderation, they still felt the need to restrict their dietary intake and avoid certain foods. Participants in the present study were eager to make lifestyle changes in order to follow their recommended diet and control their diabetes. However, with time, they slipped back into their previous eating habits, resulting in poor dietary self-care. Thus, the short term challenge was following a “restricted diet”, while the long term challenge was maintaining good dietary self-care lifelong.

Behaviour change can be cyclical and when people make changes and try to maintain them, sometimes there are “lapses and relapses” (Prochaska & DiClemente 1983; Prochaska, DiClemente, & Norcross 1992). Findings of the present study reflect the stages of behaviour change (pre-contemplation, contemplation,

preparation, action and maintenance) as outlined by Prochaska, DiClemente, and Norcross (1992). Participants in the present study, found themselves in the 'action' stage as they modified their eating behaviours to obtain good dietary self-care. However, they had difficulty stabilising and maintaining this change, resulting in relapse, which according to the Prochaska et al., ends the 'action' and 'maintenance' stage, leading participants back to (slipping into their old ways) the 'pre-contemplation' or 'contemplation stage'. Remaining at the action stage without lapses and relapse requires support (Prochaska et al., 1992) and perhaps self-efficacy which participants did admit they lacked. These "lapses and relapses" resulted in poor dietary self-care which in turn resulted in negative emotions.

Negative emotions were also experienced in social situations and when participants experienced personal problems. For example, going out to social events, eating out, going on holidays and work schedules, affected dieting because participants felt they had little control over such situations. This finding is consistent with studies (Hall et al., 2003; Savoca & Miller, 2001; Travis, 1997; Vijan et al., 2005) in which people with type 2 diabetes reported that going on holidays and eating out (Ary et al., 1986; Galasso et al., 2005; Savoca & Miller, 2001; Travis, 1997; Vinter-Replaust et al., 2004) affected their dietary plan because their routine was disrupted.

In the present study, some participants reported that during outings they did not have control over foods available to them, thus they felt compelled to eat foods outside their recommended diet. They felt that the best way to avoid such unhelpful situations was to reduce social events and stay at home, away from the world of

temptations. Unfortunately such self-imposed restrictions could result in isolation and precipitate anger and depression (Penckofer et al., 2007). Reduced participation and satisfaction of pleasurable activities as well as reduced life satisfaction have been associated with depression (Lewinsohn & Libet, 1972; Lewinshon, Redner & Seeley, 1991), while more frequent socialising has been associated with less diabetes-related emotional distress (Schiøtz, Bøgelund, Almdal, Jensen, & Willaing, 2011).

Personal problems also interfered with dietary self-care activities and caused negative emotions. When participants had personal problems, they turned to fast-foods or ate comfort foods and binged as the problems dominated their lives. This demonstrated a lack of appropriate coping skills which has been identified to hinder dietary self-care activities (Rosenstock, 1985). It also suggests a lack of dietary self-efficacy because participants gave in to their personal problems and give up efforts to maintain their diet.

The previous points illustrate participants' lack of dietary self-efficacy which has been reported to be negatively associated with diabetes self-management behaviours (Al-Khawaldeh et al., 2012; Mishali, Omer, & Heymann, 2011; Sarkar et al., 2006). Lack of dietary self-efficacy is also associated with glycemic (HbA1c) levels (Howells et al., 2002) and predicts dietary self-care activities (Nouwen et al., 2011; Senécal, Nouwen, & White, 2000) and dietary self-care and diabetes distress (Nouwen, Law, Hussain, McGovern, & Napier, 2009).

Perceived self-efficacy, according to Bandura (1977), can influence one's choice of activity, how much effort is expended and how long a person persists when faced with difficulty. For example, if perceived self-efficacy is strong, participants will persist at dietary self-care, suggesting that people with type 2 diabetes who lack dietary self-efficacy, are likely to give up when faced with obstacles, which will impact negatively on their dietary self-care. Thus, self-efficacy is an important motivator for achieving dietary goals (Early et al., 2009) and when people face challenges, self-efficacy is important to maintain self-care activities (Al-Khawaldeh et al., 2012; Nouwen et al., 2011; Senécal et al., 2000) such as food selection, and controlling food portions (Savoca & Millar, 2001). The lack of self-efficacy reported in the present study resulted in poor dietary self-care and negative emotions because participants felt that they gave in to temptations very easily.

### 2.4.3 Negative emotions, a cause or a consequence?

Perceived dietary restriction made participants feel frustrated, angry and depressed. For example, friends and family restricting participants' diet also contributed to their frustration because it made them feel different from others without diabetes. Participants felt frustrated when they compared themselves with 'more capable' people (without diabetes) who had no dietary 'restrictions'. This can be explained by the social comparison theory (Buunk & Gibbons, 2007; Festinger, 1954; Gerrard, Gibbons, Lane, & Stock, 2005) which postulates that people compare themselves to others who are more capable or less capable than they are. Social comparison is common among people with serious medical problems (Tennen, McKee, & Affleck, 2000). Thus, it is not surprising that participants in the present study compared

themselves with “more capable” people, which made them feel restricted, resulting in frustration.

Irritation, guilt, anger and depression were the negative emotions resulting from poor dietary self-care, with guilt being the most prominent. Almost all the participants reported feeling guilty when they did not follow their recommended diet. They enjoyed eating whatever they wanted to but felt guilt afterwards when they thought “I shouldn’t have eaten that”. There was anger directed at themselves when they ate foods they knew could increase their blood sugar levels. They reported feeling depressed about not being able to stick to their diet, knowing how this could impact negatively on their diabetes.

Negative emotions did not only result *from* poor dietary self-care but sometimes also resulted *in* poor dietary self-care. Frustration and anger resulted in some participants giving up on following their diet. This depicted a cycle of poor dietary self-care and negative emotions. This finding is consistent with previous findings (Penckofer et al., 2007) that when women with type 2 diabetes felt overwhelmed and stressed, they did not follow their diet which later lead to the feeling of sadness or depression and anger for not acting in their own best interest.

Negative emotions reported had underlying beliefs consistent with the REBT theory (Ellis, 1958). According to the theory, guilt, anger and depression reported in the present study are classified as unhealthy negative emotions while irritation, regret, and feeling annoyed are classified as healthy negative emotions. In the present

study, these unhealthy negative emotions had underlying cognitions such as “it is *not fair* that everybody is eating whatever they like and I can’t” (depressed), “I *mustn’t* have a cream cake, I *mustn’t* do anything naughty because it could show up in me test” (guilt), “I *shouldn’t* have eaten that, I *should* have known better” (guilt), “I can *never* get my diet right” (depressed), “I *must* have a sense of direction, I’ll *never* get it right” (depressed), and “I’m having a lapse of concentration of where I’m actually at, and it *should never* be at a cross road, I *should* stick straight to the line” (anger). This finding suggests that irrational beliefs may play a role in the development of negative emotions associated with dietary self-care in people with type 2 diabetes.

Scores on the Problem Areas In Diabetes (PAID) scale suggested that overall, most participants had minimal levels of diabetes-related emotional distress, however this did not reflect the challenges and negative emotions reported above. Perhaps this was because the scale is not diet-specific as it assesses all aspects of diabetes care. On the other hand, the Diabetes Distress Scale (DDS), which assesses four different aspects of treatment regimen and overall distress with treatment regimen, showed that participants had moderate levels of emotional burden and regimen-related distress, which is consistent with their reports of struggling with dietary self-care and the experiences of negative emotions. Nonetheless, the overall distress score suggested that only two participants had distress levels requiring clinical attention. The fact that most participants were not distressed with their overall treatment regimen supports results from the PAID. The main difficulty was with emotional burden and regimen-related distress which was reflected in participants’ lived experiences of dietary self-care and negative emotions.

The result of poor dietary self-care was more frustration, anger and depression about unsuccessful weight management and increased glycaemic levels. This is consistent with previous findings that, in spite of the effort of people with type 2 diabetes' to restrict their diet they experienced weight gain and high glycaemic levels which made them feel frustrated or depressed (Beverly et al., 2012; Savoca & Miller, 2001).

### 2.4.4 Coping with negative emotions and learning to live with the "diet"

Despite their frustration with dietary maintenance, participants acknowledged the need to 'stick to it' in order to achieve good diabetes control (Hill-Briggs et al., 2003). Coping with negative emotions and poor dietary self-care was important for good diabetes control. They had changed their eating behaviours to maintain their diet, giving up sugar and sugary foods, snacking on low calorie foods, and developing self-control in social settings to avoid foods that could affect their diet. They did not want diabetes to take over their lives, hence the need for them to take "control" of the illness and cope with the diet. This required learning from their mistakes and moving on. No matter how often they failed with dietary maintenance, participants felt they had to keep trying till they were successful.

Having occasional treats was necessary to avoid feeling deprived and getting depressed about missing out on foods they enjoyed (e.g. desserts, chocolates, take-away etc.). However, this required eating such foods in moderation (Mathew et al., 2012) or occasionally, which alluded to the importance of dietary self-efficacy for good dietary self-care. Thus, strategies should be put in place to enhance participants' confidence to maintain good dietary self-care by helping them to set

realistic goals that are achievable, employ problem-solving techniques, (Nouwen et al., 2009; Pichert et al., 1994), and persist in the face of any obstacles. This could prevent relapsing at the 'maintenance' stage and regressing to the 'pre-contemplation' or 'contemplation' stage of behaviour change (Prochaska, DiClemente, & Norcross, 1992).

### 2.4.5 Evaluating the present research as a good qualitative and IPA study.

The quality and validity of this research can be evaluated in the light of Yardley's (2000) proposed criteria for quality control, in addition to Smith's (2011) criteria for a good IPA paper. Firstly, literature search demonstrated that very little research had been conducted on negative emotions and dietary self-care in type 2 diabetes, thus there was a gap in the literature. While some of these studies used the qualitative method (DeCoster, 2003; Penckofer et al, 2007; Peres et al., 2008), Travis (1997) did not. Thus the use of a qualitative approach was deemed appropriate to explore the existing gap in the literature.

Second, the IPA approach was thought to be the most appropriate approach to explore peoples' lived experiences. Thus, this research subscribed to the theoretical principles of IPA and explored in-depth the lived experiences of people with type 2 diabetes, making sense of their experiences from their own perspective and the researcher's perspective. It focused on the uniqueness of each participant's experience and how they all contributed to the understanding of negative emotions and poor dietary self-care. The researcher acquired knowledge and skill in the use of this method through training and mentoring.

Third, a fairly large sample size was interviewed to provide empirical data about participants' experiences. The aim was to gain depth (fewer participants but more detailed information) and not breadth (more participants but less detailed information; Yardley, 2000). Thus the researcher asked questions that allowed participants to share their experiences to provide empirical evidence. Interviews were transcribed verbatim to ensure that all experiences shared were captured.

Fourth, participants shared experiences which offered the researcher insight into their challenges with dietary self-care and helped the researcher to gain a better understanding of participants' experiences and make meaning of them. The systematic process used during data analysis makes this research coherence and plausible. The researcher was committed to engaging with the data, reading and re-reading each transcript before analysis, for in-depth understanding. Individual data were analysed systematically before all the data were pulled together to form a table of themes and quotes. Step by step data analysis was conducted and each step is reported, providing a paper trail (described in the methods section) to ensure transparency. This also provides the reader the opportunity to follow exactly how the analysis was conducted and for replication.

Finally, interpretation and understanding offered in this research is based on participants' experiential report (Reid, Flowers, & Larkin, 2005). The use of extracts from transcripts ensured that themes generated were grounded in data. The three super-ordinate themes derived were well represented with extracts from all the

participants which shed light on the phenomenon under study, indicating that interviews were well conducted. Each theme discussed is represented with quotes from more than half of the participants and where important, extracts from only one participant, considered significant, was used to summarise a complete theme (Smith, 2011b). This demonstrated not only the similarities in participants' lived experiences but also portrayed difference in their experience. Research conclusions were drawn based on the themes and supporting extracts.

### 2.4.6 Limitations and recommendations for future research

One study limitation is the ethnic composition of the participants tested, with the majority being White British (n=11). Although the Heartlands Diabetes Centre has a mixed ethnic population of British, Caribbean British, South Asians and Africans, this did not reflect in the sample studied. This was because most of the non-native English speakers who were approached felt hesitant in participating due to language barriers. Considering that dietary intake may vary from culture to culture (Peres et al., 2008), perhaps having a mixed ethnic population may have added further information to the present findings. Future studies could use a mixed ethnic sample. Nonetheless, the aim of qualitative research is not to generalise findings but rather to be able to infer from findings, and this study provides valuable information about a phenomenon that has not been the central focus of many studies.

The use of a relatively large sample size (thirteen) for this type of study prolonged the period of study as more time was spent analyzing each transcript in-depth. Yet, this provided unique and varied information from varied people. Also each transcript had

meaningful information which made it difficult to decide which extract to include in this report. Extracts which could not be included in the text were included in the appendices to avoid losing vital information. However, the large volume of data obtained did not permit for every participants extracts from the various themes to be included. It is recommended that where a large sample is used, the research should be conducted over an extended period.

### 2.4.7 Implications for clinical practice

Findings from this study highlight the significant difficulty that people with type 2 diabetes experience from maintaining good dietary self-care and the negative emotions associated with this. It provides insight into the possible cycle of poor dietary self-care and negative emotions. Early recognition of negative emotions is therefore important for timely intervention and prevention of long term complications from poor dietary self-care. There is the need to develop interventions that incorporate understanding of, and how to deal with negative emotions (from poor dietary self-care), as an essential component of efforts to achieve weight management and glycaemic control.

Previous research has demonstrated that although conventional diabetes treatment (medication intake, dieting and exercise) has proved to be effective, it does not address the emotional problems associated with dietary self-care, specifically diabetes distress and possible depression (Penckofer et al, 2007). Thus, incorporating the understanding of the experiences of negative emotions in dietary education is warranted. Discussing the impact of negative emotions with people and

how to deal with it can help them cope and prevent a cycle of negative emotions and poor dietary self-care. People with poor diabetes control can be screened during clinical reviews to identify (possible) negative emotions relating to poor dietary self-care. Those exhibiting high levels of negative emotions and poor coping behaviours may benefit from psychological intervention to prevent this from escalating into more serious psychological disorders and to help prevent poor glycaemic control and diabetes complications. Perhaps, assisting people to develop more positive cognitions (rational) beliefs to replace the negative ones (irrational) may help to eliminate negative emotions and reduce poor dietary self-care.

Perceived dietary restrictions are another source of negative emotions which also need to be addressed by healthcare professionals. People with type 2 diabetes could be helped to understand that they can have flexibility in their dietary intake, to avoid feeling overly restricted and deprived. Emphasis should be placed on the fact that they are likely to encounter challenges from following their recommended diet, and be educated on how to deal with this.

### 2.4.8 Conclusion

This is the first study that has focused on dietary self-care in a type 2 diabetes population, examining the context in which these negative emotions occur in a qualitative study. This study highlights the challenges that people with type 2 diabetes experience with dietary self-care and contributes to the understanding of negative emotions and dietary self-care. Three major sources of negative emotions were identified; perceived dietary restrictions, maintaining dietary self-care, and poor

dietary self-care. The study proposes a possible cycle of poor dietary self-care and negative emotions and suggests the need to break this cycle (where one exist) to maintain good dietary self-care and diabetes control. Healthcare professionals could assess people for negative emotions where necessary and educate and support them to deal with them. This current study provides grounds for further research on dietary-related negative emotions, to explore the possible role of rational and irrational beliefs (underlying negative emotions) in dietary intake.

# CHAPTER 3: BELIEFS RELATED TO DIETARY INTAKE IN TYPE 2 DIABETES: DEVELOPMENT AND VALIDATION OF A QUESTIONNAIRE


Abstract

The aim of this study was to develop and validate a questionnaire that measures rational and irrational beliefs related to food intake among people with type 2 diabetes. One hundred and thirteen people with type 2 diabetes completed the 18-item Food Intake and Beliefs Questionnaire (FIBQ) and other related measures to evaluate the reliability and validity of the FIBQ. Principal component analysis revealed a five-factor solution of three irrational belief subscales and two rational belief subscales which demonstrated acceptable internal consistency (except factor 5). Test re-test showed the irrational subscales had temporal reliability but the rational subscales did not. Significant positive relationships of the rational subscale (*desire for success*) with irrational beliefs scales (*desire for success, need for fairness* and *self-reproach*) suggested diabetes-related rational and irrational food beliefs were held concurrently. Also, positive associations of the rational and irrational beliefs scales with distress about dietary restrictions suggested that irrespective of beliefs held, participants felt restricted with their diet. Although the irrational subscales were valid diabetes-related belief measures, the Irrational Food Belief Scale appeared to be a better associated with diabetes self-care activities. In spite of this, the irrational subscales have the potential to be used as an assessment tool for healthcare professionals to explore people with type 2 diabetes' dietary beliefs, to inform diabetes-related dietary education, and improve dietary self-care.

## 3.1 Background

### 3.1.1 Assessing rational and irrational beliefs in dietary intake

Despite the benefits of a healthy diet for good diabetes control (ADA, 2012; CDC, 2011), people with type 2 diabetes often find it difficult to adhere to their recommended diet (Ary et al., 1986; Brown et al., 1998; El Kebbi et al., 1996; Hill-Briggs et al., 2003; Penckofer et al., 2007; Schlundt, Rea, Kline, & Pichert, 1994; Yannakoulia, 2006). As reported in Chapter 2, people with type 2 diabetes reported negative emotions (such as anger, depression, guilt and frustration) associated with dietary self-care with underlying irrational beliefs. This corroborated the REBT theory which purports that irrational beliefs underlie unhealthy negative emotions.

The REBT theory (Ellis, 1958, 1962) postulates that when faced with adversity, healthy or unhealthy emotional and behavioural responses are determined by the nature of beliefs held by the individual. Rational beliefs lead to healthy negative emotions, while irrational beliefs lead to unhealthy negative emotions (Dryden, 2009). On the basis of this hypothesis, people with type 2 diabetes holding rational beliefs about their diet are likely to experience emotions that are functional (e.g. sadness, concern, remorse). They are also more likely to be motivated to face up to their dietary problems, seek support and tolerate future challenges. However, those holding irrational beliefs are likely to feel emotions that are dysfunctional (e.g. depression, anxiety, guilt), and may withdraw and disengage from good dietary self-care. Thus, while rational beliefs may lead to accomplishing the goal of good dietary self-care, irrational beliefs may hinder good dietary self-care. If negative emotions with underlying irrational beliefs can be a barrier to dietary self-care then there is a

need for a measure that can assess the presence of dietary-related rational and irrational beliefs in people with type 2 diabetes.

While a number of measures based on Ellis's REBT model exist that assess rational and irrational beliefs (e.g. Christensen, Moran, & Weibe, 1999; Jones, 1968; Koopmans, Sanderman, Timmerman, & Emmelkamp, 1994; Lindner, Kirby, Wertheim, & Birch, 1999; Malouff & Schutte, 1986; Shorkey & Whitman, 1977), only one scale, the Irrational Food Belief Scale (IFBS; Osberg, Pollard, Aguayo, & MacDougall, 2008) assesses beliefs related to food intake. This scale purports to measure the construct "irrational food beliefs", based on Ellis' (1962) irrational beliefs, but the authors define this construct as "cognitively distorted and unhealthy attitudes and beliefs pertaining to food" (p. 25). Thus, items on this scale do not fully tap into the different categories of irrational beliefs but instead focuses more on unhealthy attitudes rather than beliefs. Also, this scale was developed and validated in the general population using female undergraduate students and may therefore not apply directly to people with diabetes who are advised to follow a lifelong diet.

Thus, there is currently no measure that specifically assesses rational and irrational beliefs related to food intake for people with type 2 diabetes. Therefore, the current study aims to develop and validate a new questionnaire, the Food Intake and Beliefs Questionnaire (FIBQ), that assesses rational and irrational beliefs related to food intake among people with type 2 diabetes. Primarily, it will test the reliability and validity of the FIBQ by assessing (1) the internal consistency and test re-test

reliability of the scale, (2) factor structure of the scale, (3) its construct validity and (4) whether it is a diabetes-related measure.

## 3.2 Method

### 3.2.1 Participants

*Inclusion/Exclusion criteria*

People aged ≥40 years (the typical age at which type 2 diabetes appears, Diabetes UK, 2012), diagnosed with type 2 diabetes mellitus participated in this study. Diagnosis of type 2 diabetes was ascertained by clinicians using WHO (2006) criteria (see Chapter 1). Participants were excluded if they (1) had recent (< 6 months) major changes in the treatment of their diabetes (e.g. transfer to insulin or additional injection of insulin), (2) had other major co-morbidities (e.g. cancer, chronic pain, end-stage renal disease), (3) were on medications that suppressed hunger, (4) had other medical conditions (e.g. food allergies) which could influence appetite, or (5) had emotional problems or a traumatic experience in the past six months (e.g. death of a loved one, accidents, diagnosis of a terminal illness etc.). The convenient sampling method was used to obtain participants.

Participants were recruited from the Endocrinology and Diabetes Centre of the Birmingham Heartlands Hospital and Selly Oak Hospital. Of the 216 participants approached, 184 (85%) agreed to participate. Reasons for non-participation were illness (n=7), family commitment (n=3) and lack of interest in the study (n=22). One hundred and thirteen (61%) participants returned completed questionnaires, while 71 participants did not return the questionnaires despite three follow up phone calls

made by the researcher. Participants gave written informed consent (see Appendix 19) to participate in the study which was approved by the West Midlands Research Ethics Committee, Birmingham, UK (see Appendices 20 to 22).

*Participants' demographic and clinical characteristics*

Demographic and clinical characteristics of participants and non-participants were compared (see Table 3.1) and no differences were observed in their age, sex and ethnicity. However, differences were observed in HbA1c with non-participants having poorer diabetes control. The two groups also differed in their type of diabetes treatment. Participants were more likely to be on insulin with oral medication or oral medication only for treatment, compared to non-participants. It should be noted however that for non-participants, information for diabetes treatment and diabetes control could be obtained for only 61 and 67 respectively.

The median age of participants was 65.0 (*IQR* = 15.0) years and the majority were white British (89.4%). More than half of them were not in employment (mostly retired, 57.5%) and about one quarter lived alone (24.8%). Participants' median duration of diabetes was 12.0 (*IQR* = 12.0) years with half of them receiving insulin with oral medication. Many of them indicated not maintaining a recommended diet and on average, participants were obese but had fairly well controlled diabetes. More than half (54.9%) of the participants reported diabetes-related complications (retinopathy, neuropathy, nephropathy, hypertension and heart disease) and many (66.4%) had other co-morbid chronic medical conditions (mostly high cholesterol, osteoarthritis, rheumatoid arthritis and asthma).

Table 3.1

*Demographic and clinical characteristics of participants (n=113) and non-participants (n=103).*

| Variables | Participants *N* =113(%) | Non-participants *N* = 103(%) | Chi-Square/ Mann-Whitney U Test |
|---|---|---|---|
| *Age, Median (IQR*)* | 65.0 (15.0) | 63.5 (20.0) | *U=3651, z=-.07, p=.95* |
| *Sex (n)* | 113 | 103 | $\chi^2(1) = 0.68$, *p*=.41 |
| Men | 64 (56.6) | 64 (62.1) | |
| Women | 49 (43.4) | 39 (37.9) | |
| *Ethnicity (n)* | 113 | 103 | $\chi^2$ (1) =3.31, *p*=.07 |
| White British | 101 (89.4) | 83 (80.6) | |
| Non-white British | 12 (10.7) | 20 (19.4) | |
| *Marital status* | | | |
| Married/ Partner | 84 (74.3) | [b] | |
| Living alone | 28 (24.8) | [b] | |
| *Diabetes Treatment (n)* | 113 | [a]61 | $\chi^2$ (5) = 8.89, *p*=.03 |
| Diet only | 4 (3.5) | 0 | |
| Oral Medication | 42 (37.2) | 36 (35.0) | |
| Insulin | 16 (14.2) | 6 (5.8) | |
| Insulin + Oral medication | 51 (45.1) | 19 (18.4) | |
| *BMI, Median (IQR*)kg/m$^2$* | 31.0 (7.6) | 31.8 (7.5) | *U=2692, z=-.41, p=.68* |
| *HbA1c, Mean (SD)%* | 7.8 (1.2) | 8.4 (2.0) | *t(172)=-2.23, p=.03* |
| *Employment* | | | |
| Employed | 36 (31.9) | [b] | |
| Retired | 65 (57.5) | [b] | |
| Unemployed | 12 (10.6) | [b] | |
| *Diabetes Duration (years) Median (IQR*)* | 12.0 (12.0) | [b] | |
| *Maintaining a diet* | 22 (19.5) | [b] | |
| *Diabetes complications* | 62 (54.9) | [b] | |
| One complication | 39 (34.5) | [b] | |
| Two or more | 23 (20.4) | [b] | |
| None | 51 (45.1) | [b] | |
| *Other co-morbid medical conditions* | 75 (66.4) | [b] | |

[b]unavailable data [a] data could only be obtained for this number *interquaurtile range

### 3.2.2 Materials

*Measures*

*Development of the Food Intake and Beliefs Questionnaire (FIBQ)*

Using the REBT theory (Ellis, 1958, 1962) as a theoretical model, a questionnaire was developed to assess rational and irrational beliefs related to food intake among people with type 2 diabetes. The content of the items was based on beliefs associated with negative emotions reported by participants in Chapter 2. Irrational belief items were first constructed and then their corresponding rational belief items. From an initial set of 51 items, 30 items were selected following discussions in the supervisory team that included an expert in REBT.

These 30 items (Appendix 23) were then pilot tested for comprehensibility in a sample of 33 people with type 2 diabetes from the Endocrinology and Diabetes Centre of the Birmingham Heartlands, (n=27) and Selly Oak Hospital (n=6). Participants had characteristics as follows: mean age 63.1 (*SD* = 2.0) years, diabetes duration 12.4 (*SD* = 1.2) years, BMI 32.1 (*SD* = 1.2) kg/m$^2$ and HbA1c 8.1 (*SD* = 0.3)%. Based on feedback received, a final questionnaire of 18 items (12 irrational and 6 rational beliefs items with Cronbach's alpha = .80 and .70, respectively) scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was devised (Appendix 24).

*Validity measures*

The following measures were used to assess the validity of the FIBQ:

*Food attitude scale.* The Irrational Food Belief Scale (IFBS; Osberg et al., 2008) assesses cognitive distortions and unhealthy attitudes and beliefs related to food (Appendix 25). Participants rated the 57-item questionnaire on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). The IFBS comprises two subscales measuring irrational (41 items) and rational (16 items) food beliefs with a higher score on each subscale indicating more irrational or rational food beliefs, respectively. Internal consistency for the subscale is good (irrational = .89, rational = .70. In the present study, Cronbach's alpha was .93 for the irrational subscale and .67 for the rational subscale.

*Beliefs scale.* Rational and irrational beliefs were assessed using the Shortened General Attitude Belief Scale (SGABS*;* Lindner et al., 1999) which comprises one rational subscale and six irrational subscales (need for comfort, need for achievement, need for approval, demand for fairness, self-downing and other-downing) (Appendix 26). Participants rated responses on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Total scores on each subscale range from 4 to 20 except the subscales other-downing and need for approval which range from 3 to 15. Higher scores on each irrational subscale indicate irrational thinking in relation to that subscale while higher scores on the rational subscale indicates rational thinking. The subscales have a moderate to high (.65 to .87) test-retest reliability (Lindner, et al., 1999). In the present study,

Cronbach's alpha for the irrational subscales were high (α =.75 to .89) except need for approval and other-downing (α =.57 and .45, respectively) and also the rational subscale (.55). Need for approval, other-downing and rational subscales were therefore not used in the present study due to their low internal consistency.

*Eating Behaviour.* The Dutch Eating Behaviour Questionnaire (DEBQ; van Strien, Frijters, Bergers, & Defares, 1986) was used to assess eating behaviour styles (Appendix 27). Three subscales measure the extent to which people use emotional (13 items), restrained (10 items) and external (10 items) eating styles, which are rated on a 5-point Likert scale ranging from 1 (never) to 5 (very often). The restraint eating subscale measures inhibited eating, while the emotional and external eating subscales measure disinhibited eating. Total scores on the external and restraint subscales range from 10 to 50, and emotional eating subscale, from 13 to 65, with higher scores indicating high levels of external, restraint or emotional eating. The DEBQ has shown a high internal consistency, factorial validity and Pearson and item-total correlation co-efficient (see van Strien et al., 1986). Cronbach's alphas in the present study were .95, .89, and .80 for emotional, restrained and external subscales, respectively.

*Diabetes self-care activities.* The Summary of Diabetes Self−Care Activity Scale *(*SDSCA; Toobert & Glasgow, 1994) was used to assess diabetes self-care activities. It assesses four areas of diabetes self−care (diet, exercise, blood glucose monitoring and medication intake) over a retrospective 7−day period, using a 7-point rating scale for exercise and a 4-point and 5-point scale for the other subscales. The average

inter-item correlation within these scales is high (mean = .49) except for the diet specific scale which is moderate (mean = .40) (Toobert et al., 2000, see Appendix 5). Cronbach's alpha in the present study was, diet = .69, exercise = .83, blood glucose monitoring = .75 and medication intake= .65.

*Dietary self-efficacy.* The Diabetes Self-Efficacy Scale (DSE; Senécal, Nouwen, & White, 2000) was used to assess self-efficacy in dietary self-care (see Appendix 28). This 30-item scale assesses common barriers to dietary self-care that cover situations such as temptations, negative mood and uncontrollable situations. It is scored on a scale of 0 ("I am not confident at all that I can follow the dietary plan") to 100 ("I am completely confident that I can follow the dietary plan") and has Cronbach's alpha of .94. In the present study Cronbach's alpha was .98.

*Well-being*. The WHO-5 Well-Being Index (WHO-5; Bech, 2004) was used to assess psychological well-being (see Appendix 29). This 5-item questionnaire relates to positive mood, vitality and general interest, rated on a 6-point Likert scale from 0 (at no time) to 5 (all of the time). A total score of 0 indicates the 'worst possible quality of life' while 25 indicates the 'best possible quality of life'. Internal consistency of this scale ranges from .84 to .90, (Shea, Skovlund, Bech, Kalo, & Home, 2003) and Cronbach's alpha in the present study was .88.

*Dietary restrictions.* The diet restrictions subscale of the Diabetes Specific Quality of Life Scale (DSQOL; Bott, Muhlhauser, Overmann, & Berger, 1998) was used to assess diet-related restrictions that cause distress (see Appendix 30). It has 8 items

scored on a 6-point Likert scale ranging from 0 (do not agree at all) to 5 (very strongly agree) and high scores indicate increased distress about dietary restriction. It demonstrates good internal consistency (α=.71) and Cronbach's alpha in the present study was .86.

Demographic and clinical information including age, sex, employment status, level of education, ethnicity, marital status, duration of diabetes and diabetes treatment were collected using a self-report questionnaire (see Appendix 31). Other information regarding co-morbid conditions, diabetes-related complications, height (cm) and weight (kg), and the most recent HbA1c measure (%) were also obtained from participants' medical records.

### 3.2.3 Procedure

*Recruitment and questionnaire administration*

The recruitment procedure was identical at both Birmingham Heartlands Hospital (n= 100) and Selly Oak Hospital (n= 13). During out-patient clinics nurses identified patients with type 2 diabetes who were interviewed by the researcher to ascertain their eligibility to participate. The study was explained to eligible persons who received the Patient Information Sheet (Appendix 32) and signed the 'consent to contact' form (Appendix 33). Those who agreed to participate signed consent forms and received questionnaire packs to complete and mail back to the researcher using an enclosed self-addressed envelope. Participants whose questionnaires were received within two weeks after initial completion of the questionnaire were contacted to complete the FIBQ again over the telephone. The use of phone survey was to

ensure that participants were retested exactly two weeks after their initial testing. Test-retest data was obtained from 50 participants.

### 3.2.4 Data analysis

Data was analysed using the IBM SPSS Statistics, version 19 software. Principal component analysis with varimax rotation was computed for the FIBQ items to assess their factor structure, while Cronbach's coefficient alpha was calculated to assess the internal consistency of the factors revealed. Test-retest was established by using intraclass correlation co-efficient, while convergent and discriminant validation was tested by correlating the FIBQ with the other validated questionnaire measures. Spearman correlations coefficients were based on list-wise deletion resulting in sample size ranging 104 to 112. Multiple regression analyses were also used to establish whether the FIBQ performs better than existing measures of rational and irrational beliefs in a sample of people with type 2 diabetes.

## 3.3. Results

### 3.3.1 Factor Analysis of the FIBQ

Bartlett's test of sphericity, $\chi^2(153) = 635.46)$, $p<0.0001$ indicated significant relationships among the 18 variables included in the analysis. The Kaiser-Meyer-Olkin (KMO) value was 0.73, indicating an adequate sample size for conducting factor analysis. Five factors were revealed (see Table 3.2) based on analysis of eigenvalues > 1.0 and the scree plot of eigenvalues. These five factors accounted for 62% of the variance (see Table 3.3).

The first factor has six items and related to demand for successful dietary intake. Factor 2 included three items, which related to desire for successful dietary intake, while factor 3 had two items related to self-downing (a negative and global rating of self when a demand is not meet, Dryden, 2006). Factor 4 had two items related to need for fairness and factor 5 had two items related to tolerance with failures of dietary intake. Three items did not load on any of the three factors and therefore were discarded (Q 4, Q 7 and Q 10). Based on their content, these five factors are hereafter referred to as factor 1, *demand for success* beliefs*,* factor 2, d*esire for success* beliefs, factor 3, *self-reproach* beliefs, factor 4, *need for fairness* beliefs, and factor 5, *high tolerance* beliefs. Three factors (*demand for success, self-reproach* and *need for fairness*) had irrational belief items (irrational belief subscales) while the other two (*desire for success* and *high tolerance*) had rational belief items (rational belief subscales).

Table 3.2
*Factor loadings of the FIBQ after rotation*

| Items | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| *Factor 1 'Demand for success'* | | | | | |
| 1. I must not eat anything that will increase my blood sugar level. | **.743** | .011 | -.061 | .037 | -.134 |
| 5. I must not eat anything that will increase my weight. | **.750** | .034 | .160 | .281 | .021 |
| 8. I must get my diet right all the time if not my diabetes control will be a disaster. | **.675** | .150 | .182 | .000 | -.184 |
| 9. I must always resist foods that can affect my diabetes. | **.761** | .191 | .072 | .011 | -.073 |
| 11. I must always have the willpower to resist foods that can affect my diabetes. | **.751** | .171 | .111 | -.073 | .222 |
| 17. I must always stick to my diet if not, it would be awful. | **.606** | .211 | .401 | .140 | -.096 |
| *Factor 2 'Desire for success'* | | | | | |
| 13. I would prefer to avoid foods that will increase my blood sugar level. | .354 | **.519** | -.130 | -.232 | .111 |
| 15. I would prefer to be able to resist foods that can affect my diabetes. | .202 | **.827** | -.016 | .221 | .113 |
| 18. I would really love to have the willpower to resist foods that can affect my diabetes. | .111 | **.797** | .173 | .140 | .059 |
| *Factor 3 'Self reproach* | | | | | |
| 3. Whenever I mess up with my diet, it just proves I am useless. | .253 | -.165 | **.766** | -.098 | .111 |
| 16. Eating foods that I really should not, proves what a weak person I truly am. | .119 | .124 | **.755** | .225 | -.034 |
| *Factor 4 'Need for fairness'* | | | | | |
| 12. It is not fair that I have to diet for the rest of my life. | .055 | .284 | .336 | **.624** | -.095 |
| 14. I must lose weight because I am dieting, it is not fair that I am not losing weight. | .175 | .264 | .037 | **.747** | -.076 |
| *Factor 5 'High tolerance'* | | | | | |
| 2. If I do not get my diet right all the time, it does not mean my diabetes control is a disaster. | -.002 | .022 | .002 | -.008 | **.808** |
| 6. If I do not get my diet right, it does not mean I am useless. | -.216 | .125 | .027 | -.075 | **.806** |

Table 3.3
*Eigenvalue and variances of factor structure*

| Factors | Eigenvalues | Percentage of variance | Cumulative variance |
|---|---|---|---|
| Factor 1 | 4.68 | 26.02 | 26.02 |
| Factor 2 | 2.25 | 12.51 | 38.54 |
| Factor 3 | 1.87 | 10.36 | 48.90 |
| Factor 4 | 1.37 | 7.60 | 56.49 |
| Factor 5 | 1.05 | 5.82 | 62.31 |

### 3.3.2 Reliability of the FIBQ

*Internal consistency*

Cronbach's alpha coefficient for subscales *demand for success*, *self-reproach* and *need for fairness* were .84, .60, and .62, respectively, indicating an acceptable to high coherence of items within the subscales. Cronbach's alpha for *desire for success* and *high tolerance* were .70 and .56, respectively, indicating moderate coherence of items for '*desire for success*' and lower coherence for *high tolerance*. The *high tolerance* rational subscale was therefore dropped from further analysis due to its low internal consistency.

*Test –retest reliability*

Intraclass correlation co-efficient (ICC) was used instead of Pearson correlation, to assess test-retest reliability. The aim was to measure agreement between the two scores of FIBQ at $T_1$ (initial testing) and $T_2$ (retest) rather than measuring how $T_1$ measures will respond when $T_2$ measures change (Broglio, Ferrara, Macciocchi, & Baugarter, 2007) as is the case with Pearson correlation (Bland & Altman, 1986). Intraclass estimate of test-retest reliability of the FIBQ over a two-week period revealed moderate to good values (Anastasi, 1998; Streiner & Norman, 1995) for the

irrational subscales (see Table 3.4), indicating temporal reliability over time but ICC values for the rational subscale was marginal (Fleiss, 1986).

Table 3.4
*Intraclass correlations for test-retest reliability of the FIBQ rational and irrational subscales*

| Factors | [a]ICC (95% CI)* |
|---|---|
| *Irrational Subscale* | |
| Demand for success beliefs | .81 (0.66, 0.89) |
| Self reproach beliefs | .76 (0.58, 0.86) |
| Need for fairness beliefs | .62 (0.33, 0.78) |
| *Rational Subscale* | |
| Desire for success belief | .42 (-0.03, 0.67) |

[a] ICC= Interclass correlation

* 95% CI = 95 % Confidence interval

### 3.3.3 Validity of the FIBQ

Construct validity assessed the extent to which the FIBQ measured rational and irrational beliefs as purported. Convergent validity was assessed by intercorrelating the FIBQ subscales and also correlating them with other measures, such as beliefs scales, dietary related scales and diabetes control that the FIBQ should theoretically be similar to. Discriminant validity examined the degree of divergence from other measures such as glucose monitoring, medication intake and exercising that the FIBQ should theoretically differ from.

*Intercorrelations between the FIBQ rational and irrational subscales*

Correlations coefficients demonstrated that all the irrational subscales and also the rational subscale were significantly positively intercorrelated (except *self reproach* and *desire for success*; see Table 3.5), indicating that increased irrational beliefs about dietary intake relate to endorsing more rational beliefs about dietary intake.

Table 3.5
*Means (SD) and intercorrelations between FIBQ rational and irrational subscales*

| FIBQ Subscales | Mean | *SD* | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|
| 1- Demand for success belief | 2.89 | 0.82 | _ | | | |
| 2- Self reproach belief | 2.11 | 0.89 | .40** | _ | | |
| 3- Need for fairness belief | 2.88 | 0.90 | .31** | .29** | _ | |
| 4- Desire for success belief | 3.79 | 0.70 | .42** | .13 | .31** | _ |

* $p<.05$
** $p<.01$

*Convergent and discriminant validity of FIBQ subscales*

The aim of the present study was to develop a dietary-related beliefs scale specifically for people with type 2 diabetes. To establish convergent and discriminant validity, the FIBQ, subscales were correlated with other beliefs measures (SGABS and IFBS), food-related measures (DEBQ, DSE and BMI), diabetes-related measures (HbA1c, DSCA- diet, exercise, medication intake and blood glucose monitoring) and wellbeing (WHO-5).

*Convergent validity*

*Correlations of FIBQ subscales with the other belief scales*

All three FIBQ irrational subscales were significantly positively associated with all/ most of the SGABS irrational subscale and also with the IFBS irrational subscale confirming convergent validity (see Table 3.6). The results indicated that increased *demand for successful* dietary intake, increased *self-reproach* about dietary failures and increased *need for fairness* about dietary intake were related to endorsing more general irrational beliefs and more irrational food-related beliefs. Increased *self-reproach* about dietary failures (but not *demand for success* or *need for fairness*) was also related to endorsing less rational food-related beliefs (IFBS).

The FIBQ *desire for success* rational subscale was significantly positively associated with the IFBS rational subscales and the SGABS need for comfort and demand for fairness, indicating that increased desire for successful dietary intake related to endorsing more rational food-related beliefs but also greater need for comfort and *need for fairness* irrational beliefs (see Table 3.6).

Table 3.6

*Correlations testing validity of the FIBQ subscales with belief scales (N=112)*

| Measures | Mean | *SD* | FIBQ Irrational subscales | | | FIBQ Rational subscale |
|---|---|---|---|---|---|---|
| | | | Demand for success | Self reproach | Need for fairness | Desire for success |
| *SGABS Subscales* | | | | | | |
| SGABS need for achievement | 2.51 | 0.70 | .47** | .41** | .25** | .13 |
| SGABS need for comfort | 3.19 | 0.83 | .30** | .23* | .30** | .30** |
| SGABS demand for fairness | 3.30 | 0.79 | .21* | .07 | .17 | .35** |
| SGABS self downing | 1.87 | 0.57 | .28** | .61** | .18 | -.02 |
| *IFBS Subscales* | | | | | | |
| IFBS rational | 2.93 | 0.24 | .01 | - .30** | .04 | .22* |
| IFBS irrational | 1.99 | 0.33 | .31** | .52** | .28** | .12 |

* $p<.05$

** $p<.01$

*Correlations of FIBQ subscales with food-related measures*

*Demand for success* was unrelated to eating behaviour styles (DEBQ), but more *self-reproach* about dietary failures was associated with increased external eating, while more *need for fairness* was positively associated with increased external and emotional eating (see Table 3.7). *Desire for success* and emotional eating was also significantly positively associated. All three irrational subscales were significantly negatively associated with dietary self-efficacy (DSE) indicating that increased *demand for successful* dietary intake, increased *self-reproach* about dietary failures and increased *need for fairness* about dietary intake were associated with lower dietary self efficacy, confirming convergent validity. None of the FIBQ subscales were significantly related to BMI.

Table 3.7

*Correlations testing validity of the FIBQ subscales with food-related measures (N=105)*

| Measures | Mean | *SD* | FIBQ Irrational subscales | | | FIBQ Rational subscale |
|---|---|---|---|---|---|---|
| | | | Demand for success | Self reproach | Need for fairness | Desire for success |
| *DEBQ Subscales* | | | | | | |
| DEBQ external eating | 2.42 | 0.56 | .09 | .20* | .31* | .16 |
| DEBQ restraint eating | 2.68 | 0.83 | .18 | - .04 | .07 | .06 |
| DEBQ emotional eating | 1.73 | 0.80 | .16 | .18 | .29* | .24* |
| DSE | 64.81 | 20.27 | - .21* | - .32** | - .26** | -.11 |
| BMI (*kg/m$^2$*) | 32.2 | 6.0 | .15 | - .01 | .10 | .06 |

* $p<.05$

** $p<.01$

*Correlations of FIBQ subscales with diabetes-related measures*

All four FIBQ subscales had significantly positive associations with distress about dietary restrictions (DSQOL diet). Increased *demand for success*ful dietary intake, increased *self-reproach* and increased *need for fairness* were significantly associated with more distress about dietary restrictions, confirming convergent validity (see Table 3.8). *Desire for success* was also significantly positively associated with more distress about dietary restrictions. Increased *self-reproach* about dietary failures was associated with poorer dietary self-care activities (DSCA diet), while increased *need for fairness* was associated with poorer dietary self-care activities and poorer diabetes control (HbA1c).

*Divergent validity*

None of the four FIBQ subscales were related to exercise activities (DCSA exercise), self-monitoring of blood glucose (DCSA glucose monitoring) and medication intake (DSCA medication), confirming discriminant validity.

Table 3.8

*Correlations testing validity of the FIBQ subscales with diabetes-related measures (N=104)*

| Measures | Mean | *SD* | Irrational subscales | | | Rational subscale |
|---|---|---|---|---|---|---|
| | | | Demand for success | Self reproach | Need for fairness | Desire for success |
| DSQOL diet | 3.13 | 1.05 | .27** | .23* | .34** | .35** |
| *DSCA Subscales* | | | | | | |
| DSCA diet | 50.00 | 6.67 | - .14 | -.35** | - .20** | -.04 |
| DSCA exercise | 50.08 | 8.94 | .08 | .001 | - .04 | .13 |
| DSCA glucose monitoring | 49.99 | 7.77 | -.01 | -.15 | .05 | .06 |
| [a]DSCA medication | 50.00 | 8.67 | -.08 | -.03 | - .003 | .14 |
| WHO-5 | 2.79 | 1.15 | .02 | .03 | - .16 | -.17 |
| HbA1c (%) | 7.8 | 1.2 | .07 | .19 | .20* | - .00 |

* $p<.05$

** $p<.01$

[a] DSCA medication- only 99 participant were on medication

*Comparison of FIBQ with other belief measures*

The FIBQ, the SGABS and IFBS were entered into a series of hierarchical regression models to determine whether the diabetes-related food beliefs subscales (FIBQ) better predicted dietary distress, dietary self-care activities and diabetes control. For all models, general irrational beliefs (SGABS subscales) were entered at the first step of the model, food-related beliefs (IFBS subscales) were entered at step 2, and step 3 included the diabetes-related food beliefs (FIBQ subscales).

*Hierarchical multiple regression to predict distress about dietary restrictions (DSQOL diet)*

Results in Table 3.9 indicated that after controlling for general irrational beliefs, which explained 18% of the variance, entering food-related beliefs (step 2) explained an additional 4% of the variance in dietary distress, adjusted $R^2$ = .22, $F(2,105) = 3.91$, $p$ = .02. The addition of diabetes-related food beliefs (step 3) explained a further 5% of the variance in dietary distress over and above general irrational beliefs and food-related beliefs. Together, all the predictors explained a total of 27% of the variance in distress about dietary restrictions, adjusted $R^2$ = .27, $F(4,101) = 3.02$, $p$ =. 02. The predictor variables, SGABS need for comfort (β = .31, $p$ = .01), IFBS irrational food-related beliefs (β = .21, $p$ = .04) and FIBQ *desire for success*, (β = .27, $p$ = .01) contributed significantly to the variance in distress about dietary restrictions.

