Portfolio 1: Major Research Project

An Examination of the Influence of Continuous Glucose Monitoring on Food Relationships in Adults Living with Diabetes

Seth Mackie

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Abstract

Background: Diabetes Mellitus (DM) is recognised as one of the most complex and demanding chronic illnesses, requiring continuous monitoring and decision-making for effective management. The management requirements of Type 1 DM (T1DM) and Type 2 DM (T2DM) differ in terms of daily treatment regimen complexity, associated health implications and overall burden of disease management. Technological innovations have emerged as valuable tools in supporting individuals with the self-management of DM. Flash and Continuous Glucose Monitors (FGM/CGM) are small devices worn on the upper arm which measure blood glucose levels and enable real-time monitoring, supporting glycaemic control. To date, most research on glucose monitoring technology has focused on their impact on the management of the physical health outcomes. There remains a notable gap in the literature regarding the psychological impact of such technologies, particularly in relation to their impact on individuals' relationships with food and eating behaviours.

Aims: This research aims to understand how people recently diagnosed with T1DM experience CGM and to examine the impact of CGM on users' relationships with food and eating behaviours.

Method: This study used a qualitative methodology. Semi-structured interviews were conducted with 10 participants. Data was analysed using Reflexive Thematic Analysis.

Findings: Four main themes were constructed using Reflexive Thematic Analysis. These were *Empowerment and Autonomy, Data-Driven Diets, The Burden of Control, Re-imagining Diabetes.*

Implications: The findings are interpreted in light of relevant research and theory, with implications for future research and clinical practice. The findings from this study are helpful for ensuring people with TD1M receive adequate support to manage the psychological impacts of CGM technology.

Keywords: Continuous Glucose Monitoring Device, Type 1 Diabetes Mellitus, Food Relationships

Chapter 1: Introduction

1.1 Overview

This research explores the experiences of using Continuous Glucose Monitoring (CGM) devices for people with Type 1 Diabetes Mellitus (T1DM). Specifically, it aims to understand how use of CGM impacts users' relationship with food and eating behaviours, using a qualitative methodology. Semi-structured interviews were conducted to elicit participants' in-depth experiences and Reflective Thematic Analysis (Braun & Clarke, 2019, 2022) was used to analyse data. Chapter 1 opens by outlining the researcher's epistemological position, as well as providing a brief overview of the literature and relevant theory regarding the topic area to situate the research in context. To conclude, the chapter outlines the rationale for the systematic literature review presented in Chapter 2.

1.2 Personal and Epistemological Position

1.2.1 Personal Positionality and Reflexivity

My positionality has informed the direction of this research story. I am engaging with scientific-reflexive research, diabetes, CGM and food relationships as a young, able-bodied, white, middle-class male. These social graces (Burnham, 2018) afford me a position as an outside researcher with regards to living with diabetes. However, my interest in this topic is informed and connected to my experiences as someone living with a chronic condition and having witnessed the impact of diabetes management burden for my grandfather.

My professional lens as a Trainee Clinical Psychologist underpins my engagement with this research. My introduction to the field is informed by critical engagement with the scientific literature, conversations with psychological clinicians, researchers and engagement with experts by experience (EBE). I am particularly interested in understanding people's relationships within their contexts, their narratives and ability to create meaning from their experiences, whilst working broadly across systems of support to re-centre people within their own lives. Applying this lens, I understand diabetes as a chronic health condition that exerts an implicative force across people's lives. The predominant focus on dysfunction within healthcare contexts can risk reducing people's lives to a single problem-saturated story which may not serve them.

In attempting to understand people's experiences with diabetes, CGM and food relationships as an outsider researcher, I have continually engaged in structured approaches to facilitate reflexivity. Bracketing exercises (Tufford & Newman, 2012) have supported me to understand how my assumptions may have influenced decision making throughout the research process. These reflexive exercises have encouraged me to consider what I might *not* be hearing, considering or attending to within the subtext of people's narratives. This approach has been further enriched through conversations with an EBE, whose insights have broadened my understanding of insider positions by generously providing their knowledge and feedback. These processes have encouraged me to remain anchored in participants' lived experiences of their health condition. Some of my reflections are illustrated in tables labelled '*Moments for Reflection'* to support the reader to be informed about my thinking and decision-making processes, particularly in punctuating moments of transition. Further reflective accounts informed by bracketing can also be found in Appendix A.