Table 3.9

*Multiple regression to predict distress about dietary restrictions (DSQOL diet)*

| Predictors | B | SE B | β | Adj $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|
| Step 1 | | | | .18 | .21*** |
| (Constant) | 1.27 | .50 | | | |
| SGABS need for achievement | .29 | .16 | .19 | | |
| SGABS need for comfort | .47 | .15 | .37** | | |
| SGABS demand for fairness | -.19 | .15 | -.14 | | |
| SGABS self downing | .13 | .18 | .07 | | |
| Step 2 | | | | .22 | .06* |
| (Constant) | 1.60 | 1.36 | | | |
| SGABS need for achievement | .31 | .16 | .20 | | |
| SGABS need for comfort | .44 | .15 | .34** | | |
| SGABS demand for fairness | -.14 | .15 | -.10 | | |
| SGABS self downing | -.16 | .20 | -.09 | | |
| IFBS rational | -.48 | .41 | -.11 | | |
| IFBS irrational | .77 | .30 | .24 | | |
| Step 3 | | | | .27 | .08* |
| (Constant) | 1.19 | 1.33 | | | |
| SGABS need for achievement | .35 | .17 | .23* | | |
| SGABS need for comfort | .39 | .14 | .31** | | |
| SGABS demand for fairness | -.23 | .15 | -.17 | | |
| SGABS self downing | -.10 | .21 | -.05 | | |
| IFBS rational | -.71 | .41 | -.17 | | |
| IFBS irrational | .67 | .32 | .21* | | |
| Demand for success | -.11 | .13 | -.09 | | |
| Self reproach | .16 | .11 | .14 | | |
| Need for fairness | -.08 | .13 | -.07 | | |
| Desire for success | .41 | .15 | .27** | | |

* $p<.05$
** $p<.01$
*** $p<.001$

*Comparison of FIBQ with dietary self-care activities (DSCA diet)*

After controlling for general irrational beliefs (step 1), which explained 10% of the variance in dietary self-care, entering food-related beliefs (step 2) in the model explained an additional 9% of the variance in dietary self-care activities, adjusted $R^2$ = .19, $F(2,104) = 6.87$, $p = .002$. Entering diabetes-related food beliefs (step 3) did not add significantly to explaining the variance in dietary self-care activities (see Table 3.10). Overall, all the predictors explained a total of 18% of the variance in dietary self-care activities, adjusted $R^2$ = .18, $F(4,100) = .67$, $p = .61$. The predictor variables IFBS rational food-related beliefs ($\beta = .20$, $p = .054$) and IFBS irrational food-related beliefs ($\beta = -.25$, $p = .02$) contributed significantly to the variance in dietary self-care activities.

Table 3.10
*Multiple regression to predict dietary self-care activities (DSCA diet)*

| Predictors | B | SE B | β | Adj $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|
| Step 1 | | | | .10 | .13** |
| (Constant) | 4.15 | .29 | | | |
| SGABS need for achievement | -.03 | .09 | -.03 | | |
| SGABS need for comfort | -.12 | .09 | -.18 | | |
| SGABS demand for fairness | .12 | .09 | .17 | | |
| SGABS self downing | -.28 | .10 | -.28** | | |
| Step 2 | | | | .19 | .10** |
| (Constant) | 3.45 | .76 | | | |
| SGABS need for achievement | -.03 | .09 | -.04 | | |
| SGABS need for comfort | -.10 | .08 | -.15 | | |
| SGABS demand for fairness | .07 | .08 | .10 | | |
| SGABS self downing | -.07 | .11 | -.07 | | |
| IFBS rational | .47 | .23 | .21* | | |
| IFBS irrational | -.51 | .17 | -.30** | | |
| Step 3 | | | | .18 | .02 |
| (Constant) | 3.52 | .77 | | | |
| SGABS need for achievement | -.03 | .10 | -.04 | | |
| SGABS need for comfort | -.09 | .08 | -.13 | | |
| SGABS demand for fairness | .08 | .09 | .101 | | |
| SGABS self downing | -.04 | .12 | -.04 | | |
| IFBS rational | .46 | .24 | .20* | | |
| IFBS irrational | -.43 | .19 | -.25* | | |
| Demand for success | .06 | .08 | .09 | | |
| Self reproach | -.06 | .06 | -.09 | | |
| Need for fairness | -.08 | .08 | -.12 | | |
| Desire for success | -.04 | .09 | -.05 | | |

* $p<.05$
** $p<.01$

*Comparison of FIBQ with diabetes control (HbA1c)*

Results predicting diabetes control showed that general irrational beliefs did not significantly predict diabetes control but entering food-related beliefs (step 2) in the model explained 6% of the variance in diabetes control, adjusted $R^2$ = .04, F(2,99) = 4.53, *p* = .01 (see Table 3.11). Entering diabetes-related food beliefs in the model (step 3) did not add significantly to explaining the variance in dietary self-care activities. Overall, all the predictors explained a total of 4% of the variance in dietary self-care activities, adjusted $R^2$ = .04, *F*(4,95) = .88, *p* = .48. The predictor variable IFBS irrational food-related beliefs (β = .29, *p* = .02) contributed significantly to the variance in diabetes control.

Table 3.11
*Multiple regression to predict diabetes control (HbA1c)*

| Predictors | B | SE B | β | Adj $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|
| Step 1 | | | | | |
| (Constant) | 7.53 | .67 | | -.02 | .02 |
| SGABS need for achievement | .19 | .22 | .06 | | |
| SGABS need for comfort | -.08 | .21 | -.05 | | |
| SGABS demand for fairness | -.05 | .20 | -.03 | | |
| SGABS self downing | .21 | .25 | .10 | | |
| Step 2 | | | | | |
| (Constant) | 5.80 | 1.89 | | .04 | .08* |
| SGABS need for achievement | .15 | .21 | .08 | | |
| SGABS need for comfort | -.15 | .20 | -.10 | | |
| SGABS demand for fairness | -.04 | .20 | -.03 | | |
| SGABS self downing | -.12 | .27 | -.06 | | |
| IFBS rational | .02 | .57 | .004 | | |
| IFBS irrational | 1.21 | .40 | .33** | | |
| Step 3 | | | | | |
| (Constant) | 5.77 | 1.91 | | .04 | .03 |
| SGABS need for achievement | .13 | .23 | .07 | | |
| SGABS need for comfort | -.21 | .20 | -.14 | | |
| SGABS demand for fairness | .02 | .21 | .02 | | |
| SGABS self downing | -.12 | .29 | -.06 | | |
| IFBS rational | .11 | .59 | .02 | | |
| IFBS irrational | 1.06 | .45 | .29* | | |
| Demand for success | .031 | .19 | .02 | | |
| Self reproach | .28 | .15 | .20 | | |
| Need for fairness | -.03 | .18 | -.02 | | |
| Desire for success | -.20 | .22 | -.11 | | |

* $p<.05$
** $p<.01$

## 3.4 Discussion and conclusion

### 3.4.1 Overview

The development of the FIBQ yielded four subscales (three irrational and one rational subscale) reflecting different categories of REBT rational and irrational beliefs. The FIBQ irrational subscales were more reliable and valid measures than the rational subscale. However, the positive association between the FIBQ rational and irrational subscales and also their positive association with distress about dietary restrictions suggested that people with type 2 diabetes held rational and irrational dietary-related beliefs concurrently. It also suggested that people felt distressed about dietary restrictions irrespective of the beliefs they held. Irrational belief subscales were valid measures of general irrational beliefs, food-related beliefs and diabetes-related measures, as a result of their associations with these measures. Discriminant validity was confirmed for all four FIBQ subscales. Assessing the FIBQ as a diabetes-related measure suggested that although the rational subscale, *desire for success*, was better at predicting distress about dietary restrictions. Overall, the FIBQ irrational subscales may be a useful food-related beliefs measure for use by healthcare professionals.

### 3.4.2 Factor structure and reliability of the FIBQ

The FIBQ irrational subscales reflected demand beliefs (rigid and extreme, Dryden, 2006) about dietary intake and diabetes control, depreciation belief (Dryden, 2006) related to self-downing regarding poor dietary self-care, low frustration tolerance beliefs (Dryden, 2006) and preference beliefs (flexible ideas) about successful dietary intake. The REBT theory (Ellis, 1994) identifies different categories of rational

(preference anti-awfulising beliefs, high frustration tolerance, self, other and life acceptance belief) and irrational (demand, awfulising, low frustration tolerance, self, other and life depreciation) beliefs and the present subscales reflect these different categories of beliefs. However, the present study did not have a sample large enough to perform confirmatory factor analysis to determine whether the factor structure reported in the present study represented multi dimensionality of rational and irrational beliefs. Further studies are warranted in this light.

Internal consistency of the irrational subscales suggested acceptable (for the *self reproach* and *need for fairness* subscales) to high coherence (*demand for success* subscale), while that for the rational subscale (*desire for success* subscale) was moderate. Intraclass correlation test-retest reliability measuring the agreement between scores on $T_1$ (initial testing) and $T_2$ (two week afterwards) suggested that estimate values of the irrational subscales were acceptable while the value for the rational subscale was only marginal. Intraclass correlation co-efficient recommended for interpreting ICC estimate values are varied (Anastasi, 1998; Fleiss, 1986; Streiner & Norman, 1995). Intraclass correlation coefficients of .60 have been recommended as the minimum acceptable value (Anastasi, 1998), .40 to 75 as “fair to good” (Fleiss, 1986) and values > .75 as indicating good reliability (Streiner & Norman, 1995). Values < .75 have been deemed to have moderate to poor reliability for scales used in health research (Portney & Waltkin, 1993). Thus, the irrational subscales *demand for success* and *self-reproach* can be considered to have good reliability while *need for fairness* has moderate reliability (over a two week period). However, the *desire for success* rational subscale was only marginally reliable.

### 3.4.3 Validity of the FIBQ subscales

Intercorrelation of the FIBQ subscales showed that increased diabetes-related irrational food beliefs were related to increased rational beliefs (with the exception of *desire for success* and self-reproach), suggesting that participants held rational and irrational food beliefs concurrently. The FIBQ *desire for success* subscale was also positively linked to the SGABS need for comfort and demand for fairness, as well as the IFBS rational subscale. This also confirmed that participants held concurrent rational and irrational food-related beliefs (MacInnes, 2004). These findings contradict two reports of a negative association between irrational and rational belief subscales (Bernard, 1998; Osberg et al., 2008). However, it corroborates Ellis' assertion that irrational and rational beliefs are distinct constructs, not at opposing ends of a continuum (Bernard, 2009), possibly explaining their co-existence in the present study.

While irrational beliefs may be reported in the general population (Bernard, 1998; Jáuregui-Lobera & Bolaños-Rios, 2011; Osberg et al., 2008) and distinguished from rational beliefs, this may be different for people with type 2 diabetes. It is possible that for people with diabetes, irrational beliefs are not entirely 'irrational'. This is because healthcare professionals make clear that patients 'have to', 'should' or 'must' stick to their recommended diet for good dietary self-care and diabetes control and to avoid or delay diabetes complications. Thus, although the REBT model may apply to the general population and other clinical populations, it may not be an appropriate model to apply to the present available data, to fully explain the beliefs

that people with type 2 diabetes associated with their dietary self-care intake. One could also argue that healthcare professionals educate people with diabetes such that they promote autonomous self-regulation vs controlled self-regulation. In other words, healthcare professionals should encourage people with diabetes to make the right food choices because it important for them for maintain healthy eating rather than making them feel pressured either by their interpersonal environment (externally motivated) or by intrapsychic forces such as guilt or fear (introjected motivation, Nouwen et al., 2011).

Discriminant validity of the FIBQ subscales was confirmed because they demonstrated as distinct construct from other diabetes self-care activities (DSCA) such as exercise, blood glucose monitoring and medication intake. This confirmed the FIBQ subscales as a measure related exclusively to diabetes diet and not other diabetes-related self-care activities.

Convergent validity of the FIBQ irrational beliefs was confirmed with the SGABS irrational subscales (moderately high to low associations). Of interest is the stronger association between FIBQ *demand for success* and SGABS need for achievement. Both scales measure achievement and success which provides evidence for the validity of the *demand for success* subscale. Another finding is the stronger positive association between the FIBQ self-reproach and the SGABS self-downing subscale as both scales measure self depreciation beliefs. Thus, *demand for success* and *self-reproach* subscales of the FIBQ were valid measures of 'demand' and self depreciation beliefs. *Need for fairness* was not associated with the SGABS demand

for fairness, although both subscales measure low frustration tolerance, but *need for fairness* was convergent with other SGABS irrational subscales. Convergent validity of the FIBQ subscales (except *desire for success*) was also confirmed with the IFBS irrational measure suggesting the subscales were food-related and/or belief-related measures.

Convergent validity of the FIBQ subscales (except *desire for success*) was confirmed with the dietary self-efficacy (DSE) scale, confirming the food-specific nature of the FIBQ subscales. Endorsing more irrational beliefs was linked to lower dietary self-efficacy. Thus*, demand for successful* dietary intake, *self-reproach* and the *need for fairness* was linked to participants feeling less confident about following a dietary plan. It is possible that when patients believe that they must succeed with their diet but regularly fail at it, their self-efficacy decreases. It is also possible that having low dietary self-efficacy made participants demand success and fairness with their diet, or made them reproach themselves for dietary failures.

The absence of an association between the FIBQ subscales and restraint eating (DEBQ) corroborates a previous report that dietary restraint was unrelated to irrational food belief scores (Osberg et al., 2008), but contradicts another finding that restraint eaters are prone to distorted demanding cognitions (Ruderman, 1985). External eating was linked to *self reproach* and *need for fairness*, while emotional eating was linked to *need for fairness* and *desire for success*. This finding reflects findings from Chapter 1 which suggested that negative emotions from perceived dietary restrictions and lack of dietary maintenance sometimes resulted in even

poorer dietary self-care. A possible explanation is that perhaps when participants believed that dietary recommendations were unfair (because of perceived restrictions) and/or reproach themselves for dietary failures, they experienced negative feelings and engaged in external and emotional eating. The positive association between *desire for success* and emotional eating further confirm that participants held both rational and irrational beliefs concurrently.

Validity of the FIBQ subscales with weight management (BMI) was not confirmed corroborating findings by Osberg et al., (2008), but contradicting another that did find a negative association between irrational food beliefs and BMI (Jáuregui-Lobera & Bolaños-Rios, 2011). In the present study, holding diabetes-related food beliefs was not linked to weight management. It is possible that although participants held irrational beliefs and were more distressed about dietary restrictions, this was not associated with dietary self-care to the extent that it could impact weight management. As participants reported in Chapter 2, although negative emotions (with underlying irrational beliefs) affected dietary self-care, they still acknowledged the need to maintain good dietary self-care for good diabetes control. This could explain why holding diabetes-related food beliefs were not related to weight management.

The FIBQ subscales were valid diabetes-related measures as they were positively linked to distress about diabetes dietary restrictions (DSQOL). For example, the link between *demand for success* and distress about dietary restriction suggested that the more patients believed that they must ‘always’ stick rigidly to their recommended

diet, the more they became distressed about their dietary restrictions. It is therefore not surprising that increased *need for fairness* was also linked to more distress about dietary restrictions. *Desire for success* was also linked to more distress about dietary restrictions suggesting that even when participants held more rational beliefs about successful dieting, they still felt distressed about dietary restrictions. The above findings support the finding in Chapter 2 that perceived dietary restriction was a challenge in diabetes self-care.

*Self-reproach* and *need for fairness* subscales were negatively linked with dietary self-care activities (DSCA). A possible explanation is that holding *self-reproach* beliefs could result in negative emotions (such as guilt), which could hinder dietary self-care activities. Increased *need for fairness* about dietary intake could also bring frustration, which could result in less engagement in good dietary self-care activities. Again, as reported earlier, *need for fairness* was positively linked to emotional eating. This may possibly explain the *need for fairness* association with poor diabetes control (HbA1c) in the present study. This corroborates a previous finding (Christensen et al., 1999) that greater irrational health belief scores were positively associated with diabetes control. Also, the positive association of *need for fairness* with external and emotional eating, and *self-reproach* with external eating suggests the possible negative impact of irrational food-related beliefs on eating behaviours. Wellbeing (WHO-5) was unrelated to the FIBQ subscales.

When controlling for general irrational beliefs (SGABS) and food-related irrational belief (IFBS), the FIBQ *desire for success* rational subscale significantly improved the

association with distress about dietary restrictions. This suggested that knowing about dietary-related rational food beliefs was useful in learning about distress about dietary restrictions. The more participants desired successful dietary intake the more distressed they become about dietary restrictions. It also supports the finding in Chapter 2 about participants always feeling restricted with their dietary intake.

Dietary self-care activity (DSCA-diet) was significantly associated with endorsing more rational and less irrational food-related beliefs (IFBS). The FIBQ and SGABS subscales did not contribute significantly to this association. This suggested that determining whether participants held rational or irrational food beliefs (IFBS) was useful in learning about associations with dietary self-care activities. Also, in the final model testing diabetes control (HbA1c), irrational food-related beliefs (IFBS) was the only scale which contributed significantly to the association with diabetes control. Knowing about a person's irrational food-related beliefs was useful in learning about associations with diabetes control.

These findings suggest that the IFBS was more associated with diabetes-related measures compared to the FIBQ subscales. However, inspection of the items on the IFBS scale suggests that many of the items do not reflect irrational beliefs as defined by the REBT model (characterised by demands, awfulising, low frustration tolerance and self, other and life depreciation beliefs). Some examples of items from the IFBS are; "*Being overweight is genetic, so why bother trying to lose weight", "Some foods are addictive", "Only high fat foods taste good"* and *"Exercise can undo the effects of a poor diet"* (see appendix 25). Osberg et al., (2008) stated that the development of

the IFBS is an “extrapolation of Ellis’ (1962, 1993) more general construct of irrational beliefs” (p. 26). However, the authors defined irrational food beliefs as “cognitively distorted and unhealthy attitudes and beliefs pertaining to food” (p. 26) which may explain the nature of items which do not reflect Ellis’s irrational beliefs.

Thus the association of the IFBS irrational subscale with diabetes-related measures could be explained by the fact that its items are more related to attitudes towards ‘healthy eating’ than REBT rational or irrational food beliefs. Maintaining healthy eating is key in diabetes management and therefore could possibly explain the IFBS irrational subscale association with diabetes-related measures. The IFBS and FIBQ irrational subscales may be useful measures for people with type 2 diabetes, but the IFBS may be better associated with diabetes-related measures compared to the FIBQ.

### 3.4.4 Limitations and recommendations for future research

The findings of this study should be considered in the light of the following limitations. First, participants were recruited from secondary care specialist centres, where the majority of people attended the clinic as a result of poor diabetes control (HbA1c >8.0%) and comorbid medical conditions affecting diabetes. This sample may differ from people with type 2 diabetes managed in primary care, who may have better controlled diabetes with correspondingly better dietary self-care and therefore may respond differently to the FIBQ. Also, participants differed from non-participants in their diabetes treatment in that a higher percentage of the former were on insulin and oral medication, while majority of non-participants were on oral medication alone.

Nonetheless, this study still provides new and useful information for understanding rational and irrational beliefs related to dietary intake and how they relate to distress about dietary restrictions, dietary self-care activates, and dietary self-efficacy. Further research is required to validate the irrational subscale with primary care patients (who may be better controlled) and compared them with patients from specialist diabetes clinics (who may not be well controlled) to assess the ecological validity of the FIBQ, and establish its appropriate use in diabetes care.

Secondly, a difference in the method of data collection has to be considered. During initial testing ($T_1$), participants completed the FIBQ themselves. However, test retest of the FIBQ ($T_2$) was conducted via a phone call, resulting in two different procedures which may have produced different responses. For instance, during retest phase, participants sometimes offered explanations to questions before answering them and therefore may have given more thought to the questions than they did during initial testing. However, this pragmatic approach was considered the most appropriate method to ensure that test-retest occurred within the two-week retest period. Despite this limitation, test retest reliability was confirmed for the irrational subscales.

Thirdly, the *self-reproach* and *need for fairness* subscales were two-items subscales and the minimum number of items required per factor is three (Anderson & Rubin, 1956; Comrey, 1988; Costello & Osborne, 2005). Further development of the FIBQ could include more items (of the same category of beliefs) to improve the stability of the subscales (Floyd & Widaman, 1995; Guadagnoli & Velicer, 1988). Also, further

studies are warranted to perform confirmatory factor analysis to establish the multidimensionality of the FIBQ.

Finally, the WHO-5 was the only psychological wellbeing measure that was correlated with the FIBQ subscales. The absence of a mood scale made it impossible to assess participants' mood during testing and how it may have been related to the FIBQ subscales. Nonetheless, one can speculate that because irrational beliefs were associated with distress about dietary restrictions and in Chapter 2, perceived dietary restrictions were associated with unhealthy negative emotions perhaps the sample in the present study may have been experiencing some negative emotions. Future studies should include measures of mood to obtain information about the emotional state of patients when they complete the FIBQ.

### 3.4.5 Implications for clinical practice

The FIBQ irrational subscales may have the potential for assessing food-related beliefs in people with type 2 diabetes. The subscales can be administered in a short time frame and therefore could be used with patients experiencing challenges with dietary self-care during clinical reviews and in dietary education. The subscales cover three different aspects of irrational beliefs (demands, self depreciation and low frustration tolerance) and thus could be used to identify irrational belief(s) dominating a patient's thinking about dietary self-care. This knowledge could then be used to educate people to be mindful of irrational beliefs to promote good dietary self-care and optimal diabetes control. The IFBS irrational subscale could also be used by healthcare professionals to assess unhealthy eating attitudes. The FIBQ subscales

were related to dietary self-efficacy, distress about dietary restrictions and dietary self-care activities. Therefore, healthcare professionals could incorporate skill building strategies for dietary self-efficacy into their education and help to make people more aware of the consequence of holding irrational beliefs about their dietary intake.

The present study showed that rational and irrational food beliefs were held concurrently and both were positively associated with each other, as well as distress about dietary restrictions. Perhaps what the REBT model classified as irrational may not be entirely irrational for people with type 2 diabetes. These beliefs about *demand for successful* dietary intake, *self reproach* about dietary failures and the *need for fairness* with dietary intake may be 'irrationally rational' for these people who perhaps believe that the only way to control their diabetes is that they 'must', 'should' and 'have to' follow their diet.

A meta-synthesis of qualitative studies on the self-management in type 2 diabetes by Gomersall, Midall, and Summer (2011) demonstrated that although multiple and complex competing factors such as culture, gender and interpersonal relations can influence diabetes management, people with type 2 diabetes are seen by healthcare professionals as individuals accountable for good health. Thus, the 'self' plays an important role in diabetes management and so poor management suggests failure on the part of the individual due to failure of self-control (Gomersall et al., 2011). This could perhaps, explain why participants held these 'irrationally rational' beliefs.

Gomersall et al., (2011) pointed out that as a result of the complex and varied information that people with diabetes receive; there is sometimes miscommunication with healthcare professionals and the process of self-management and diabetes control, which can affect individuals. Perhaps people with type 2 diabetes may be misinterpreting dietary education and believing that the only way to stay health is to avoid high calorie foods rather than eating them occasional or in moderation and hence the type of beliefs they hold about dietary intake. As participants elucidated in Chapter 2, it is important to have an occasional dietary treat, to avoid feeling deprived and depressed. Emphasis should be placed on educating patients to feel less restricted by their dietary regimen and maintain flexibility in their dietary intake and how to manage unsuccessful dietary maintenance. Healthcare professionals should emphasise when educating people with type 2 diabetes that dietary self-care is not about prohibitions but instead it is about eating in moderation, and to ensure that dietary recommendations are interpreted appropriately.

### 3.4.6 Conclusion

The present study represents the first step in the development of a food-related beliefs scale for people with type 2 diabetes. The FIBQ irrational subscales showed to be reliable and valid measures of irrational beliefs, distress about dietary restrictions and diabetes dietary activities which could be used by healthcare professionals. Holding rational and irrational beliefs about dietary intake were both positively associated with general irrational beliefs, some eating behaviour styles and distress about dietary restrictions. Thus rational and irrational food beliefs were held

concurrently, suggesting that for people with type 2 diabetes, the goal of dietary self-care is to follow their diet without any 'preference'. "I prefer to follow my diet" (rational) and "I must follow my diet" (irrational) seem to have the same meaning for participants with type 2 diabetes. Perhaps to them, the only option for optimal diabetes control is that they "must", "have to" or "should" follow their recommended diet. Although irrational food beliefs may be useful in learning about diabetes and dietary-related activities, the REBT model may not fully explain the beliefs and practices of dietary self-care among people with type 2 diabetes.

# CHAPTER 4: AN ELECTROENCEPHALOGRAPHIC (EEG) STUDY OF BELIEFS, FOOD TYPE AND EMOTIONS IN TYPE 2 DIABETES

Abstract

The aim of the study was to test the effect of priming with beliefs on electrocortical processing and emotional response to food pictures. Nineteen people with type 2 diabetes were tested by recording electroencephalographic (EEG) data as they held a rational or irrational belief and viewed pictures of high fat savoury, high fat sweet and low calorie foods, while rating their emotional responses (pleased, content, regretful or guilty). Subsequently event related potentials (ERP) were computed. Findings showed that rational and irrational beliefs did not enhance electrocortical processes but rational beliefs were associated with positive emotions,('content' and 'pleased'), relative to guilt, which is contrary to the REBT assumptions that irrational beliefs are associated with unhealthy negative emotions such as guilt. Relative to feeling content, pleased, or regretful, the emotion 'guilt' was associated with both high fat savoury and high fat sweet foods compared to low calorie foods, suggesting that participants distinguished high calorie foods from low calorie foods. Further to this, larger ERP amplitudes were recorded at P200 and Late Positive Potential (LPP) in the frontal scalp region and lateralised differences for the P200 component, for high fat savoury foods compared to high fat sweet and low calorie foods. This was suggestive of attentional bias and emotional evaluation of high fat savoury foods. This finding was supported by behavioural responses which showed delay in reaction time for high fat savoury foods. The distinction made between high fat savoury and high fat sweet foods (in spite of both being high calorie foods) needs further attention from researchers.

## 4.1 Background

### 4.1.1 Dietary intake and REBT beliefs

Negative emotions have been shown to result both from poor dietary self-care and in poor dietary self-care as reported in Chapter 2 (also see DeCoster, 2003; Penckofer et al., 2007; Peres et al., 2008; Travis, 1997). In REBT, negative emotions are classified as healthy/functional (concern, remorse, disappointment, sorrow and healthy anger) and unhealthy/dysfunctional (anxiety, guilt, shame, hurt and unhealthy anger, Dryden, 2009) with underlying rational or irrational beliefs, respectively (see Chapter 1). The core assumption of this theory holds that irrational beliefs cause psychological disturbances (Ellis & Dryden, 1997; Dryden, 2009). Thus in REBT, individuals are guided to recognise the dysfunctional nature of their beliefs and encouraged to hold more rational (functional) beliefs.

Studies have tested this core REBT assumption (Bond & Dryden, 1997; Bond, Dryden, & Briscoe, 1999; Bond & Dryden, 2000) but to date, only one study (Harris, Davies, & Dryden, 2006) has investigated the physiological (blood pressure- BP, respiratory rate and heart rate) and psychological (self-reported anxiety and concern) effects of beliefs. In this study, 90 patients from a general medical practice were placed in a stress-induced situation while holding rational, irrational or indifferent beliefs. Holding irrational beliefs increased systolic BP and anxiety, while holding rational beliefs decreased systolic BP and increased concern. There was more increased diastolic BP for irrational beliefs compared to rational beliefs. However, holding indifferent beliefs did not change systolic BP and all three belief types had no effect on respiratory rate and heart rate. Harris et al., (2006) concluded that 'mental

rigidity' (holding irrational beliefs) resulted in 'automatic rigidity' (increase peripheral resistance) while 'mental flexibility' (holding rational beliefs) resulted in 'automatic flexibility' (decrease peripheral resistance).

If holding rational or irrational beliefs can have functional or dysfunctional consequences respectively, then beliefs could play a role in the way individuals with type 2 diabetes appraise their dietary intake and manage dietary self-care. A positive relationship has been found between irrational self-expectation beliefs (e.g. 'I must perfectly accomplish all things') and inappropriate eating attitudes (obsession with eating, dieting and obese-phobia), among women at college, suggesting that irrationality was related to eating problems (Tomotake, Okura, Taniguchi, & Ishimoto, 2002). Findings reported in Chapters 2 and 3 have also shown that negative emotions can impact negatively on dietary self-care, and diabetes-related irrational food beliefs are associated with diabetes- and diet-related activities. Thus, there is the need to examine more closely the role of beliefs (the source of negative emotions) on dietary self-care, by experimentally exploring the physiological (electrocortical processes) and psychological (emotional response) effects of holding rational or irrational beliefs, on response to food pictures.

### 4.1.2 Event Related Potentials and brain region activation

Event related potentials are relative time-locked electroencephalographic waveforms which results from exposure to stimuli. ERP waveforms are generated by concurrent electrocortical activation in brain regions responsible for neurosensory and cognitive processing (Ehlers, Phillips, Sweeny, & Slawecki, 2003). ERPs have been used to

study electrocortical processing of food stimuli but no study has investigated the electrocortical processes involved in holding rational and irrational beliefs. It is not known which components may be involved in cortical processes related to food belief. Thus, the present study will explore the most commonly identified components such as P100, P200, P300b and LPP, (Key, Dove, & Magiure, 2005) involved in the electrocortical processing of food pictures. These components have been chosen because they have been shown to reflect processes such as visual and selective attention, stimulus classification and evaluation, as well as affective processing of emotional stimuli.

The P100 component is the first positive going ERP waveform, which is linked to early information processing and is modulated by selective attention to stimuli. The P200 component is linked to memory processes and is modulated by selective attention and stimulus classification (Garcia-Larrea, Lukaszewicz, & Manguiere, 1992). P300 is the most researched ERP component (Folstein & Van Petten, 2008; Key et al., 2005), made up of the P300a and P300b. This study will focus on the P300b which is pronounced at parietal sites scalp position and reflects evaluation and categorisation processes (Picton, 1992; Polich, & Kok, 1995). The LPP component which is a positive slow moving ERP associated with emotional content and motivation of visual stimuli and evaluative incongruence (Cacioppo, Crites, & Gardner, 1996) will also be investigated. These ERP components and their hypothetical meaning are presented in Table 4.1.

Table 4.1

*ERP components and their hypothetical cognitive meaning*

| **ERP components** | **Hypothetical cognitive meaning.** |
|---|---|
| **P100**<br>The first positive going ERP waveform, typically peaking at 100 ms post stimulus and occurring largely at occipital sites. | • Linked to early information processing and modulates selective attention to stimuli.<br>• Differs based on the amount of attention given to a stimulus. For example, it is larger for unpleasant stimuli than pleasant stimuli (for review see Olofsson, Nordin, Sequeira, & Polich, 2008). |
| **P200**<br>The second positive going ERP waveform, typically peaking at 200 ms post stimulus and largest at anterior and central sites. | • Linked to memory processes and modulated by selective attention and stimulus classification (Garcia-Larrea, et al., 1992).<br>• Larger amplitudes recorded for negative stimuli than positive stimuli (Carretie, Mercado, Tapia & Hinojose, 2001).<br>• Food cues elicit larger amplitudes compared with neutral stimuli (Leland & Pineda, 2006).<br>• Bilateral differences reported. Both left and right hemispheres elicit larger amplitudes for emotional words compared with neutral words (Paulmann & Kotz, 2008) and larger amplitudes for grimace and emotional faces compared with neutral faces (Paulmann & Pell, 2009). |
| **P300a**<br>Positive in polarity and typically peaking around 300ms to 700 ms | • Modulated by higher cognitive processes that are linked to selective attention (Donchin & Cole, 1988) and is affected by differences in arousal state (Polich & Kok, 1995).<br>• Linked to stimulus relevance and evaluation, and memory function (Donchin & Coles 1988, |

| | |
|---|---|
| post stimulus and is pronounced at parietal scalp positions. | Donchin Karis, Bashore, Coles, & Gratton, 1986). Also reflects processes involved in stimulus categorisation (Polich & Kok, 1995).<br>• Larger when more effort is devoted to a task (Key et al. 2005).<br>• Larger amplitudes have emerged for positive than negative stimuli (Zheng, 2011) and for food stimuli compared with control stimuli. |
| **LPP Frontal and Posterior**<br>Positive slow moving ERP that occurs between 300 and 1200 ms post stimulus. | • Associated with emotional content and motivation of visual stimuli and used to study affective processing of emotional stimuli (Cuthbert, Schupp, Bradley, Birbaumer, & Lang, 2000; Diedrich, Naumann, Maier, Becker, & Bartussek, 1997).<br>• Emotional pictures increase LPP amplitudes compared to neutral stimuli (Cuthbert et al, 2000; Diedrich, 1997)<br>• Enhanced amplitude for negative words than positive words (Zheng, 2011).<br>• Mixed findings about the lateralisation of LPP activation and affective/emotional stimuli. Example, LPP frontal is lateralised with positives stimuli evoking greater amplitude in the left hemisphere and negative stimuli in the right hemisphere (Cunninghan, Espinet, DeYoung, & Zelazo, 2005; Gable & Harmon-Jones 2010; Graham & Cabeza, 2001).<br>• Appetitive pictures evoke larger amplitude than neutral pictures, more so in left frontal site but not the right. (Gable & Harmon-Jones, 2010).<br>• Pleasant stimuli activate LPP frontal sites largely than unpleasant stimuli but activation is the same for both stimuli at parietal sites though larger, compared with neutral stimuli (Diedrich, 1997). |

### 4.1.3 Event related potentials and food stimuli

Several studies have investigated electrocortical processing of food stimuli and reported differences in brain activation for food-related stimuli compared with neutral stimuli, with the former producing larger activations (e.g. Chechlacz et al., 2009; Leland & Pineda, 2006; Nijs, Franken, & Muris, 2008, 2010). Nijs et al., (2008) found that although ERP amplitudes did not differ between obese and normal weight individuals during exposure to food stimuli, both groups showed greater amplitude for food stimuli relative to neutral stimuli at P300 and LPP central and posterior sites. Similarly, Leland and Pineda, (2006) found that compared with neutral words, food-related words produced greater amplitude for LPP (P420) and anterior negativity (N160), in left frontal sites compared to the right frontal sites. These findings suggest the reinforcing nature of food stimuli as well as the motivational significance of food related stimuli (Leland & Pineda, 2006; Nijs et al., 2008).

Amplitude differences have also been reported for calorific content of food stimuli and the brain region sites involved. For example, high caloric foods are reported to produce larger brain activation in the P200 (central and anterior sites), P300 (posterior and central sites) and LPP components for normal and obese people (Nijs et al., 2008, 2010) and larger Early Positive Negativity (EPN) for healthy controls (Blechert, Feige, Joos, Zeeck, & Tuschen-Caffier, 2011). High caloric foods have also been shown to elicit larger LPP amplitudes in midline frontal, central and parietal sites among a student sample (Gable & Harmon-Jones, 2010).

The literature presented suggests that the calorific content of food stimuli can affect brain activation. As reported in Chapter 2, when people with type 2 diabetes did not follow their recommended diet they experienced unhealthy negative emotions (e.g. guilty, anger, depression) which are likely to have underlying irrational beliefs. Findings reported in Chapter 3 also suggested that rational and irrational beliefs were held concurrently and both were associated with distress about dietary restrictions. However, irrational beliefs were further linked to dietary self-care activities dietary self-care efficacy and emotional and external eating.

As discussed previously, it is possible that for people with type 2 diabetes what the REBT model classifies as irrational may not be totally irrational to them because to maintain good dietary self-care, they 'have to', 'must or 'should' follow their diet. If this is the case then the question is will individuals holding rational or irrational beliefs respond with different emotions (healthy or unhealthy), considering that irrational beliefs were further linked to poorer dietary self-care activities, lower dietary self-care efficacy and more emotional and external eating, or will they respond with the same emotions considering that the two beliefs were held concurrently and associated with more distress about dietary restrictions.

In order to test the above, an experimental study was considered to be the most appropriate method as this will offer the opportunity for participants to be primed with the two beliefs sequentially and for the effect to be assessed by monitoring brain activation and emotional responses simultaneously. According to Linden (2008), there are specific brain activations to thought processes and changes in beliefs, cognitive style, preferences, and attitudes which are likely to be reflected in changes

in brain activation. Thus, if different beliefs produce specific physiological and psychological changes (Harris et al., 2006), then it is probable that holding rational or irrational beliefs, will activate different brain regions and produce corresponding emotions. To date, electrocortical processing of food stimuli while holding a belief has not been explored. This study therefore aims to investigate if priming with rational and irrational beliefs will affect electrocortical and emotional responses to food pictures.

The present study investigated whether: (1) priming participants with rational or irrational beliefs would lead to differences in event-related potentials, (2) presentation of different food types would lead to differences in event-related potentials and (3) the emotional response to food pictures would be affected by beliefs (rational/irrational) and/ or food type (high fat savoury, high fat sweet and low calorie). Findings will provide further evidence on how the REBT model can be used to understand negative emotions and dietary self-care and possibly establish the use of this approach in diabetes dietary education and diabetes care.

## 4.2 Method

### 4.2.1 Study design

A within-subject design was used to investigate the main effects and interaction effects between beliefs and food type. Beliefs (rational /irrational) and food pictures (high fat savoury, high fat sweet and low calorie) were manipulated, and event-related potentials measured. Participants were primed with rational or irrational belief statements, before viewing and rating their emotional response to the food pictures

presented. Presentation of beliefs was counterbalanced for participants to avoid confounding by order effect.

### 4.2.2 Participants

*Inclusion/exclusion criteria*

Participants were individuals aged 40 years and older (the typical age at which type 2 diabetes appears, Diabetes UK, 2012), who were diagnosed with type 2 diabetes for at least one year. Diagnosis of type 2 diabetes was ascertained by clinicians, based on the WHO (2006) criteria (see Chapter 1). Selection criteria for participation comprised the following: (1) well controlled diabetes as defined by HbA1c ≤8%, (2) control of diabetes by tablets or by diet only; and (3) no major co-morbidities (e.g., cancer, chronic pain, end-stage, renal disease). Participants were excluded if they had any of the following: (1) a medical condition (e.g. food allergies etc) which could influence appetite and food intake, (2) were receiving medications that suppressed hunger, (3) had suffered a stroke or a heart attack in the last three months; and/or d) had existing emotional problems or had a traumatic experience in the past six months (e.g. death of a loved one, accidents, diagnosis of a terminal illness, etc.).

A previous repeated measures study on REBT and negative emotions (McGrath 2008, unpublished) yielded medium to large effect sizes, ranging from .20-.31, with an average effect size of .25. Similar effect sizes were anticipated in this study. With only one group, an alpha of .05 and power of .80 the required sample size was 28 participants however, only 19 participants could be obtained for the study. Participants were recruited from primary and secondary care clinics in Birmingham, UK through convenience sampling. Of the 43 participants approached, 18 (42%)

were not interested in participating, three cancelled appointments because of illness or death in the family, and three did not attend. Characteristics of those who did not participate could not be obtained. A total of 19 participants with type 2 diabetes were tested, and all gave written informed consent (see Appendix 34). The study was approved by the Birmingham, East, North and Solihull Research Ethics Committee, Birmingham, UK, South Birmingham Primary Care Trust and the University of Birmingham Ethics Committees (see Appendix 35).

*Participants' demographic and clinical characteristics*

The median age of participants was 59.0 (*IQR* = 14.0) years with more than half of them being men (n = 11). The median age duration of diabetes was 6.0 (*IQR* = 8.0) years and all participants used tablets to control their diabetes, except one participant who used diet only to control his diabetes. Most participants were White British (n=15) with the rest being British Asian, or White African or Caribbean. Most were married or living with their partners (n = 17) and more than half of them were retired (n = 10). When asked, nine participants admitted they did not maintain their recommended diet. On average, participants were overweight (mean=29.3, *SD*= (4.3 kg/m$^2$) but had well controlled diabetes (mean= 6.1, *SD*= 1.1%). Only one participant reported having a diabetes-related complication (retinopathy).

### 4.2.3 Materials

*Measures*

*Demographics and medical background.* Demographic and medical background data obtained included age, sex, occupation, marital status, age of diabetes onset,

diabetes treatment, diabetes-complications and other medical conditions (see Appendix 36). Participants were also asked to list what they ate for breakfast on the morning of testing and rate how hungry they were on a 10 centimetre visual analogue scale of 0 (not at all hungry) to 10 (extremely hungry).

Questionnaires

*Belief scale.* The Shortened General Attitude Belief Scale (SGABS; Lindner et al., 1999) was used to assess rational and irrational beliefs as described in Chapter 3 (see Appendix 26). Cronbach's alpha in this sample for the subscales was high (.75 to .90) except for the rational subscale (α = .56) and other downing irrational (α = .49). The two subscales were excluded from the present study due to low internal consistency.

*Eating behaviour.* The Dutch Eating Behaviour Questionnaire (DEBQ; van Strien, et al., 1986) was used to assess participants' behavioural eating styles as described in Chapter 3 (see Appendix 27). Cronbach's alpha in the present sample were emotional eating, α =.97, external eating, α =.90 and restraint eating, α =.92.

*Diabetes specific distress.* The Problem Area In Diabetes Questionnaire *(*PAID*;* Polonsky et al., 1995) assessed diabetes-specific emotional distress as described in Chapter 2 (see Appendix 6). In the present study Cronbach's alpha was .96.

*Food related beliefs.* The irrational subscales of the Food Intake and Beliefs Questionnaire (FIBQ*;* Amankwah-Poku et al, Unpublished doctoral dissertation,

University of Birmingham) as described in Chapter 3 of this thesis, was used to assess participants' dietary-related irrational beliefs (see Appendix 24). This 10-item questionnaire, is scored on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree) with three subscales. Total score range from 6 to 30 for *demand for success* subscale and 2 to 10 for *need for fairness* and *self-reproach* subscales, with higher scores indicating irrational thinking about dietary intake. Cronbach's alpha in the present study were, *demand for success*, α = .79 *need for fairness* α = .69 and *self reproach*, α = .85.

*Mood assessment.* The Profile of Mood States-Brief Form (POMS-Brief; McNair, Lorr, Heuchert & Droppleman, 2003), was used to assess participants' affective state (see Appendix 37). This 30-item adjective mood scale assesses different mood states and requires individuals to indicate how they feel presently. It has six subscales (fatigue-inertia, vigour-activity, tension-anxiety, depression-dejection, anger-hostility, and confusion-bewilderment) and each is scored on a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely). With the exception of the vigour-activity subscale which is reverse scored, total scores for each of the subscales range from 0 to 20, with higher scores indicating greater distress. A total mood score ranging from 0 (least disturbed) to 80 (most disturbed) is obtained by subtracting the vigour-activity subscale score from the total score of the 5 other subscales. Internal consistency for the POMS-Brief is "highly satisfactory" with Cronbach's alpha, ranging from .76 to .92 (McNair & Heuchert, 2010). In the present study, Cronbach's alpha ranged from adequate to high (.65 to .92) except for tension-anxiety (.59) and confusion-bewilderment (.38). These two subscales were not used in the present study due to their low internal consistency.

*Behavioural responses.* Four emotional responses were used during experimentation. Participants were asked to imagine themselves eating foods depicted in the food pictures and rate how they will feel by choosing from one of these four emotions: content, pleased, regretful or guilty.

Physiological measures

*Diabetes control.* The Bayer DCA−2000+ Analyzer (Bayer Corporation Elkhart, USA., now Siemens) was used to measure participants' glycosylated haemoglobin (HbA1c) levels over the last 90 days. Using capillary blood, this device produces highly accurate result within six minutes (Bayer Corporation, 1997). Sensitivity of the assay is 2.5% (Siemens Health Care Diagnostics, Tarrytown, IN, U.S.A.)

*Blood glucose.* The ACCU-CHEK Aviva glucose meter (Roche Diagnostics Ltd, Reading, UK) was used to measure participants' random blood glucose levels using the finger-prick method.

*Body Mass Index (BMI) kg/ $m^2$.* Participants' height and weight were measured in the laboratory with participants wearing light clothing and no shoes.

*EEG data acquisition*. A BioSemi 128 Channel EEG equipment (BioSemi, Amsterdam, Netherlands) was used to record continuous EEG data with active Ag/AgCl electrodes from 128 scalp electrodes, to obtain event related potentials. Electrodes were positioned on participants' scalp using a nylon electrode headcap

(BioSemi, Amsterdam, Netherlands), according to the 10–5 extension of the International 10-20 electrode system (Oostenveld & Praamstra, 2001). The electrode holders in the head cap were filled with Electro gel (Electro-Cap International, Inc., USA) using a syringe and the 128 Ag/AgCl active electrodes were plugged in. CMS and DRL electrodes for reference and ground were positioned adjacent to the Cz electrodes on both sides. Eye movements were monitored by vertical and horizontal electro-oculogram (VEOG and HEOG, respectively) channels. HEOG was recorded from a pair of electrodes on the outer canthi of each eye, while VEOG was recorded from an electrode below the left eye. Prior to placement of the electrodes, participants' forehead, mastoid and areas around their eyes were clean with cotton and NuPrep EEG abrasive skin prepping gel, and alcohol swab. EEG and EOG signals were sampled at a rate of 512 Hz per channel. Data from EEG recordings were stored on the computer hard disk for subsequent analysis.

Stimuli

*Beliefs statements:* Rational and irrational belief statements related to dietary intake were used to prime the participants. These belief statements were formulated based on beliefs reported about dietary self-care and negative emotions as described in Chapter 2. The most frequently reported statements were used. There were five irrational belief statements (e.g. It is awful that I have to diet for the rest of my life) with five corresponding rational belief statements (e.g. It is bad that I have to diet for the rest of my life but not awful (see Appendix 38).