1.2.2 Theoretical Perspective, Ontology and Epistemology

The theoretical perspective taken by the researcher informs both the methodological choices and how data is interpreted. Furthermore, the theoretical orientation taken by the researcher is inherently tied to their ontological and epistemological stance. Ontology relates to how individuals understand the nature of reality, what exists and how it can be understood (Scotland, 2012). Whereas epistemology is concerned with the nature and scope of knowledge, including how we come to know what we know and how individuals conceptualise truth (Blaikie, 2007). These philosophical foundations influence the questions researchers are interested in investigating, as well as how they perceive and engage with the data in the field they are studying.

The current study adopts a Critical Realist (CR) perspective, a philosophical approach first developed by Roy Bhaskar in the late 20th century as a response to limitations within approaches including positivism, interpretivism, and constructivism (Bhaskar, 2013; Danermark et al., 2002). CR offers a dual lens, asserting that while a reality exists independently of our perceptions, our understanding of it is inevitably mediated through our subjective and socially situated experiences (Archer et al., 2013). This perspective maintains the tension of a realist ontology, acknowledging an external objective reality, alongside a relativist epistemology, recognising that all knowledge is fallible and context dependent (Easton, 2010). Overall, CR rejects the notion that our understanding of reality (ontology) can be fully explained by how we acquire knowledge (epistemology), asserting instead that what we know represents only a limited part of a broader, independent reality (Fletcher, 2017).

In applying a CR framework, this study aims to engage with participants' narratives in a manner that foregrounds both contextual specificity and ontological depth. Participants' accounts are understood not merely as subjective expressions, but as situated realities shaped by intersecting socio-cultural, historical and material contexts. CR supports a reflexive, analytical stance by encouraging the researcher to move beyond descriptive representation, and to interrogate the mechanisms and structural conditions underpinning these experiences (Houston, 2010). By resisting reductive interpretations, CR can capture the contradictions and complexity of human experience without oversimplification or detachment from its broader systemic context.

1.3 Situating the Research in Context

1.3.1 Diabetes Mellitus

Diabetes Mellitus (DM) is a common medical condition that occurs when the body is unable to produce enough insulin or effectively use it, leading to insufficient glucose storage in adipose tissue, muscle and liver (Abel et al., 2024). The global prevalence of DM has been estimated to be 6.1% and is projected to increase significantly by 2050 (Ong et al., 2023). DM has emerged as a significant global public health concern due to its increasing prevalence (Zimmet et al., 2016) and the development of secondary health consequences due to damage to blood vessels and nerves, including heart disease, stroke, diabetic kidney disease, retinopathy and peripheral neuropathy (Fowler, 2008; Tomic et al., 2022). It is a major global contributor to mortality and disability worldwide, affecting people across all countries, age groups and genders (Saeedi et al., 2019; Ong et al., 2023).

There are two common types of DM: T1DM and Type 2 (T2DM), although, there are other variations of DM including hybrid forms. Regarding the DM population in the UK, around 8% of people are expected to be living with T1DM and 90% of people are expected to be living with T2DM, with other forms of DM making up the remaining 2% (Diabetes UK, n.d). T2DM is considered a metabolic condition and has been associated with obesity and a sedentary lifestyle. Various genetic and non-genetic risk factors are associated with T2DM, including age, ethnicity, genetics, environment and lifestyle (Murea et al., 2012; Kyrou et al., 2020; Ortiz-Martínez et al., 2022). T1DM is an autoimmune condition, characterised by insulin deficiency (NHS, 2024). T1DM has a strong genetic component, and symptoms typically appear during early adulthood, although it can develop at any age (Chaing et al., 2014; Tuomilehto, 2013). T1DM is one of the most prevalent chronic health conditions in the UK. As T1DM typically develops at a younger age, it consequently has a greater potential impact on premature morbidity and mortality (Brady et al., 2021). The prevalence of T1DM varies worldwide; however, it is estimated that 400,000 people in the UK are living with T1DM, with increasing incidence (Ng & Soni, 2023). At present, there is no cure for T1DM and consequently, people living with T1DM require lifelong insulin therapy to manage blood glucose (BG) levels and to prevent complications.

1.3.2 Management of DM

DM is widely recognised as one of the most demanding chronic illnesses, requiring continuous monitoring and complex decision-making related to its management (Shrivastava et al., 2013). The management requirements of T1DM and T2DM differ in terms of daily regimen complexity, short-term consequences and overall management burden although, it is evident that self-care is a key component for effective management for all types of DM. Self-care typically involves engaging in daily activities and behaviours to help control blood sugar levels, improve quality of life and prevent complications (Shrivastava et al., 2013; Ahmad & Joshi, 2023). Within the context of diabetes management, self-care has been defined as an evolving process through which individuals acquire knowledge and awareness, enabling them to navigate the complex nature of the condition within a broader social context (Cooper et al., 2003; Paterson & Thorne, 2000).