*Food pictures:* Three different categories of food pictures were used for the computer task (see Appendix 39). These were high fat savoury (e.g., chips, pizza, battered fish), high fat sweet (e.g. cake, ice cream, shortbread) and low calorie (e.g. white meat, vegetables, boiled potatoes) foods. High fat savoury and high fat sweet categories had 24 food pictures each, while the low calorie category included 48 food pictures. All food pictures were matched in size, colour, brightness and complexity. Their calorific content was assessed by a specialist diabetes and weight management dietician at the Endocrinology and Diabetes Centre of the Birmingham Heartlands Hospital, UK. Each food picture measured 9 cm X 9 cm in dimension and 300 x 300 pixels in width and height, with 24- bit depth. The pictures had a white background and were 15 cm x 15 cm in size when projected onto the computer monitor. Food pictures were obtained from the Inmagine website (www.inmagineicom).

### 4.2.4 Procedure

*Recruitment of participants*

In hospitals, prospective participants were approached in the waiting area during out-patient clinics. After verifying eligibility the researcher explained the study and those who expressed interest were given the Patient Information Sheet (see Appendix 40). Their contact details (see Appendix 41) were also obtained. At the University of Birmingham, advertisements (see Appendix 42) were sent out via email (through the five colleges in the University) and also placed on the student portal (my.bham student portal) as a personal announcement. University personnel who were

interested contacted the researcher who interviewed them via phone to ascertain eligibility and provided them with the patient information sheet via email or by post.

All prospective participants were contacted one week after receiving the patient information sheet to confirm participation and book appointments. Participants were asked to have their breakfast at 8:00 am and arrive in the laboratory at 9:30 am for testing.

*Experimental design and stimulus*

On arrival the procedure was again explained to participants and any questions they had were answered before they provided written informed consent and completed the questionnaires. This was followed by a finger prick test to obtain blood for measuring HbA1c and random blood glucose levels, and then their weight and height were measured. They were then seated in front of a computer monitor at a distance of 80 cm to prepare them for experimentation.

First, participants were fitted with the electrode cap and the electrodes were plugged in, during which the computer task (rating food pictures) was explained to them. They performed a practise trial of the computer task to familiarise themselves with using the computer keyboard and making quick responses. This trial included 1 block of 10 trials of food pictures (fruits) which were not included in the actual experimentation. Participants were monitored by the researcher through a one-way video camera from an adjacent room with communication via a two-way microphone and speaker.

The food pictures were presented on a 17" personal computer monitor screen (60Hz refresh rate) using the E-prime Version 2.0 software package (Psychological Software Tool Inc.). Participants were primed with irrational (Condition 1) or rational (Condition 2) belief statements (counterbalanced across participants) before the presentation of food pictures. After the priming task, participants rated the food pictures according to how appetizing they looked and whether or not they would eat the foods depicted in the pictures. For a diagram of the procedure, see Figure 4.1.

Procedures for both conditions were the same (using the same food pictures) and only differed in the type of belief statements presented. All instructions, questions and answers were presented on the computer monitor screen and participants responded by pressing the number on the keyboard that corresponded with their response. Steps for testing involved the following: First participants were primed with rational or irrational belief statements (depending on the condition being tested) for 90 seconds with the following instructions: "*You are going to be shown a list of belief statements. Spend a couple of minutes imagining yourself holding these beliefs as if they were true for you. Please read them over and over again until they disappear from the screen. You will be required to hold these beliefs throughout this part of the experiment until further instruction*".

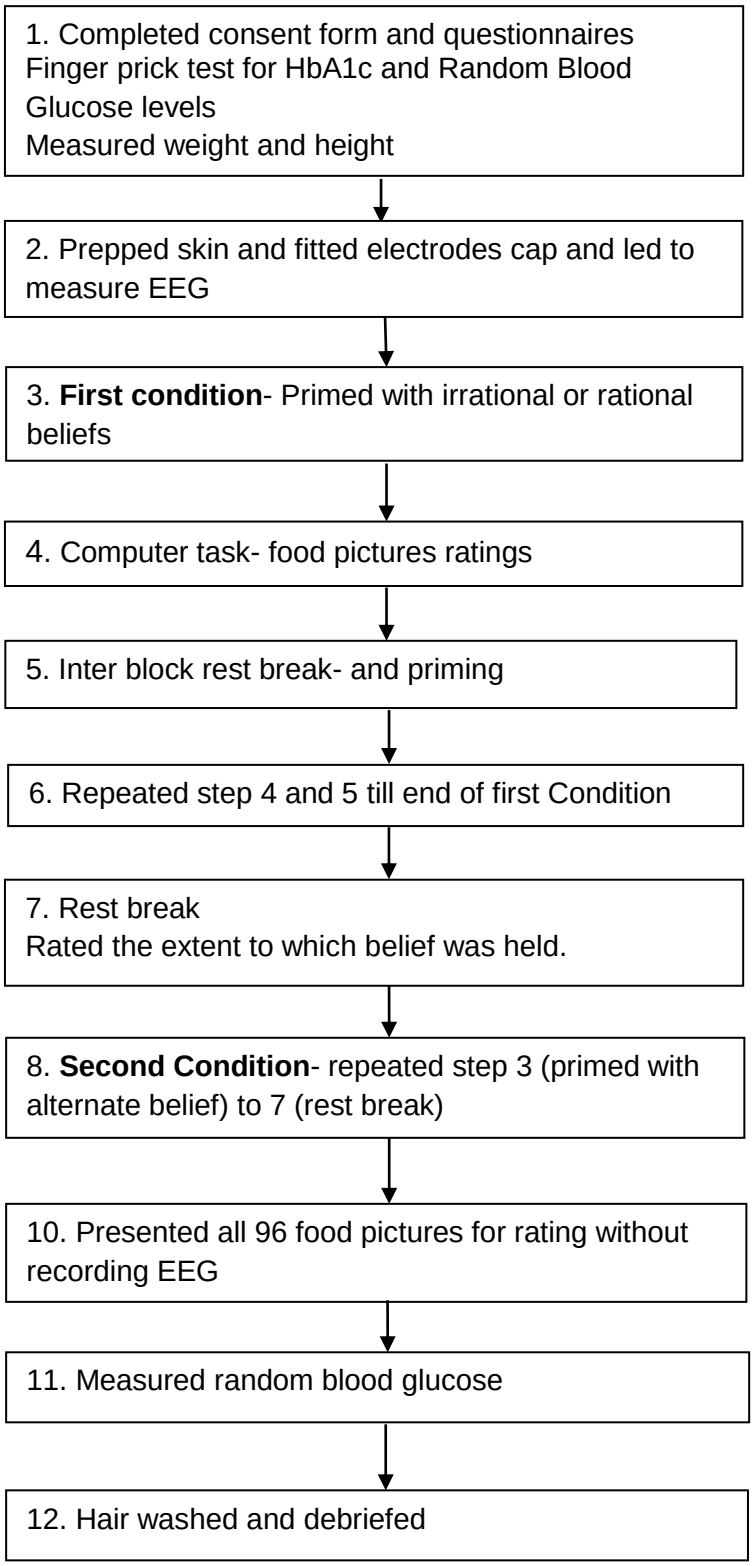


*Figure 4.1.* Experimental procedure

Participants were then presented with the food pictures to respond to while holding the belief (see Figure 4.2 below). Each picture presentation represented one trial sequence which involved the following: First, the statement "*Imagine having eaten this*" appeared on the screen for 250 milliseconds (ms), followed by a fixation cross for 250 ms, then the food picture appeared for 500 ms. Next was the question "*How would you feel about yourself*?" with responses (*1=content, 2=pleased, 3=regretful and 4=guilty*) for participants to choose from.

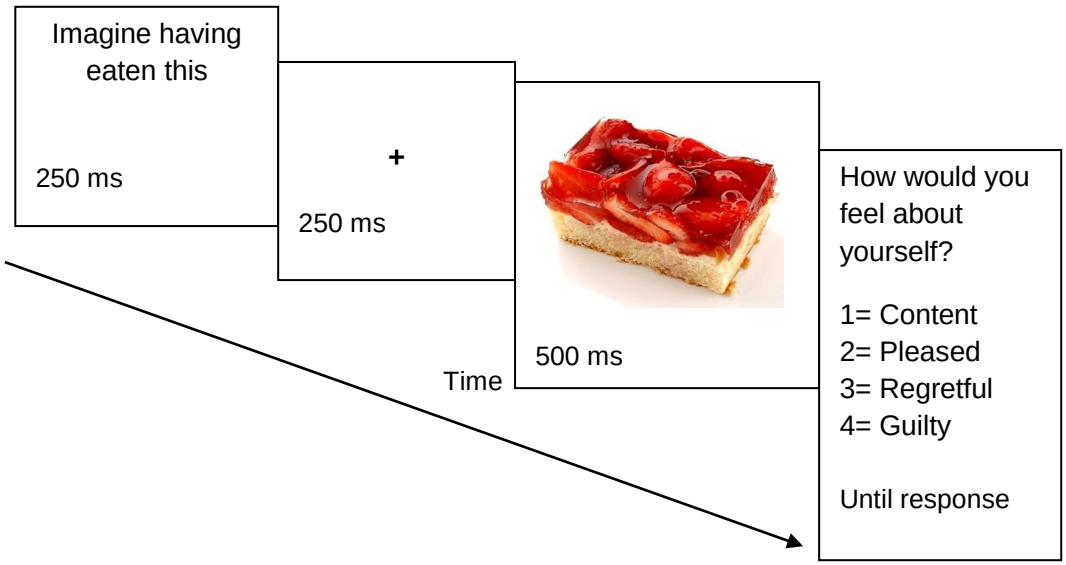


*Figure 4.2.* A single trial sequence

Each food picture was presented three times, making a total of 288 trials presented at random in six blocks of 48 trials (per block) with each block containing food pictures from each of the three food categories. Participants had 30 seconds rest breaks in-between blocks, after which the belief statements appeared on the screen again (45 seconds), prior to the next block commencing, to reinforce priming. EEG was recorded continuously during experimentation and response to food pictures

was controlled by the E-prime program. At the end of the condition, participants rated to what extent they were able to hold the belief while rating the food pictures using a belief scale, ranging from 1 ('to no extent') and 9 ('to a great extent'). Each condition lasted approximately 20 minutes.

Participants were then given the Food Intake and Beliefs Questionnaire to complete and their blood glucose was measured again. The electrode cap was then removed and their hair was washed before debriefing. Participants spent on average 2.5 hours in the laboratory for this whole procedure and received compensation of £25.

### 4.2.5 Data Analysis

*EEG data analysis*

Offline segmentation and averaging of EEG signals was performed using the BrainVision Analyzer software (BrainProducts, Munich, Germany). Data was re-referenced to average of left and right mastoids and bandpass filtered from 1.0 (12 dB/ octave slope) to 25 Hz (48 dB/ octave slope) to remove slow-wave activity and high frequency noise. This continuous EEG data were eye movement corrected using Gratton, Coles and Donchin's (1983) method implemented in the BrainVision Analyzer and segmented into epochs (relative to reference maker positions) from 200 ms pre-stimulus onset to 1000 ms post-stimulus onset. Epochs were artifact rejected when activity in any electrode exceeded $\pm$ 100μV. Artifact free trials were then averaged and baseline corrected using the 200ms pre stimulus period of the epoch. Grand averages of epoch for the three food types were then created based on the

two conditions tested (rational and irrational), to identify the different components of interest.

Based on visual inspection of grand average waveform, the following ERP components were identified; P100 (80 ms to 130 ms), P200 (200 ms to 300 ms), P300b (300 ms to 600 ms), and LPP (800 ms to 1200 ms). The Current Density Source (CDS) topographical maps of these components showed high activity at the parieto-occipital region for the P100, P200, and LPP component while activity was high at the frontal regions for LPP. Four electrodes were pooled from in and around these regions of high activity and peaks detected for analysis. Data were then exported into IBM SPSS version 19 for further analysis. All other data were analysed using the SPSS Statistics. Significant levels for all results were 0.05 and 0.008 for post-hoc t-test analysis with six observations.

*Questionnaire analysis*: Descriptive analysis (means, standard deviations and frequencies) was performed on the data obtained from questionnaires.

*Behavioural data analysis*: Behavioural analyses assessed the effect of beliefs and food type on picture ratings (i.e. emotional responses) and reaction time. Reaction time for rating the three food types under the two belief conditions was analysed using the repeated measures ANOVA test (General Linear model). For food picture ratings, data were obtained for how often participants chose any of the four emotional responses (content, pleased, regretful and guilty) given a belief or food type.

Multinominal logistic regression analysis was performed to determine which emotion(s) participants chose most frequently.

*Electrophysiological data:* Separate repeated measures ANOVAs (General Linear model) were used to test the effect of belief and food type on ERPs for the various ERP components and their associated midline electrodes. Greenhouse-Geisser correction of degree of freedom was applied where appropriate. Where there were significant differences, pairwise comparison of means with Bonferroni adjustment was used.

## 4.3. Results

### 4.3.1 Analysis of questionnaires

Participants' mean score on the irrational subscale was lower than that for the rational subscale (see Table 4.2) on the FIBQ, indicating that on average they held more rational beliefs about their food intake and fewer irrational beliefs. The mean score on the PAID was low, indicating low diabetes-related emotional distress. Scores on the SGABS irrational subscales were higher for demand for fairness and need for comfort but lower for self-downing.

Participants did not exhibit external, emotional or restraint eating behaviour styles. Mood assessment also indicated that they were not experiencing tension, depression, anger, fatigue or confusion during the time of the experiment but had a slight sense of vigour. Finally, participants indicated that during experimentation, they were able to hold the rational beliefs better than the irrational beliefs.

Table 4.2
*Means (SD) of participants' response to questionnaires*

| Variable | Mean (*SD)* |
|---|---|
| *FIBQ* | Range = 1 to 4 |
| Demand for success | 3.1 (0.8) |
| Need for fairness | 2.1 (0.9) |
| Self-reproach | 3.1 (0.9) |
| *Belief scale* | Range = 1 to 9 |
| Rational belief rating scale | 7.2 (2.1) |
| Irrational belief rating scale | 5.1 (3.1) |
| *Total PAID Median (IQR)* | 13.5 (32.0) |
| *SGABS* | Range = 1 to 5 |
| Need for achievement | 2.8 (1.0) |
| Need for Approval | 2.7 (0.8) |
| Need for Comfort | 3.3 (0.8) |
| Demand for fairness | 3.4 (0.8) |
| Self Downing | 2.0 (1.1) |
| *DEBQ* | Range = 1 to 5 |
| External Eating | 2.6 (0.8) |
| Restrained Eating | 2.7 (1.0) |
| Emotional Eating | 2.0 (1.1) |
| *POMS* | Range = 0 to 4 |
| Depression | 0.0 (1.0) |
| Anger | 0.0 (0.0) |
| Vigour | 1.4 (1.0) |
| Fatigue | 0.8 (1.0) |

*IFBQ*- Food Intake and Beliefs Questionnaire
*PAID*- Problem Area In Diabetes
*SGABS*- Shortened General Attitude Belief Scale
*DEBQ*- Dutch Eating Behaviour Questionnaire
*POMS*- Profile of Mood States

### 4.3.2 Behavioural analysis

*Reaction Time*

The length of time it took participants to make emotional responses about food (reaction time) was not affected by the type of belief they held, $F$ (1,18) = .44, $p$ = .51, $\eta^2$ = .024 (see Table 4.3). There was however a significant main effect of food type, $F$ (2,36) = 11.04, $p$ = .0001, $\eta^2$ = .380, indicating that reaction time varied, based on the type of food presented. Pairwise comparisons with Bonferroni correction revealed delayed reaction times in response to high fat savoury foods compared with high fat sweet foods, $p$ < 0.0001 and low calorie foods, $p$ = .047. There was no significant interaction effect between belief and food type, $F$ (2,36) = 1.81, $p$ =.18, $\eta^2$ = .091, on reaction time.

Table 4.3
*Reaction time (msec) of emotional response to food type*

| Variables | Mean (*SE*) |
|---|---|
| Irrational | 697.8 (124.8) |
| Rational | 728.7 (214.5) |
| High fat savoury | 765.9 (148.9) |
| High fat sweet | 668.9 (162.7) |
| Low calorie | 705.1 (146.2) |

*Emotional response: Picture ratings*

Multinomial logistic regression was performed to determine which emotion(s) (content, pleased, regretful and guilty) participants' chose most frequently given a belief and/or food type (see Table 4.4). The regression model using guilt as a reference, showed a significant relationship between the predictor variables (belief and food type) and the outcome variable (emotional response). The model fit was significant, $\chi^2$ = (9) 3310.86, $p$<0.0001, indicating that the full model (with the predictor variables belief and food type) predicted emotional responses significantly better than the null model (with no predictor variables). The likelihood ratio tests also showed that belief and food type were both significant (p<0.0001) contributors to explaining the differences in emotional responses. Thus, belief and food type were useful predictors for distinguishing between the emotional responses made by participants as they differentiated guilt (reference category) relative to the other three emotional responses; content, pleased and regret.

Compared with priming with rational beliefs, when participants were primed with irrational beliefs (irrespective of food type), they were more likely to report feeling content (OR = 1.32, 95%CI = 1.15, 1.52) or pleased (OR = 1.6, 95%CI = 1.38, 1.82) relative to feeling guilty. There was no significant difference between feeling regretful and feeling guilty (see Table 4.4). In relation to food type (irrespective of belief type), participants were less likely to report feeling content relative to feeling guilty when they imagined themselves eating high fat savoury (OR = 0.07, 95%CI = 0.06, 0.09) or high fat sweet foods (OR = 0.02, 95%CI = 0.01, 0.02) compared with low calorie foods (see Table 4.5). Also, compared with low calorie foods, when they imagined

themselves eating high fat savoury and high fat sweet foods they were less likely to report feeling pleased relative to feeling guilty (OR = 0.05, 95%CI = 0.04, 0.06 and OR = 0.01, 95%CI = 0.008, 0.013 respectively). Finally, compared with low calorie foods, when participants imagined themselves eating high fat savoury and high fat sweet foods, they were less likely to report feeling regretful relative to feeling guilty (OR = 0.42, 95%CI = 0.32, .054 and OR = 0.15, 95%CI = 0.12, 0.20 respectively).

Table 4.4

*Observed frequencies for emotional responses related to beliefs and food type*

| Variables | Frequency | % |
|---|---|---|
| *High fat savoury foods* | | |
| Irrational | | |
| Content | 334 | 24.4 |
| Pleased | 340 | 24.9 |
| Regret | 322 | 23.5 |
| Guilt | 372 | 27.2 |
| Rational | | |
| Content | 284 | 20.8 |
| Pleased | 213 | 15.6 |
| Regret | 509 | 37.2 |
| Guilt | 362 | 26.5 |
| *High fat sweet foods* | | |
| Irrational | | |
| Content | 166 | 12.1 |
| Pleased | 202 | 14.8 |
| Regret | 284 | 20.8 |
| Guilt | 716 | 52.3 |
| Rational | | |
| Content | 135 | 9.9 |
| Pleased | 56 | 4.1 |
| Regret | 348 | 25.4 |
| Guilt | 829 | 60.6 |
| *Low calorie foods* | | |
| Irrational | | |
| Content | 474 | 36.0 |
| Pleased | 654 | 49.7 |
| Regret | 143 | 10.9 |
| Guilt | 46 | 3.5 |
| Rational | | |
| Content | 516 | 37.7 |
| Pleased | 718 | 52.4 |
| Regret | 95 | 6.9 |
| Guilt | 41 | 3.0 |

Table 4.5

*Multinomial analysis of emotional responses related to beliefs and food type*

| Emotion [a] | *B* | *SE* | *p* | OR (95% Confidence Interval) |
|---|---|---|---|---|
| Content | | | | |
| Irrational belief | .28 | .070 | .0001* | 1.32 (1.15, 1.52) |
| Rational belief | 0[b] | | | |
| High fat savoury | -2.62 | .13 | .0001* | 0.07 (0.06, 0.09) |
| High fat sweet | -4.09 | .13 | .0001* | 0.02 (0.01, 0.02) |
| Low calorie | 0[b] | | | |
| Pleased | | | | |
| Irrational belief | .46 | .07 | .0001* | 1.6 (1.38, 1.82) |
| Rational belief | 0[b] | | | |
| High fat savoury | -3.07 | .12 | .0001* | 0.05 (0.04, 0.06) |
| High fat sweet | -4.59 | .13 | .0001* | 0.01 (0.008, 0.013) |
| Low calorie | 0[b] | | | |
| Regret | | | | |
| Irrational belief | -.11 | .07 | .091 | 0.90 (0.79, 1.02) |
| Rational belief | 0[b] | | | |
| High fat savoury | -.88 | .14 | .0001* | 0.42 (0.32, 0.54) |
| High fat sweet | -1.89 | .13 | .0001* | 0.15 (0.12, 0.20) |
| Low calorie | 0[b] | | | |

[a]The reference category is: Guilt.

[b] This parameter is set to zero because it is redundant

* *p* is significant at 0.0001

### 4.3.3 Event related potential (ERP) analysis

Repeated measures ANOVA analysis using a 2 (beliefs- rational and irrational) x 2 (hemisphere- left and right) x 3 (food type- high fat savoury, high fat sweet and low calorie) factorial design was performed on peak amplitude values and peak latency values. Midline components were analysed using repeated measures ANOVA analysis with a 2 (beliefs- rational and irrational) x 3 (food type- high fat savoury, high fat sweet and low calorie) factorial design. Results of the peak latency values showed no significant main effects or interaction effects for any of the components investigated (P100, P200, P300b, and LPP frontal and posterior). Thus, this was omitted from subsequent analysis and is not reported or discussed further. Results for peak amplitude values are presented in the following pages. Overall, food type elicited differences in amplitude but beliefs did not elicit differences at any of the peaks tested. Grand average ERP waveforms at different electrode sites for rational and irrational belief and Current Source Density (CSD) topographical map of grand average waveforms for each component are presented in Figures 4.3 and Figures 4.4, respectively.

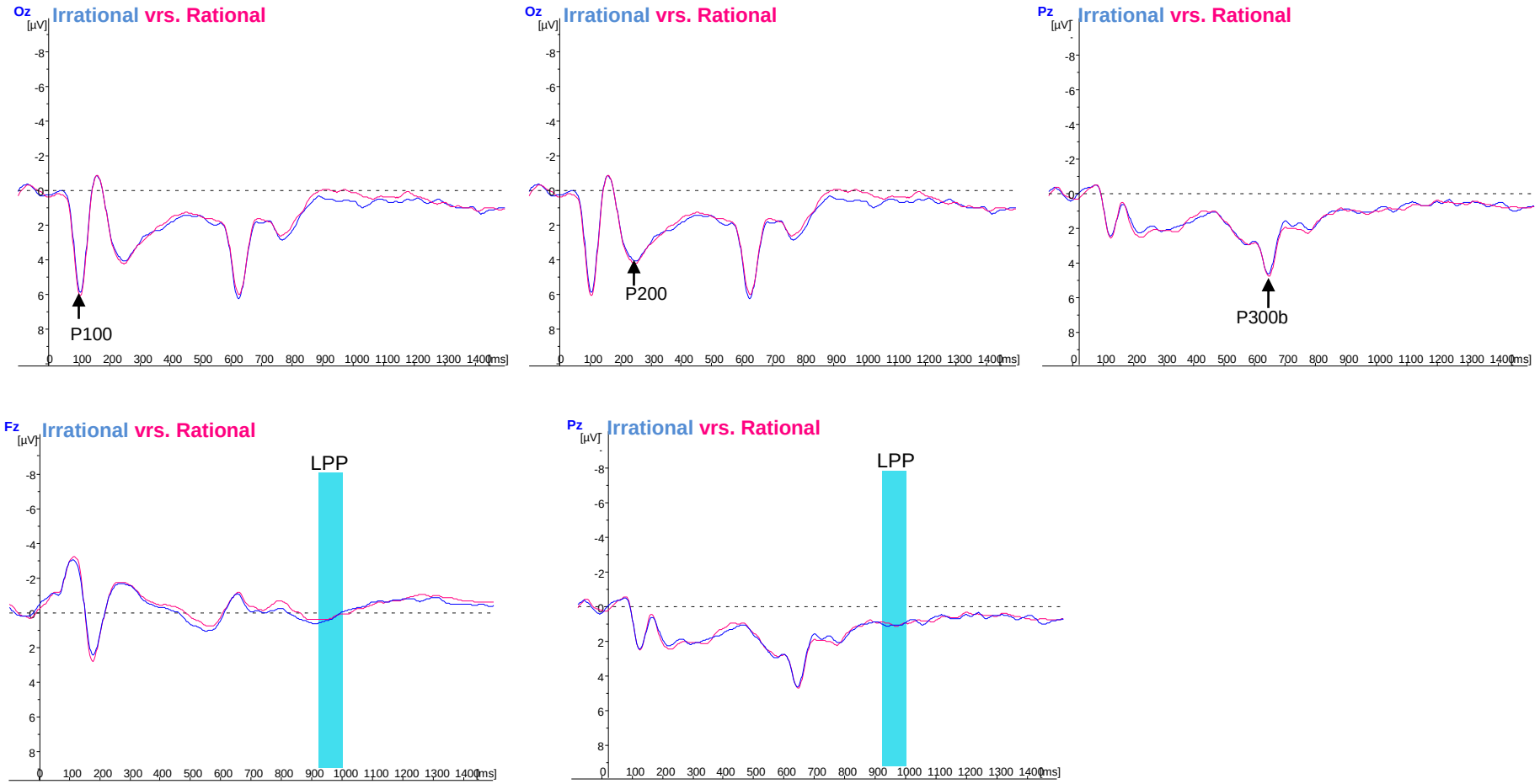


*Figure 4.3*. Grand average waveforms for irrational (blue line) and rational (pink line) beliefs at different electrode sites.

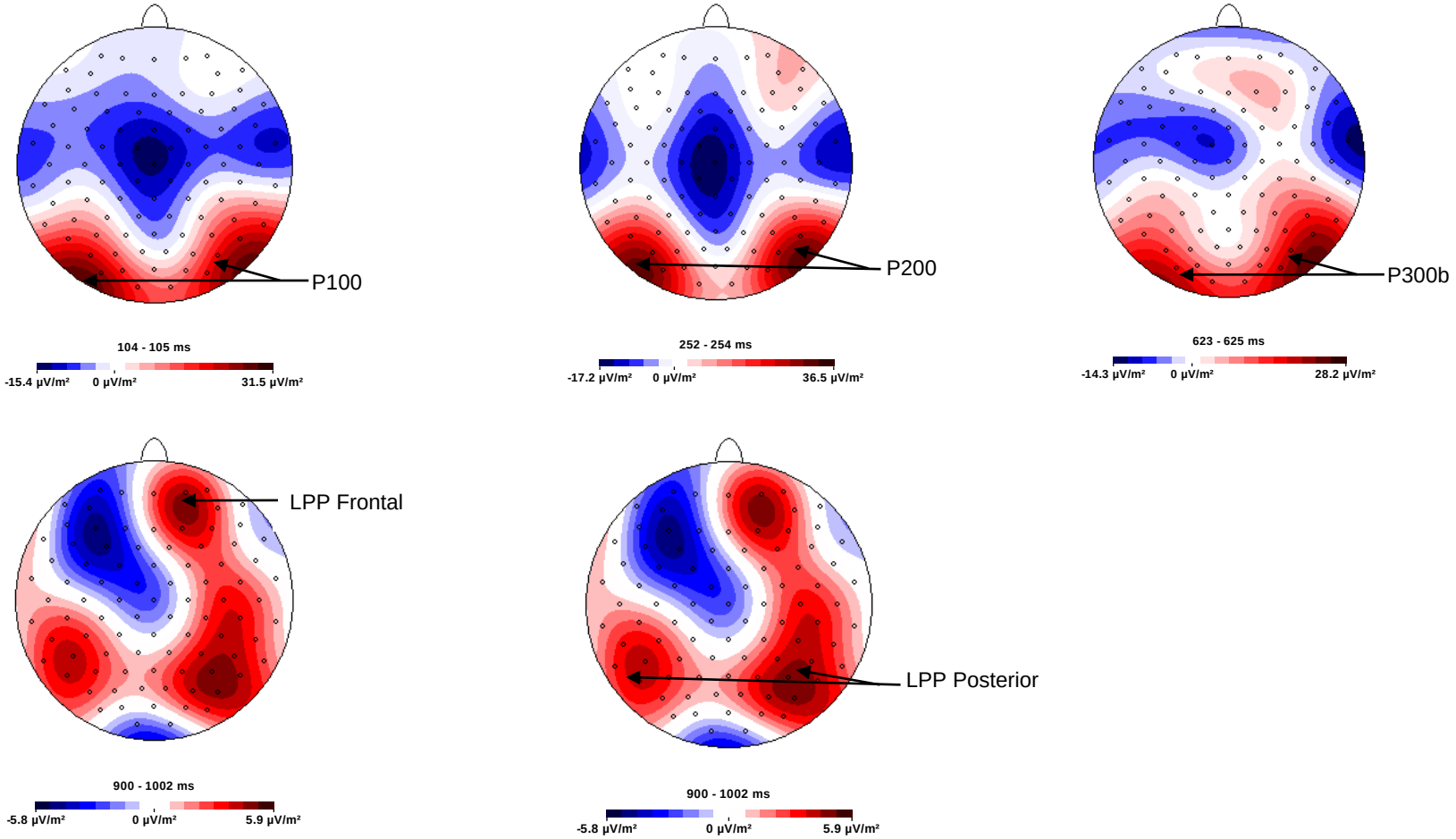


*Figure 4.4.* CSD topographical maps for irrational and rational beliefs grand average waveforms at different electrode sites

*P100 component*

There were no significant main effects of belief, hemisphere or food type on amplitude (see Table 4.6). However, there was a significant interaction for belief x hemisphere x food type. Post-hoc analyses using paired t-tests showed differences between irrational low calorie foods (mean= 7.3) and rational low calorie foods in the right hemisphere (mean = 6.8), however, this did not reach multiple comparison corrected significance levels ($p$ = .04). Type of belief appeared to be the source of this difference but this did not reach statistical significance. Finally, analysis of midline amplitude at P100 showed no significant main effects or interactions of belief and food type, indicating that P100 midline amplitudes were not affected by beliefs and/or food type.

Table 4.6

*Mean (SE) and ANOVA results of P100 amplitudes elicited by belief, hemisphere and food type (n=19)*

| Variables | Mean(*SE*) | F test |
|---|---|---|
| *Posterior amplitude* | | |
| Belief | | $F(1,18) = 1.50$. $p = .24$, $\eta^2 = .077$ |
| Irrational belief | 7.2(1.1) | |
| Rational belief | 7.4(1.1) | |
| Hemisphere | | $F(1,18) = .69$. $p = .42$, $\eta^2 = .037$ |
| Left hemisphere | 7.5 (1.2) | |
| Right hemisphere | 7.0(1.1) | |
| Food type | | $F(2,36) = .24$, $p = .79$, $\eta^2 = .013$ |
| High fat savoury | 7.2(1.1) | |
| High fat sweet | 7.2(1.1) | |
| Low calorie | 7.3(1.1) | |
| Belief x hemisphere | | $F(1,18) = .86$, $p = .37$, $\eta^2 = .046$ |
| Belief x food type | | $F(2,36) = .23$. $p = .80$, $\eta^2 = .013$ |
| Hemisphere x food type | | $F(2,36) = .80$. $p = .42$, $\eta^2 = .043$ |
| Belief x hemisphere x food type | | $F(2,38) = 4.25$. $p = .02$, $\eta^2 = .191$* |
| *Posterior midline amplitude* | | |
| Belief | | $F(1,18) = .88$. $p = .36$, $\eta^2 = .047$ |
| Irrational belief | 6.1(1.1) | |
| Rational belief | 6.3(0.9) | |
| Food type | | $F(2,36) = .25$, $p = .71$, $\eta^2 = .014$ |
| High fat savoury | 6.2(1.1) | |
| High fat sweet | 6.1(1.0) | |
| Low calorie | 6.2(1.0) | |
| Belief x food type | | $F(2,36) = .14$. $p = .87$, $\eta^2 = .008$ |

** p<0.05*

*P200 component*

A significant main effect emerged for food type but not for belief and hemisphere (see Table 4.7). Pairwise comparisons with Bonferroni correction showed larger P200 amplitudes for high fat savoury foods compared with high fat sweet (*p*=.02) and LC foods (p=.01). A significant interaction effect emerged for hemisphere x food type though this was borderline significance. Post-hoc analysis showed larger amplitudes for high fat savoury foods compared with low calorie foods in the left hemisphere, ($p<0.008$) and larger amplitudes for high fat savoury foods compared with high fat sweet foods in the right hemisphere ($p<0.008$) when participants held rational beliefs. Analyses of midline amplitude values showed a significant main effect of food type but not belief. Pairwise comparisons with Bonferroni correction showed significantly larger amplitudes for high fat savoury foods compared with low calorie foods (*p* = .001). Grand average ERP waveforms for food type at P200 and CSD topographical map from grand average waveforms are presented in Figures 4.5 and 4.6, respectively. No significant interactions of belief x food type emerged at midline.

Table 4.7

*Mean (SE) and ANOVA results of P200 amplitudes elicited by belief, hemisphere and food type (n=19)*

| Variables | Mean(*SE*) | F test |
|---|---|---|
| *Posterior amplitude* | | |
| Belief | | $F(1,18) = .00.\ p = .97,\ \eta^2 = .000$ |
| Irrational belief | 5.5(0.7) | |
| Rational belief | 5.6(0.7) | |
| Hemisphere | | $F(1,18) = 1.83.\ p = .19,\ \eta^2 = .092$ |
| Left hemisphere | 5.4(0.7) | |
| Right hemisphere | 5.7(0.7) | |
| Food type | | $F(2,36) = 8.13,\ p = .001,\ \eta^2 = .311$* |
| High fat savoury | 6.0(0.7) | |
| High fat sweet | 5.3(0.7) | |
| Low calorie | 5.4(0.7) | |
| Belief x hemisphere | | $F(1,18) = .14,\ p = .71,\ \eta^2 = .008$ |
| Belief x food type | | $F(2,36) = .64,\ p = .53,\ \eta^2 = .034$ |
| Hemisphere x food type | | $F(2,36) = .3.75,\ p = .054,\ \eta^2 = .172$* |
| Belief x hemisphere x food type | | $F(2,36) = .38,\ p = .69,\ \eta^2 = .020$ |
| *Posterior midline amplitude* | | |
| Belief | | $F(1,12) = .18,\ p = .74,\ \eta^2 = .006$ |
| Irrational belief | 5.3(0.8) | |
| Rational belief | 5.2(0.8) | |
| Food type | | $F(2,36) = .6.39.\ p = .004,\ \eta^2 = .262$* |
| High fat savoury | 5.6(0.8) | |
| High fat sweet | 5.2(0.8) | |
| Low calorie | 4.9(0.8) | |
| Belief x food type | | $F(2,36) = .07.\ p = .93,\ \eta^2 = .004.$ |

** p<0.05*

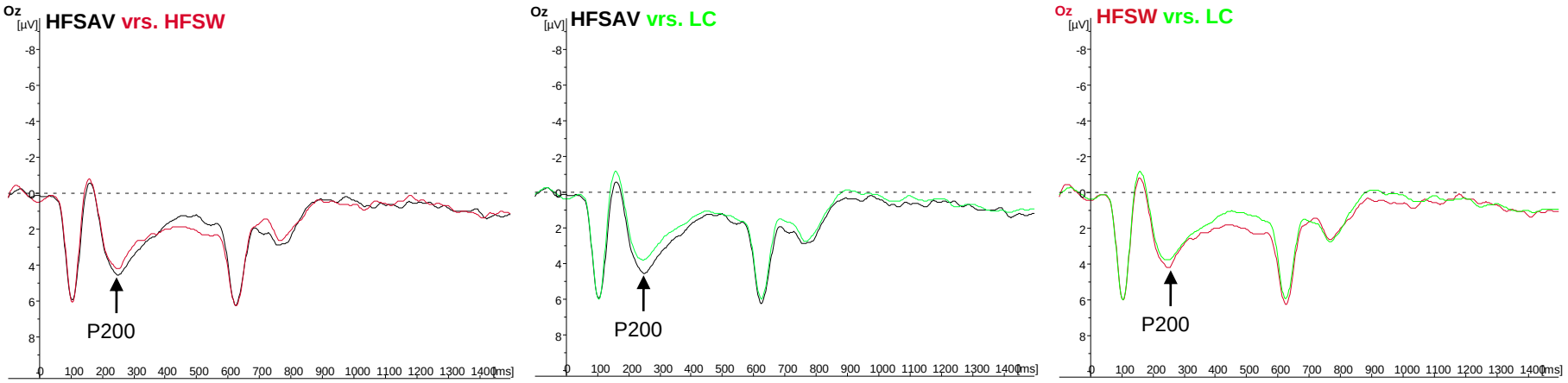


*Figure 4.5.* Grand average waveforms at P200 computed from Oz, comparing high fat savoury (HFSAV, black line), high fat sweet (HFSW, red line) and low calorie (LC, green line) foods

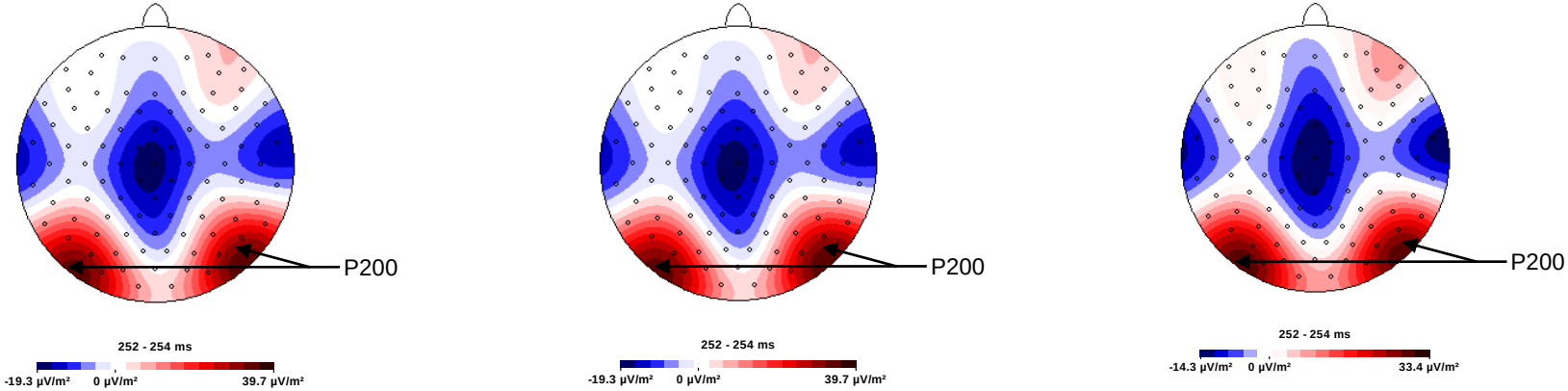


*Figure 4.6.* CSD topographical maps at P200 for corresponding grand average waveforms.

*P300b component*

Analyses of P300b amplitude values showed no significant main effects or interactions emerging for belief, hemisphere, or food type on amplitude except for a non-significant trend in the expected direction for hemisphere and food type (see Table 4.8). When participants held irrational beliefs, there were larger amplitudes in the right hemisphere (mean = 6.0) than the left hemisphere (mean = 5.20) for high fat savoury foods and larger amplitudes in the right hemisphere (mean = 5.90) than the left hemisphere (mean = 5.0) for low calorie foods. Midline amplitude analyses also showed no significant main effects or interactions of belief and food type, indicating that the variables did not produce variations in amplitude levels.

Table 4.8

*Mean (SE) and ANOVA results of P300b amplitudes elicited by belief, hemisphere and food type (n=19)*

| Variables | Mean(*SE*) | F test |
|---|---|---|
| *Posterior amplitude* | | |
| Belief | | $F(1,18) = .04$, $p = .85$, $\eta^2 = .002$ |
| Irrational belief | 5.6(0.7) | |
| Rational belief | 5.7(0.8) | |
| Hemisphere | | $F(1,18) = 2.57$, $p = .13$, $\eta^2 = .125$ |
| Left hemisphere | 5.4(0.7) | |
| Right hemisphere | 6.0(0.8) | |
| Food type | | $F(2,36) = .38$, $p = .69$, $\eta^2 = .021$ |
| High fat savoury | 5.7(0.7) | |
| High fat sweet | 5.7(0.7) | |
| Low calorie | 5.6(0.7) | |
| Belief x hemisphere | | $F(1,18) = 2.80$, $p = .11$, $\eta^2 = .135$ |
| Belief x food type | | $F(2,36) = 2.25$, $p = .12$, $\eta^2 = .111$ |
| Hemisphere x food type | | $F(2,36) = 2.76$, $p = .08$, $\eta^2 = .133$ |
| Belief x hemisphere x food type | | $F(2,36) = 1.43$, $p = .25$, $\eta^2 = .073$ |
| *Posterior midline amplitude* | | |
| Belief | | $F(1,18) = .29$, $p = .60$, $\eta^2 = .016$ |
| Irrational belief | 4.9(0.7) | |
| Rational belief | 5.1(0.7) | |
| Food type | | $F(2,36) = 62$, $p = .54$, $\eta^2 = .033$ |
| High fat savoury | 5.0(0.5) | |
| High fat sweet | 5.2(0.8) | |
| Low calorie | 4.8(0.7) | |
| Belief x food type | | $F(2,36) = 1.43$, $p = .25$, $\eta^2 = .074$ |

*LPP component- Frontal*

The mean late positive potential (LPP) activity from 900 to 1000 ms was investigated as the LPP is a slow wave activity without any discernible peak. Thus, data was obtained from the mean amplitude rather than peak amplitude. A significant main effect emerged for food type but not belief and hemisphere (see Table 4.9). Pairwise comparisons with Bonferroni correction revealed larger LPP amplitudes for high fat savoury foods compared with low calorie foods ($p$ =.02). Grand average ERP waveforms for food type at LPP frontal and CDS topographical map of grand average waveforms are presented in Figures 4.7 and 4.8, respectively. No significant interaction effects emerged. Midline amplitude analysis produced no significant main effects or interactions of belief and food type, indicating that belief and/or food type did not affect midline amplitude levels.

Table 4.9

*Mean (SE) and ANOVA results of LPP Frontal amplitudes elicited by belief, hemisphere and food type (n=19)*

| Variables | Mean(*SE*) | F test |
|---|---|---|
| *Frontal amplitude* | | |
| Belief | | $F(1,18) = 2.10$, $p = .17$, $\eta^2 = .104$ |
| Irrational belief | 1.4(0.2) | |
| Rational belief | 1.2(0.2) | |
| Hemisphere | | $F(1,18) = .21$, $p = .65$, $\eta^2 = .011$ |
| Left hemisphere | 1.2(0.2 | |
| Right hemisphere | 1.3(0.2) | |
| Food type | | $F(2,36) = 5.55$, $p = .02$, $\eta^2 = .236$* |
| High fat savoury | 1.5(0.2) | |
| High fat sweet | 1.2(0.2) | |
| Low calorie | 1.2(0.2) | |
| Belief x hemisphere | | $F(1,18) = .06$, $p = .82$, $\eta^2 = .003$ |
| Belief x food type | | $F(2,36) = 1.63$, $p = .21$, $\eta^2 = .083$ |
| Hemisphere x food type | | $F(2,36) = 1.43$, $p = .25$, $\eta^2 = .074$ |
| Belief x hemisphere x food type | | $F(2,36) = 1.97$, $p = .15$, $\eta^2 = .099$ |
| *Frontal midline amplitude* | | |
| Belief | | $F(1,18) = 2.14$, $p = .16$, $\eta^2 = .106$ |
| Irrational belief | 1.4(0.2) | |
| Rational belief | 1.2(0.2) | |
| Food type | | $F(2,36) = 2.40$, $p = .11$, $\eta^2 = .118$ |
| High fat savoury | 1.5(0.2) | |
| High fat sweet | 1.1(0.2) | |
| Low calorie | 1.2(0.2) | |
| Belief x food type | | $F(2,36) = .1.97$, $p = .15$, $\eta^2 = .099$ |

** p<0.05*

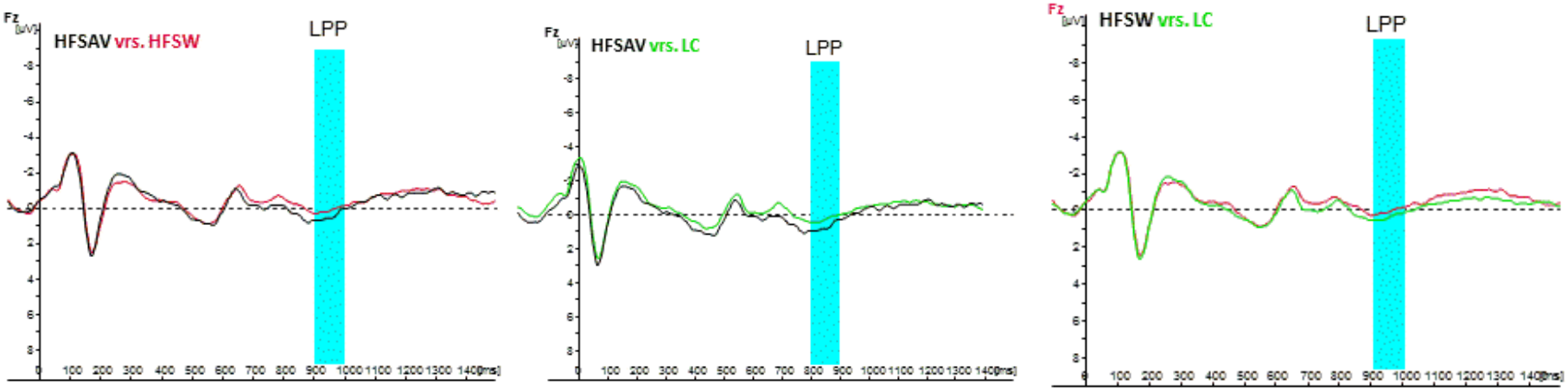


*Figure 4.7.* Grand average waveforms at LPP Frontal computed from Fz, comparing high fat savoury (HFSAV, black line), high fat sweet (HFSW, red line) and low calorie (LC, green line) foods

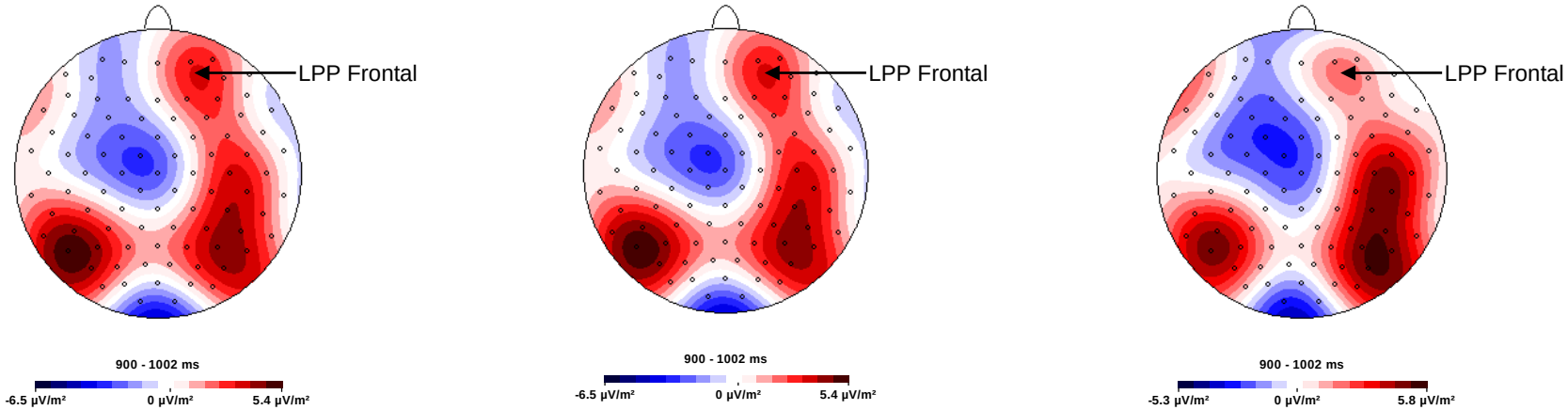


*Figure 4.8.* CSD topographical maps at LPP Frontal for corresponding grand average waveforms.

*LPP component- Posterior*

As reported above, data for this component was obtained for mean amplitude rather than peak amplitude. A significant main effect emerged for food type but not belief and hemisphere (see Table 4.10). Mean amplitude for high fat savoury foods was larger compared with high fat sweet and low calorie foods, but pairwise comparisons with Bonferroni correction showed no significant difference between the means (high fat savoury and high fat sweet, $p$=.80; high fat savoury and low calorie, $p$= .10; high fat sweet and low calorie, $p$=.29). No significant interaction effects emerged. Midline amplitude analysis showed no significant main effects or interactions of belief and food type, indicating that belief and/or food type did not affect midline amplitude values.

Table 4.10

*Mean (SE) and ANOVA results of LPP Posterior amplitudes elicited by belief, hemisphere and food type (n=19)*

| Variables | Mean(*SE*) | F test |
|---|---|---|
| *Posterior amplitude* | | |
| Belief | | $F(1,18) = .87$, $p = .36$, $\eta^2 = .046$ |
| Irrational belief | 1.4(0.2) | |
| Rational belief | 1.6(0.2) | |
| Hemisphere | | $F(1,18) = 1.29$, $p = .27$, $\eta^2 = .067$ |
| Left hemisphere | 1.5(0.2) | |
| Right hemisphere | 1.6(0.2 | |
| Food type | | $F(2,36) = 3.48$, $p = .04$, $\eta^2 = .16$* |
| High fat savoury | 1.7(0.2) | |
| High fat sweet | 1.6(0.2) | |
| Low calorie | 1.3(0.2) | |
| Belief x hemisphere | | $F(1,18) = 1.03$, $p = .32$, $\eta^2 = .054$ |
| Belief x food type | | $F(2,36) = 1.15$, $p = .33$, $\eta^2 = .060$ |
| Hemisphere x food type | | $F(2,36) = .32$, $p = .73$, $\eta^2 = .017$ |
| Belief x hemisphere x food type | | $F(2,36) = .33$, $p = .90$, $\eta^2 = .060$ |
| *Posterior midline amplitude* | | |
| Belief | | $F(1,18) = 1.68$, $p = .21$, $\eta^2 = .085$ |
| Irrational belief | 1.4(0.2) | |
| Rational belief | 1.8(0.3) | |
| Food type | | $F(2,36) = 1.79$, $p = .18$, $\eta^2 = .091$ |
| High fat savoury | 1.8(0.3) | |
| High fat sweet | 1.5(0.2) | |
| Low calorie | 1.5(0.2) | |
| Belief x food type | | $F(2,36) = .53$, $p = .59$, $\eta^2 = .029$ |

**p<0.05*

## 4.4 Discussion and conclusion

### 4.4.1 Overview

Food type produced differences in electrocortical processes but priming with beliefs did not have an effect. Food type enhanced larger amplitudes at the P200 component, suggesting attentional bias towards high fat savoury food compared to high fat sweet and low calorie foods. Emotional evaluation of food type was also evident with larger amplitude for high fat savoury foods compared with low calorie foods at LPP frontal sites. These finding were supported by behavioural data showing delayed reaction time to high fat savoury foods compared with high fat sweet and low calorie foods. Contrary to the REBT theory, positive emotions (pleased and content) were associated with irrational beliefs, relative to guilt. However, in relation to food type, relative to feeling content, pleased, or regretful, guilt was associated with high fat savoury and high fat sweet foods compared with low calorie foods.

### 4.4.2 Behavioural effect of belief

*Reaction time to rational and irrational beliefs*

Priming with rational or irrational beliefs did not affect reaction time of food picture rating, suggesting that type of belief did not play a role in the time it took to respond to the food pictures. This finding may indicate that either belief had no effect or that priming with beliefs was not effective enough to produce significant differences. However, belief was a useful predictor for distinguishing emotional responses made, suggesting that priming with beliefs was effective.

*Emotional response to rational and irrational beliefs*

Relative to the emotion guilt, the emotions contented and pleased were associated with irrational beliefs compared with rational beliefs which contradicts the REBT hypothesis that holding irrational beliefs are associated with unhealthy negative emotions such as guilt (Ellis, 1962; Dryden, 2009). The question then is why were positive emotions associated with irrational beliefs relative to guilt? A possible explanation may be the type of task used in the present experiment. Participants were primed with irrational beliefs and then asked to imagine themselves eating foods shown on the computer screen, to which they then made emotional responses. It is possible that they may have responded to how they would feel *immediately* after imagining themselves eating the foods as opposed to how they would feel much *later* when they had given thought to what they had 'eaten' and its consequences.

In Chapter 2 participants reported that when they ate foods that were not recommended, they enjoyed it (perhaps feeling pleased or content) until sometime afterwards, when they reflected on their behaviour and its consequences, and then they began to feel guilty. As one participant mentioned, she blocks the guilt out while eating and it is only afterwards that "*the guilt comes flooding in*". Thus in the present study, the emotions pleased and content may have been immediate emotional responses to the food pictures (while holding irrational beliefs) which may differ from a more reflective latter emotional response. One may argue that on average the sample tested in the present study had better controlled diabetes (mean HbA1c= 6.1%) than those interviewed in Chapter 2 (mean HbA1c= 8.6%) and therefore an

inference cannot be made from Chapter 2 to the present study. However, in Chapter 2 individuals who were fairly well controlled still reported challenges with dietary self-care. It is possible that holding irrational beliefs brings frustration, anger and depression (as reported in Chapter 2) and so people may get fed up and not care when they go contrary to their recommended diet (until later), and experience positive emotions. Associating positive emotions with irrational beliefs relative to guilt, suggests that irrational beliefs may play a role in dietary intake. However, the RBET model may not be an appropriate model to understand and explain the role of beliefs in dietary intake, with the available data.

### 4.2.3 Beliefs and event related potentials

Rational and irrational beliefs did not elicit differences in ERPs amplitudes. Although differences were evident in the right hemisphere at P100 between irrational beliefs towards low calorie foods and rational beliefs towards low calorie foods, this was not significant. One could argue that perhaps priming with beliefs may not have been effective because priming occurred at the beginning of each block of 48 trials rather than on trial by trial basis. One could also argue that participants may have been unable to hold the irrational beliefs because ratings of the extent to which they held the beliefs during experimentation demonstrated that they were better able to hold rational beliefs than irrational beliefs. Nonetheless, the fact that beliefs had an effect on emotional responses suggest that priming was effective but could not produce electrocortical differences.

### 4.4.4 Behavioural effect of food type

*Reaction time to food type*

Delayed response to high fat savoury compared with high fat sweet and low calorie foods suggests reaction time was determined by food type. Participants took longer to respond to high fat savoury foods compared to the other food types. Of interest is the difference in reaction time for high fat savoury and high fat sweet foods. People with type 2 diabetes are recommended to eat more of low calorie foods and less of high calorie foods (ADA, 2003) to improve weight management and diabetes control, and prevent long term complications. Thus, one would have expected differences between just high calorie and low calorie foods. However, biased attention towards high fat savoury, compared with high fat sweet foods suggested that participants distinguished between the two high calorie foods, perhaps with the former having a more negative or unpleasant connotation, hence the delayed reaction time.

Given that food pictures for all three food types were rated as appetizing suggests that differences in reaction time may have resulted from differences in their calorific content. Reaction time to high fat sweet and low calorie foods did not differ, suggesting that though the former are high in calories, perhaps they were perceived as less of a threat to health. Low calorie foods are recommended (for regular consumption) for people with type 2 diabetes and this may explain the absence of biased attention to this food type. Also, participants in the present study were fairly well controlled (HbA1c≤8.0%) and perhaps more aware of the consequences of eating high fat sweet foods (increased glycaemia) and hence did not perceive them in a negative way compared to high fat savoury foods. Further, although excess

intake of fatty foods does not directly affect glycemic levels, it is associated with cardiovascular diseases, obesity and cancers. Obesity on the other hand is associated with increased insulin resistance which could also explain the biased attention to high fat savoury foods.

*Emotional response to food type*

Food type was a useful predictor of emotional responses. Relative to feeling content, pleased, or regretful, guilt was associated with high fat savoury and high fat sweet foods compared to low calorie foods (irrespective of belief type). The association of high calorie foods with guilt is consistent with other studies that have reported high calorie foods to be associated with negative emotions. For example, when women imagined themselves eating foods depicted in pictures, they associated more guilt with high calorie foods and more positive or neutral emotions with low calorie foods (Rousset, Deiss, Julliard, Schlich, & Droit-Volet, 2005). Although this study was conducted with healthy controls who (compared to people with diabetes) are not complied by health reasons to follow a recommended diet, participants still associated guilt with high calorie foods probably for health reasons.

Other studies (e g. Decoster, 2003; Penckofer et al.,2007; Travis, 1997) have also reported that people with diabetes felt guilty when they ate foods (e.g. sweets) which were not part of their daily recommended diet. Again, in Chapter 2 of this thesis, all participants (except one) associated guilt with eating high calorie foods such as, fast foods, chocolates, crisps cakes and cream cakes. As mentioned before, the feeling of guilt was experienced much later after the food had been eaten. The present

findings add support to existing literature about emotional response to high calorie foods which are not recommended for regular consumption, compared to low calorie foods for people with type 2 diabetes.

### 4.4.5 Food type and event related potentials

Delayed reaction time to high fat savoury foods reflected in electrocortical processing at P200 and LPP frontal but not at P100, P300b and LPP posterior. At P200 posterior sites, larger amplitudes were elicited for high fat savoury foods compared with high fat sweet and low calorie foods. At P200 midline sites, larger amplitude for high fat savoury foods compared with low calorie foods was recorded. Enhanced P200 amplitude was also lateralised. High fat savoury foods elicited larger amplitudes compared with low calorie foods in the left hemisphere, while high fat savoury foods elicited larger amplitudes compared with high fat sweet foods in the right hemisphere. This suggests that during early stages of information processing, participants may have allocated more attentional resources to high fat savoury foods (Nijs et al., 2010) based on its calorific content and perhaps its effect on dietary self-care and diabetes control.

Amplitude differences at P200 corroborate other findings that have reported attention salience to food stimuli at P200. For example, food-related words enhanced P200 amplitudes in obese people compared with normal weight people (Nijs et al., 2010). The present finding also supports previous findings of larger amplitudes in the posterior and central sites for high calorie foods compared with low calorie foods (Blechert et al., 2011; Nijs et al., 2010). Leland and Pineda (2006) found that larger

amplitudes at P200 for food cues compared with neutral cues, suggested salience to food words or more efficient classification of food stimuli. Thus the present findings suggest that high fat savoury foods were more salient to people with type 2 diabetes (Chechlacz et al., 2009).

The P200 component is also modulated by stimulus classification (Garcia-Larrea et al., 1992) and emotional valance of stimuli. For example, Carretié, Martin-Loeches, Hinojosa, & Mercado, (2001) demonstrated that P200 was enhanced in students when they responded to negative emotion stimuli compared to positive emotion stimuli. Other studies have also reported larger P200 amplitude for negative/ unpleasant stimuli than positive/ pleasant stimuli (e.g. Delplanque, Lavoieb, Hota, Silverta, & Sequeiraa, 2004; Doallo, Holguin, & Cadaveira, 2006; Olofsson & Polich, 2007). In the present study, high fat savoury foods may have been classified differently from the other food types, perhaps as an unpleasant stimuli and/ a threat to dietary self-care and diabetes control, hence the enhanced P200 amplitudes. This finding suggests a negativity bias (Carretié et al., 2001; Delplanque et al., 2004) towards high fat savoury foods at P200. Further research is however needed to confirm this negativity bias.

Hemispheric differences at P200 posterior electrode sites suggest that both hemispheres processed food type differently. This corroborates other studies (Paulmann & Kotz, 2008; Paulmann & Pell, 2009) that have also found that enhanced amplitudes differ for emotional and neutral stimuli in the left and right hemispheres. It is uncertain why both hemispheres processed high fat sweet and

low calorie food differently, however, this finding supports findings by Paulmann and Kotz (2009). They found that although larger amplitudes were recorded for emotional words than neutral words, amplitudes in the two hemispheres were enhanced by different emotion words. Inferring from this, although high fat savoury and high fat sweet foods are high in calories, electrocortical processing differed in the two hemispheres perhaps due to the calorific content of the foods.

Larger amplitude was recorded for high fat savoury foods compared with low calorie foods at LPP frontal sites. LPP is modulated by emotional valence and is larger for emotionally intense stimuli (Cuthbert, Schupp, Bradley, Birbaumer, & Lang, 2000). Thus, the present finding suggests that high fat savoury foods may have been emotionally more salient than low calorie foods (Gable & Harman-Jones, 2010). This corroborates other findings that have also reported LPP frontal amplitudes to be larger for both negative and positive stimuli during evaluative judgement tasks (Cunningham, Espinet, DeYoung, & Zelazo, 2005) and for pleasant and unpleasant stimuli (Hajcak & Olvet, 2008; Schupp et al., 2000).

Food type did not produce differences in amplitude at P100. Considering that P100 modulates (visual) attentional bias, this suggests that equal visual attentional resources were allocated to all three food types. This finding is contrary to previous findings that emotional content of stimuli causes attentional bias towards negative stimuli (with larger P100 amplitude) compared to positive stimuli (Carretié, Hinojosa, & Marcado, 2006; Delplanque et al., 2004; Smith, Cacciopo, Larsen, & Chartrand, 2003). P100 peaks at the initial stage of information processing and it may well be

that in the present study, early visual processing of food type did not differ. This suggests that participants evaluated the different foods types as equally. The absence of differences in amplitude at LPP posterior is also contrary to previous studies which have found enhanced amplitude at LPP posterior for both positive and negative stimuli (e.g. Cacioppo, Crites, & Gadner, 1996).

At P300, there was a non-significant trend recorded for hemisphere and food type. Enhanced P300 amplitude was lateralised as high fat savoury and low calorie foods elicited larger amplitudes in the right hemisphere than that in the left hemisphere. Perhaps evaluative processing and food differentiation may have started earlier at P300, but did not reach significance until later on at LPP frontal. Given that P300 reflects decision making, modulating increased attention, evaluative processes and motivational salience, one would have expected that the calorific content of the food stimuli in the present study would affect cortical processes involved at P300. However, the present findings suggest that evaluative processing and/ motivational salience toward food type was not evident.

Differences were recorded at P200 and later at LPP frontal but not at P300. Though the reasons for these findings are not known, one may speculate that perhaps participants may be conditioned that high calorie foods are not part of their regular diet. Hence, their immediate response to high calorie foods is possibly with the thought that, 'this is not good for me', which may account for differences at the early stages of information processing (P200). This thought is perhaps then discarded (absence of difference at P300) until participants begin to distinguish between high

calorie and low calories foods at LPP frontal. However, this does not explain the difference found between high fat savoury and high fat sweet foods. These findings need further examination.

### 4.4.6 Limitations and recommendations for future research

The current study had a number of limitations. First, the study did not test healthy controls to compare them with people with type 2 diabetes. Thus one cannot conclude whether or not these findings are specific to people with type 2 diabetes. Future studies could compare people with type 2 diabetes and healthy controls, to investigate if holding rational or irrational beliefs will differ in the two groups. Electrocortical processing of the food type can be investigated to establish if healthy controls will also make a distinction between high fat savoury foods and high fat sweet foods. In spite of the above, the study offers new insight into the effect of beliefs and calorific content of food stimuli on electrocortical processes among people with type 2 diabetes.

Second, the sample size tested in this study was relatively small (N= 19). Future studies replicating the present study could test a larger sample size. For instance, there was a non-significant trend at P300 for food type and P100 for type of belief. Perhaps testing a lager sample size could confirm any significant or non-significant differences at these time windows. In spite of this limitation, the present study sets the stage for further studies to be conducted, especially as it provides information about the distinction made between high fat savoury food and high fat sweet foods.

Third, the sample used had fairly well controlled diabetes (HbA1c = 6.1%) and therefore findings cannot be generalised to people with poorly controlled diabetes. Future studies could compare well controlled and poorly controlled people, to assess the effect of diabetes control on priming with beliefs and the impact on emotional responses. This will determine whether or not poorly controlled people will also associate positive emotions with irrational beliefs.

Finally, the number of food pictures per block may have made priming with beliefs less effective. Though priming was done in-between blocks, it may have been difficult for participants to continue holding a belief while viewing and responding to 48 food pictures at a time. Regardless of this, beliefs showed differences in emotional response to food pictures. Future studies should consider reducing the number of pictures per block for more effective priming or prime on trial-by-trial bases.

### 4.4.7 Implications for clinical practice

In this study, guilt was associated with high fat savoury and high fat sweet foods compared to low calorie foods, demonstrating how participants may feel about eating high calorie foods. Most importantly a distinction was evident in the electrocortical processing of the two high calorie food types, with high fat savoury foods being processed as perhaps negative or unpleasant stimuli. People with type 2 diabetes are recommended to eat high calorie foods in moderation because they are commonly known to worsen their diabetes control and contribute towards the development of other health problems such as cardiovascular disease and certain

types of cancer. However, the present findings suggest that people may be more concerned about high fat savoury foods than high fat sweet foods. Thus, healthcare professionals in their education could emphasis with equal importance the health implications of both types of high calorie foods and also emphasise that these foods are not forbidden but permitted in moderation.

Also, it is important that healthcare professionals are able to determine the type of beliefs people hold about their dietary intake and educate them on holding more positive cognitions about dietary intake in spite of challenges with maintaining good dietary self-care.

### 4.4.8 Conclusion

This study is the first to offer insight into the electrocortical processing of rational and irrational beliefs, and calorific food content, in people with type 2 diabetes. High fat savoury and high fat sweet foods are both high in calories but people with type 2 diabetes made a distinction between them. This was evident in larger amplitude recorded for high fat savoury compared to high fat sweet and low calorie foods. The difference between high fat savoury foods and high fat sweet foods was also evident in behavioural responses with delayed reaction time to high fat savoury foods. However, emotional response to food type was different as high fat savoury and high fat sweet foods were both associated with guilt, (relative to feeling content, pleased, or regretful) compared to low calorie foods. Though rational and irrational beliefs did not affect electrocortical processing of food pictures, irrational beliefs were associated with positive emotions rather than unhealthy negative emotions,

suggesting that beliefs regarding dietary intake in people with type 2 diabetes does not appear to closely fit the REBT model

# CHAPTER 5: GENERAL DISCUSSION

## 5.1 Discussion

### 5.1.1 Overview

Dietary self-care is a key component in the treatment of type 2 diabetes but for many people it continues to be a challenge. Negative emotions are one of the barriers to dietary self-care, and had not been previously explored in relation to diabetes. In the first study. people with type 2 diabetes shared their lived experiences with maintaining dietary self-care. They recounted challenges they faced and the negative emotions they experienced when they tried to follow their diet. Beliefs which they reported to be associated with negative emotions were used to develop a questionnaire in the second study, to investigate the role of rational and irrational beliefs in dietary self-care.

People with type 2 diabetes held diabetes-related rational and irrational food beliefs concurrently. Diabetes-related irrational food beliefs were associated with distress about dietary restrictions, dietary self-care activities, as well as dietary self-efficacy suggesting that irrational beliefs may play a role in dietary self-care. In the third study, the role of rational and irrational beliefs in dietary intake was further tested by investigating their effect on electrocortical processing and emotional responses using food pictures. Beliefs did not affect electrocortical processing. However, in terms of emotional responses, irrational beliefs were associated with positive emotions, relative to guilt. While guilt was associated with high calorie foods (relative to feeling content, pleased, or regretful), electrocortical processing for high fat savoury and high fat sweet foods differed as the former elicited larger amplitudes in brain

activation. This thesis explored phenomena that have not been previously investigated providing insight for future considerations.

### 5.1.2 Summary of main findings

In the qualitative study (Chapter 2), findings suggested that negative emotions were associated with people's ability to follow and maintain their recommended diet. When they tried to follow their diet, people with type 2 diabetes reported feeling restricted (Mathew et al., 2012; Peres et al., 2008; Sherman et al., 2000; Yannakoulia, 2006), because they felt that their preferred foods were 'forbidden'. They also felt their family and friends restricted their dietary intake which made them feel frustrated, angry, and depressed because they felt they could not be "normal".

Poor dietary self-care resulted from social situations such as eating out, family gathering, and going on holidays (Galasso et al., 2005; Hall et al., 2003; Savoca & Miller, 2001; Vijan et al., 2005 Vinter-Replaust et al., 2004), personal problems, and low dietary self-efficacy (Ary et al., 1986; Early et al., 2009; Savoca & Miller, 2001). This in turn resulted in people feeling frustrated, irritated annoyed and guilty. They also felt guilt, anger and depression for not acting in their own best interests (Penckofer et al., 2007).

The most prominent negative emotion associated with poor dietary self-care was guilt and for some participants, guilt was even synonymous with food. Negative emotions sometimes resulted in poorer dietary self-care. For example, frustration, guilt and anger from poor dietary self-care, had a more negative impact when some

participants gave up and continued “abusing the diet”. When dietary maintenance did not improve glycaemic levels, negative emotions were again experienced. People with type 2 diabetes felt particularly frustrated, depressed and angry when they restricted their dietary intake but were still not successful at obtaining optimal gylceamic levels. These findings demonstrated a possible cycle of poor dietary self-care and negative emotions.

Using a quantitative method, the Food Intake and Beliefs Questionnaire (FIBQ) was developed, based on beliefs associated with negative emotions (Ellis, 1962) as reported in Chapter 2. The FIBQ measured diabetes-related rational and irrational food beliefs among people with type 2 diabetes. Endorsing more diabetes-related irrational beliefs, as assessed with the newly developed FIBQ, was linked to more distress about dietary restrictions, poorer dietary self-care activities and lower dietary self-efficacy. Diabetes-related rational food beliefs were also positively linked to the irrational food beliefs and more distress about dietary restrictions. This suggested that rational and irrational food-related beliefs were held concurrently, and irrespective of a belief held, people felt distressed about dietary restrictions. This supports findings from the qualitative study that negative emotions were associated with perceived dietary restrictions, and further suggests that rational and irrational beliefs are also associated with dietary restrictions.

It is plausible that because of the adverse health consequences associated with poor dietary self-care and weight increase, maintaining a healthy diet is not just a ‘preference’ as worded by the REBT inspired questionnaire but indeed a ‘necessity’.

Thus, for people with diabetes, ‘should’, ‘must’ or ‘having to’ follow their diet may not appear irrational. Therefore, for many people with type 2 diabetes, the distinction made by the REBT model between rational and irrational beliefs may have become blurred. However, given the associations of irrational beliefs and negative emotions, healthcare professionals should emphasise the importance of maintaining good dietary self-care, but avoid inducing unduly pressures and scaremongering. The fact that the FIBQ irrational subscales relate to other dietary self-care measures suggests the subscales may be a useful assessment tool to identify irrational beliefs related to dietary intake.

To further test the role of beliefs in dietary intake, an experimental method was used to investigate the effect of holding rational and irrational beliefs on electrocortical processing and emotional responses to food pictures. Relative to feeling pleased and content, guilt was associated with high calorie foods compared to low calorie foods, possibly because people with type 2 diabetes are recommended to eat more of low calorie foods and less of high calorie foods. This association with guilt could also be because high calorie foods are associated with poorer diabetes control.

A further distinction was made between the high fat savoury and high fat sweet foods in electrocortical processing. Enlarged amplitudes were evident for high fat savoury foods compared to high fat sweet and low calorie foods at P200 time window, corroborating findings by Nijs etal., (2010). Stimulus classification processing may have occurred at this time window, resulting in attentional bias and enhanced amplitude for high fat savoury foods (Blechert et al., 2011; Carretie, et al., 2001; Nijs

et al., 2010). Possibly, high fat savoury foods may have been classified as negative/ unpleasant stimuli because participants may have appraised them as 'prohibited' rather than permitted in moderation. This suggested a negativity bias to high fat savoury foods (Carretie et al., 2000; Delplanque et al., 2004). This possible negativity bias was reflected in delayed reaction time to high fat savoury foods compared with high fat sweets and low calorie foods.

Beliefs did not produce differences in electrocortical processing even though irrational beliefs were associated with positive emotions (pleased and content) relative to guilt. This is contrary to the REBT assumption that irrational beliefs are associated with unhealthy negative emotions such as guilt. The type of task used in this experiment may explain this finding. Participants were asked to make an emotional response having imagined themselves eating foods depicted in food pictures. It is plausible that the positive emotions reported may reflect how they would feel eating the foods they like, rather than how they would feel later when they had time to reflect on the possible negative consequences of having 'failed' to maintain their diabetes diet.

This thesis investigated negative emotions and beliefs in dietary self-care from the REBT perspective. The qualitative study (Chapter 2) showed that negative emotions associated with dietary self-care had underlying irrational beliefs. For example unhealthy negative emotions such as feeling angry, guilt or depressed were linked to irrational beliefs such as *"I mustn't have a cream cake", "It's not fair, I didn't ask to be diabetic", "oh you've failed again", "I must have a sense of direction", , "I shouldn't*

*have had it", "you've blown it"* and, *I've failed"*. This suggests that for people with type 2 diabetes, irrational beliefs may play a role in the development of negative emotions associated with dietary self-care.

The questionnaire development study (Chapter 3) showed that people with type 2 diabetes associated diabetes-related irrational food beliefs with other diabetes dietary-related measures but held irrational and rational diabetes-related food beliefs concurrently. Perhaps people felt compelled to maintain their dietary regimen thus, "I prefer not to eat anything that will affect my diet" and "I must not eat anything that will affect my diet" were not distinct to them. This may suggest the beliefs that people with type 2 diabetes hold about dietary intake may not be best explained by the REBT theory of rational or irrational beliefs.

Further to the above, in REBT, irrational beliefs are associated with unhealthy negative emotions thus in the experimental study, one would have expected irrational beliefs to be associated with the emotion guilt. However, irrational beliefs were associated with positive emotions (content and pleased). Although the researcher argued that perhaps the positive emotions were participant's immediate response (see Chapter 4) this is not in line with the REBT model and its assumptions. Thus, again, the beliefs regarding dietary self-care in people with type 2 diabetes do not appear to closely fit the REBT model.

In conclusion, although the qualitative study identified negative emotions with underlying irrational beliefs, people with type 2 diabetes may not consider these

beliefs as irrational. Perhaps to them, they "must" follow their diet if they want to control their diabetes and so engaging in unhealthy eating is something they "*should not*" or "*must not*" do. Thus, although irrational beliefs may play a role in negative emotions, the REBT model may not be the appropriate model to fully understand beliefs associated with dietary self-care in people with type 2 diabetes.

### 5.1.3 Methodological considerations

A mixed methods design was used to achieve the aims of this thesis. Attributes of a strong empirical mixed methods research is that it should be well developed in terms of its methods, data collection and analysis, integrating to provide an understanding of the area of study (Creswell and Tashakkori, 2007). Studies presented in this thesis were developed and conducted with these attributes in mind but nonetheless, the researcher acknowledges the studies have limitations. The following are the strengths and limitations of the studies conducted.

*Strengths and weaknesses*

A strength of this thesis is the use of a mixed methods design. The three methods used were complementary of each other (Morgan, 1998), and findings from the first study was used to inform subsequent studies. The use of a qualitative method allowed for participants to share first-hand experiences of dietary self-care while the researcher probed and asked questions based on participants' responses. This provided substantial detailed information from the patients' perspective which the researcher could analyse and draw conclusions from. This methodology was a more valid way of exploring the area of interest compared to using a questionnaire which

would have restricted participants' response and offered them very little opportunity to share their lived experiences. Another strength of this thesis is the use of a relatively large sample size (n=13) in the qualitative research which enabled the researcher to obtain varied information from several individuals about the same phenomenon.

The use of a quantitative study allowed for information obtained from the qualitative study to be tested on a larger sample. The strength of this study is the use of information gathered from people with type 2 diabetes. First, the FIBQ was developed based on beliefs associated with negative emotions as reported by people with type 2 diabetes. Second, the questionnaire was tested and validated with people with type 2 diabetes, making it a diabetes-specific questionnaire. Third, the questionnaire was validated with other belief measures, dietary-related measures and diabetes-related measures. Though the rational subscale of the FIBQ was not reliable over time, the irrational subscales were reliable and valid measures, and could serve as useful measures of diabetes-related food beliefs in clinical care and research studies.

Several studies have tested the REBT hypothesis (e.g. Bond & Dryden, 1997; Bond, et al, 1999; Bond & Dryden, 2000) but to date, only one study (Harris et al., 2006) has tested the physiological effect (blood pressure, pulse rate and heart rate) of holding rational or irrational beliefs. Thus, the experimental study in this thesis is the first to investigate the physiological effect of beliefs by measuring electrocortical processing rather than obtaining peripheral measures. The experimental study also

provides useful and new information about people with type 2 diabetes distinguishing between high fat savoury and high fat sweet foods in spite of both being high calorie foods.

In spite of the above strengths, this thesis has some limitations:

First, participants in the qualitative study were predominately white-British and thus the findings may not reflect the experiences of type 2 diabetes patients from minority-ethnic groups. Considering that food intake varies from culture to culture, perhaps people of different ethnic backgrounds may have different experiences with dietary self-care. However, dietary recommendations are the same for all people with type 2 diabetes (more low calorie foods and less high calorie foods), irrespective of ethnic background. Therefore poor dietary self-care may still result in negative feelings. Also, the purpose of IPA is to explore the lived experience of people who are similar in some respect (e.g. people with type 2 diabetes), but not every respect. Thus, this study still provides meaningful information about dietary self-care and negative emotions. Future studies could examine the lived experience of people with type 2 diabetes from different ethnic backgrounds and compare their dietary intake and experiences.

Second, the questionnaire study, tested participants from secondary care specialist centres, a sample which may differ from people from primary care. People with diabetes at secondary care specialist centres are typically those with poorly controlled diabetes although in the present study the sample appeared to have

reasonably well controlled diabetes. Thus, the present finding may not be generalisable to patients treated in primary care. Future research could test the FIBQ in a primary care population.

Finally, the absence of testing healthy controls is a limitation of the experimental study. Comparing healthy controls to a sample of patients with type 2 diabetes may have provided further insight into the effect of beliefs. This may have provided supportive data on the differences found between the effect of beliefs and food types. The use of healthy controls may also have allow more definitive conclusions to be drawn about the distinction made between high fat savoury and high fat sweet foods. In spite of this limitation, this is the first study to investigate the electrocortical effects of rational and irrational beliefs and food type among people with type 2 diabetes. The above limitations notwithstanding, studies presented in this thesis are novel and add to existing knowledge on the dietary self-care of people with type 2 diabetes.

### 5.1.4 Implications for clinical practice

First, findings highlight negative emotions as a cause and consequence of poor dietary self-care and suggest that a possible cycle may exist. Healthcare professionals could identify people experiencing negative emotions from poor dietary self-care and help them manage their negative emotions. Diabetes, diet and weight management programmes could incorporate the understanding of experiences of dietary negative emotions, its consequences and how to manage it.

Second, the identification of perceived dietary restrictions as salient in dietary self-care attests to the need for healthcare professionals to emphasise that high calorie foods are not forbidden but allowed occasionally, and in moderation. For instance, electrocortical processing indicated that patients had biased attention to high fat savoury food, suggestion they may have perceived this food type as negative, unpleasant or forbidden. Dietary education should emphasise that it is better to have flexibility in dietary maintenance than to feel restrictive and deprived, which may have negative consequences for dietary self-care such as bingeing or feeling depressed. Also, family members restricting dietary intake can be frustrating and can result in negative emotions. Thus, family members could be included in dietary education to allow them to have a better understanding of the challenges people with type 2 diabetes face and how best they as family members can support them.

Third, as Bandura (1977) describes, the level of dietary self-efficacy will determine the effort people will put into maintaining good dietary self-care and how much they will persist when faced with challenges. In this thesis low dietary self-efficacy was found to affect dietary self-care and cause negative emotions. Thus interventions such as setting realistic goals, dealing with barriers to good dietary self-care, getting good family support, among others (e.g. Nouwen et al., 2009) can enhance dietary self-efficacy and improve dietary self-care as people persevere in the face of challenges.

Fourth, increased irrational food beliefs were related to increased distress about dietary restrictions, poorer dietary self-care activities and lower dietary self-efficacy.

The FIBQ irrational belief subscales could therefore be used as a screening tool to identity patients with irrational beliefs about their dietary intake. The subscales measure different components of irrational beliefs and could be used to inform healthcare professionals about the type of irrational beliefs dominating a person's thoughts and provide the impetus for addressing these beliefs.

### 5.1.5 Implications for future research

The qualitative study established the role of negative emotions in dietary self-care. However, the study did not focus on identifying the types of foods associated with negative emotions (although participants gave examples). Future qualitative research could explore more about the negative emotions, focusing on the type of emotions associated with different categories of food. Also, people could be given examples of dietary-related rational and irrational belief statements and asked to comment on them to investigate whether they perceive these beliefs as truly rational of irrational, as explained by the REBT theory or whether these beliefs have the same meaning for them. This could provide further information about the applicability of the REBT model in understanding dietary intake among people with type 2 diabetes.

The experimental study provides a foundation for further studies with a larger sample and the use of a healthy control group for comparison. It would be worth investigating further why people processed high fat savoury and high fat sweet foods differently, considering that both are high calorie foods. It would also be worthwhile to examine whether healthy controls would make the same responses to the food

pictures or whether they will just distinguish between high calorie foods and low calorie foods. Future studies could take the following steps; first, test people with type 2 diabetes and healthy controls to investigate ERP differences for the three foods types. If differences exist, then the next step will be to test the effects of beliefs and food type (as in the present study) to determine the effect of priming with beliefs in healthy controls. Will healthy controls also associate irrational beliefs with positive emotions, or will they associate it with unhealthy negative emotions and confirm the REBT hypothesis?

In relation to the distinction made between high fat savoury and high fat sweet foods, the researcher could only speculate on the possible reasons for this finding. Further studies could use interviews to obtain in-depth information about this. Studies could focus on people's perceptions about high calorie and low calorie foods, perceptions about high fat savoury and high fat sweet foods, their perceived effects on diabetes control, and the reasons for these perceptions. This could provide information on whether or not people with type 2 diabetes are misunderstanding dietary education.

The FIBQ irrational subscales measures different aspects of irrational beliefs which may suggest the subscales may be multi-dimensional. The sample used in the present study was not large enough to confirm this multi dimensionality. Future studies are warranted to perform confirmatory factor analysis. Also, considering that two subscales (*need for fairness* and *self-reproach* subscales) had only two items, future studies could modify them by including more items of the same kinds of irrational beliefs.

Once the FIBQ subscales are modified based on the above stated, further studies are needed to validate these subscales in other type 2 diabetes cohorts for further validation. Validation with measures of mood such as the Profile of Mood Scale (McNair, Lorr, Heuchert, & Droppleman, 2003) and Beck's Depression Inventory (Beck, 1961) is also warranted to ascertain the association between irrational food beliefs and mood and/ or negative emotions.

### 5.1.6 Conclusion

Negative emotions are associated with patient's ability to follow a recommended diet as a result of perceived dietary restrictions, daily challenges and poor dietary self-care. This can create a cycle of negative emotions and poor dietary self-care. Irrational beliefs underlying these negative emotions are associated with more distress about dietary restrictions, poorer dietary self-care activities and lower dietary self-care activities. However, the association between rational beliefs and irrational food beliefs and distress about dietary restrictions suggests that for people with type 2 diabetes, rational and irrational beliefs about dietary intake may have the same meaning. Although high calorie foods are associated with guilt, a further distinction has been made between high fat savoury and high fat sweet foods with biased attention for high fat savoury foods, suggesting negativity bias. Negative emotions and irrational beliefs may play a role in dietary self-care and diabetes distress, thus healthcare professionals could pay more attention to this phenomenon. However, the REBT model may not be the appropriate model for use to fully understand the role of beliefs in dietary self-care among people with type 2 diabetes.

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# APPENDICES

Appendix 1: Consent Form

UNIVERSITY OF BIRMINGHAM
School of Psychology

**CONSENT FORM**

**Title of Project*:*** *Adherence to dietary regimen and negative emotions in type 2 diabetes: Exploring patients' beliefs.*

**Researcher***:* Margaret Amankwah-Poku

**If you have decided that you would like to take part in this research, then please initial each box below to show that you have understood what the research is about.**

Please initial box

1. I confirm that I have read and understood the information sheet dated ..... (version .....) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time during the research interview, without giving any reason, without my medical care or legal rights being affected. ☐

3. I understand that the research interview will be audio recorded. ☐

4. I understand that following the research interview I will have a two-week period after my participation for reflection. The researcher will then contact me at which point I may withdraw my interview entirely or in part, without giving any reason, without my medical care or legal rights being affected. ☐

5. I understand that the data collected during this study will be looked at by the researcher and relevant others at the University of Birmingham to ensure that the analysis is a fair and reasonable representation of the data. ☐

6. I understand that direct quotes from my interview may be published in any write-up of the data, but that my name will not be attributed to any such quotes and that I will not be identifiable by my comments. ☐

7. I understand that relevant sections of my medical notes may be looked at by the researcher Birmingham University where it is relevant to my taking part in this research and agree that this can be done. ☐

8. I agree to take a finger prick test to establish the control of my diabetes (HbA1c). ☐

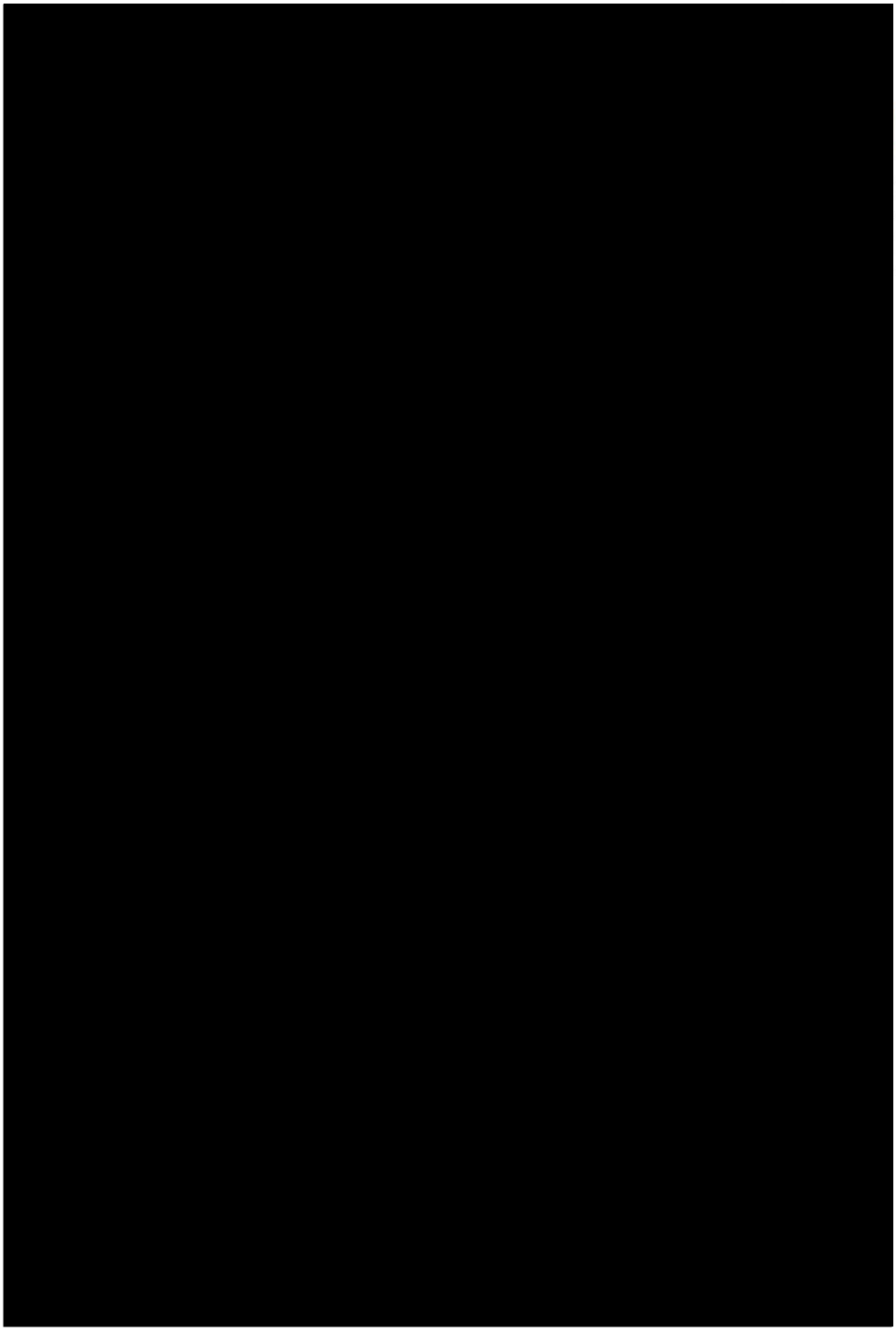
9. I agree to take part in the above study. ☐

10. I agree to my GP being informed of my participation in the study. ☐

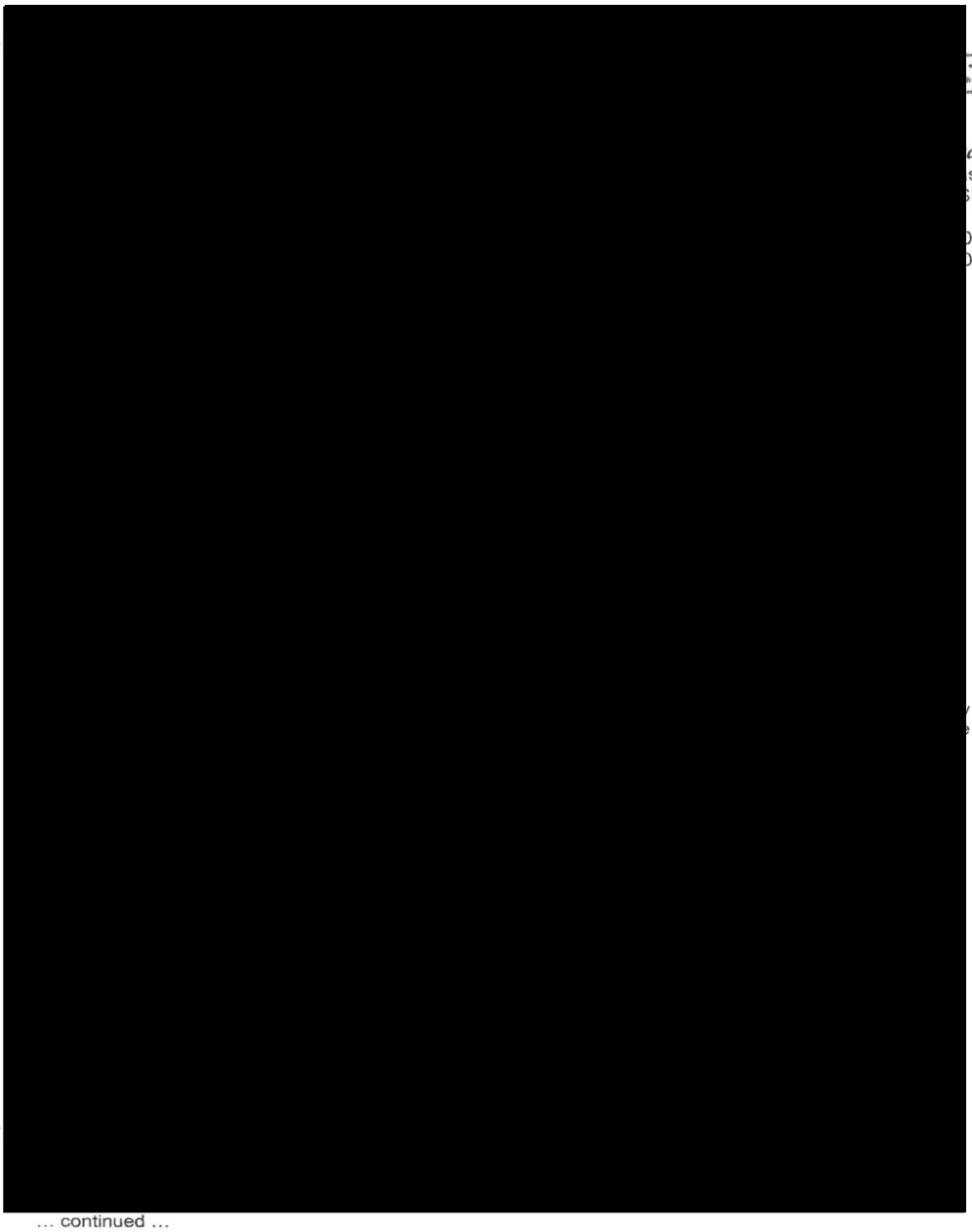
| ..... | ..... | ..... |
|---|---|---|
| Name of Participant | Date | Signature |

| ..... | ..... | ..... |
|---|---|---|
| Name of Researcher | Date | Signature |

Appendix 2: NHS Research Ethics Committee ethics approval letter



Appendix 3: Heart of England Hospital R&D Ethics approval letter



... continued ...