A T1DM diagnosis can place high demands on the individual as people are required to manage self-care by administering synthetic insulin to replicate pancreatic function, which regulates blood glucose (BG) levels. For people living with T2DM, typical strategies to manage DM and regulate BG levels, include making changes to lifestyle including diet and levels of exercise. The risk of developing T2DM can be reduced with nutritional and lifestyle interventions (Salas-Salvadó et al., 2011). BG levels can be affected by a range of factors such as dietary intake, temperature, illness, psychological stress and physical activity (Aikens, 2012; Kenny et al., 2016; Russell et al., 2016). Living with DM can be complex, with perpetual medication taking, diet control and constant monitoring of BG levels (Fagan & Parsons, 2021; Seo et al., 2019). The majority of DM daily self-care is handled by the individual or their families (Shrivastava et al., 2013; Busebaia et al., 2023). Fear of Hypoglycaemia is also a common concern for both people living with diabetes and their families (Diabetes UK, 2019; Jensen et al., 2021) and is associated with heightened anxiety and poorer self-management (Böhme et al., 2013). For some, the endless tasks involved in DM management can feel overwhelming and can negatively impact psychological well-being for both the individual and their family (Hendrieckx et al., 2019; Messina et al., 2018; Jensen et al., 2021; Keen, 2019). For example, people living with T1DM must make over 100 additional decisions each day and therefore the cognitive and psychological impact of this responsibility cannot be underestimated (Parsons et al., 2024). Many individuals describe experiencing diabetes burnout due to feelings of frustration and fatigue from the daily demands of maintaining self-care and managing glycaemic control (Abdoli et al., 2021).

1.3.3 Developments in Technology for DM management

Diabetes technology is continuously developing to support individuals with managing DM. To ensure individuals are in control of their BG levels, it is recommended that people track their levels through self-monitoring (Heinemann et al., 2018). Traditionally, this has required a finger prick, which can give the individual information about their BG level and aid management of diet, activity and medication. However, for people living with DM, this method can be challenging, requiring routine use of needles which are painful and may be difficult to accept as part of daily life. These factors can contribute to inconsistencies in BG monitoring. Research has indicated that fear of blood and checking is associated with suboptimal glycaemic control (Al Hayek et al., 2017). Healthcare technology has evolved to overcome these limitations.

In recent years, technological advancements have aided individuals with DM management and supplemented care provided by healthcare services (Hunt, 2015) (Figure 1). The benefits of this technology have been recognised in the NHS Long-Term Plan, as evidenced by the planned wider roll-out of glucose monitor devices (Phillips, 2019). In 2017, the FreeStyle Libre (FSL) flash glucose monitor device was introduced. This coin-sized wearable device, applied to the upper arm for a duration of up to 14 days, measures interstitial glucose levels using a 4mm filament which is inserted into the subcutaneous tissue. Users obtain a digital reading of their interstitial glucose levels by scanning the sensor with a compatible device. Glucose data is recorded at 15-minute intervals and users can access trends for the previous 8 hours on the screen. Since the introduction of flash glucose monitoring devices, significant advancements have been made in diabetes glucose monitoring technology, enhancing both accuracy and user experience. Continuous Glucose Monitoring (CGM) devices have offered more detailed insights into glucose trends, through providing real-time data on an individual's glucose levels. Researchers continue to explore further non-invasive glucose monitoring technologies for people with DM. Such innovations could offer more comfortable and accessible options for glucose monitoring.