Appendix 4: Demographic Data

Demographic Data

Below are questions that ask for information about yourself and your diabetes. Please answer all questions.

1. Age: _____ years
2. Sex: _____
3. Occupation: _____
4. Marital status: _____
5. When you were first diagnosed with diabetes: _____
6. What diabetes medication are you on?

_____

_____

7. List any diabetes complications that you may have.

_____
_____

**To be filled by the researcher**

8. Weight: _____
9. Height: _____
10. Body mass index (BMI) _____
11. HbA1c _____

Appendix 5: Summary of Diabetes Self-Care Activity Scale (SDSCA)

**Summary of Diabetes Self-Care Activity Scale (SDSCA)**

The questions below ask about your diabetes self-care activities during the past 7 days. If you were ill during the past 7 days, please think back to the last 7 days that you were not ill. Please answer the questions as honestly and accurately as you can.

**Please answer ALL questions. Circle the appropriate response.**

1. How often did you follow your recommended diet over the last 7 days? (If you have not been given a specific diet by the diabetes care team, please answer according to the general guidelines you have been given).

**Always** **Usually** **Sometimes** **Rarely** **Never**

2. How much of the time did you successfully limit calories as recommended in your healthy eating for diabetes control?

**None of the time** **A little of the time** **Some of the time** **Most of the time** **All of the time**

3. During the past week, how many of your meals included high fibre food, such as fresh fruits, fresh vegetables, and peas, bran?

**None of them** **A few of them** **Some of them** **Most of them** **All of them**

4. During the past week, how many of your meals included high fat foods, such as butter, ice cream, oil, nuts and seeds, mayonnaise, fried food, salad dressing, crisps, pies, pizzas and sausages?

**None of them** **A few of them** **Some of them** **Most of them** **All of them**

5. During the past week, how many of your meals included sweets and desserts, such as pastries, cake, jam, soft drinks (not diet), chocolate and cream biscuits?

**None of them** **A few of them** **Some of them** **Most of them** **All of them**

6. How often did you exercise the amount suggested by your doctor or diabetes specialist nurse?

**None of them** **A few of them** **Some of them** **Most of** **All of them**

7. On how many of the last 7 days did you exercise for at least 20 minutes?

**0 1 2 3 4 5 6 7**

8. On how many of the last 7 days did you exercise on top of what you do as part of your work?

**0 1 2 3 4 5 6 7**

9. On how many of the last 7 days (that you were not ill) did you did you test your glucose (blood sugar) level?

**0 1 2 3 4 5 6 7**

10. Over the last 7 days how many of the glucose (blood sugar) tests recommended by your doctor did you actually do (covering all meals and pre bed)?

**None of them** **A few of them** **Some of them** **Most of** **All of them**

11. How many of your recommended insulin injections / medication did you take in the last 7 days that you were supposed to?

**All of them** **Most of them** **Some of them** **None of them**

12. How many of your recommended insulin injections / medication did you have at the time you were supposed to?

**All of them** **Most of them** **Some of them** **None of them**

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 6: Problem Areas in Diabetes (PAID) Questionnaire

**Problem Areas in Diabetes (PAID ) Questionnaire**

INSTRUCTIONS: Which of the following diabetes issues are currently a problem for you? To what degree do you perceive the following as problematic? **Circle** the appropriate response. Please provide an answer for each question.

| | Not a problem | Minor Problem | Moderate Problem | Somewhat Serious Problem | Serious Problem |
|---|---|---|---|---|---|
| 1. Not having clear and concrete goals for your diabetes care? | 0 | 1 | 2 | 3 | 4 |
| 2. Feeling discouraged with your diabetes treatment plan? | 0 | 1 | 2 | 3 | 4 |
| 3. Feeling scared when you think about living with diabetes? | 0 | 1 | 2 | 3 | 4 |
| 4. Uncomfortable social situations related to your diabetes care (e.g. people telling you what to eat)? | 0 | 1 | 2 | 3 | 4 |
| 5. Feelings of deprivation regarding food and meals? | 0 | 1 | 2 | 3 | 4 |
| 6. Feeling depressed when you think about living with diabetes? | 0 | 1 | 2 | 3 | 4 |
| 7. Not knowing if your mood or feelings are related to your diabetes? | 0 | 1 | 2 | 3 | 4 |
| 8. Feeling overwhelmed by your diabetes? | 0 | 1 | 2 | 3 | 4 |
| 9. Worrying about low blood sugar reactions? | 0 | 1 | 2 | 3 | 4 |
| 10. Feeling angry when you think about living with diabetes? | 0 | 1 | 2 | 3 | 4 |
| 11. Feeling constantly concerned about food and eating? | 0 | 1 | 2 | 3 | 4 |
| 12. Worrying about the future and the possibility of serious complications? | 0 | 1 | 2 | 3 | 4 |
| 13. Feelings of guilt or anxiety when you get off | 0 | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| track with your diabetes management? | | | | | |
| 14. Not “accepting” your diabetes? | 0 | 1 | 2 | 3 | 4 |
| 15. Feeling unsatisfied with your diabetes physician? | 0 | 1 | 2 | 3 | 4 |
| 16. Feeling that diabetes is taking up too much of your mental and physical energy every day? | 0 | 1 | 2 | 3 | 4 |
| 17. Feeling alone with your diabetes? | 0 | 1 | 2 | 3 | 4 |
| 18. Feeling that your friends and family are not supportive of your diabetes management efforts? | 0 | 1 | 2 | 3 | 4 |
| 19. Coping with complications of diabetes? | 0 | 1 | 2 | 3 | 4 |
| 20. Feeling “burned out” by the constant effort needed to manage diabetes? | 0 | 1 | 2 | 3 | 4 |

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 7: Diabetes Distress Scale (DDS)

## Diabetes Distress Scale (DDS)

DIRECTIONS: Living with diabetes can sometimes be tough. There may be many problems and hassles concerning diabetes and they can vary greatly in severity. Problems may range from minor hassles to major life difficulties. Listed below are 17 potential problem areas that people with diabetes may experience. Consider the degree to which each of the 17 items may have distressed or bothered you DURING THE PAST MONTH and circle the appropriate number.

Please note that you are being asked to indicate the degree to which each item may be bothering you in your life, NOT whether the item is merely true for you. If you feel that a particular item is not a bother or a problem for you, you would circle "1". If it is very bothersome to you, you might circle "6".

| | Not a Problem | A Slight Problem | A Moderate Problem | Somewhat Serious Problem | A Serious Problem | A Very Serious Problem |
|---|---|---|---|---|---|---|
| 1. Feeling that diabetes is taking up too much of my mental and physical energy everyday. | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. Feeling that my doctor doesn't know enough about diabetes and diabetes care. | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. Feeling angry, cared, and/or depressed when I think about living with diabetes. | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. Feeling that my doctor doesn't give me clear enough directions on how to manage my diabetes. | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. Feeling that I am not testing my blood sugars frequently enough. | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. Feeling that I am often failing with my diabetes routine. | 1 | 2 | 3 | 4 | 5 | 6 |
| 7. Feeling that friends or family are not supportive enough of self-care efforts (e.g. planning activities that conflict | 1 | 2 | 3 | 4 | 5 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| with my schedule, encouraging me to eat the "wrong" foods). | | | | | | |
| 8. Feeling that diabetes controls my life. | 1 | 2 | 3 | 4 | 5 | 6 |
| 9. Feeling that my doctor doesn't take my concerns seriously enough. | 1 | 2 | 3 | 4 | 5 | 6 |
| 10. Not feeling confident in my day-to-day ability to manage diabetes. | 1 | 2 | 3 | 4 | 5 | 6 |
| 11. Feeling that I will end up with serious long-term complications, no matter what I do. | 1 | 2 | 3 | 4 | 5 | 6 |
| 12. Feeling that I am not sticking closely enough to a good meal plan. | 1 | 2 | 3 | 4 | 5 | 6 |
| 13. Feeling that friends or family don't appreciate how difficult living with diabetes can be. | 1 | 2 | 3 | 4 | 5 | 6 |
| 14. Feeling overwhelmed by the demands of living with diabetes. | 1 | 2 | 3 | 4 | 5 | 6 |
| 15. Feeling that I don't have a doctor who I can see regularly enough about my diabetes. | 1 | 2 | 3 | 4 | 5 | 6 |
| 16. Not feeling motivated to keep up my diabetes self-management. | 1 | 2 | 3 | 4 | 5 | 6 |
| 17. Feeling that friends or family don't give me the emotional support that I would like. | 1 | 2 | 3 | 4 | 5 | 6 |

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 8: Initial interview schedule

## Initial interview schedule

The following are the questions that will be used as a guide for the interviews. There are four lead questions with probe questions for each of the questions. The aim of using these probe questions is to find out the negative emotions that relate to dieting, the beliefs (rational or irrational) that underlie these negative emotions and how this affects their adherence to dietary regimen.

**Question**

*Many people who live with diabetes have reported having difficulty adjusting to the change in lifestyle as a result of the illness and dieting is one of the most difficult things that they have to deal with. How is this for you?*

1. **Lead questions** Tell me about your diet and how this has affected you.
    - **Probe**: Can you give me an example of such an occurrence
    - **Probe**: How did you feel?
    - **Probe**: What was the main factor about this that led you to feel …… (insert emotion) How did you manage to feel ……...(insert emotion) about ……(insert inference and probe for irrational beliefs)?
    - **Probe**: What are you telling yourself when you are feeling that way?

2. **Lead questions** Tell me about the challenges that you face when you try to follow to your diet.
    - **Probe**: Can you give me an example of such an occurrence
    - **Probe**: How did you feel?
    - **Probe**: What was the main factor about this that led you to feel …… (insert emotion) How did you manage to feel ……...(insert emotion) about ……(insert inference and probe for irrational beliefs)?
    - **Probe**: What are you telling yourself when you are feeling that way?

3. **Lead questions** Tell me about how you deal with these challenges and how this affects you?
    - **Probe**: Can you give me an example of such an occurrence
    - **Probe**: How did you feel?
    - **Probe**: What was the main factor about this that led you to feel …… (insert emotion) How did you manage to feel ……...(insert emotion) about ……(insert inference and probe for irrational beliefs)?
    - **Probe**: What are you telling yourself when you are feeling that way?

4. **Lead questions** Tell me about when you are not able to follow your diet and you eat foods inconsistent with your dietary regimen?

- **Probe**: Can you give me an example of such an occurrence
- **Probe**: How did you feel?
- **Probe**: What was the main factor about this that led you to feel ……(insert emotion) How did you manage to feel ……...(insert emotion) about ……(insert inference and probe for irrational beliefs)?
- **Probe**: What are you telling yourself when you are feeling that way?

Appendix 9: Final interview schedule

## Final interview schedule

The following are the questions that will be used as a guide for the interviews. There are four lead questions with probe questions for each of the questions. The aim of using these probe questions is to find out the negative emotions that relate to dieting, the beliefs (rational or irrational) that underlie these negative emotions and how this affects their adherence to dietary regimen.

**Question**

*Many people who live with diabetes have reported having difficulty adjusting to the change in lifestyle as a result of the illness and dieting is one of the most difficult things that they have to deal with. How is this for you?*

1. **Lead questions** Tell me about your diet.
    - **Probe**: How do you feel about being on a diet?
    - **Probe**: Can you give me an example of such an occurrence
    - **Probe**: How did that make you feel?
    - **Probe**: What was the main factor about this that led you to feel …… (insert emotion) *Why did you feel* ……...(insert emotion) about ……(insert inference and probe for irrational beliefs)?
    - **Probe**: What are you telling yourself when you are feeling that way? / What are the thoughts that go through your mind when you are feeling that way? What else are you telling yourself? *(Probe further for irrational beliefs)*

2. **Lead questions** Tell me about how your diet affects you.
    - **Probe**: Can you give me an example of such an occurrence
    - **Probe**: How did that make you feel?
    - **Probe**: What was the main factor about this that led you to feel …… (insert emotion) *Why did you feel* ……...(insert emotion) about ……(insert inference and probe for irrational beliefs)?
    - **Probe**: What are you telling yourself when you are feeling that way? / What are the thoughts that go through your mind when you are feeling that way? What else are you telling yourself? *(Probe further for irrational beliefs)*

3. **Lead questions** Tell me about the challenges that you face when you try to follow to your diet.
    - **Probe**: Can you give me an example of such an occurrence
    - **Probe**: How did that make you feel?

- **Probe**: What was the main factor about this that led you to feel …… (insert emotion) *Why did you feel* ……...(insert emotion) about ……(insert inference and probe for irrational beliefs)?
- **Probe**: What are you telling yourself when you are feeling that way? / What are the thoughts that go through your mind when you are feeling that way? What else are you telling yourself? *(Probe further for irrational beliefs)*

4. **Lead questions** Tell me about how you deal with these challenges?
    - **Probe**: Can you give me an example of such an occurrence
    - **Probe**: How did that make you feel?
    - **Probe**: What was the main factor about this that led you to feel …… (insert emotion) *Why did you feel* ……...(insert emotion) about ……(insert inference and probe for irrational beliefs)?
    - **Probe**: What are you telling yourself when you are feeling that way? / What are the thoughts that go through your mind when you are feeling that way? What else are you telling yourself? *(Probe further for irrational beliefs)*

5. **Lead questions** Tell me about how these challenges affects you?
    - **Probe**: Can you give me an example of such an occurrence
    - **Probe**: How did that make you feel?
    - **Probe**: What was the main factor about this that led you to feel ……? (insert emotion) *Why did you feel* ……...(insert emotion) about ……(insert inference and probe for irrational beliefs)?
    - **Probe**: What are you telling yourself when you are feeling that way? / What are the thoughts that go through your mind when you are feeling that way? What else are you telling yourself? *(Probe further for irrational beliefs)*

6. **Lead questions** Tell me about what happens when you don't stick to your diet?
    - **Probe**: Can you give me an example of such an occurrence
    - **Probe**: How did that make you feel?
    - **Probe**: What was the main factor about this that led you to feel ……(insert emotion) *Why did you feel* ……...(insert emotion) about ……(insert inference and probe for irrational beliefs)?
    - **Probe**: What are you telling yourself when you are feeling that way? / What are the thoughts that go through your mind when you are feeling that way? What else are you telling yourself? *(Probe further for irrational beliefs)*

Appendix 10: Patient Information Sheet

PATIENT INFORMATION SHEET

**1. Study Title**

**Adherence to dietary regimen and negative emotions in type 2 diabetes: Exploring patients' beliefs.**

**2. Invitation paragraph**

You are being invited to take part in a research study that is being undertaken at Birmingham University. Before you make a decision about whether you want to take part, it will be important for you to find out more about the reasons why this research is being carried out and what it will involve. So please take some time to carefully read the information below. You can discuss it with anyone (including friends, family or GP), if you wish. **If you have any questions or would like some more information, please feel free to contact me**. My contact details are at the end of this letter.

Thank you for reading this.

**3. What is the purpose of the study?**

As you are aware, dietary self-care plays a very important role in the management of type 2 diabetes but its success is affected by many factors. This study is interested in how negative emotions can affect dietary self-care in type 2 diabetes. We hope to find out what kind of thoughts you have about following your diet. We would like to find out whether you or other people with type 2 diabetes experience negative emotions which interfere with your dietary self-care. We hope that our findings will help to improve the quality of care for people with type 2 diabetes – especially education regarding dietary self-care.

**4. Why have I been chosen?**

All people with type 2 diabetes, aged 40 years and older who have had type 2 diabetes for at least one year from the Diabetes Clinic at Birmingham Heartlands Hospital have been invited to take part .

**5. Do I have to take part?**

You do not have to take part. The decision to participate is completely voluntary so it is up to you to decide whether or not you wish to take part. You will be given up to one week to think about the information in this letter and decide whether or not you wish to take part. The researcher will contact you (if you consent to that) to find out if you would want to participate. This will give you the opportunity to ask any questions that you may have about the study. If you do decide to take part, you can either sign the consent form on the day or contact us when you feel ready to do so. We will then make an appointment at a time of your convenience at the Diabetes Clinic to carry out the research. Remember, if you decide to take part, you will still be free to withdraw at any time. Following the research interview you will have a two-week period after your participation for reflection. The researcher will then contact you at which point you may decide to withdraw your interview entirely or in part. Withdrawing will not affect your current or future NHS treatment.

**6. What will happen to me if I take part?**

If you agree to take part, an appointment will be made for the research to take place at a time of your convenience. The research will be carried out in a quiet room at the Diabetes Clinic of Birmingham's Heartlands Hospital. During the research session, you will be interviewed by the researcher. The interview questions will be based on dietary self-care, and the session will last for one hour. After the interview you will be given 4 short questionnaire and rating scales to fill out. The questionnaires will ask about the problems that you have had living with diabetes over the past one week or one month. It will also ask about some personal information such as your age, sex, duration of diabetes etc. This will last for 20 minutes. Finally, you will be asked to take a finger prick test to establish the control of your diabetes (HbA1c) and your height and weight will be measured.

**7. What do I have to do?**

If you are happy to be contacted by the researcher then all we would ask is for you to sign the consent form to be contacted. The researcher will then contact you to discuss the study with you in more detail. If, after discussion you are still interested in participating in the study, an appointment can be made for the research to take place. However, if you feel that you must discuss your involvement in the study with your doctor or anyone else, please do. This study will NOT involve drugs or any other medical procedures.

**8. What are the possible disadvantages and risks of taking part?**

There are no risks involved. However, if you become distressed as a result of your participation, please let us know using the contact details below. In the first instance we will discuss the difficulties that arose with you. If you require professional help, we will discuss this with you first and suggest that you contact your GP.

**9. What are the possible benefits of taking part?**

This study has no direct benefits for you. However, the information that is provided by you and other participants may increase the knowledge of health educators and professionals who advise people with type 2 diabetes about their diet.

**10. Will my travel expense be reimbursed?**

Yes, your travel expense with receipts will be reimbursed. Reimbursements will be up to an amount of ten pounds (£10).

**11. What if something goes wrong?**

Once again, if participating in this research project distresses you, you should let the researcher, Margaret Amankwah-Poku know by using the contact information at the end of this sheet. In the first instance, she will discuss your difficulties with you. If you need professional help, she will speak to you about this and you may then want to contact your GP or Doctor at clinic or your diabetes care providers. If, as a result of your taking part in this study you have questions about your dietary regimen, your dietician can be contacted. You could also contact the Patient Advice and Liaison Service (PALS, 0121 424 1212) for confidential advice and support to patients, families and their careers.

There are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the course of this study, the normal National Health Service complaints mechanisms should be available to you.

**12. What if I have special needs?**

We will make every effort to ensure that there are no barriers for you if you wish to take part. If you have 'communication problems' (due to a disability – e.g. hearing impairment / visual impairment/ dyslexia) you are asked to contact us using the details below. If you have difficulties with reading, please inform us. The researcher may be able to offer you more time to complete the study and will assist you in reading the questionnaires. If you envisage any other problems, please contact the researcher and every effort will be made to make things easier for you

**13. Will my taking part in this study be kept confidential?**

Your participation in the study will be kept confidential. Your name will remain anonymous - being changed to a personalised code. Computer based data will be kept on file at the University of Birmingham and will be password protected. All of your paper data (i.e. questionnaire responses) will be kept in a locked cabinet. Paper records from this study will be kept for 1 year and destroyed once the study is complete. The original audio recordings of the interviews will be kept in a secure place at the University of Birmingham and destroyed once the study has ended. Direct quotes from your interview may be published in any write-up of the data, but your name will not be attributed to any such quotes and you will not be identifiable by your comments. Margaret Amankwah-Poku will ensure the security of the information you give. Only members of the research team led by Mrs. Margaret Amankwah-Poku will have access to the information/data for analyses.

**14. What will happen to the results of the research study?**

On completion, the results of this study may be sent for publication in a scientific journal. However, you will not be personally identifiable in this report/publication. Each participant will be informed about the results of the study. Copies of a summary of the findings will be sent to you and to your consultant at the clinic. You can ask for one of these if you are interested in finding out what we found.

**15. Who is organising and funding the research?**

The research is organised and funded by the School of Psychology of the University of Birmingham.

**16. Who has reviewed the study?**

This study has been reviewed and approved by the Birmingham, East, North and Solihull Research Ethics Committee according to local regulations.

**17. Contact for Further Information**

If you decide to take part, you will be given another of these information sheets to read and keep, together with a copy of the signed consent form. Thank you for

reading this information. If you have any matters which may concern you, or further questions, you may speak to either of the Chief Investigator in charge of this project, Margaret Amankwah-Poku on the following number: (0750) 178 5790, or to Dr. Arie Nouwen on the following number (0121)414 7203 at the School of Psychology, University of Birmingham. Alternatively, you may contact the Patient Advice & Liaison Service (PALS) of Heartlands Hospital at (0121) 424 1212.

**Thank you for considering taking part in this study.**

Appendix 11: Consent for contact form

## CONSENT FOR CONTACT

Title of Project:

***Adherence to dietary regimen and negative emotions in type 2 diabetes: Exploring patients' beliefs.***

Name of Researcher: Margaret Amankwah-Poku

If you have decided that you agree to being contacted about this study by the researcher please put your name and contact details below and sign this letter. Thank you!

I agree to being contacted by the researcher from the School of Psychology at the University of Birmingham regarding my participation in the study.

_____ _____ _____

Name Date Signature

_____

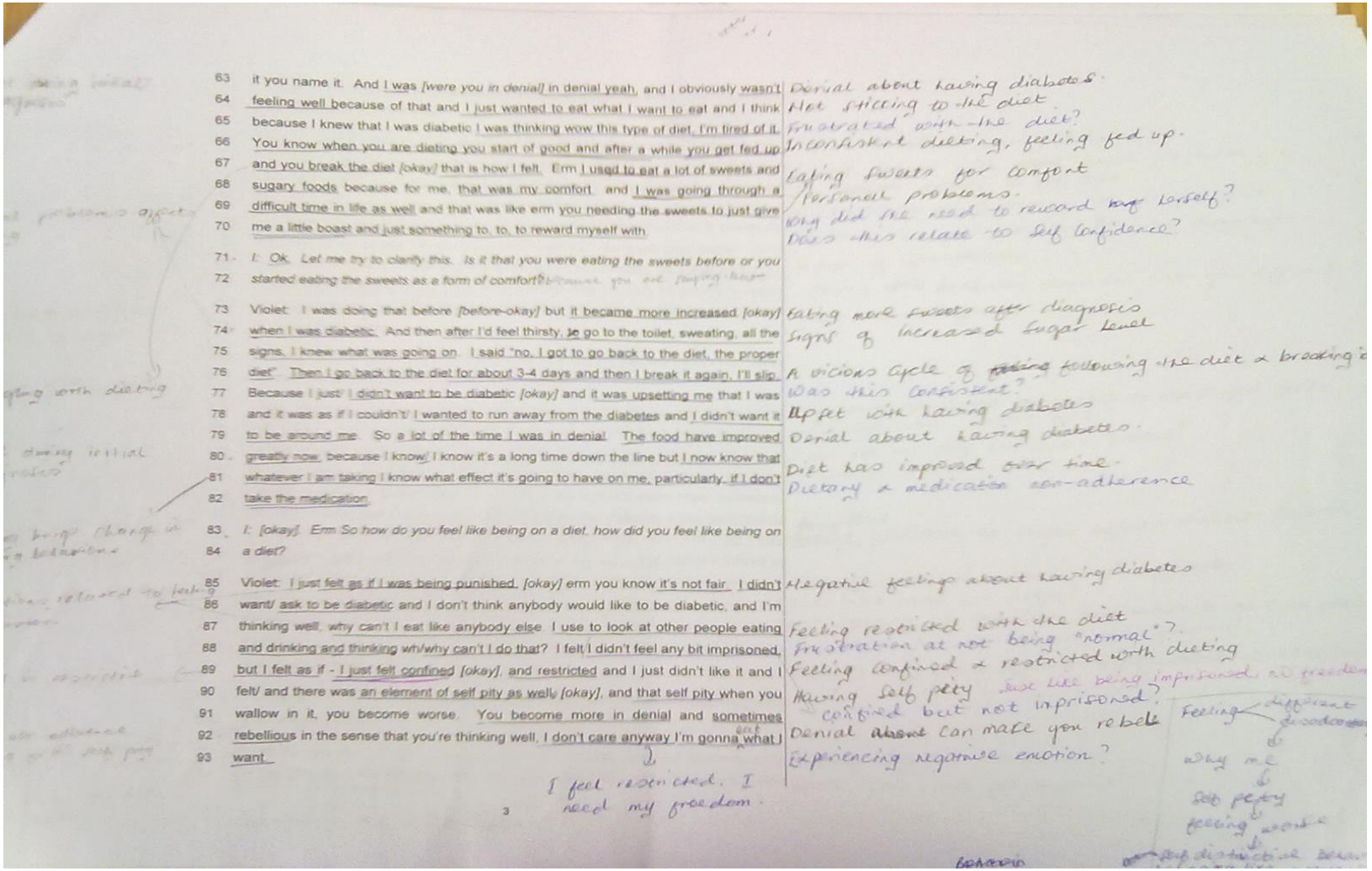
**Contact telephone number**

_____ _____ _____

Name of Researcher Date Signature

Appendix 12: Example of initial coding

**Initial coding for Violet**



it you name it. And I was *[were you in denial]* in denial yeah, and I obviously wasn't feeling well because of that and I just wanted to eat what I want to eat and I think because I knew that I was diabetic I was thinking wow this type of diet, I'm tired of it. You know when you are dieting you start of good and after a while you get fed up and you break the diet *[okay]* that is how I felt. Erm I used to eat a lot of sweets and sugary foods because for me, that was my comfort and I was going through a difficult time in life as well and that was like erm you needing the sweets to just give me a little boast and just something to, to, to reward myself with.

I: Ok. *Let me try to clarify this. Is it that you were eating the sweets before or you started eating the sweets as a form of comfort?*

Violet: I was doing that before *[before-okay]* but it became more increased *[okay]* when I was diabetic. And then after I'd feel thirsty, so go to the toilet, sweating, all the signs, I knew what was going on. I said "no, I got to go back to the diet, the proper diet". Then I go back to the diet for about 3-4 days and then I break it again, I'll slip. Because I just/ I didn't want to be diabetic *[okay]* and it was upsetting me that I was and it was as if I couldn't/ I wanted to run away from the diabetes and I didn't want it to be around me. So a lot of the time I was in denial. The food have improved greatly now, because I know/ I know it's a long time down the line but I now know that whatever I am taking I know what effect it's going to have on me, particularly, if I don't take the medication.

I: *[okay]. Erm So how do you feel like being on a diet, how did you feel like being on a diet?*

Violet: I just felt as if I was being punished, *[okay]* erm you know it's not fair. I didn't want/ ask to be diabetic and I don't think anybody would like to be diabetic, and I'm thinking well, why can't I eat like anybody else. I use to look at other people eating and drinking and thinking wh/why can't I do that? I felt/ I didn't feel any bit imprisoned, but I felt as if - I just felt confined *[okay]*, and restricted and I just didn't like it and I felt/ and there was an element of self pity as well *[okay]*, and that self pity when you wallow in it, you become worse. You become more in denial and sometimes rebellious in the sense that you're thinking well, I don't care anyway I'm gonna what I want.

I feel restricted. I need my freedom.

3

Denial about having diabetes.
Not sticking to the diet
Frustrated with the diet?
Inconsistent dieting, feeling fed up.
Eating sweets for comfort
Personal problems.
Why did he need to reward myself?
Does this relate to self confidence?

Eating more sweets after diagnosis
Signs of increased sugar level
A vicious cycle of ~~eating~~ following the diet & breaking it
Was this consistent?
Upset with having diabetes
Denial about having diabetes.
Diet has improved over time.
Dietary & medication non-adherence

Negative feelings about having diabetes

Feeling restricted with the diet
Frustration at not being "normal"?
Feeling confined & restricted with dieting
Having self pity
Confined but not imprisoned.
Denial about can make you rebel
Experiencing negative emotion?

94 *I: Okay (LAUGH) and erm so what other emotions would you use to express the way*
95 *you were feeling at that time.*

96 Violet: I think I felt down, I felt depressed, *[okay]* I felt different from everybody else,
97 I felt fed-up with people say/ telling me, you can't do this and you can't do that and so
98 many things that they were telling me, all because you are diabetic you can't have
99 salt, because you'll be sick- and I'm thinking where, do you, you, you, where do you
100 errh what/ who qualifies you to be my doctor, *[okay]* my GP. That's what people do,
101 they tend to say all that, 'oh you can't, I'm an authority' you know authoritarian. "Don't
102 do this and you can't do that and this and that" and I'm thinking, I'm a human being, I
103 haven't done anything wrong, I'm a human being. Erm, it's easy for people to correct
104 you but when they are in the same situation, they, they, they themselves are not able
105 to correct themselves.

106 *I: Okay, and erm, what was it that erm, what was making you feel depressed. What*
107 *are the main factors that led you to feel depressed?*

108 Violet: That I couldn't eat the sugary foods, foods that are/ the comfort foods, foods
109 that I liked. Erm, you know it's funny I/ as I was going through these in about a
110 couple of years say 5 years ago, and I realized that we have addictions. We have
111 the drug abuse, we have the taking control drugs, prescription drugs, we have
112 caffeine in coffee, all those things. Coke and all the rest of it, many more, cigarettes,
113 smoking, alcohol, and I have come to the realization that diabetes, if you don't control
114 it, you'll have problems with being addicted to sweet things. Erm and I felt I was
115 addicted to sugar and it is an addiction sometimes, the sugar that makes it difficult to
116 control the diabetes. I felt restricted *[okay]*, I felt hurt, I felt different from everybody
117 else, resented that other people could sit and eat and do whatever they wanted, and
118 eat what they wanted to eat but I sometimes would go/ pretend that I too could eat
119 *[okay]* erm but knowing at the back of my mind that you could, you could be doing
120 over a period time some serious damage.

121 *I: Okay, so why did you feel erm depressed that other people can eat what they want*
122 *to eat but you can't?*

123 Violet: Because I'm, I'm, I love food *[okay]* and I love meals, going out for meals and I
124 just felt different, I felt different. Erm, how can I put it how can I describe it? You

Appendix 13: Example of emergent themes

**Emergent themes from Violet's transcript**

| EMERGENT THEMES | EXTRACTS | PAGE & LINE ♯ |
|---|---|---|
| **Page 3** | | |
| Denial about having diabetes<br>Denial during initial diagnosis | I was in denial yeah, and I obviously wasn't feeling well because of that and I just wanted to eat what I want to eat and I think because I knew that I was diabetic I was thinking wow this type of diet, I'm tired of it. | 3.63-65 |
| Struggling with dieting | when you are dieting you start of good and after a while you get fed up and you break the diet, that is how I felt……. I said "no, I got to go back to the diet, the proper diet". Then I go back to the diet for about 3-4 days and then I break it again, I'll slip | 3.66-67, 75-76 |
| Personal problems affect dieting | I used to eat a lot of sweets and sugary foods because for me, that was my comfort and I was going through a difficult time in life as well and that was like erm you needing the sweets to just give me a little boast | 3.67-69 |
| Denial during initial diagnosis | I didn't want to be diabetic and it was upsetting me that I was and it was as if I couldn't/ I wanted to run away from the diabetes and I didn't want it to be around me. So a lot of the time I was in denial | 3.77-79 |
| Dieting brings change in eating behaviour | The food have improved greatly now, because I know/ I know it's a long time down the line but I now know that whatever I am taking I know what effect it's going to have on me | 3.79-81 |
| Cognitions related to feeling of depression | I just felt as if I was being punished, you know it's not fair……. why can't I eat like anybody else? | 3.85, 87 |
| Dieting is restrictive | I just felt confined and restricted and I just didn't like it | 3.89 |

| | | |
|---|---|---|
| Poor dietary self-care resulting from self pity | there was an element of self-pity as well, and that self-pity when you wallow in it, you become worse. You become more in denial and sometimes rebellious in the sense that you're thinking well, I don't care anyway I'm gonna what I want | 3.90-93 |
| **Page 4** | | |
| Feeling depressed about dietary restrictions | I think I felt down, I felt depressed, I felt different from everybody else. I felt fed-up with people say/ telling me, you can't do this and you can't do that | 4.96-97 |
| Cognitions related to feeling of depression | I'm thinking …… who qualifies you to be my doctor I'm thinking, I'm a human being, I haven't done anything wrong, I'm a human being. *[Depressed]* That I couldn't eat the sugary foods, foods that are/ the comfort foods, foods that I liked | 4.99-100, 102-103, 108-109 |
| Frustrated with others enforcing dietary restrictions | I felt fed-up with people say/ telling me, you can't do this and you can't do that and so many things that they were telling me, all because you are diabetic you can't have salt, because you'll be sick- and I'm thinking …… who qualifies you to be my doctor | 4.96-100 |
| Addiction to sugar | I felt I was addicted to sugar and it is an addiction sometimes - the sugar that makes it difficult to control the diabetes | 4.114-116 |
| Hurt and resentment from dietary restrictions | I felt hurt, I felt different from everybody else, resented that other people could sit and eat and do whatever they wanted, | 4.116-118 |
| Poor dietary self-care resulting from resentment | I sometimes would go, pretend that I too could eat erm but knowing at the back of my mind that you could, you could be doing over a period time some serious damage | 4.118-120 |
| Dietary restrictions makes you feel different | I felt different from everybody else…… I love food and I love meals, going out for meals and I just felt different | 4.116-117, 123-124 |

Appendix 14: Example of categorising emergent themes into themes

**Categorising emergent themes into themes- Violet's transcript**

| Super ordinate themes | Themes |
|---|---|
| Feeling bad (anxious, regretful, guilty and annoyed) about diet restrictions in social situations | Denial during initial diagnosis<br>Dieting is restrictive<br>Addiction to sugar<br>Frustration with caregivers' recommendations<br>Dietary restrictions makes you feel different<br>Frustrated with others enforcing dietary restrictions<br>Feeling depressed about dietary restrictions<br>Cognitions related to feeling of depression<br>Feeling angry about dietary non-adherence<br>Cognitions related to feeling of anger<br>Dietary non-adherence resulting from self pity<br>Hurt and resentment from dietary restrictions<br>Dietary non-adherence resulting from resentment<br>Feeling of freedom from dietary restrictions<br>Feeling guilty about dietary non-adherence<br>Cognitions related to feeling of guilt |
| Feeling bad (regretful, guilty depressed and frustrated) about struggle with dieting | Distressed about having diabetes<br>Frustration with having diabetes<br>Struggling with dieting<br>Personal problems affect dieting<br>Lack of self control over dietary non-adherence<br>Feeling depressed with challenges of dieting |

| | |
|---|---|
| | Feeling guilty about dietary non-adherence<br>Cognitions related to feeling of guilt<br>Negative effect of dietary non- adherence<br>Fear of diabetes complications |
| I rationalise to deal with the negative emotions of not following the diet. | Rationalizing about dietary non-adherence<br>Rationalizing- Gentle clinical consultation improves diabetes control<br>Rationalizing- Harsh clinical consultation affects diabetes control |
| Coping with the restrictions and struggles of dieting, to stay healthy and avoid negative emotions. | Dieting brings change in eating behaviour<br>Having control over dieting<br>Coping with dietary non-adherence<br>Good meals prevents snacking<br>Prioritizing- Putting diet first is important<br>Time management is important for dietary adherence<br>Motivation to improve dieting<br>Social support from diabetes patients is important<br>Guilt and denial becomes remorse and acceptance over time<br>Pride and satisfaction coping with dietary non-adherence<br>Understanding diabetes is important |

Appendix 15: Example of extracting quotes to support themes

**Example of quotes supporting Violet themes**

| EMERGENT THEMES | EXTRACTS | PAGE & LINE ♯ |
|---|---|---|
| Cognitions related to feeling of anger | • self pity, I can't cope, will I ever/ I don't anticipate that I'm ever gonna get any of these under control | 7.194-195 |
| Cognitions related to feeling of depression | • I just felt as if I was being punished, you know it's not fair……. why can't I eat like anybody else?<br>• I'm thinking …… who qualifies you to be my doctor I'm thinking, I'm a human being, I haven't done anything wrong, I'm a human being. *[Depressed]* That I couldn't eat the sugary foods, foods that are/ the comfort foods, foods that I liked | 3.85, 87<br>4.99-100, 102-103, 108-109 |
| Cognitions related to feeling of guilt | • I've caused something and I am now trying to correct, it but it is difficult because I am this person that/ I'm my worst enemy, so to speak<br>• I get rebellious, I say "I don't care". I know I've done wrong, but I beat myself up sometimes, in, …….on the emotional side, not physically, and I'd say "oh why did you do that, you shouldn't have done that, you are a failure, you can't manage anything. It's not going good for you, your personal life is not going good for you and your health also" and you just get caught up and you are saying, 'once I can't control my personal life, I can't control that and then I can't even control my diabetes'. So you sought of get lost in it all | 5. 144-145<br>5.154-6.161 |
| Poor dietary self-care resulting from resentment and self pity | • there was an element of self pity as well, and that self pity when you wallow in it, you become worse. You become more in denial and sometimes rebellious in the sense that you're thinking well, I don't care anyway I'm gonna eat what I wantI<br>• sometimes would go, pretend that I too could eat erm but knowing at the back of my mind that you could, you could be doing over a period time | 3.90-93<br>4.118-120 |

| | | |
|---|---|---|
| | some serious damage | |
| Dieting is restrictive | • I felt different from everybody else…… I love food and I love meals, going out for meals and I just felt different,<br>• I just felt as if I was being punished, you know it's not fair……. why can't I eat like anybody else?.....I use to look at other people eating and drinking and thinking why can't I do that? ……..I just felt confined and restricted and I just didn't like it | 4.116-117, 123-124<br>3.85-89 |
| Feeling depressed about dietary restrictions | • I think I felt down, I felt depressed, I felt different from everybody else. I felt fed-up with people say/ telling me, you can't do this and you can't do that | 4.96-97 |
| Feeling guilty about poor dietary self-care | • Guilt. I am guilty stricken, because I know that I've taken these/ the wrong foods, I know I'm damaging my, my nerves, and then my, my heart, and then the cholesterol. I. I/ guilt and I know that I can't reverse it. Or I get paralyzed with what I've done and not do anything and wait for the negative symptoms to come on | 7.188-191 |
| Feeling of freedom from dietary restrictions | • At the time when you're currently eating it, it's fantastic, because it's me, I'm free, and so you sometimes/ you, you/ it's because subconsciously you've, you're, you're behaving as if you are not diabetic | 8.217-219 |
| Frustrated with others enforcing dietary restrictions | • I felt fed-up with people say/ telling me, you can't do this and you can't do that and so many things that they were telling me, all because you are diabetic you can't have salt, because you'll be sick- and I'm thinking …… who qualifies you to be my doctor | 4.96-100 |
| Hurt and resentment from dietary restrictions | • I felt hurt, I felt different from everybody else, resented that other people could sit and eat and do whatever they wanted | 4.116-118 |

# Appendix 16: Themes across all participants

**SUPER-ORDINATE THEMES AND THEMES FOR ALL PARTICIPANTS**

| SUPER-ORDINATE THEMES | Carl -01 | Violet -02 |
|---|---|---|
| **Feeling bad (anxious, regretful, guilty and annoyed) about diet restrictions in social situations** | Dieting is restrictive<br>Social situations affects dietary adherence<br>Family gathering affects dietary adherence<br>Job affects dietary maintenance<br>Convenience eating affects dieting<br>Feeling annoyed about dietary non-adherence<br>Feeling guilty about dietary non-adherence<br>Anxiety about clinical appointments | Denial during initial diagnosis<br>Dieting is restrictive<br>Addiction to sugar<br>Frustration with caregivers' recommendations<br>Dietary restrictions makes you feel different<br>Frustrated with others enforcing dietary restrictions<br>Feeling depressed about dietary restrictions<br>Cognitions related to feeling of depression<br>Feeling angry about dietary non-adherence<br>Cognitions related to feeling of anger<br>Dietary non-adherence resulting from self pity<br>Hurt and resentment from dietary restrictions<br>Dietary non-adherence resulting from resentment<br>Feeling of freedom from dietary restrictions<br>Feeling guilty about dietary non-adherence<br>Cognitions related to feeling of guilt |
| **Feeling bad (regretful, guilty depressed and frustrated) about struggle with dieting** | Struggling with dieting<br>Home is a comfort zone for dietary adherence<br>Staying hungry causes unhealthy eating<br>Feeling of regret about dietary non-adherence<br>Feeling guilty about dietary non-adherence<br>Feeling depressed about unsuccessful dieting<br>Frustration with doctors' recommendations | Distressed about having diabetes<br>Frustration with having diabetes<br>Struggling with dieting<br>Personal problems affect dieting<br>Lack of self control over dietary non-adherence<br>Feeling depressed with challenges of dieting<br>Feeling guilty about dietary non-adherence<br>Cognitions related to feeling of guilt<br>Negative effect of dietary non- adherence<br>Fear of diabetes complications |
| **I rationalise to deal with the negative emotions of not following the diet** | Questioning self about dietary non-adherence<br>Physical effect of dietary non-adherence<br>Coping with of guilt from dietary non-adherence<br>Rationalizing about having diabetes (treat it as a positive)<br>Rationalizing about being on a diet (other pleasure beside food)<br>Rationalizing about dietary non-adherence (I'll behave tomorrow) | Rationalizing about dietary non-adherence<br>Rationalizing- Gentle clinical consultation improves diabetes control<br>Rationalizing- Harsh clinical consultation affects diabetes control |
| **Coping with the restrictions and struggles of dieting to stay healthy and avoid negative emotions** | Education is important for dietary adherence<br>Dieting brings change in eating behaviour<br>Self control is important for dietary adherence<br>Dealing with temptations of dietary non adherence<br>Having a treat is important<br>Reducing social functions for dietary adherence<br>Diabetes research is important | Dieting brings change in eating behaviour<br>Having control over dieting<br>Coping with dietary non-adherence<br>Good meals prevents snacking<br>Prioritizing- Putting diet first is important<br>Time management is important for dietary adherence<br>Motivation to improve dieting<br>Social support from diabetes patients is important<br>Guilt and denial becomes remorse and acceptance over time<br>Pride and satisfaction coping with dietary non-adherence<br>Understanding diabetes is important |

| Roxy -03 | Martin -05 | Sohpie -08 | Jess -09 |
|---|---|---|---|
| Dieting is restrictive<br>Addiction to food (food is like being on drugs)<br>Lack of money affects dietary maintenance<br>Job change affects dietary maintenance<br>Frustration with having diabetes<br>Frustration with unsuccessful diabetes treatment | Denial during initial diagnosis<br>Having diabetes is restrictive<br>Dieting is restrictive<br>Family crisis affects dietary adherence<br>Celebration causes dietary non-adherence<br>Making food choices is a challenge<br>Frustration with dietary restrictions<br>Frustration with small prints on food labels | Dieting is restrictive<br>Diet makes you feel different<br>Addiction to chocolate<br>Family gathering affects dietary adherence<br>Social situations affects dieting<br>Frustration with dietary restrictions<br>Feeling depression about dieting<br>Anxiety with clinical appointments<br>Eating out affects dietary adherence | Frustration with shopping for the right food |
| Struggles with dieting<br>Lack of self control over unhealthy eating<br>Family gathering affects dietary adherence<br>Personal problems affect dietary adherence<br>Your mood affects your diet<br>Lack of self worth affects dieting<br>Difficulty maintaing weight lost<br>Feeling of regret about dietary non-adherence<br>Feeling guilty about dietary non-adherence<br>Feeling guilty about non-adherence to doctor's recommendation<br>Feeling guilt over lack of self control | Having diabetes is a boring chore<br>Frustration with having diabetes<br>Feeling irritated about having diabetes<br>Lack of self control over over-eating<br>Negative effect of dietary non-adherence<br>Dietary adherence requires focusing<br>Feeling guilty over dietary non-adherence<br>Cognitions related to feeing of guilt<br>Feeling angry about dietary non-adherence<br>Anxiety about clinical appointments | Struggle with dieting<br>Weather conditions affects dieting<br>Holidays affects dietary adherence<br>Christmas affects dieting<br>Frustration with unsuccessful dieting<br>Feeling depression about unsuccessful dieting<br>Frustration with having diabetes<br>Frustration with unsuccessful diabetes control<br>Feeling depression about having diabetes<br>Frustration with caregivers recommendations<br>Fear of diabetes complications | Struggling with dieting<br>Addiction to sweet things<br>Christmas affects dieting<br>Feeling of regret about dietary non-adherence<br>Feeling guilty about dietary non-adherence<br>Cognition related to feeling of guilt |
| Physical effect of dietary non-adherence<br>Questions unhealthy eating behaviour<br>Rationalizing unhealthy eating behaviour<br>Rationalizing -separates dieting issues from daily activities | Coping with guilt from dietary non-adherence<br>Rationalizing about negative emotions<br>Rationalizing dietary non-adherence<br>Rationalizing about diabetes treatment | Rationalizing- coping with frustration from dieting<br>Rationalizing about being on a diet<br>Rationalizing- Dietary non-adherence is rare<br>Rationalizing chocolate intake | Rationalizing about dietary restrictions |
| Employing alternatives to dietary maintainance<br>Dieting brings change in eating behaviour<br>Need for food diary to maintain dieting<br>Needs for social support to lose weight- (dependence)<br>Making efforts to lose weight<br>Losing weight impacts health<br>Feeling of pride and satisfaction with weight loss | Family providing support for dietary adherence<br>Pride and satisfaction from dietary adherence | Having control over diabetes<br>Dieting brings change in eating behaviour<br>Spouse provides support for dietary adherence<br>Diabetes education is important<br>Participating in research is beneficial | Dieting brings change in eating behaviour<br>Dietary adherence needs focusing<br>Having a treats is important<br>Substituting sweet things for fruits |

| Kevin -10a | Laura -11 | Dan -12a | Brad- 13 |
|---|---|---|---|
| Dieting is restrictive<br>Dieting makes you feel different<br>Frustration with shooping for the right food<br>Job affects dietary maintenance<br>Frustration with dietary restrictions<br>Frustration with job affecting dietary maintenance | Dieting is restrictive<br>Convenience eating affects dieting<br>Feeling irritated with dietary restrictions<br>Giving up regimented dieting (weight watchers)<br>Frustration with shopping for right food | Denial during initial diagnosis<br>Comfort eating sweet foods<br>Job affect dietary maintenance<br>Adverts pose a challenge for dieting<br>Feeling of anger from dietary restrictions<br>Feeling of anger from family's dietary restrictions<br>Cognitions related to feeling of anger (family)<br>Freedom from family means freedom from restrictions<br>Feeling of anger from dietary non-adherence<br>Cognitions related to feeling of anger<br>Sense of failure from dietary non-adherence<br>Diabetes has caused short temperedness | Denial during initial diagnosis<br>Dieting is restrictive<br>Frustration with dietary restrictions<br>Feeling angry at being treated differently |
| Struggling with dieting<br>Snacking affects dietary adherence<br>Comfort eating – (eating out of boredom)<br>Weather conditions affects dietary adherence<br>Lack of self control over dietary non-adherence<br>Dieting is endless (needs consistency)<br>Feeling guilty about dietary non-adherence<br>Cognitions related to feeling of guilt<br>Depressed about dietary non-adherence | Struggling with dieting<br>Snacking affects dieting<br>Lack of self control-over dietary non-adherence<br>Feeling shameful about eating chocolates<br>Feeling guilty from dietary non-adherence<br>Cognitions related to feeling of guilt<br>Feeling angry about lack of self control | Struggling with dieting<br>Denial affects dieting<br>Feeling of anger from dietary non-adherence<br>Cognitions related to feeling of anger<br>Feeling angry about unsuccessful dieting | Struggling with dieting<br>Food can be addictive |
| Rationalizing -dietary adherence is not strict<br>Doctor's reprimand causes dietary adherence | Feeling of anger about caregivers' lack of information<br>Rationalizing about dietary non-adherence<br>Rationalizing- Dietary non-adherence is rare | Rationalising- maintaining healthy eating before diagnosis<br>Rationalising about dietary non-adherence<br>Having a treat is acceptable | Coping with emotions from dietary non-adherence<br>Rationalizing- Dietary adherence is not restrict<br>Rationalizing about dietary restrictions<br>Rationalizing about dietary non-adherence<br>Having a treat is acceptable |
| Dieting needs focusing<br>Dieting brings change in eating behaviour<br>Self-control is important for dietary adherence<br>Pride and satisfaction with resisting temptations | Being in control of dieting<br>Dieting brings change in eating behaviour<br>Spousal support to maintain healthy eating<br>Needing support to make food choices | Dieting brings change in eating behaviour<br>Educating the mind is important for dietary adherence<br>Overcoming self denial is important for dieting<br>Self control is important for dietary adherence | Dieting brings change in eating behaviour<br>Spousal support for dietary adherence<br>Having control over dieting<br>Dieting is unpleasant but helpful |

| Ella -14 | Tony- 15 |
| --- | --- |
| Denial about having diabetes<br>Addiction to food<br>Addiction to sweets<br>Frustration with dieting<br>Frustration from endless dieting<br>Feeling guilty about dietary non-adherence<br>Cognitions related to feeling of guilt<br>Dietary non-adherence resulting from guilt<br>Feeling of anger from family's dietary restrictions<br>Cognitions related to feeling of anger<br>Dietary non-adherence resulting from anger<br>Lack of self control over dietary non-adherence<br>Feeling of worthlessness from dietary non adherence | |
| Struggling with dieting<br>Struggling with weight management<br>Personal problems affects dietary adherence<br>Stress affects dietary adherence<br>Eating to cope with stress<br>Frustration with unsuccessful dieting<br>Self blame for dietary non-adherence<br>Feeling of regret from dietary non-adherence<br>Feeling guilty about dietary non-adherence<br>Cognitions related to feeling of guilt | Struggling with dieting<br>Snacking affects dieting<br>Conenience eating affects dieting<br>Personal problems affecting dieting<br>Feeling guilty about snacking at night<br>Cognitions related to feeling of guilt<br>Depressed about dietary non-adherence<br>Depressed about weight gain<br>Cognition related to feeling of depression<br>Dieting and exercise go hand in hand |
| Coping with dietary non-adherence | Coping with the feeling of guilt and depression<br>Rationalizing about having diabetes<br>Rationalizing about dietary non-adherence |
| Need for stricter dietary regimen<br>Having a treats is important | Dieting brings change in eating behaviour<br>Maintaining the diet is beneficial |

Appendix 17: Frequencies of super-ordinate themes, themes and sub-themes

| **Super-ordinate themes, themes and sub-themes** | Carl | Violet | Roxy | Martin | Ian | Sophie | Jess | Kevin | Laura | Dan | Brad | Ella | Tony | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Super- ordinate theme 1: Diet self-care, a constant challenge** | | | | | | | | | | | | | | |
| ***Theme 1: "It's a blessed diet"*** | | | | | | | | | | | | | | ***13*** |
| Dieting is rigid and restrictive | x | x | x | x | | x | | x | x | | x | | | 8 |
| Struggling with dietary self-care- every day is a challenge | x | x | x | | x | x | x | x | x | x | x | x | x | 12 |
| ***Theme 2: Home is a comfort zone- other places are a risk*** | | | | | | | | | | | | | | ***8*** |
| Social situations affecting dietary self-care | x | | x | x | x | x | x | | | | | | | 6 |
| Job schedules affect dietary self-care | x | | x | | x | | | x | | x | | | | 5 |
| Home is a comfort zone | x | | | | | | | | | | | | | 1 |
| ***Theme 3: I don't have the willpower*** | | | | | | | | | | | | | | **11** |
| Personal problems and dietary self-care | | x | x | x | x | | | | | | | x | x | 6 |
| Food addiction, snacking and convenient eating | x | x | x | | x | x | x | x | x | | | x | x | 10 |

| **Super-ordinate themes, themes and sub-themes** | Carl | Violet | Roxy | Martin | Ian | Sophie | Jess | Kevin | Laura | Dan | Brad | Ella | Tony | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lack of self control for dietary maintenance | | x | x | x | | | | x | x | | | x | x | 7 |
| **Super- ordinate theme 2: Negative emotions, a cause or a consequence?** | | | | | | | | | | | | | | |
| ***Theme 1: Feeling frustrated angry and depressed about dietary restrictions*** | | | | | | | | | | | | | | ***10*** |
| Dietary restrictions makes you feel different and frustrated | | x | x | x | | x | x | x | x | | x | x | | 9 |
| Feeling depressed and angry about dietary restrictions | | x | | | | x | | | | x | | x | | 4 |
| ***Theme 2: The feeling afterwards- paralyzed with negative emotions*** | | | | | | | | | | | | | | ***11*** |
| Feeling irritated, annoyed and regretful poor dietary self-care | x | | | | x | | x | | | | | x | | 4 |
| Feeling guilty, angry and depressed about poor dietary self- | x | x | x | x | | | x | x | x | x | | x | x | 10 |
| Poor dietary self-care from negative emotions | | x | | | x | | | | | | | x | | 3 |
| ***Theme 3: "You get lost in it all"*** | | | | | | | | | | | | | | ***6*** |

| **Super-ordinate themes, themes and sub-themes** | Carl | Violet | Roxy | Martin | Ian | Sophie | Jess | Kevin | Laura | Dan | Brad | Ella | Tony | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| The futility of dieting: feeling frustrated, depressed and angry | x | x | | | x | x | | | | x | | x | | 6 |
| **Super-ordinate theme 3: Coping with negative emotions and living with the 'diet'** | | | | | | | | | | | | | | |
| ***Theme 1: Coping with negative emotions from poor dietary self-care*** | | | | | | | | | | | | | | ***8*** |
| Rationalising poor dietary self-care and negative emotions | x | | | x | x | x | | x | | x | x | | x | 8 |
| ***Theme 2: You have to accept the diet*** | | | | | | | | | | | | | | ***12*** |
| Having control and accepting poor dietary self-care | | x | | | x | x | | | x | | | x | | 5 |
| Dieting brings change in eating behaviour | x | x | x | | x | x | x | x | x | x | x | | x | 11 |
| ***Theme 3: What is important for good dietary self-care*** | | | | | | | | | | | | | | ***8*** |
| Have an occasional treat | x | | | | x | | x | | | | x | x | | 5 |
| Self control is key | x | | x | | x | | | x | | x | | | | 5 |

Appendix 18: Extracting quotes across transcripts to support themes

**Super- ordinate theme 1: Diet self-care, a constant challenge**

| **Themes and** *Sub-themes* | **Quotations** | **Page & Line** |
|---|---|---|
| **Theme 1: "It's a blessed diet"** | | |
| *Dieting is rigid and restrictive* | • It's restricted I mean a certain, certain things I like. You suddenly go out with people and I want a McDonald's milkshake, but you can't have too many milkshakes and things like that<br>• I think is the strict routine probably<br>• The wife would say for instance she wouldn't give me a certain thing because I have no option, they have got sugar in and stuff like that..... I was a bit grieved at that time. | 4.105-107<br>1.16<br>12.391-394 |
| *Struggling with dietary self-care- every day is a challenge* | • When you are dieting you start of good and after a while you get fed up and you break the diet, that is how I felt……. I said "no, I got to go back to the diet, the proper diet". Then I go back to the diet for about 3-4 days and then I break it again, I'll slip<br>• I've been dieting for years so it's like it's basically a lifestyle, but you know you, you're always gonna to break a diet, you're always going to do something you shouldn't do<br>• It's difficult to start with because when you walk pass a Gregg shop and you know you can smell the bread and they are freshly baked then you look in the window and you see all these lovely sort of cream cake and iced buns and things but erm difficult/ yeah very difficult to start with..... We are succumb to temptation and erm you know it's very, very difficult at times, it's very difficult | 3.66-67, 75-76<br>12.339-341,<br>3.79-82, 8.299-300 |

| **Theme 2: Home is a comfort zone- other places are a risk** | | |
|---|---|---|
| *Social situations affecting dietary self-care* | • like family functions or any kind of function, then, I find it hard because it's like you have the meal there and you still come home and it's like you have something else to eat again<br>• I was following the diet up to, up till we went on the cruise. ….. We went on the cruise and oh dear the food there and that's when it went wrong<br>• If you're on holiday because times are different and you just got to try and balance it out really.....it does frustrate you at times | 4.101-103<br>17.462-464<br>13.368-369 |
| *Job schedules affect dietary self-care* | • When you are on the road like I am and on the move, when do you stop and eat..... if you suddenly start thinking I'm on the run, I'll have a burger or stop and have a Kentucky chicken, ..... that's when the weight goes on and suddenly when your controls go out of the wall<br>• Because of the hours of work I always errh, my eating, patterns are not as what normal people will so like. I mean I could be having my main meal at midnight, you know because like we're not finished work till like you know midnight, after midnight<br>• When I'm at work, I'll just have to go to just the local shop and buy sometime like a pack of crisp if I'm hungry.....It's, it's a bit frustrating at times you know. I thought well perhaps if I had a normal job, start the work at 9 o'clock and finish at 5 o'clock and have your lunch at lunch time and lunch/ your evening meals at 6 o'clock | 12.335-336, 342-345<br>1.12-15<br>2. 73-74, 76-77, 7.226-228 |

| **Theme 3: I don't have the willpower** | | |
|---|---|---|
| *Personal problems and dietary self-care* | • If I'm in a good mood then I might/ I might be alright, but if I am feeling depressed or down, then that's when the binge eating starts<br>"You tend to put the diabetes on hold and you say 'I can't deal with you now". | 7.177-178 |
| *Food addiction, snacking and convenient eating* | • My wife erm tries to cook healthy meals for us whenever possible.....so the challenge is just, just trying not to snack too much and trying not to eat errh convenient foods too often<br>• I've just had a bag of crisps.....cos that was conveniently safe really. I just quickly had a cup of drinking chocolate and a bag of crisps. So that I suppose isn't healthy is it..... | 6.205-209<br><br>5.131, 6.133, 137-138 |
| *Lack of self control for dietary maintenance* | • Sunday's lunch oh God I loved, it was a mountain I ate…….I should have stopped when I had had enough, and/ but it was so nice so I just carried on<br>• eating a bar of chocolate is, is just disgraceful.....I enjoy every mouthful, every mouthful and I think I'll just have 2 squares, it becomes 4, 6, 8 and I ate the whole bar. I mean it's a big square, a big bar of chocolate and I eat the whole lot<br>• mean I have got certain amount of willpower, but when it comes to diet and exercise the urge is not there | 8.209<br>9.226-227<br><br>7.177, 183-185<br><br>7.210-220 |

**Super- ordinate theme 2: Negative emotions, a cause or a consequence?**

| **Themes and** *Sub-themes* | **Quotations** | **Page & Line** |
|---|---|---|
| **Theme 1: Feeling frustrated angry and depressed about dietary restrictions** | | |
| *Dietary restrictions makes you feel different and frustrated* | • sometimes you get fed up, you want to be normal, you want to be like anyone else<br>• we're kids now, ..... "don't have that chocolate you're not supposed to have that"<br>• I found it very confusing. Erm I'd really would love someone to go shopping with me and say "no you can't have that" 'cos you standing reading labels and their mind boggling, you know I am not sure whether yes I can, no I can't. Very *[frustrating]*..... | 9.234-235<br>2.53-54<br>4.92-94, 97, |
| *Feeling depressed and angry about dietary restrictions* | • even my daughters will say to me..... "mum why are you having that why do you need that couple of biscuits or anything"..... then I get angry because they are telling me, I'm their mum, they don't tell me what to do..... | 17.494-499, |
| **Theme 2: The feeling afterwards- paralyzed with negative emotions** | | |
| *Feeling irritated, annoyed and regretful poor dietary self-care* | • You get irritated and you can proper feel like having a go at people and things like that ..... You get annoyed with yourself because you think well, I know I shouldn't have ate that" | |
| | • you can get down and think you know what are you doing to yourself | 8.245-246 |
| | • you get annoyed with yourself because you think well I know I shouldn't have ate that | 4.108-109 |

| | | |
|---|---|---|
| | • I think you can feel guilty.....I suppose that guilt comes into it doesn't it.....yes there is a little bit of guilt.....if you know that something is going to be bad for you and you still carry on doing it, you have to take the remedy that comes with | 6.162, 8.232, 18.513, 9.240-241 |
| *Feeling guilty, angry and depressed about poor dietary self-care* | • You just don't feel good, you hurt your self esteem, it's like, the guilt kicks in again ..... Yeah that guilt is always there with food<br>• I do feel guilty sometime that erm I have eaten what I shouldn't have done<br>• lovely while I'm eating it lovely while I'm eating it, but then afterwards I think ah *[guilt]*<br>• I get paralyzed with what I've done and not do anything and wait for the negative symptoms to come on. You don't want to do anything, you're angry; sometimes you are angry as well…….. self pity, I can't cope, will I ever/ I don't anticipate that I'm ever gonna get any of these under control | 8.189, 14, 337<br>2.39-40<br>8.194-195<br><br>7.191-192, 194-195 |
| *Poor dietary self-care from negative emotions* | • there was an element of self pity as well, and that self pity when you wallow in it, you become worse. You become more in denial and sometimes rebellious in the sense that you're thinking well, I don't care anyway I'm gonna eat what I want……sometimes would go, pretend that I too could eat erm but knowing at the back of my mind that you could, you could be doing over a period time some serious damage | 3.90-93, 4.118-120 |
| **Theme 3: "You get lost in it all"** | | |
| *The futility of dieting: feeling frustrated, depressed and angry* | • That could be frustrating when it's not- so you think right that's it I'm going to go have a drink.....you can think oh sod it you know. If I'm going to be like this and that's not working you know if I don't feel any difference, what's the difference? But you don't think like that for long, you have to get on track | 14. 408-409, 15.424-426 |
| | • It disheartens you a bit; it does dishearten you a bit..... sometimes you think well I'm trying very hard to control it and it's not working.....Oh frustration, you get frustrated with it .... Sometimes you get depressed about it, thinking/ trying to you know, trying to balance it out and trying to get/ do the right thing and trying to do everything and sometimes it still doesn't work | 10.259, 265, 14.393-395 |

**Super-ordinate theme 3: Coping with negative emotions and living with the 'diet'**

| **Themes and** *Sub-themes* | **Quotations** | **Page & Line** |
|---|---|---|
| **Theme 1: Coping with negative emotions from poor dietary self-care** | | |
| *Rationalising poor dietary self-care and negative emotions* | • But I'm not worried about the diet because I know that if I do make a mistake or I do comfort eat, that I can correct it, as long as I don't continue to do that all the time.<br>• you get into work and then you know you don't get any choice. So sometimes I think well I'm best if I've had a chocolate bar then having nothing, you know, you know, I don't want me sugar low<br>• I mean if we follow the strict diet you know we wouldn't really do anything would we.....we don't live in an ideal world and erm there are times that erm you know we erm we do run off the forbidden track and then we errh we come off the rails | 18.554-558<br>19.258-260<br>5.169-170, 9.340 |
| | • Yes I shouldn't be doing it .....and you think, well I'm having a cake but sod it, it's only, one cake, I say that to meself to cancel it out you see, so I'm only having one cake | 5.172, 5.175-176 |
| **Theme 2: You have to accept the diet** | | |
| *Having control and accepting poor dietary self-care* | • I don't, I don't face challenges. That to me, that will mean it's taking over your whole life I don't want anything to take over my whole life<br>• try to be as normal as possible not because I've got this disease, but I got to learn to live with it and I've got to control it<br>• if you start eating all these stuff and you, you don't eat your healthy stuff, you feel, you a little - you know, you feel rough..... dealing with it, you don't worry about because you can get more stressed out and eat more stuff | 12.307-308<br>9.243-244<br>10.283-284, 287-288 |

| | | |
|---|---|---|
| *Dieting brings change in eating behaviour* | • I just try to stick to routine with it and basically/ I don't eat junk food or fast food, I make, I make basically my own food, all of it<br>• I tend now to eat what I want to eat, before I go out to a party or whatever so that I'm not over tempted, I'm pretty full when I get there<br>• It is a lot better in the sense that, …… before I eat something or choose something to eat, I think about what I'm doing<br>• I didn't eat a lot of fruits really, never really liked them anyway. I will have an apple or an orange once a/ every once a month. But I have them once a day now | 1.16-18<br>5.141-142<br>2.38-39<br>4.116-118 |
| **Theme 3: What is important for good dietary self-care** | | |
| *"Have an occasional treat"* | • you can treat yourself every now and then and looking forward to those rather than actually be - rather be disappointed that you can't partake.....<br>• the thing is if you are dieting and you don't- if you have it occasionally I don't think it will hurt you anyway.<br>• they always say if you have it in moderation, you're okay. It's, it's the not in moderation isn't it? I mean I will occasionally have something, if I haven't had anything for a few days when we go out | 4.108-109,<br>18.532-534<br>4.107-110 |
| *Self control is key* | • it's a lot with willpower and things like that. I often think if I wasn't in this trade ..... I could think perhaps me lifestyle would have been different.<br>• I think you've got to have your mind right. You know, you've got to be focus on it and be strong and determined to do it.<br>• it's getting the brain to accept the fact that errh hey, you know we don't have these anymore..... education in the mind/ in the brain could tell the taste buds you know that you know that "hey you not gonna have this".....it's the, the inner self. I think if you can conquer that erm and say "yes I can have these things, but within strict moderation" | 13.368-371, 19-549-551<br>3.82-83, 105-106, 12.442-443 |

Appendix 19: Consent Form

Version 2 (20-04-11)

UNIVERSITY OF BIRMINGHAM
School of Psychology

**Code number:** _____

# CONSENT FORM

Title of Project*:*
**Beliefs related to dietary intake in type 2 diabetes: Development and validation of a questionnaire.**

Researcher*:* Margaret Amankwah-Poku

**If you have decided that you would like to take part in this research, then please initial each box below to show that you have understood what the research is about.**

Please initial box

1. I confirm that I have read and understood the information sheet dated 20/04/11 (Version 2) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time during the research interview, without giving any reason, without my medical care or legal rights being affected. ☐

3. I understand that the data collected during this study will be looked at by the researcher and relevant others at the University of Birmingham to ensure that the analysis is a fair and reasonable representation of the data. ☐

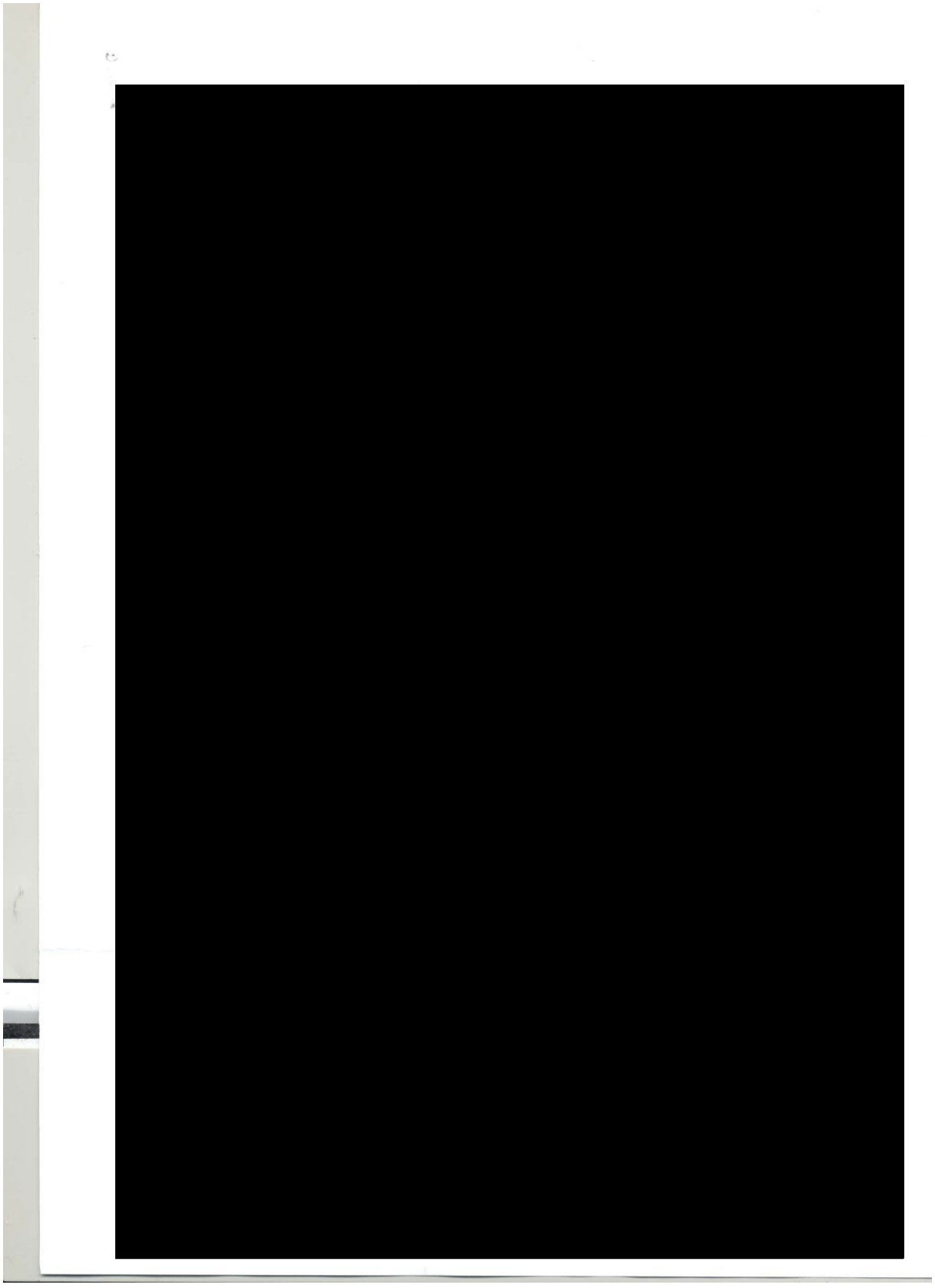
4. I understand that relevant sections of my medical notes may be looked at by the researcher Birmingham University where it is relevant to my taking part in this research and agree that this can be done. ☐

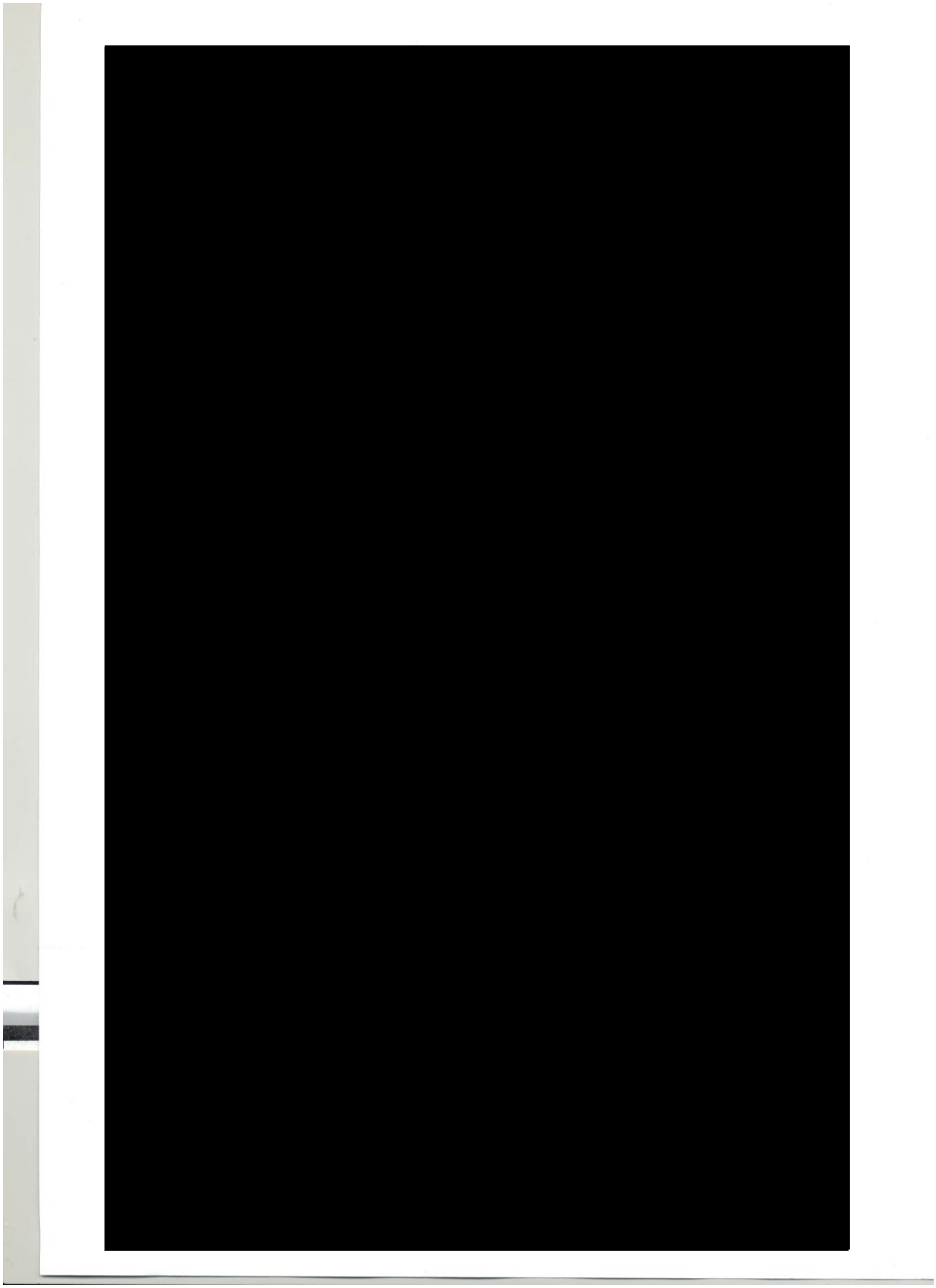
5. I agree to take part in the above study. ☐

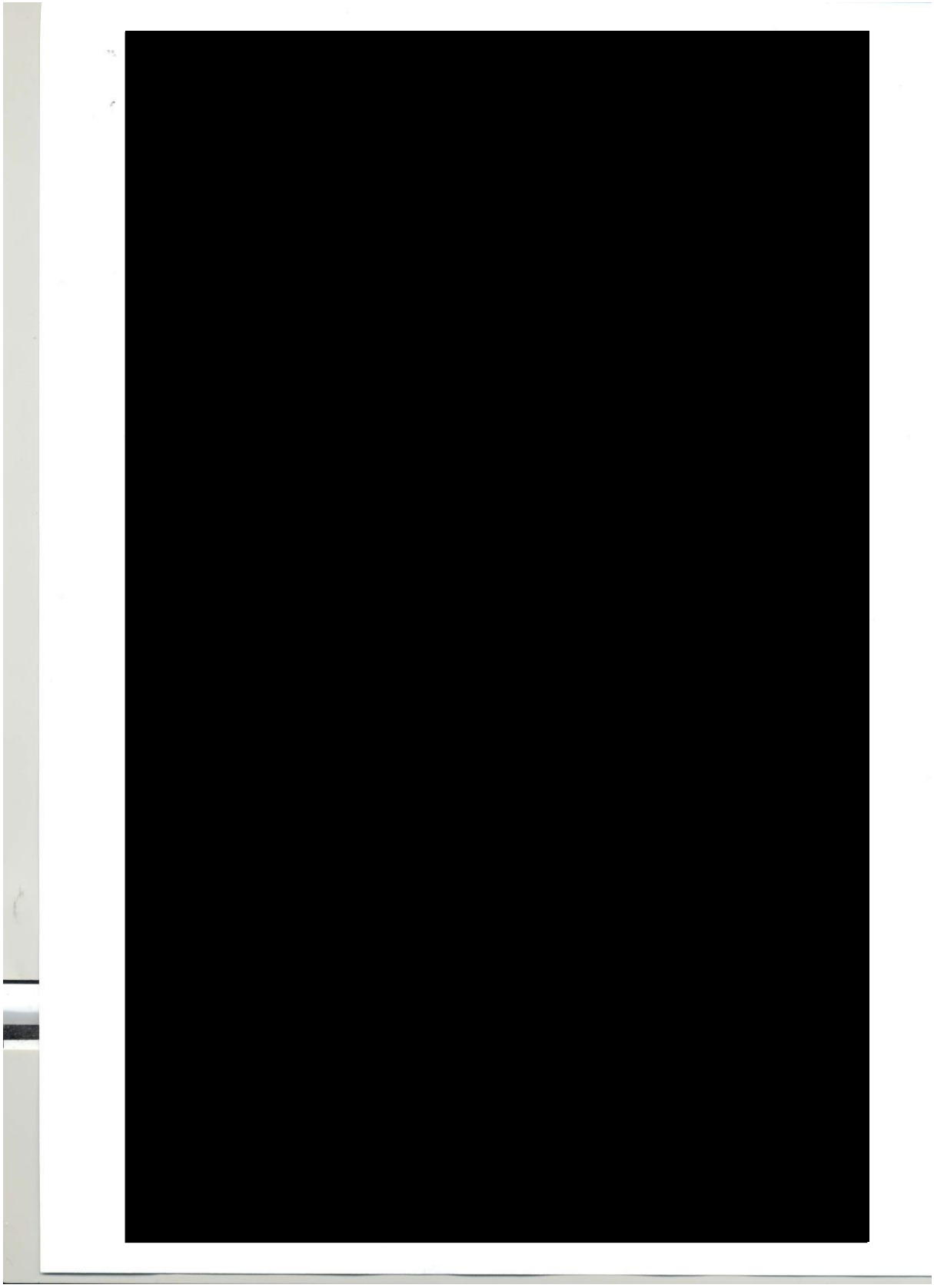
6. I agree that I can be contacted if further research is done on this topic. ☐

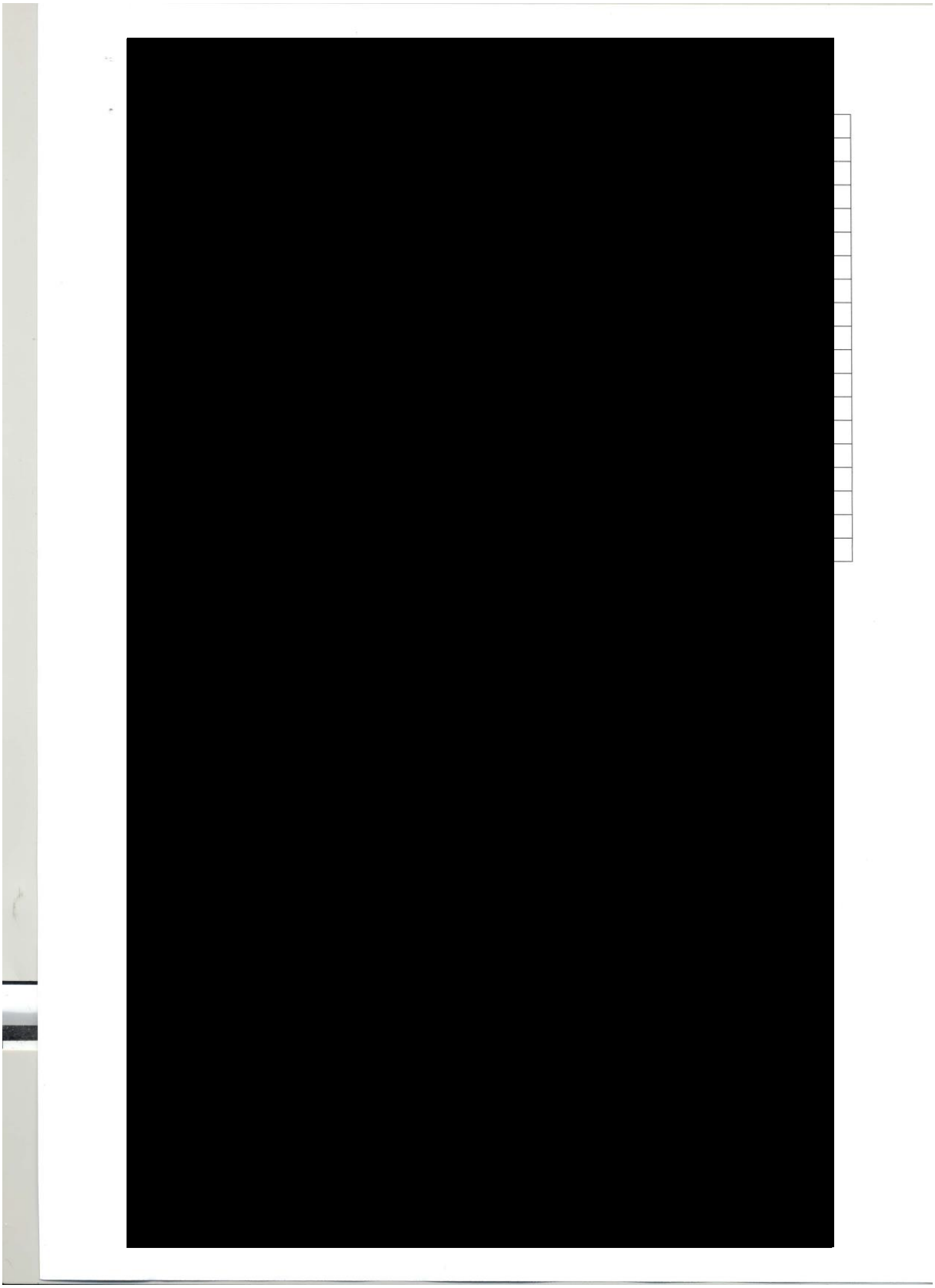
| ..... | ..... | ..... |
|---|---|---|
| Name of Participant | Date | Signature |
| ..... | ..... | ..... |
| Name of Researcher | Date | Signature |

Appendix 20: West Midlands Research Ethics Committee approval









This Research Ethics Committee is an advisory committee to West Midlands Strategic Health Authority
The National Research Ethics Service (NRES) represents the NRES Directorate within the Research Ethics Committees in England

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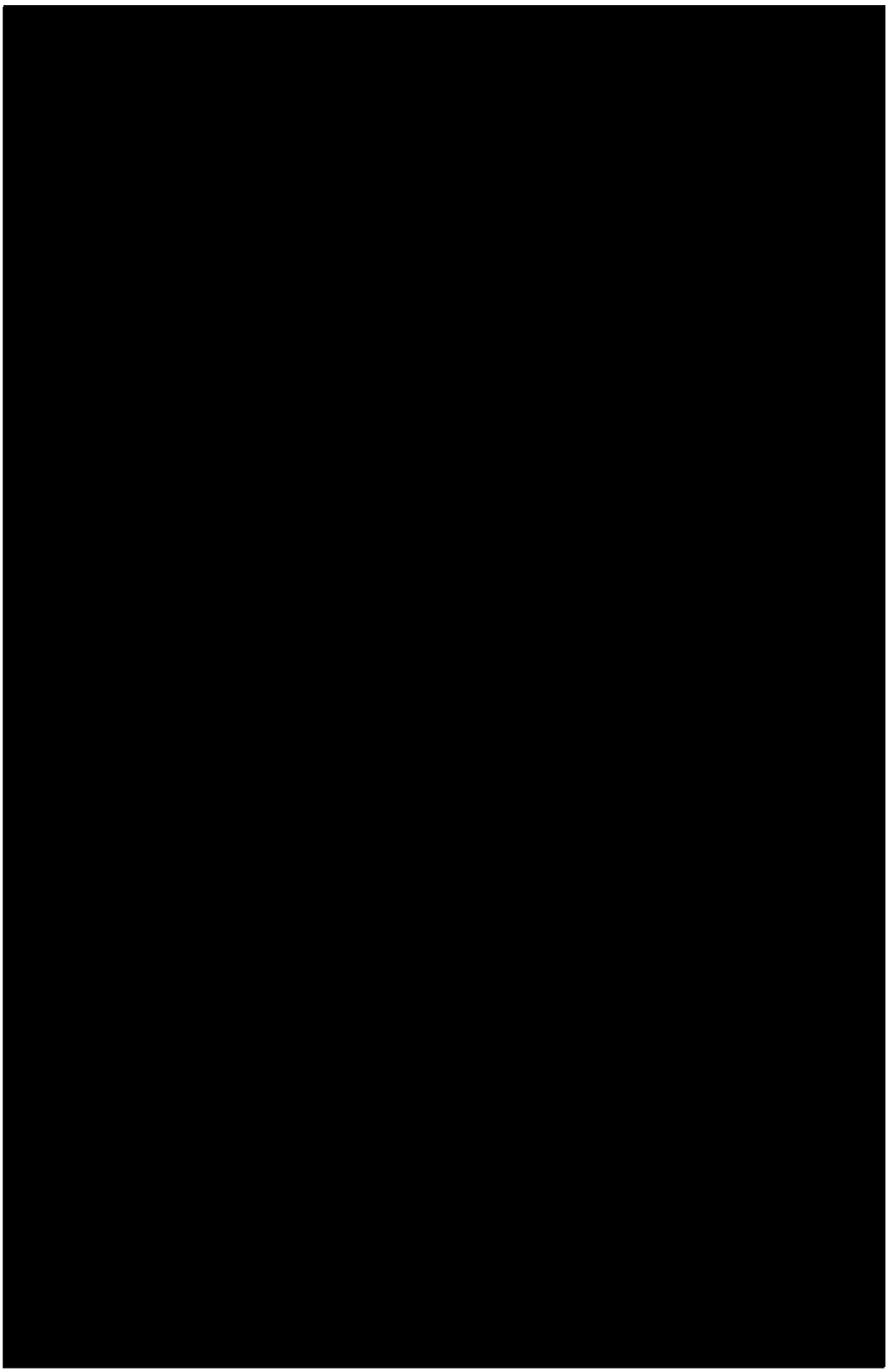
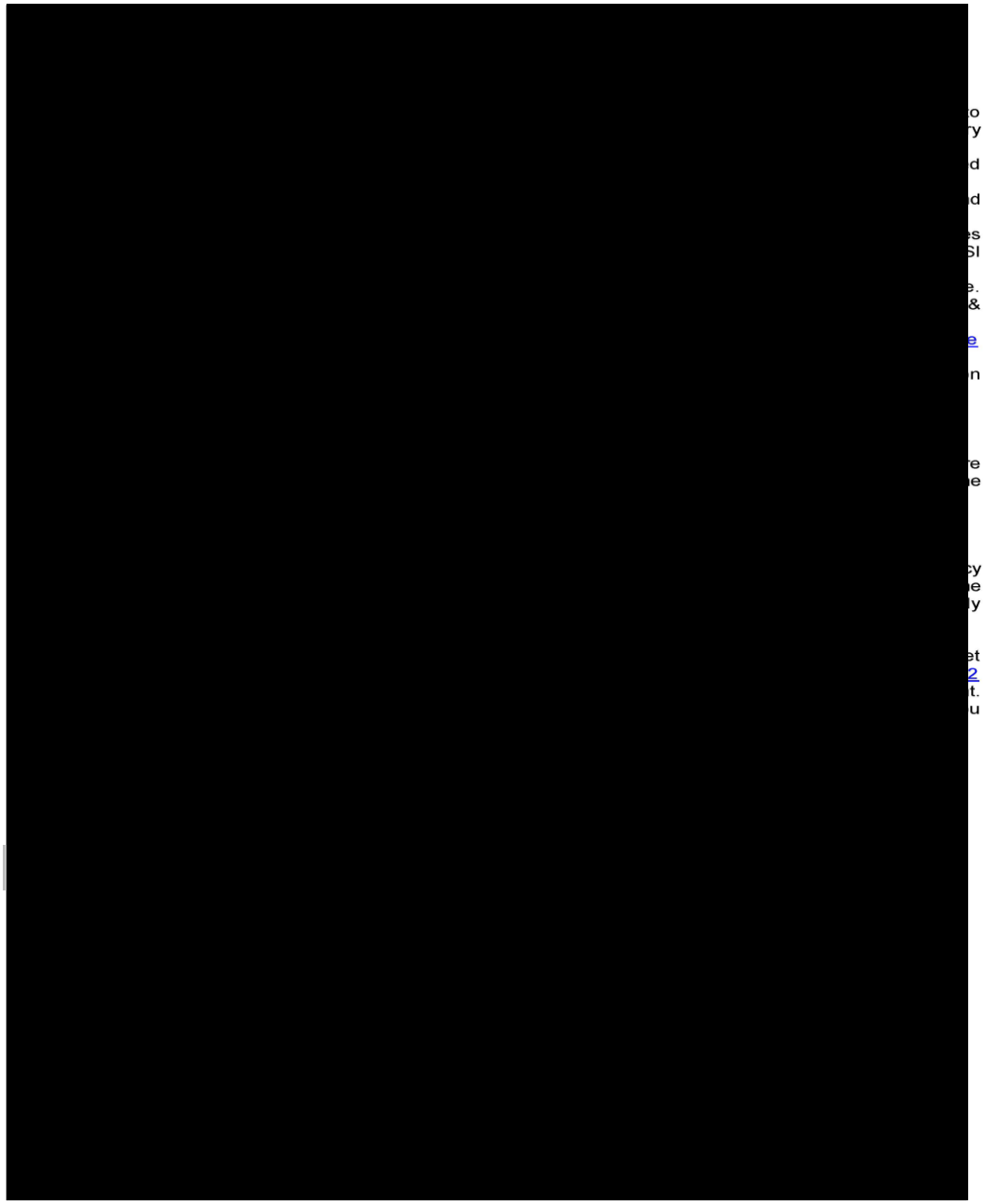
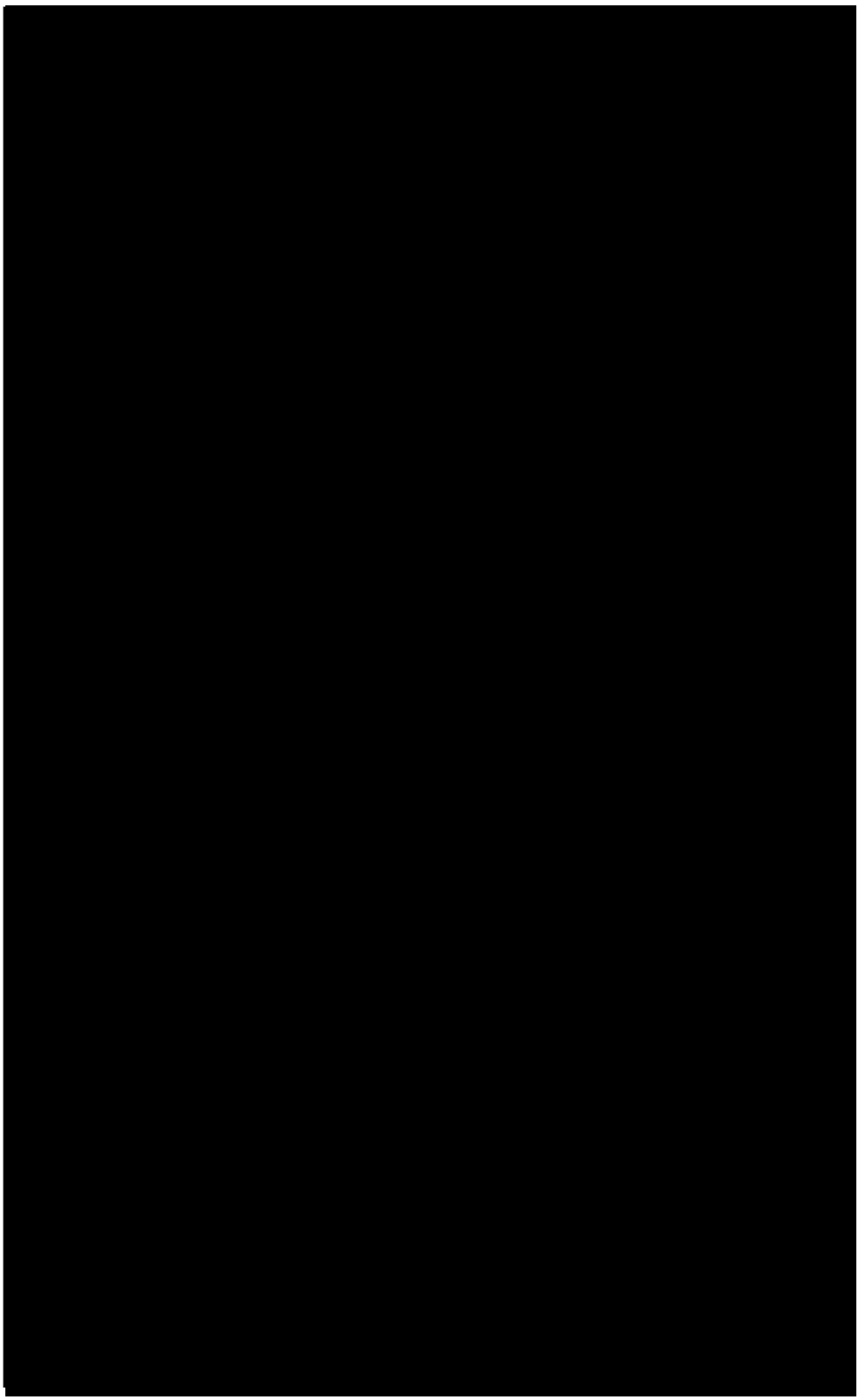
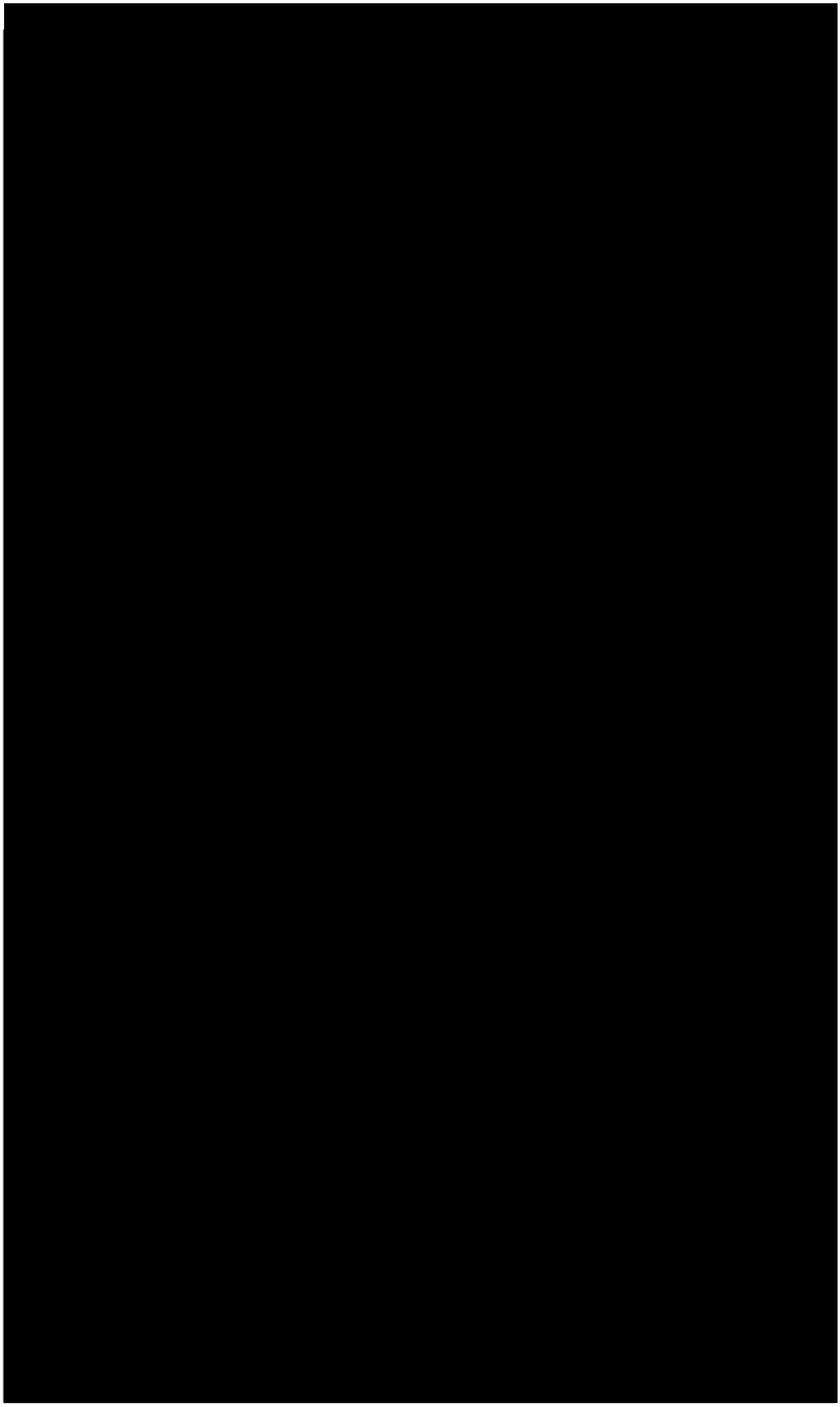
Appendix 21: Heartlands Research & Development ethics approval





Appendix 22: Selly Oak ethics approval





Appendix 23: Initial 30-item- Food Intake and Beliefs Questionnaire

Version 1 (4/03/2011) Code Number _____

## Food Intake and Beliefs Questionnaire (FIBQ)

Instructions: Below are a set of statements that describe what some people think and believe about their diet. Please read each statement carefully and circle the response that best describes the way you think about your diet. Please answer all questions by circling the appropriate response. There is no right or wrong answer.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| 1. I must not eat anything that will increase my blood sugar level. | 1 | 2 | 3 | 4 | 5 |
| 2. If I do not get my diet right all the time, it does not mean my diabetes control is a disaster. | 1 | 2 | 3 | 4 | 5 |
| 3. Whenever I mess up with my diet, it just proves I am useless. | 1 | 2 | 3 | 4 | 5 |
| 4. I would really love to be able to eat whatever I want, but there is no reason why I have to be able to. | 1 | 2 | 3 | 4 | 5 |
| 5. It is difficult that I have to diet for the rest of my life, but I can bear it, and it will be worth the effort. | 1 | 2 | 3 | 4 | 5 |
| 6. I must not eat anything that will increase my weight. | 1 | 2 | 3 | 4 | 5 |
| 7. I would prefer to be losing weight because I am dieting, but if I am not, it is not the end of the world. | 1 | 2 | 3 | 4 | 5 |
| 8. I must have self-control over how much food I eat. | 1 | 2 | 3 | 4 | 5 |
| 9. If I do not get my diet right, it does not mean I am useless. | 1 | 2 | 3 | 4 | 5 |
| 10. No one must tell me what I should eat because of my diabetes. | 1 | 2 | 3 | 4 | 5 |
| 11. It is awful if my family/friends restrict what I eat. | 1 | 2 | 3 | 4 | 5 |
| 12. I must get my diet right all | | | | | |

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| the time if not my diabetes control will be a disaster. | 1 | 2 | 3 | 4 | 5 |
| 13. I would prefer to have self-control over how much food I eat but I don't have to be in control all the time. | 1 | 2 | 3 | 4 | 5 |
| 14. I must always resist foods that can affect my diabetes. | 1 | 2 | 3 | 4 | 5 |
| 15. At social functions, I cannot stand it if everybody is eating whatever they want and I cannot. | 1 | 2 | 3 | 4 | 5 |
| 16. Eating foods that are not good for me does not mean I am a weak person. | 1 | 2 | 3 | 4 | 5 |
| 17. It is bad if I am not able to stick to my diet, but not awful. | 1 | 2 | 3 | 4 | 5 |
| 18. I must always have the willpower to resist foods that can affect my diabetes. | 1 | 2 | 3 | 4 | 5 |
| 19. I would prefer not to eat anything that will affect my weight. | 1 | 2 | 3 | 4 | 5 |
| 20. I must be able to eat whatever I want. | 1 | 2 | 3 | 4 | 5 |
| 21. At social functions, I would prefer to be able to eat what everyone else is eating, but I don't have to. | 1 | 2 | 3 | 4 | 5 |
| 22. It is not fair that I have to diet for the rest of my life. | 1 | 2 | 3 | 4 | 5 |
| 23. I would prefer to avoid foods that will increase my blood sugar level. | 1 | 2 | 3 | 4 | 5 |
| 24. I must lose weight because I am dieting, it is not fair that I am not losing weight. | 1 | 2 | 3 | 4 | 5 |
| 25. I would prefer to be able to resist foods that can affect my diabetes. | 1 | 2 | 3 | 4 | 5 |
| 26. Eating foods that I really should not, proves what a weak person I truly am. | 1 | 2 | 3 | 4 | 5 |
| 27. It is bad if family/friends | | | | | |

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| restrict what I eat, but not awful | 1 | 2 | 3 | 4 | 5 |
| 28. I must always stick to my diet if not, it would be awful. | 1 | 2 | 3 | 4 | 5 |
| 29. I would really love to have the willpower to resist foods that can affect my diabetes. | 1 | 2 | 3 | 4 | 5 |
| 30. I would prefer it if people do not tell me what I should eat because of my diabetes. | 1 | 2 | 3 | 4 | 5 |

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 24: Final Food Intake and Beliefs Questionnaire

Version 1 (4/03/2011) Code Number _____

## Food Intake and Beliefs Questionnaire (FIBQ)

Instructions: Below are a set of statements that describe what some people think and believe about their diet. Please read each statement carefully and circle the response that best describes the way you think about your diet. Please answer all questions by circling the appropriate response. There is no right or wrong answer.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| 1. I must not eat anything that will increase my blood sugar level. | 1 | 2 | 3 | 4 | 5 |
| 2. If I do not get my diet right all the time, it does not mean my diabetes control is a disaster. | 1 | 2 | 3 | 4 | 5 |
| 3. Whenever I mess up with my diet, it just proves I am useless. | 1 | 2 | 3 | 4 | 5 |
| 4. It is difficult that I have to diet for the rest of my life, but I can bear it, and it will be worth the effort. | 1 | 2 | 3 | 4 | 5 |
| 5. I must not eat anything that will increase my weight. | 1 | 2 | 3 | 4 | 5 |
| 6. If I do not get my diet right, it does not mean I am useless. | 1 | 2 | 3 | 4 | 5 |
| 7. No one must tell me what I should eat because of my diabetes. | 1 | 2 | 3 | 4 | 5 |
| 8. I must get my diet right all the time if not my diabetes control will be a disaster. | 1 | 2 | 3 | 4 | 5 |
| 9. I must always resist foods that can affect my diabetes. | 1 | 2 | 3 | 4 | 5 |
| 10. At social functions, I cannot stand it if everybody is eating whatever they want and I cannot. | 1 | 2 | 3 | 4 | 5 |
| 11. I must always have the willpower to resist foods that can affect my diabetes. | 1 | 2 | 3 | 4 | 5 |
| 12. It is not fair that I have to diet for the rest of my life. | 1 | 2 | 3 | 4 | 5 |
| 13. I would prefer to avoid foods that will increase my blood sugar | 1 | 2 | 3 | 4 | 5 |

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| level. | | | | | |
| 14. I must lose weight because I am dieting, it is not fair that I am not losing weight. | 1 | 2 | 3 | 4 | 5 |
| 15. I would prefer to be able to resist foods that can affect my diabetes. | 1 | 2 | 3 | 4 | 5 |
| 16. Eating foods that I really should not, proves what a weak person I truly am. | 1 | 2 | 3 | 4 | 5 |
| 17. I must always stick to my diet if not, it would be awful. | 1 | 2 | 3 | 4 | 5 |
| 18. I would really love to have the willpower to resist foods that can affect my diabetes. | 1 | 2 | 3 | 4 | 5 |

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 25: Irrational Food Belief Scale
Version 1 (18/02/2011)

## Food Attitude Survey

Listed below are a number of statements related to people's attitudes towards food. Using the rating scale below, **tick** the response which best exemplifies your degree of agreement with each statement. Please be as candid and honest as possible.

| | **Strongly Disagree** | **Disagree** | **Agree** | **Strongly agree** |
|---|---|---|---|---|
| 1. Food is a substitute source of comfort | | | | |
| 2. Some foods are able to relax you. | | | | |
| 3. Eating healthy doesn't take more time than unhealthy eating. | | | | |
| 4. I can't possibly live without my favourite food. | | | | |
| 5. Broiling and roasting meats is a healthy way to cook them. | | | | |
| 6. My greatest pleasure in life is eating. | | | | |
| 7. Eating is a good way to overcome boredom. | | | | |
| 8. Exercise can undo the effects of a poor diet. | | | | |
| 9. Eating healthy does not have to mean giving up my favourite foods entirely. | | | | |
| 10. Food is a good way to lift depression. | | | | |
| 11. Social events are not as fun without food. | | | | |
| 12. Healthy eating should be a way of life. | | | | |
| 13. If no one sees me eating something, the calories don't count. | | | | |
| 14. Only high fat foods taste good. | | | | |
| 15. The only way to diet is to crash diet. | | | | |
| 16. A good means of stress reduction is to eat. | | | | |
| 17. The key to a healthy diet is to achieve balance in the foods you eat. | | | | |
| 18. Some foods are irresistible. | | | | |

| | Strongly Disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| 19. If something is fat free, you can eat as much as you want of it. | | | | |
| 20. Unsaturated fat is better than saturated fat. | | | | |
| 21. Breakfast is the most important meal of the day. | | | | |
| 22. If you eat something you shouldn't, you should feel guilty. | | | | |
| 23. There are some foods you can have in an unlimited amount and not gain weight. | | | | |
| 24. One should strive for 5 servings of fruits and vegetables a day. | | | | |
| 25. I simply cannot control my weight because I love to eat. | | | | |
| 26. There are some foods over which I cannot control my intake. | | | | |
| 27. I must have sweets to exist. | | | | |
| 28. It's important to have at least 6 servings a day of the food group that includes bread, cereal, rice, or pasta. | | | | |
| 29. Eating healthy can reduce risk for some diseases such as cancer, diabetes, and heart disease. | | | | |
| 30. All social gatherings must be centered on food. | | | | |
| 31. Some foods are addictive. | | | | |
| 32. Food is my one pleasure and I should not have to regulate my intake of it. | | | | |
| 33. Food is a good substitute for sex. | | | | |
| 34. To hell with what's healthy, let me eat what I want. | | | | |
| 35. Calcium enriched foods are needed for strong bones. | | | | |
| 36. You won't gain weight for anything you eat before 8 p.m. | | | | |
| 37. If I exercise first, I can eat whatever I want. | | | | |
| 38. Being overweight is genetic, so why bother trying to lose weight? | | | | |
| 39. Foods like fruits and vegetables | | | | |

| | Strongly Disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| have no calories. | | | | |
| 40. There are times when I NEED certain foods. | | | | |
| 41. One should choose lean or low-fat meats. | | | | |
| 42. You can drink as much of fluids as you want and not gain weight. | | | | |
| 43. A small amount of fat is needed in a healthy diet. | | | | |
| 44. Happiness can be achieved through eating. | | | | |
| 45. You can eat as much as you want as long as it's low fat. | | | | |
| 46. Once you eat something bad, you've blown your diet. | | | | |
| 47. I believe it is important to eat only when you are hungry. | | | | |
| 48. Because alcohol has no fat, it can't make you gain weight. | | | | |
| 49. What a person eats really has no effect on their health. | | | | |
| 50. It is punishment to have to eat certain foods like fruits and vegetables. | | | | |
| 51. To diet is to give up the pleasure of eating. | | | | |
| 52. Diet food is boring. | | | | |
| 53. One should strive to eat 3 healthy meals a day. | | | | |
| 54. Not being able to eat what you want will make you sad. | | | | |
| 55. Eating can help overcome loneliness. | | | | |
| 56. I believe in the food pyramid as a guide to healthy eating. | | | | |
| 57. If you exercise, it doesn't matter what you eat. | | | | |

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 26: Shortened General Attitude Belief Scale

Version 1 (4/03/2011)

**Shortened General Attitude and Belief Scale (SGABS)**

Here are a set of statements which describe what some people think and believe. Read each statement carefully and decide how much you agree or disagree with it. There are no right or wrong answers. Only you can tell what you really believe so please mark the way you really think. **Tick** the box which shows your agreement or disagreement with each statement**.** Please try to answer each question.

| | **Strongly agree** | **Agree** | **Neutral** | **Disagree** | **Strongly disagree** |
|---|---|---|---|---|---|
| 1. It's unbearable to fail at important things, and can't stand not succeeding at them. | | | | | |
| 2. I can't stand a lack of consideration from other people, and I can't bear the possibility of their unfairness. | | | | | |
| 3. It's unbearable being uncomfortable, tense or nervous and I can't stand it when I am. | | | | | |
| 4. I have worth as a person even if I do not perform well at tasks that are important to me. | | | | | |
| 5. I can't stand being tense or nervous and I think tension is unbearable. | | | | | |
| 6. It's awful to be disliked by people who are important to me and it is a catastrophe if they don't like me. | | | | | |
| 7. If important people dislike me, it is because I am an unlikable bad person. | | | | | |
| 8. When I am treated inconsiderately, I think it shows what kind of bad and hopeless people are in the world. | | | | | |
| 9. If I am rejected by someone I like, I can accept myself and still recognise my worth as a human being. | | | | | |
| 10. If I do not perform well at tasks that are so important to me, it is | | | | | |

| | Strongly agree | Agree | Neutral | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| because I am a worthless bad person. | | | | | |
| 11. It's awful to do poorly at some important things, and I think it is a catastrophe if I do poorly. | | | | | |
| 12. I think it is terribly bad when people treat me with disrespect. | | | | | |
| 13. When people I like reject me or dislike me, it is because I am a bad or worthless person | | | | | |
| 14. I cannot stand being treated unfairly, and I think unfairness is unbearable. | | | | | |
| 15. I believe that if a person treats me very unfairly they are bad and worthless | | | | | |
| 16. I can't stand hassles in my life. | | | | | |
| 17. It's awful to have hassles in one's life and it is a catastrophe to be hassled. | | | | | |
| 18. I cannot tolerate not doing well at important tasks and it is unbearable to fail. | | | | | |
| 19. It is important that people treat me fairly most of the time, however I realise I do not have to be treated fairly just because I want to be. | | | | | |
| 20. If I do not perform well at things which are important, it will be a catastrophe | | | | | |
| 21. It is unbearable to not have respect from people, and I can't stand their disrespect. | | | | | |
| 22. If important people dislike me, it goes to show what a worthless person I am. | | | | | |
| 23. I must be liked and accepted by people I want to like me, and I will not accept their not liking me. | | | | | |
| 24. I want to be liked and accepted by people whom I like, but I realise that they don't have to like me just because I want them to | | | | | |

| | Strongly agree | Agree | Neutral | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| 25. When people who I want to like me, disapprove of me or reject me, I can't bear their disliking me. | | | | | |
| 26. If people treat me without respect, it goes to show how bad they really like me. | | | | | |

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

## Appendix 27 Dutch Eating Behaviour Questionnaire

Version 1 (4/03/2010) Code number: ____

The Dutch Eating Behaviour Questionnaire (DEBQ)
External Eating Measure

Please answer ALL questions. Circle the appropriate response.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. Do you have a desire to eat when you are irritated? | not relevant | never | seldom | sometimes | often | very often |
| 2. If food tastes good to you, do you eat more than usual? | | never | seldom | sometimes | often | very often |
| 3. Do you have a desire to eat when you have nothing to do? | not relevant | never | seldom | sometimes | often | very often |
| 4. When you have put on weight do you eat less than you usually do? | not relevant | never | seldom | sometimes | often | very often |
| 5. Do you have a desire to eat when you are depressed or discouraged? | not relevant | never | seldom | sometimes | often | very often |
| 6. If food smells good, do you eat more than usual? | | never | seldom | sometimes | often | very often |
| 7. How often do you refuse food or drink offered to you because you are concerned about your weight? | | never | seldom | sometimes | often | very often |
| 8. Do you have a desire to eat when you are feeling lonely? | not relevant | never | seldom | sometimes | often | very often |
| 9. If you smell something delicious, do you have a desire to eat it? | | never | seldom | sometimes | often | very often |
| 10. Do you have a desire to eat when somebody lets you down? | not relevant | never | seldom | sometimes | often | very often |
| 11. Do you try to eat less at mealtimes than you would like to eat? | | never | seldom | sometimes | often | very often |
| 12. If you have something delicious to eat, do you eat it straight away? | | never | seldom | sometimes | often | very often |
| 13. Do you have a desire to eat when you are cross? | not relevant | never | seldom | sometimes | often | very often |
| 14. Do you watch exactly what you eat? | | never | seldom | sometimes | often | very often |
| 15. If you walk past a baker, do you have a desire to buy something delicious? | | never | seldom | sometimes | often | very often |
| 16. Do you have a desire to eat when something unpleasant is about to happen? | | never | seldom | sometimes | often | very often |

| | | | | | | |
|---|---|---|---|---|---|---|
| 17. Do you deliberately eat foods that are slimming? | | never | seldom | sometimes | often | very often |
| 18. If you see others eating, do you also have a desire to eat? | | never | seldom | sometimes | often | very often |
| 19. When you have eaten too much, do you eat less than usual the following day? | not relevant | never | seldom | sometimes | often | very often |
| 20. Do you get the desire to eat when you are anxious, worried or tense? | | never | seldom | sometimes | often | very often |
| 21. Can you resist eating delicious foods? | | never | seldom | sometimes | often | very often |
| 22 Do you deliberately eat less in order not to become heavier? | | never | seldom | sometimes | often | very often |
| 23. Do you have a desire to eat when things are going against you and when things have gone wrong? | | never | seldom | sometimes | often | very often |
| 24. If you walk past a snack bar or café, do you have a desire to buy something delicious? | | never | seldom | sometimes | often | very often |
| 25. Do you have a desire to eat when you are emotionally upset? | not relevant | never | seldom | sometimes | often | very often |
| 26. How often do you try not to eat between meals because you are watching your weight? | | never | seldom | sometimes | often | very often |
| 27. Do you eat more than usual, when you see others eating? | | never | seldom | sometimes | often | very often |
| 28. Do you have a desire to eat when you are bored or restless? | not relevant | never | seldom | sometimes | often | very often |
| 29. How often in the evenings do you try not to eat because you are watching your weight? | | never | seldom | sometimes | often | very often |
| 30. Do you have a desire to eat when you are frightened? | not relevant | never | seldom | sometimes | often | very often |
| 31. Do you take your weight into account with what you eat? | | never | seldom | sometimes | often | very often |
| 32. Do you have a desire to eat when you are disappointed? | not relevant | never | seldom | sometimes | often | very often |
| 33. When preparing a meal, are you inclined to eat something? | | never | seldom | sometimes | often | very often |

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 28: Diabetes Self-Efficacy Scale

Version 1 (4/03/2011)

**APPRAISAL OF DIETARY PLAN**

Certain situations which might make following a dietary plan for diabetes difficult are described below. For each of these situations, we would like to know how confident you are that you will be able to follow your dietary plan on a regular basis.

Using the scale below, please indicate how confident you are in your ability to follow your dietary plan on a regular basis by writing a number between 0 and 100 on the lines provided. If the statement does not apply to your situation, please write N/A.

0 10 20 30 40 50 60 70 80 90 100

Not at all confident — Moderately confident — Totally confident

| | CONFIDENCE (0-100) |
|---|---|
| 1. When watching television | _____ |
| 2. When feeling tired or bored | _____ |
| 3. When not working and at home | _____ |
| 4. When feeling tense or preoccupied | _____ |
| 5. When dining with friends who habitually have foods high in fat and/or sugar content | _____ |
| 6. When preparing food for others | _____ |
| 7. When eating at a restaurant | _____ |
| 8. When feeling annoyed or angry | _____ |
| 9. When very hungry | _____ |
| 10. When feeling depressed | _____ |
| 11. When taking the time to sit back and unwind | _____ |
| 12. When taking the time to enjoy a good meal | _____ |
| 13. When celebrating with others | _____ |
| 14. When offered food that has high fat and/or sugar content | _____ |
| 15. When a lot of foods high in fat and/or sugar content are available at home | _____ |
| 16. When the recommended foods (low in fat and/or in sugar content, fruit, vegetables, etc.) are difficult to obtain | _____ |
| 17. When craving foods with a high fat and/or sugar content | _____ |
| 18. When ill | _____ |
| 19. When we are entertaining others at home | _____ |
| 20. When on holiday | _____ |
| 21. When cleaning up after meals | _____ |
| 22. During festivities, when appetising foods that have high fat | |

and/or sugar content are being served _____

23. When pressed for time _____
24. When visiting another town or region and wanting to taste the local food_____
25. When preparing my own meals _____
26. When faced with appealing foods that have high
    fat and/or sugar content in a supermarket _____
27. When my schedule doesn't go to plan _____
28. When I need to eat (snacks, regular meals) even though
    others are not eating _____
29. When feeling well _____
30. When I want more variety in my diet _____

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 29: Well-Being Index

## WHO (Five) Well-Being Index (1998 Version)

Please indicate for each of the five statements which is closest to how you have been feeling over the last two weeks. Notice that higher numbers mean better well-being.
Example: If you have felt cheerful and in good spirits more than half of the time during the last two weeks, put a tick in the box with the number 3 in the upper right corner.

| *Over the last two weeks* | **0 At no time** | **1 Some of the time** | **2 Less than half of the time** | **3 More than half of the time** | **4 Most of the time** | **5 All of the time** |
|---|---|---|---|---|---|---|
| 1. I have felt cheerful and in good spirits | | | | | | |
| 2. I have felt calm and relaxed | | | | | | |
| 3. I have felt active and vigorous | | | | | | |
| 4. I woke up feeling fresh and rested | | | | | | |
| 5. My daily life has been filled with things that interest me | | | | | | |

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 30: DSQOL- Diet Questionnaire

Version 1 (4/03/2011)

## Diabetes Specific Quality of Life Scale- Diet Subscale

Diabetes is associated with different restrictions and burdens for most people. This questionnaire asks what your treatment goals are, how much diabetes represents a burden in your day to day living. Please rate each statement on how applicable it is to your personal situation.

How much have you felt burdened and restricted by diabetes and its treatment over the last 4 weeks? Please rate your agreement with the statements below by **ticking** the appropriate box

| | 0 **Do not agree at all** | 1 **Hardly agree at all** | 2 **Agree a little** | 3 **Some-what agree** | 4 **Quite strongly agree** | 5 **Very strongly agree** |
|---|---|---|---|---|---|---|
| 1. It is a burden for me that I need to constantly think about my food plan. | | | | | | |
| 2. I have to give up good-tasting foods. | | | | | | |
| 3. I cannot eat as much as I want of certain foods. | | | | | | |
| 4. I wish I could eat more the way I want to, without having to plan everything beforehand. | | | | | | |
| 5. I bother me that I cannot eat like other people. | | | | | | |
| 6. I bother me that I cannot eat as spontaneously as people who do not have diabetes. | | | | | | |
| 7. I often cannot eat as much as I would like. | | | | | | |
| 8. I would like to eat a greater amount of certain foods which increase my blood sugar strongly | | | | | | |

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 31: Demographic Information
Version 1 (4/03/2011)

**Demographic Data**

Below are questions that ask for information about yourself and your diabetes. Please answer all questions. Tick a box where appropriate.

1. Age: _____ years

2. Sex: ☐ **Male** ☐ **Female**

3. Employment status:

   ☐ **Working full-time** ☐ **Working part time**
   ☐ **Retired** ☐ **Not employed**

4. Level of Education:

   ☐ **Primary** ☐ **Secondary**
   ☐ **College** ☐ **Tertiary**

5. Ethnicity:

   ☐ **White:** British, Irish, or any other
   ☐ **Asian or Asian British:** Indian, Pakistani, Bangladeshi, or any other
   ☐ **Black or Black British:** Caribbean, African, or any other
   ☐ **Mixed background (e.g.** White and Black , Black and Asian, or any other)
   ☐ **Other** ……

**6.** Marital status: ☐ **Living alone** ☐ **Living with partner**

7. When were you first diagnosed with diabetes: _____

8. Do you maintain a recommended diet ☐ **Yes** ☐ **No**

9. What diabetes medication are you on?

   ☐ **Diet only** ☐ **Tablet & diet**
   ☐ **Tablet, insulin & diet** ☐ **Insulin & diet**

10. Have you had your medication changed from tablets to insulin injection in the last 6 months? ☐ **Yes** ☐ **No**

11. List any diabetes complications that you may have.

_____

12. List any other medical conditions that you have apart from diabetes.

_____

**To be filled by the Researcher**

13. Weight: _____ 14. Height: _____

15 Body mass index (BMI) _____

16 HbA1c _____

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 32: Patient Information Sheet
Version 2 (20/04/11)

Code number: _____

UNIVERSITY OF BIRMINGHAM
School of Psychology

**PATIENT INFORMATION SHEET**

**1. Study Title**

**Beliefs related to dietary intake in type 2 diabetes: Development and validation of a questionnaire.**

**2. Invitation paragraph**

You are being invited to take part in a research study that is being undertaken at Birmingham University. This study is a student research as part of a PhD. Before you make a decision about whether you want to take part, it will be important for you to find out more about the reasons why this research is being carried out and what it will involve. So please take some time to carefully read the information below. You can discuss it with anyone (including friends, family or GP), if you wish.

**If you have any questions or would like some more information, please feel free to contact me**. My contact details are at the end of this letter.
Thank you for reading this.

**3. What is the purpose of the study?**

As you are aware, dietary self-care plays a very important role in the management of type 2 diabetes but its success is affected by many factors. The purpose of this study is to develop a questionnaire that will assess people's beliefs related to dietary intake. We would like to find out what you or other people with type 2 diabetes think and belief about being on a diet as part of your diabetes treatment. We hope that our findings will help to improve the quality of care for people with type 2 diabetes – especially education regarding dietary self-care.

**4. Why have I been chosen?**

All people with type 2 diabetes, aged 40 years and older who have had type 2 diabetes for at least one year from the Diabetes Clinic at Birmingham Heartlands and Selly Oak Hospitals have been invited to take part .

**5. Do I have to take part?**

You do not have to take part. The decision to participate is completely voluntary so it is up to you to decide whether or not you wish to take part. You will be given up to one week to think about the information in this letter and decide whether or not you wish to take part. The researcher will contact you (if you consent to that) to find out if you would want to participate. This will give you the opportunity to ask any questions that you may have about the study. Remember, if you decide to take part, you will still be free to withdraw at any time. Withdrawing will not affect your current or future NHS treatment.

**6. What will happen to me if I take part?**

If you agree to take part, a consent form together with 11 questionnaires will be sent to you through the post to complete. These questionnaires ask questions related to your eating behaviour, your thoughts and beliefs about your diet, diabetes issues that are currently a problem for you, adherence to your diabetes regimen, any mood disturbances that you may be experiencing and your psychological well-being. You will also be asked to provide some personal information such as your age, sex, duration of diabetes etc. These questionnaires together with the consent form will take approximately 1 hour to complete. Once you have completed them, you will be required to mail them back to the researcher using a return envelop that would be made available to you. On the other hand if you will be returning to the clinic for an appointment anytime soon, I will be here at the clinic to give you the questionnaires to complete.

Two weeks after completing this task, you may be sent just one of the 11 questionnaires you completed earlier on, to complete again and mail it back to the researcher. This questionnaire will take only 4 minutes to complete. Finally, we will like to know the control of your diabetes (HbA1c) and your height and weight therefore; if you agree, I will obtain that information from your medical record through the diabetes care team.

**7. What do I have to do?**

If you are happy to be contacted by the researcher then all we would ask is for you to sign the consent form to be contacted. The researcher will then contact you to discuss the study with you in more detail. If after discussion you are still interested in participating in the study, the questionnaire will be sent to you through the post for you to complete and return to us. However, if you feel that you must discuss your involvement in the study with your doctor or anyone else, please do. This study will NOT involve drugs or any other medical procedures, it just involves completing questionnaires.

**8. What are the possible disadvantages and risks of taking part?**

There are no risks involved when you take in this study. However, if you become distressed as a result of your participation, please let us know using the contact details provided. In the first instance we will discuss the difficulties that arose with you. If you require professional help, we will discuss this with you first and suggest that you contact your GP.

**9. What are the possible benefits of taking part?**

This study has no direct benefits for you. However, the information that is provided by you and other participants may increase the knowledge of health educators and professionals who educate and advise people with type 2 diabetes about their diet.

**10. What if something goes wrong?**

Once again, if participating in this research project distresses you, you should let the researcher, Margaret Amankwah-Poku know by using the contact information at the end of this sheet. In the first instance, she will discuss your difficulties with you. If you need professional help, she will speak to you about this and you may then want

to contact your GP or Doctor at the clinic or your diabetes care providers. If as a result of your taking part in this study you have questions about your dietary regimen, your dietician can be contacted. You could also contact the Patient Advice and Liaison Service (PALS, (0121) 424 1212) for confidential advice and support to patients, families and their carers.
There are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the course of this study, the normal National Health Service complaints mechanisms should be available to you.

**11. What if I have special needs?**
We will make every effort to ensure that there are no barriers for you if you wish to take part. If you have 'communication problems' (due to a disability – e.g. hearing impairment / visual impairment/dyslexia) you are asked to contact us using the contact details provided. If you have difficulties with reading, please inform us. The researcher may be able to offer you more time to complete the study and will assist you in reading the questionnaires. If you envisage any other problems, please contact the researcher and every effort will be made to make things easier for you.

**12. Will my taking part in this study be kept confidential?**
Your participation in the study will be kept confidential. Your name will remain anonymous - being changed to a personalised code. Computer based data will be kept on file at the University of Birmingham and will be password protected. All of your paper data (i.e. questionnaire responses) will be kept in a locked cabinet. Paper records from this study will be kept for 1 year and destroyed once the study is complete. Margaret Amankwah-Poku will ensure the security of the information you give. Only members of the research team led by Mrs. Margaret Amankwah-Poku will have access to the information/data for analyses.

**13. What will happen to the results of the research study?**
On completion, the results of this study may be sent for publication in a scientific journal. However, you will not be personally identifiable in this report/publication. Each participant will be informed about the results of the study. Copies of a summary of the findings will be sent to you and to your consultant at the clinic. You can ask for one of these if you are interested in finding out what we found.

**14. Who is organising and funding the research?**
The research is organised and funded by the School of Psychology at the University of Birmingham.

**15. Who has reviewed the study?**
This study has been reviewed and approved by the West Midlands Research Ethics Committee according to local regulations.

**16. Contact for Further Information**

If you decide to take part, you will be given another copy of these information sheets to read and keep, together with a copy of the signed consent form.

Thank you for reading this information. If you have any matters which may concern you, or further questions, you may speak to either of the Chief Investigator in charge of this project, Margaret Amankwah-Poku on the following numbers: (0121) 414 2942 or 0750 178 5790, or to Dr. Arie Nouwen on the following number (0121) 414 7203 both at the School of Psychology, University of Birmingham. Alternatively, you may contact the Patient Advice & Liaison Service (PALS) of Heartlands Hospital on (0121) 424 1212.

**Thank you for considering taking part in this study.**

Appendix 33: Consent for contact form

Version 1 (4/03/2011) Code number: ____

**CONSENT FOR CONTACT**

Title of Project:

**Beliefs related to dietary intake in type 2 diabetes: Development and validation of a questionnaire.**

Name of Researcher: Margaret Amankwah-Poku

If you have decided that you agree to being contacted about this study by the researcher, please put your name and contact details below and sign this letter. Thank you!

I agree to being contacted by the researcher from the School of Psychology at the University of Birmingham regarding my participation in the study.

_____ _____ _____

Name Date Signature

_____

Contact telephone number

_____ _____ _____

Name of Researcher Date Signature

UNIVERSITY OF BIRMINGHAM
School of Psychology

# CONSENT FORM

Title of Project*:*

***Irrational beliefs and unhealthy food preference in type 2 diabetes: Testing the Rational Emotive Behaviour Therapy (REBT) Model.***

Researcher*:* Margaret Amankwah-Poku

**If you have decided that you would like to take part in this research, then please initial each box below to show that you have understood what the research is about.**

Please initial box

1. I confirm that I have read and understood the information sheet dated 18/05/2011 (version 3.) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time during the research interview, without giving any reason, without my medical care or legal rights being affected. ☐

3. I understand that this research will involve recording Electroencephalography (EEG) data, and I agree that this can be done. ☐

4. I understand that the data collected during this study will be looked at by the researcher and relevant others at the University of Birmingham to ensure that the analysis is a fair and reasonable representation of the data. ☐

5. I understand that relevant sections of my medical notes may be looked at by the researcher Birmingham University where it is relevant to my taking part in this research and agree that this can be done. ☐

   I have not had any heart condition in the past three months. ☐

6. I agree to take a finger prick test to establish the control of my diabetes (HbA1c) and two random blood glucose levels. ☐

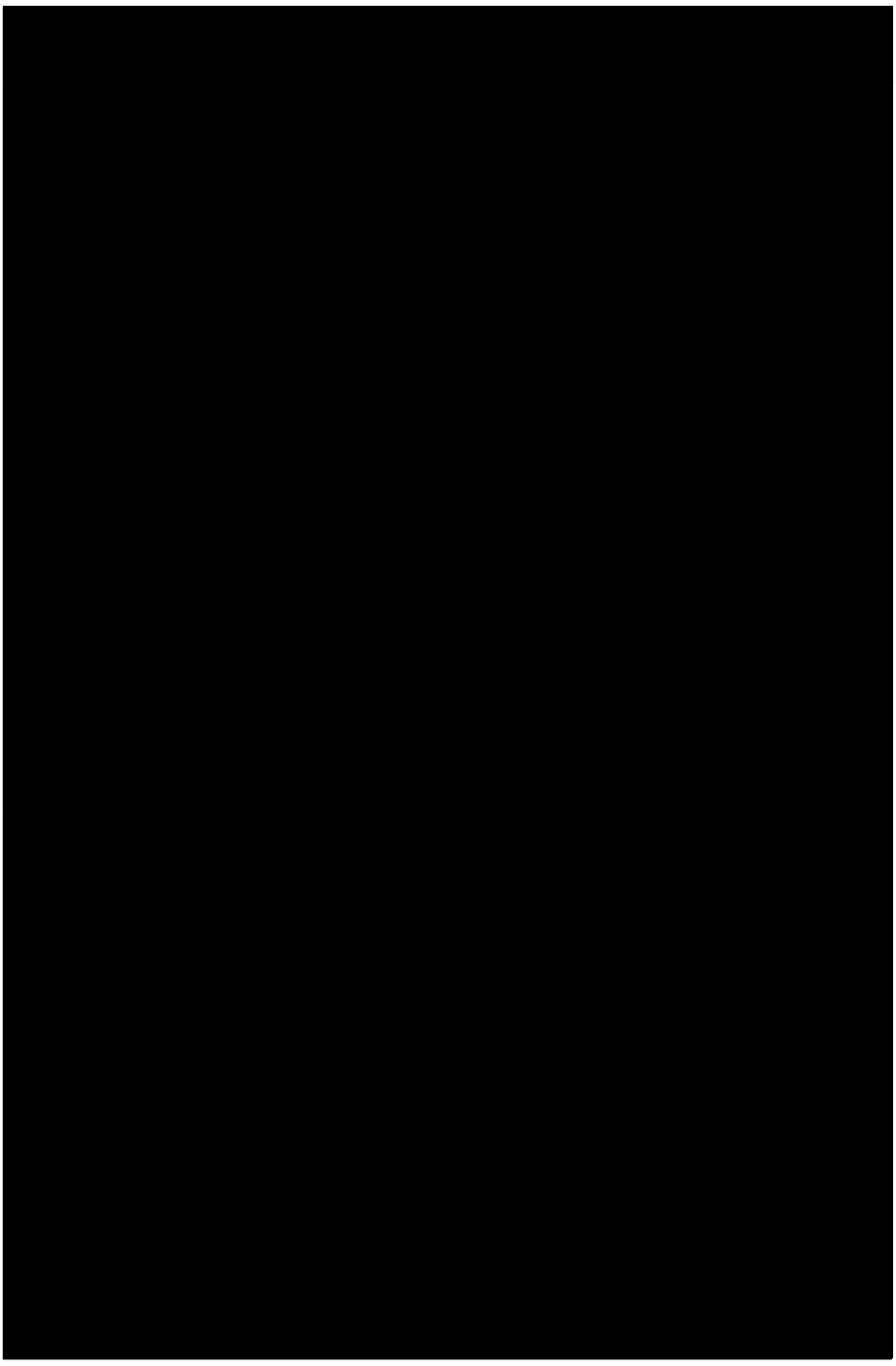
7. I agree to take part in the above study. ☐

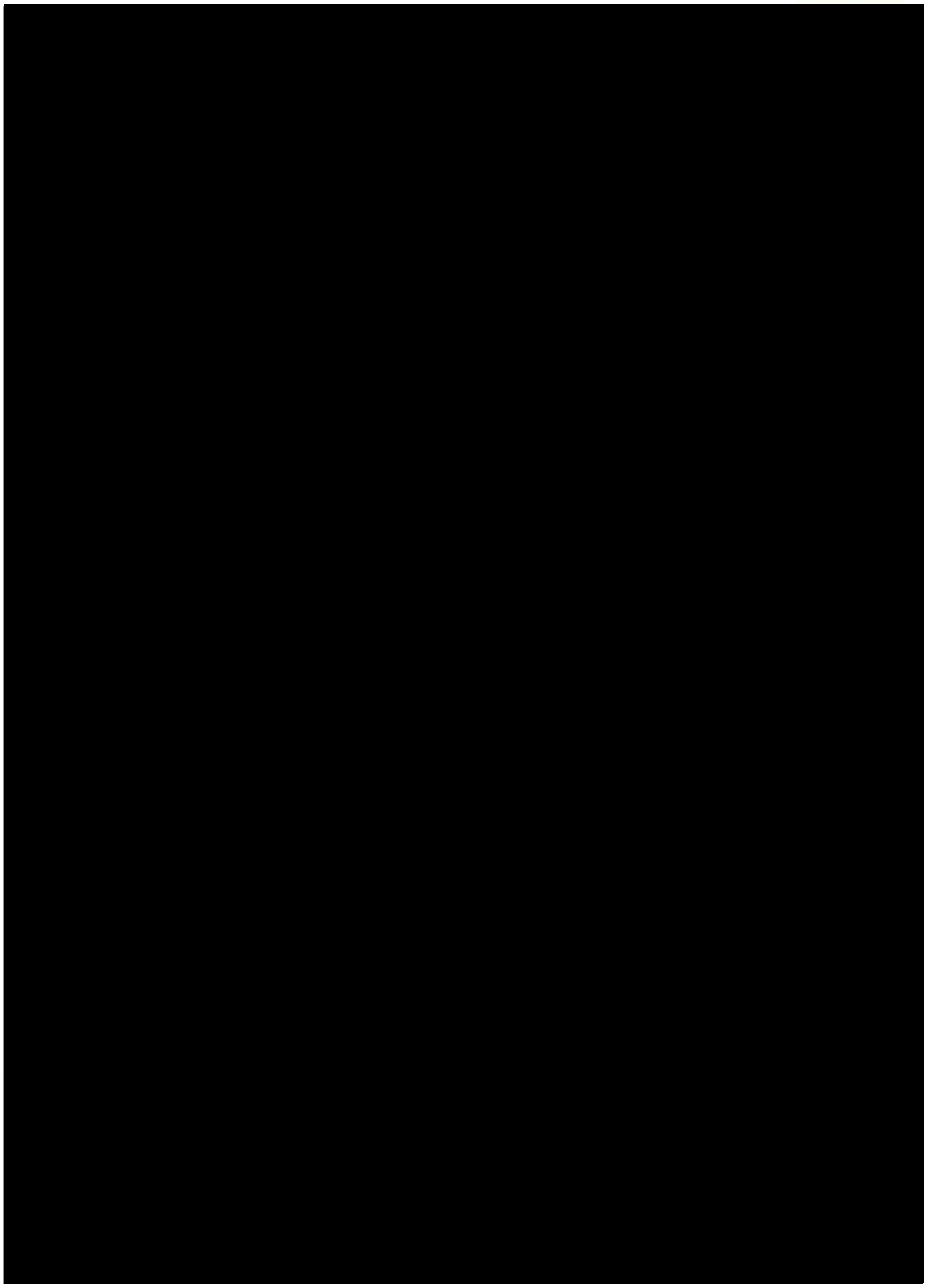
8. I agree to my GP being informed of my participation in the study. ☐

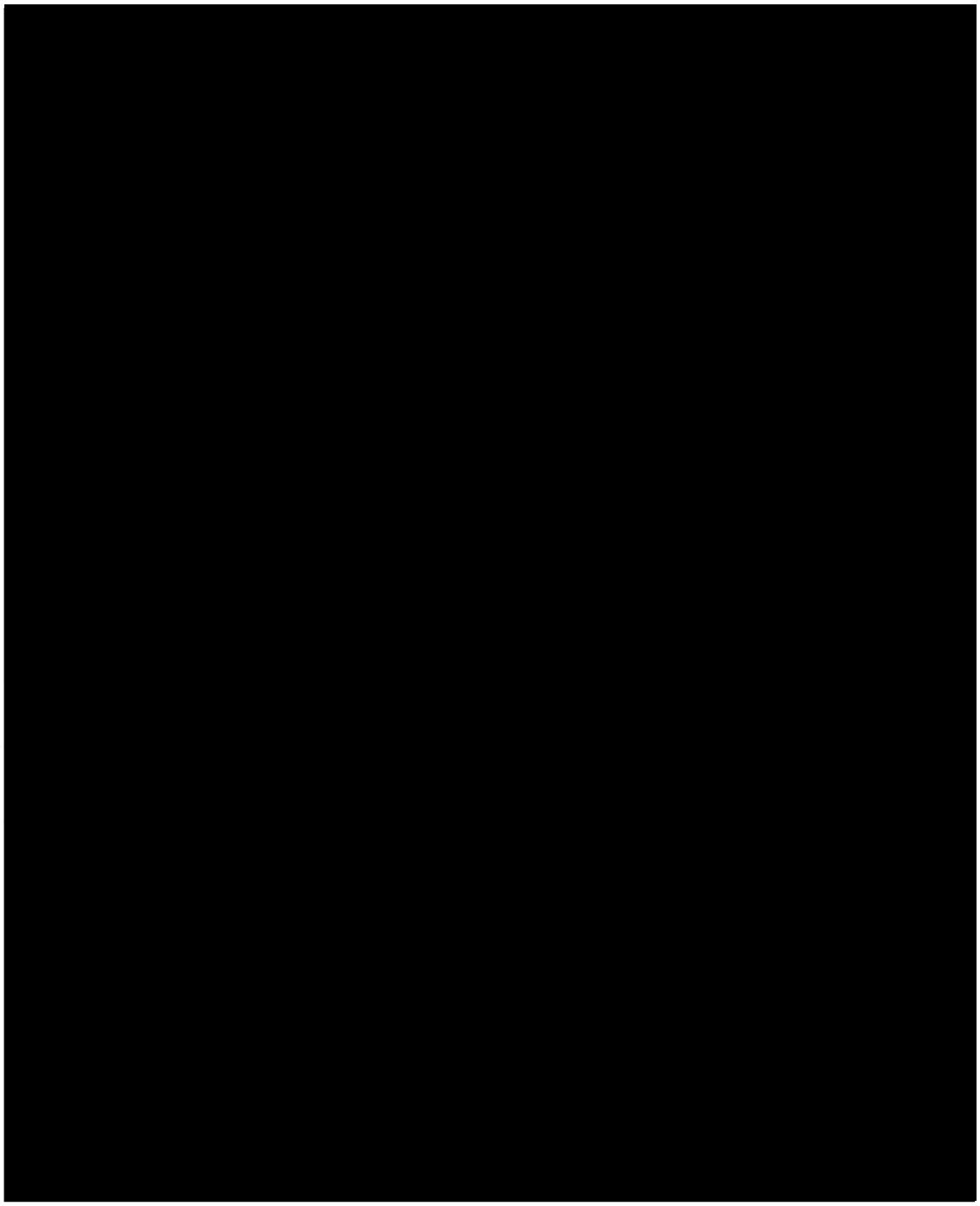
9. I agree that I can be contacted if further research is done on this topic. ☐

| | | |
|---|---|---|
| ..... | ..... | ..... |
| Name of Participant | Date | Signature |
| ..... | ..... | ..... |
| Name of Researcher | Date | Signature |

Appendix 35: Ethics approvals and amendments







This Research Ethics Committee is an advisory committee to West Midlands Strategic Health Authority

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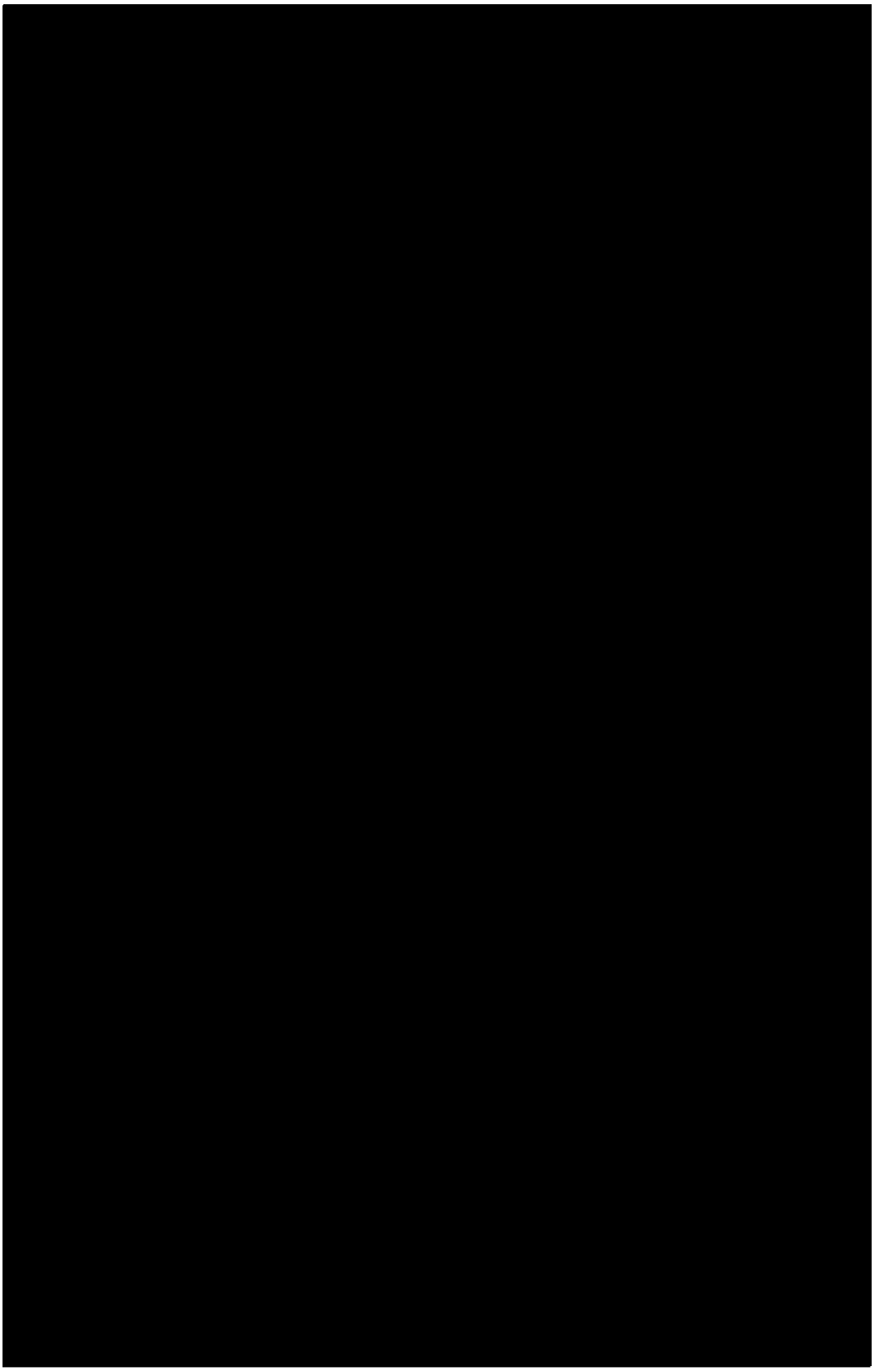
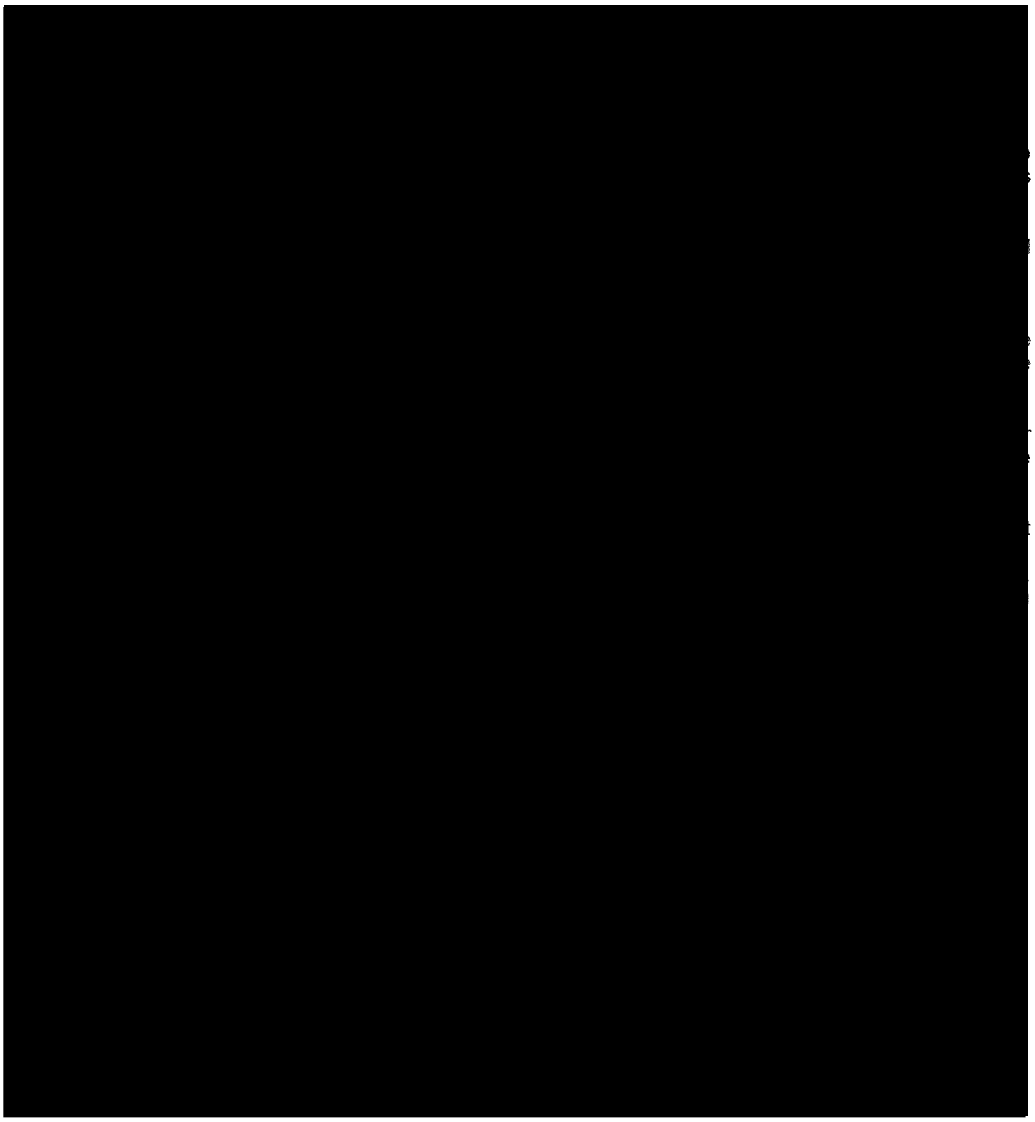
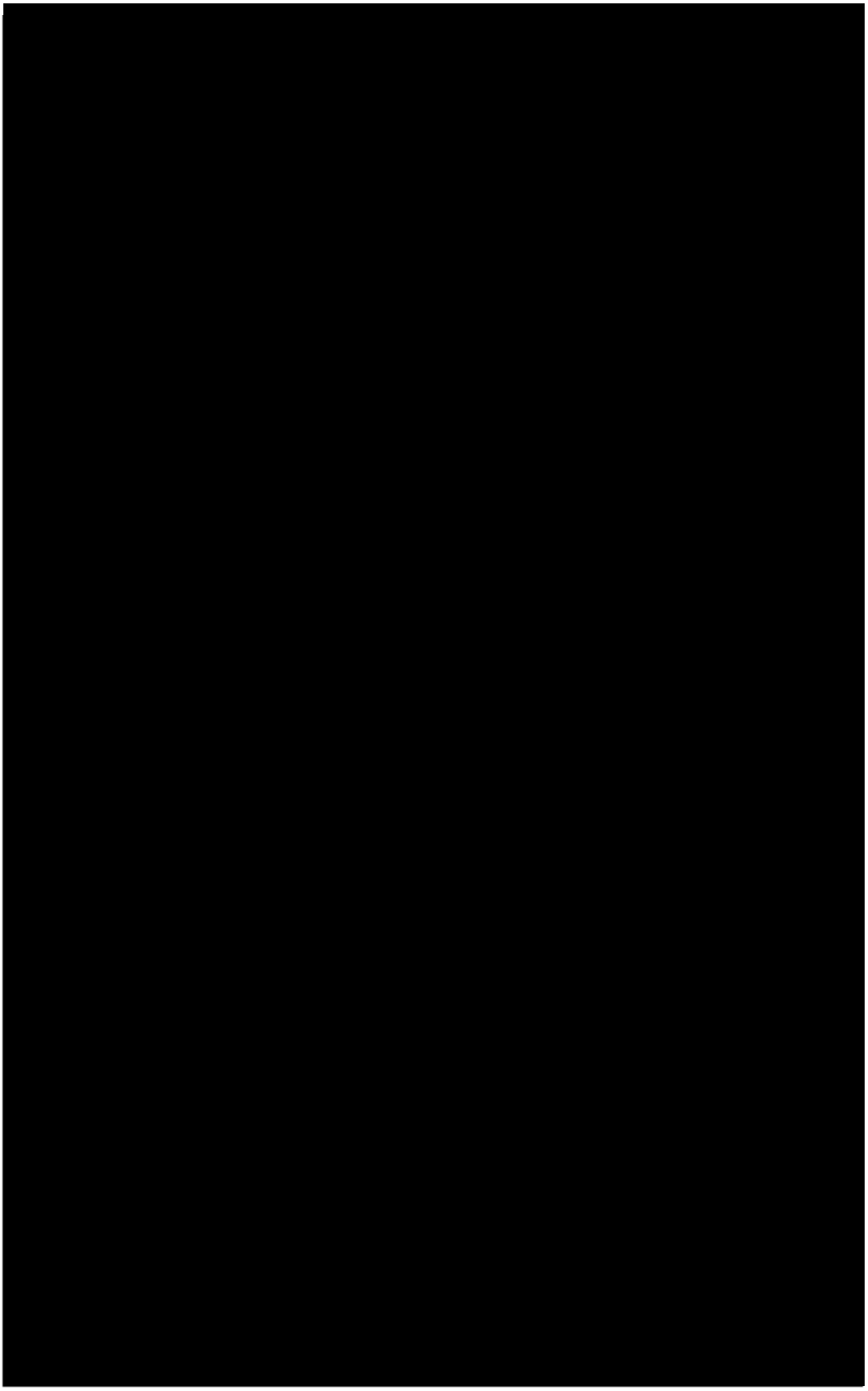
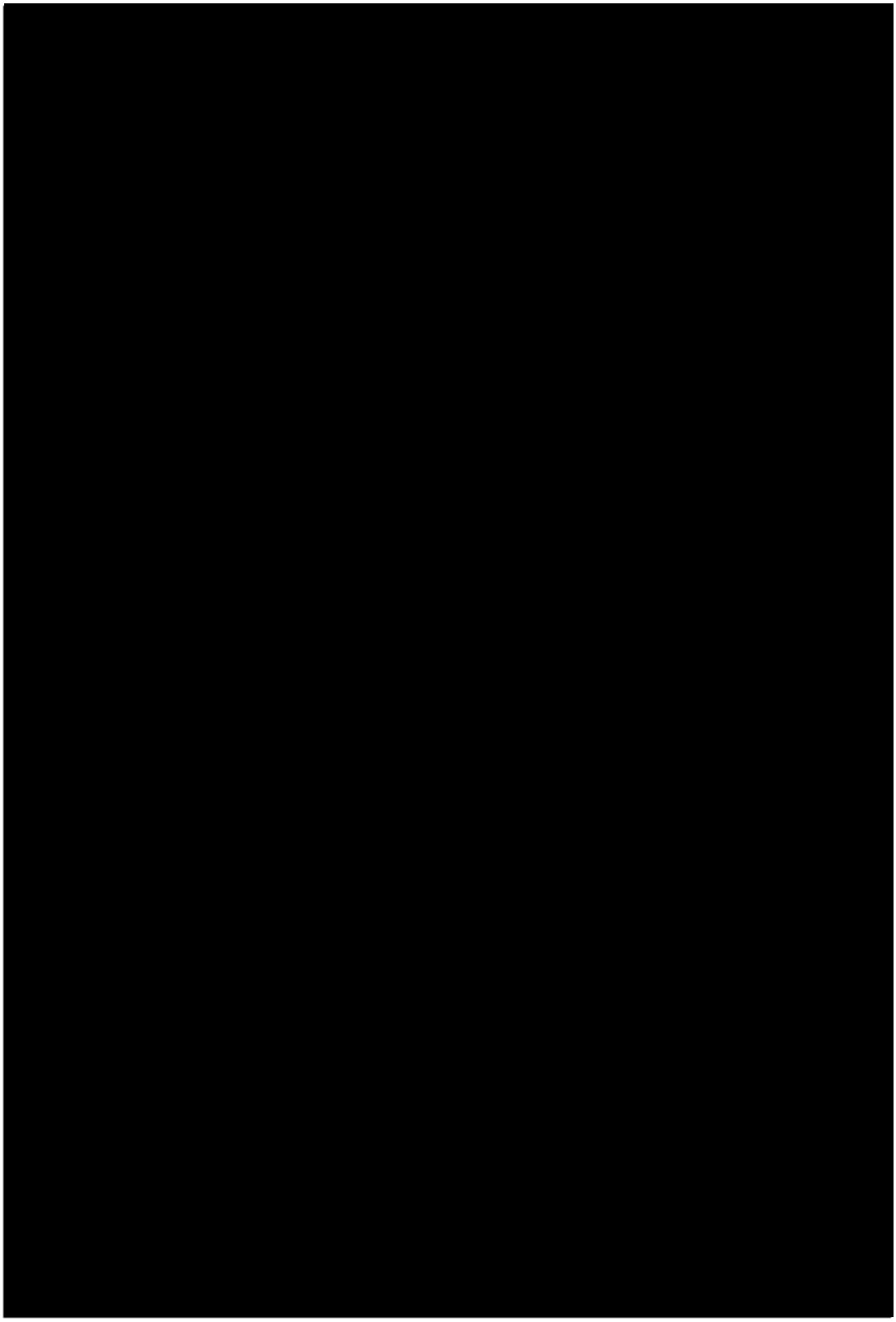
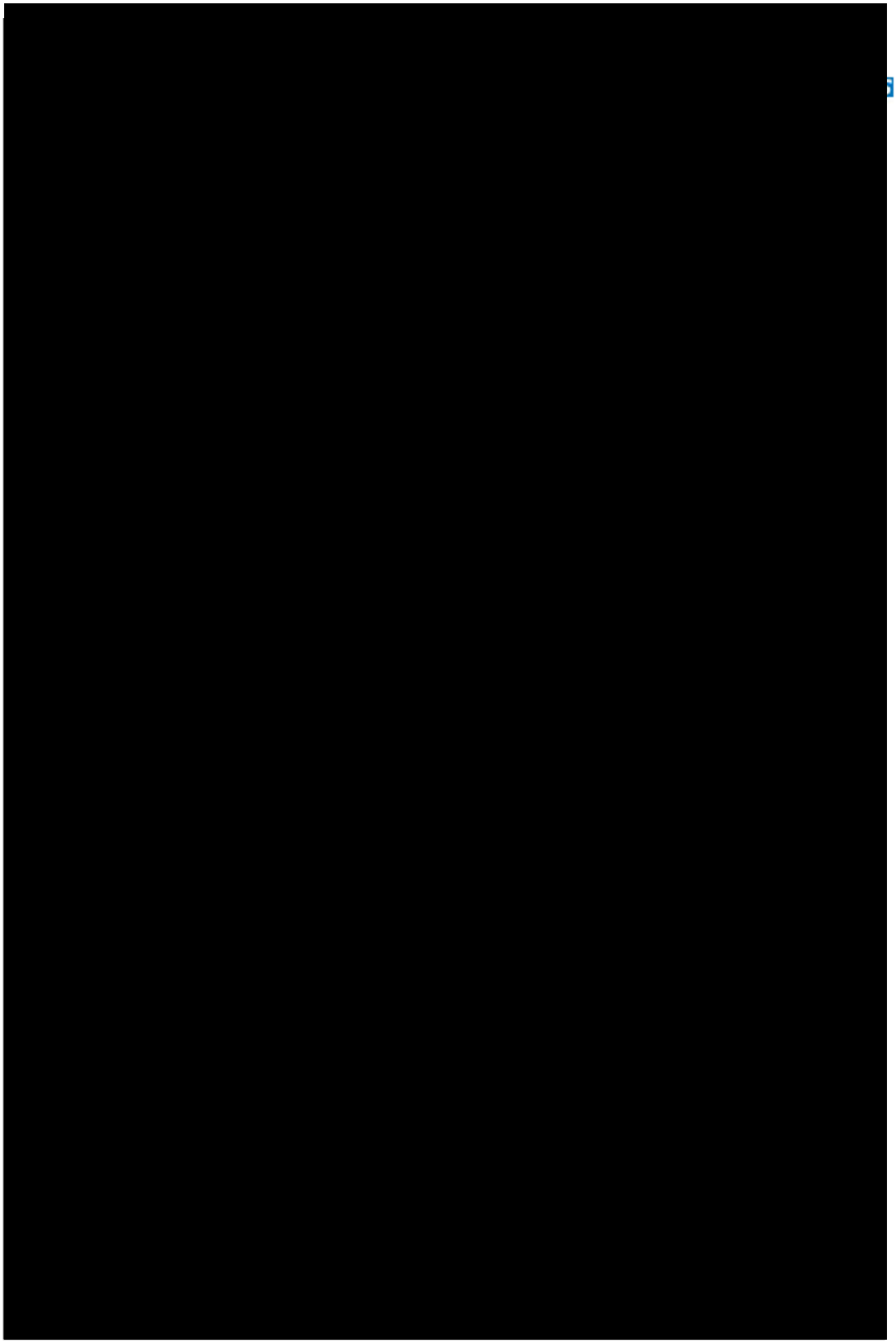
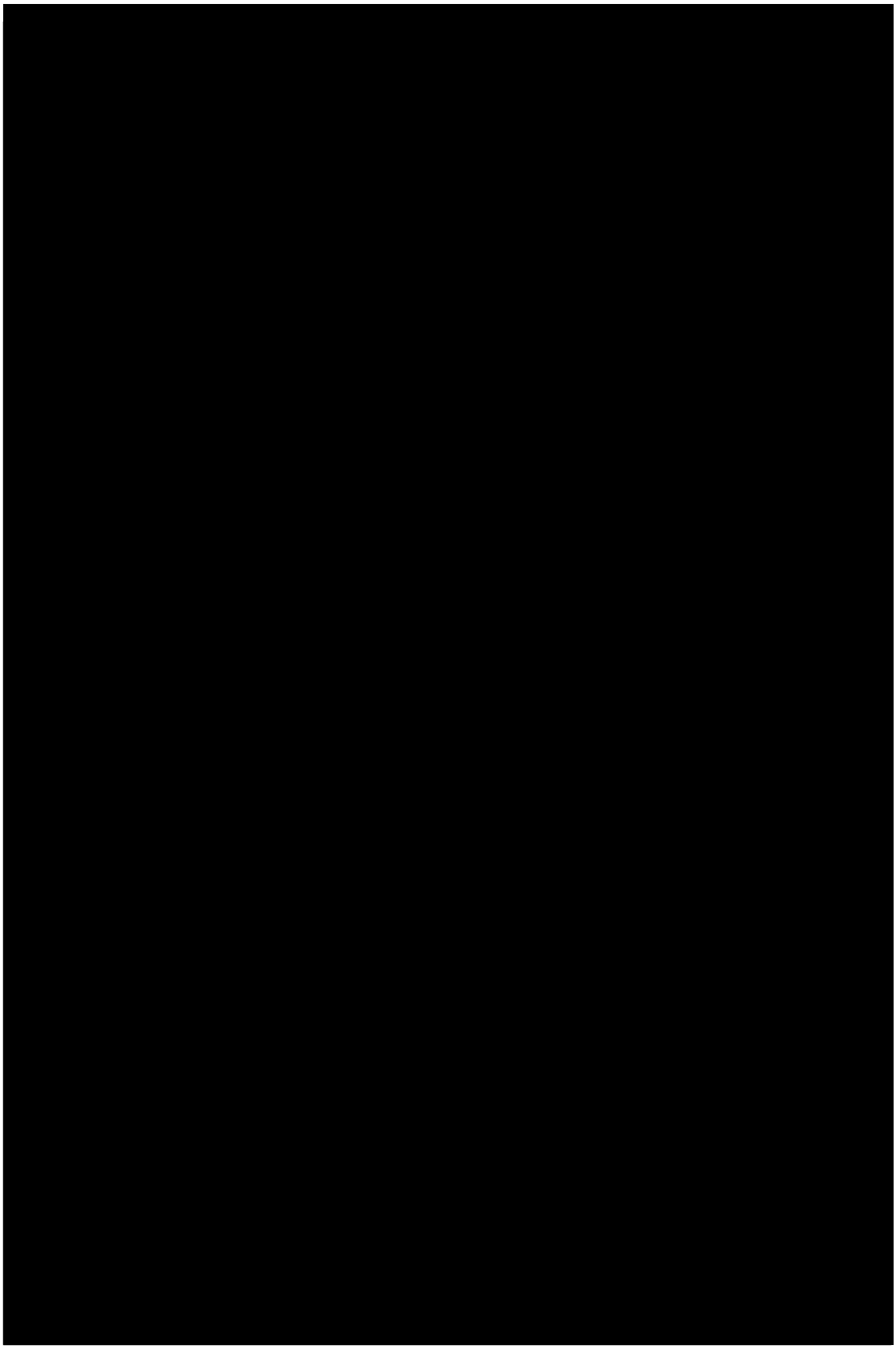


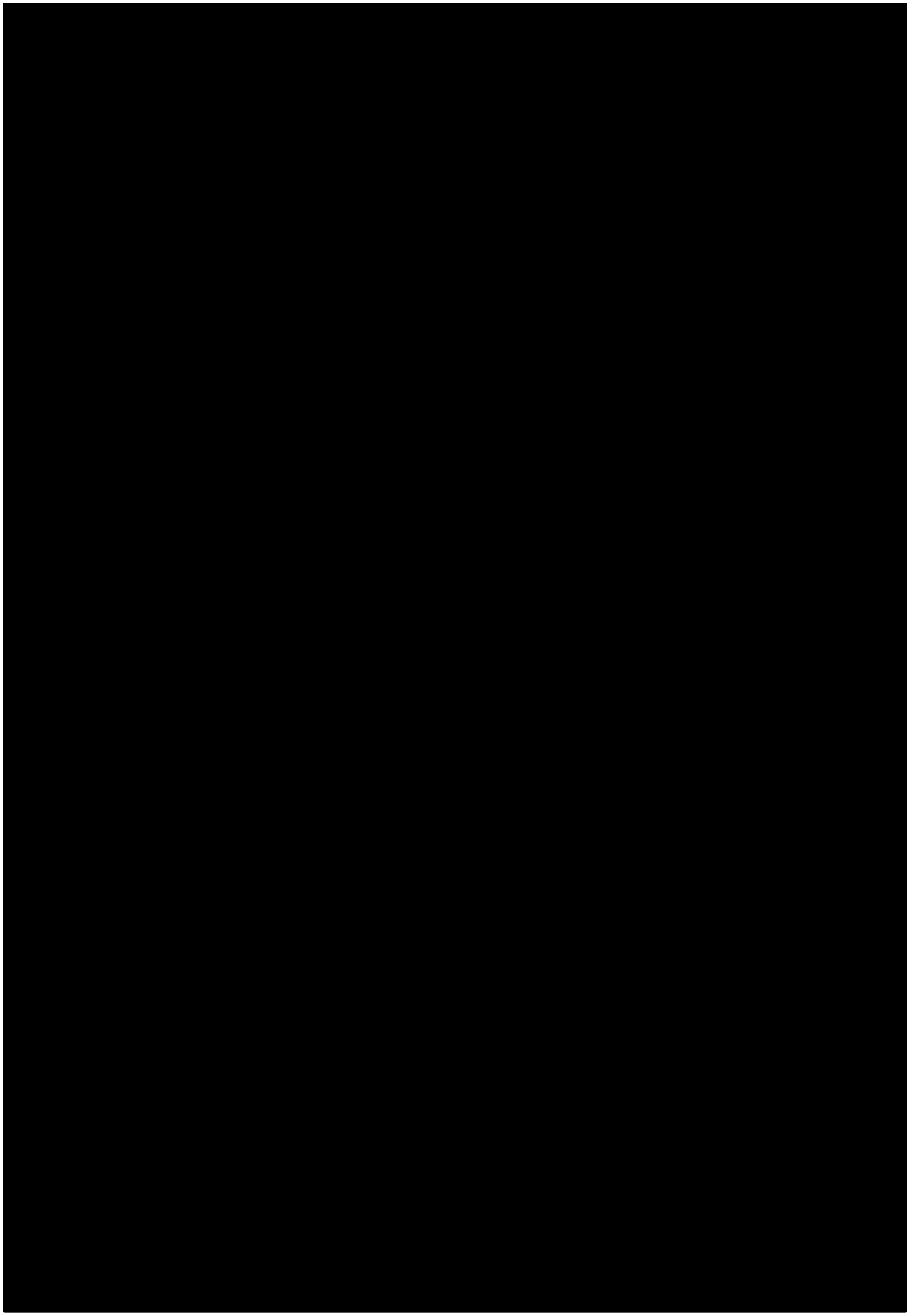












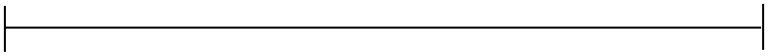
Appendix 36: Demographic Information

Version 2 (18/05/2011) Code Number _____

**Demographic Data**

Below are questions that ask for information about yourself and your diabetes. Please answer all questions.

1. Age: _____ years
2. Sex: Male Female
3. Occupation: _____
4. Level of Education: _____
5. Ethnicity: _____
6. Marital status: _____
7. When you were first diagnosed with diabetes: _____
8. Do you maintain a recommended diet Yes No
9. What diabetes medication are you on?
10. _____
11. List any diabetes complications that you may have.
12. _____
13. List any other medical conditions that you may have apart from diabetes and list any medications you may be taking for this condition
14. _____
15. _____
16. How hungry are you?



Not at all hungry — Extremely hungry

17. At what time did you have your breakfast? _____

18. Please list what you ate and approximately how much you ate. Please include sauce, sugar, milk etc.

_____

_____

_____

_____

19. Have you had anything to eat after breakfast? 1. Yes 2. No

20. If yes, specify what you ate _____

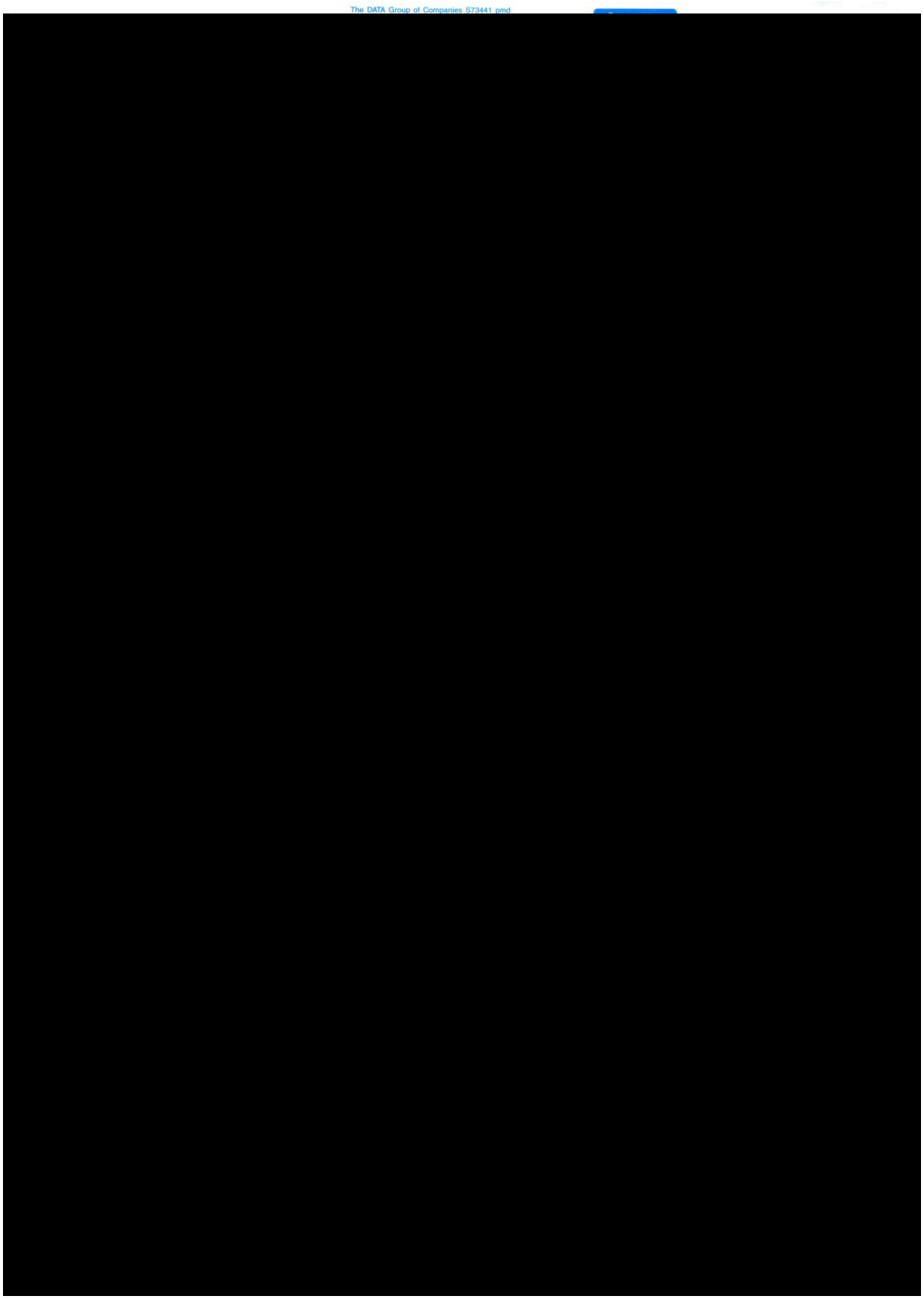
_____

**To be filled by the researcher**

1. Weight: _____ 2. Height:_____
2. Body mass index (BMI) _____ 3. HbA1c _____
4. Random Blood Glucose (Before) _____ Time _____
5. Random Blood Glucose (After) _____ Time _____

**PLEASE CHECK THAT ALL QUESTIONS HAVE BEEN ANSWERED**

Appendix 37: Profile of Mood States- Brief Form



Appendix 38: Rational and irrational belief statements

**Irrational Belief Statements for Priming**

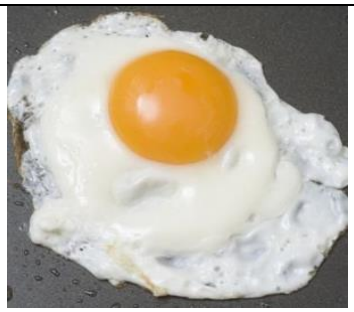
- It is not fair that I have diabetes
- I cannot stand being on a diet
- It is awful that I have to diet for the rest of my life
- I cannot stand it if other people are eating whatever they want and I cannot
- It is not fair that I cannot eat like everyone else I must be able to eat whatever I want to eat

**Rational Belief Statements for Priming**

- It is difficult that I have diabetes, but I can bear it
- It is difficult that I have to be on a diet but I can stand it
- It is bad that I have to diet for the rest of my life but not awful
- It is difficult if everyone is eating whatever they want and I cannot, but I can stand it
- It is difficult that I cannot eat like everybody else, but I can bear it

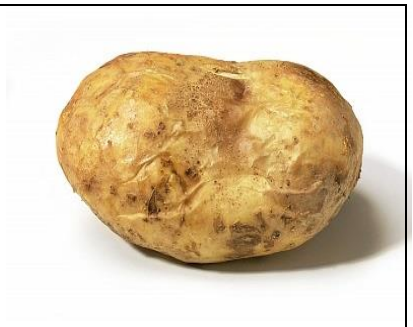
Appendix 39: Food pictures

**High Fat savoury, high fat sweet and low calorie food pictures**

| | | |
|---|---|---|
|  |  |  |
| Fried Egg | Cashew nuts | Chips |
|  |  |  |
| Nachos cheese | Almonds | Baked potatoes |
|  |  |  |
| Crisp | Pringles | Batter coated fish |
|  |  |  |
| Burger | Butter croissant | Chicken curry rice |

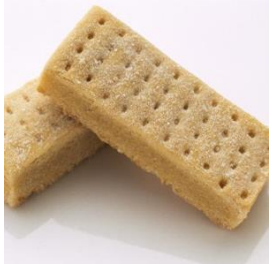
| | | |
|---|---|---|
|  |  |  |
| Blueberry muffin | Chicken | Boiled egg |
|  |  |  |
| Chicken | Brocoli | Crisp |
|  |  |  |
| Brown bread | Chocolate donut | Chocolate muffin |
|  |  |  |
| Apricot cheesecake | Brown bread | Almond ricatto |

| | | |
|---|---|---|
|  |  |  |
| Vanilla icecream | Brown rice | Nutty magnum |
|  |  |  |
| Brown rice | Butter croissant | Cake |
|  |  |  |
| Carrots | Carrots peas soup | Iced donut |
|  |  |  |
| Asparagus | Salad | Salad |
|  |  |  |
| Tomato | Cucumber | Cauliflower |

| | | |
|---|---|---|
|  |  |  |
| Fish Vegetable | Celery | Jacket potato |
|  |  |  |
| Chicken breast | Vegetable soup | Lettuce |
|  |  |  |
| Lettuce | Tomato | Cheddar |
|  |  |  |
| Cheesecake | Chicken breast | Chicken breast |
|  |  |  |
| Chicken salad | Chocolate bar | Chocolate brownies |

| | | |
|---|---|---|
|  |  |  |
| Chocolate cake | Chocolate cookies | Cod |
|  |  |  |
| Cod | Corn | Corn |
|  |  |  |
| Corn flakes | Cucumber | Cupcake |
|  |  |  |
| Danish pastry | Digestives | Fish chip |
|  |  |  |
| Fish fingers | Glazed donut | Green pepper |

| | | |
|---|---|---|
|  |  |  |
| Lamb | Lasagne | Leek |
|  |  |  |
| Mixed veg | Onion rings | Pancake |
|  |  |  |
| Pasta | Peas | Peas |
|  |  |  |
| Pizza | Potatoes | Red pepper |
|  |  |  |
| Salad | Sandwich | Sandwich |

| | | |
|---|---|---|
|  |  |  |
| Sesame bread | Short bread | Strawberry cake |
|  |  |  |
| Strawberry ice cream | Swiss cheese | Truffles |
|  |  |  |
| Tuna | Turkey breast | Vegetable soup |
|  |  |  |
| White chocolate | Whole meal penne | Yellow pepper |

# PATIENT INFORMATION SHEET

## 1. Study Title

**Irrational beliefs and unhealthy food preference in type 2 diabetes: Testing the Rational Emotive Behaviour Therapy (REBT) Model.**

## 2. Invitation paragraph

You are being invited to take part in a research study that is being undertaken at Birmingham University. Before you make a decision about whether you want to take part, it will be important for you to find out more about the reasons why this research is being carried out and what it will involve. So please take some time to carefully read the information below. You can discuss it with anyone (including friends, family or GP), if you wish. If you have any questions or would like some more information, please feel free to contact me. My contact details are at the end of this letter.

Thank you for reading this.

## 3. What is the purpose of the study?

As you are aware, dietary self-care plays a very important role in the management of type 2 diabetes but its success is affected by many factors. This study is interested in how negative emotions can affect dietary self-care in type 2 diabetes. The researchers would like to find out how people with type 2 diabetes' thoughts can influence their food preferences which may interfere with dietary self-care. We would also like to find out how your brain reacts to food pictures that will be presented. We hope that our findings will help to improve the quality of care for people with type 2 diabetes – especially education regarding dietary self-care.

## 4. Why have I been chosen?

All people with type 2 diabetes, aged 40 years and older who have had type 2 diabetes for at least one year from the Diabetes Clinic at Birmingham Heartlands and Selly Oak Hospitals, South Birmingham PCT and University of Birmingham have been invited to take part .

## 5. Do I have to take part?

You do not have to take part. The decision to participate is completely voluntary so it is up to you to decide whether or not you wish to take part. You will be given up to one week to think about the information in this letter and decide whether or not you wish to take part. The researcher will contact you (if you consent to that) to find out if you would want to participate. This will give you the opportunity to ask any questions that you may have about the study. If you do decide to take part, you can either sign the consent form on the day of testing or contact us when you feel ready to do so. We will then make an appointment at a time of your convenience to carry out the research at the School of Psychology, University of Birmingham. Remember, if you decide to take part, you will still be free to withdraw at any time. Withdrawing will not affect your current or future NHS treatment.

**6. What will happen to me if I take part?**

If you agree to take part, an appointment will be made for the research to take place at a time of your convenience. The research will be carried out at the School of Psychology, University of Birmingham. You will first be given 7 short questionnaires and rating scales to complete. The questionnaires will ask about the problems that you have had living with diabetes over the past one week or one month as well as you eating behaviour. It will also ask about some personal information such as your age, sex, duration of diabetes etc. and your weight and height will be measured. You will also be asked to take a finger prick test to establish the control of your diabetes (HbA1c) and your random blood glucose level, after which you will be given a list of statements to read.

Once you have read those statements, you will then be shown a number of food pictures on a computer screen and you will be asked to indicate how you would feel if you eat those foods. You will be required to use the computer keyboard to make your responses and you will be given short rest periods in-between the presentation of the food pictures. You do not have to worry if you are not very familiar with using the computer. You don't need to be computer literate to complete the task. You will be given the opportunity to practice before testing begins so that you can familiarise yourself with using of the computer keyboard to make responses. When you have finished this first task, you will be given a rest period again, and then the procedure will be repeated but this time you will be given a different list of statements to read before the food pictures are presented. After this second step, you will again be presented with food pictures and asked two questions, which you will respond to by using the computer keyboard.

We will also measure how your brain reacts to the food pictures during the task using electroencephalogram (EEG) technique. Your brain activity will be measured using a non-invasive method with electrode that will be placed on your head using a head cap. This is to help us monitor how your brain reacts to the food pictures and the responses that you make. First, a nylon head cap with plastic buttons will be placed on your head and the buttons will be filled with gel using a syringe. After filling the holes with gel, the EEG electrodes will then be attached. Also electrodes will be placed below and at the side of each of your eye (to monitor eye movement) using adhesive rings, and behind each your ear as well. You will have gel in your hair after the procedure, and it will be possible for you to wash and dry your hair when you finish. The laboratory is equipped with a hand shower, and we will provide you with shampoo, a hair dryer as well as a comb and a mirror to use.

(Sample picture of a participant fitted with an electrode cap and EEG electrodes)

Once you have completed the procedure, you will be asked to take a finger prick test to measure your random blood glucose level again. The whole procedure is expected to last approximately 3 hours.
You will be asked to eat at 8:00am on the morning that you will be tested, and you will be required to eat your regular breakfast that is recommended for people with diabetes. Also you will be expected to arrive at the School of Psychology at 9:30am. Arrangements will be made to meet you at a point on the University of Birmingham Edgbaston campus to take you to the School of Psychology where testing will take place

**7. What do I have to do?**

If you are happy to be contacted by the researcher then all we would ask is for you to sign the consent form to be contacted. The researcher will then contact you to discuss the study with you in more detail. If, after discussion you are still interested in participating in the study, an appointment can be made for the research to take place. However, if you feel that you must discuss your involvement in the study with your doctor or anyone else, please do. This study will NOT involve drugs or any other medical procedures.

**8. What are the possible disadvantages and risks of taking part?**

There are no risks involved. However, in the unlikely event that you become distressed as a result of your participation, please let us know using the contact details below. In the first instance we will discuss the difficulties that arose with you. If you require professional help, we will discuss this with you first and suggest that you contact your GP.

**9. What are the possible benefits of taking part?**

This study has no direct benefits for you. However, the information that is provided by you and other participants may increase the knowledge of health educators and professionals who advise people with type 2 diabetes about their diet.

**10. Will my travel expense be reimbursed?**

Your expenses (travel, parking) will be paid up to a maximum of £25

**11. What if something goes wrong?**

Once again, in the unlikely event that participating in this research project distresses you, you should let the researcher, Margaret Amankwah-Poku know by using the contact information at the end of this sheet. In the first instance, she will discuss your difficulties with you. If you need professional help, she will speak to you about this and you may then want to contact your GP or Doctor at clinic or your diabetes care providers. If, as a result of your taking part in this study you have questions about your dietary regimen, your dietician can be contacted. You could also contact the Patient Advice and Liaison Service (PALS, 0121 424 1212) for confidential advice and support to patients, families and their careers.

There are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the course of this study, the normal National Health Service complaints mechanisms should be available to you.

**12. What if I have special needs?**

We will make every effort to ensure that there are no barriers for you if you wish to take part. If you have 'communication problems' (due to a disability – e.g. hearing impairment / visual impairment/ dyslexia) you are asked to contact us using the details below. If you have difficulties with reading, please inform us. The researcher may be able to offer you more time to complete the study and will assist you in reading the questionnaires. If you envisage any other problems, please contact the researcher and every effort will be made to make things easier for you.

**13. Will my taking part in this study be kept confidential?**

Your participation in the study will be kept confidential. Your name will remain anonymous - being changed to a personalised code. Computer based data will be kept on file at the University of Birmingham and will be password protected. All of your paper data (i.e. questionnaire responses) will be kept in a locked cabinet. Paper records from this study will be kept for 3 year and destroyed once the study is complete. Margaret Amankwah-Poku will ensure the security of the information you give. Only members of the research team led by Mrs. Margaret Amankwah-Poku will have access to the information/data for analyses.

**14. What will happen to the results of the research study?**

On completion, the results of this study may be sent for publication in a scientific journal. However, you will not be personally identifiable in this report/publication. Each participant will be informed about the results of the study. Copies of a summary of the findings will be sent to you and to your consultant at the clinic. You can ask for one of these if you are interested in finding out what we found.

**15. Who is organising and funding the research?**

The research is organised and funded by the School of Psychology of the University of Birmingham.

**16. Who has reviewed the study?**

This study has been reviewed and approved by the Birmingham, East, North and Solihull Research Ethics Committee according to local regulations.

**17. Contact for further information**

If you decide to take part, you will be given another of these information sheets to read and keep, together with a copy of the signed consent form.

Thank you for reading this information. If you have any matters which may concern you, or further questions, you may speak to either of the Chief Investigator in charge of this project, Margaret Amankwah-Poku on the following number: (0750) 178 5790/ (0121)471 2395, or to Dr. Arie Nouwen on the following number (0121)414 7203 at the School of Psychology, University of Birmingham. Alternatively, you may contact the Patient Advice & Liaison Service (PALS) of Heartlands Hospital at (0121) 424 1212.

**Thank you for considering taking part in this study.**

Appendix 41: Consent to be contactedform
Version 1 (18/01/2010) Code number: ____

CONSENT FOR CONTACT FORM

Title of Project:
***Irrational beliefs and unhealthy food preference in type 2 diabetes: Testing the Rational Emotive Behaviour Therapy (REBT) Model.***

Name of Researcher: Margaret Amankwah-Poku

**If you have decided that you agree to being contacted about this study by the researcher, please put your name and contact details below and sign this letter. Thank you.**

I agree to being contacted by the researcher from the School of Psychology at the University of Birmingham regarding my participation in the study.

| _____ | _____ | _____ |
|---|---|---|
| Name | Date | Signature |

_____
Contact telephone number

| _____ | _____ | _____ |
|---|---|---|
| Name of Researcher | Date | Signature |

Appendix 42: Advertisements- Poster

**Poster for recruitment of Participants**

# Research Opportunity in Diabetes

**We are interested to learn about how your thoughts and feelings affect the kind of food you choose to eat.**

**We will show you food pictures while you think about positive and negative aspects of your diet, during which we will measure your brain activity.**

**We will reimburse your travel expenses when you come and take part in this research.**

**If you are interested in participating in this research or want more information, please contact:**

[redacted]