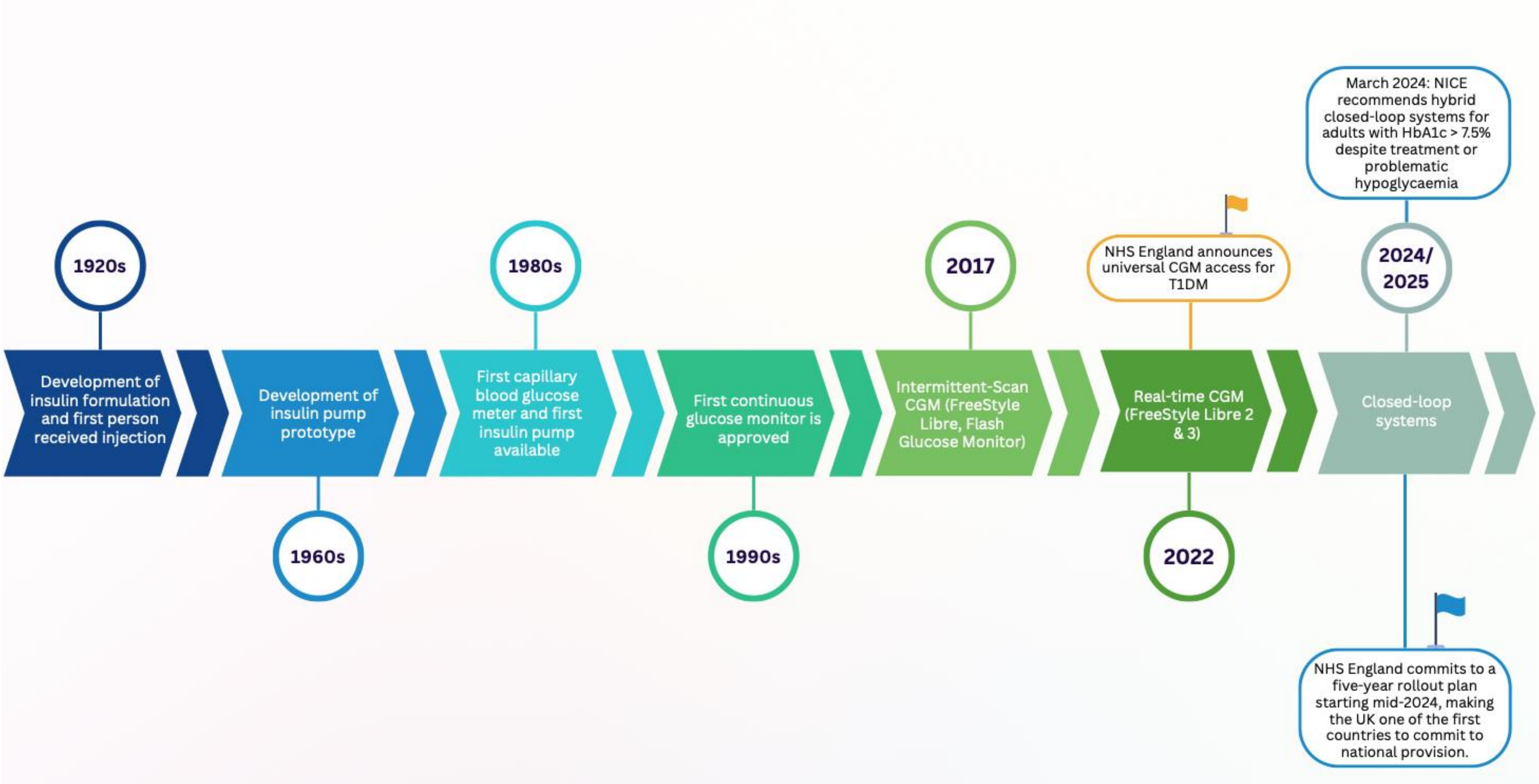
To date, research on glucose monitoring devices has predominantly focused on the accuracy and usability of devices in supporting the management of DM. For example, highlighting that users report high treatment satisfaction due the instantaneous visualisation of data and ability to track glycaemic trends, which has supported overall DM management (Lawton et al., 2018; Hommel et al., 2014; Tansey et al., 2011). Numerous studies have demonstrated the effectiveness of CGM in improving self-care behaviours among patients living with diabetes (Chang et al., 2025; Johnston et al., 2022; Lawton et al., 2018). Glucose monitoring devices have also been found to be associated with improved glycaemic control and increased checking of BG levels (Gleeson et al., 2019; Overend et al., 2019; Dover et al., 2017). Additionally, CGM use is associated with improved quality of life for individuals (Patton & Clements, 2016; Mitsuishi et al., 2017). Brady et al. (2021) argue that access to technology and self-management support is crucial for people with T1DM as the precise adjustment of insulin doses is essential for improving quality of life. Despite continued advancements in glucose monitoring technology and recommendations for widespread implementation (Phillips, 2019), limited research has examined the psychological impact of these devices. Within the literature, glucose monitoring technology has been found to reduce diabetes-related distress (Patton & Clements, 2016; Barnard et al., 2016; Addalla et al., 2024). However, some users have also reported feeling emotional burden and information overload from the device (Patton & Clements, 2016; Barnard et al., 2016; Franceschi et al., 2021; Tanenbaum & Commissariat, 2023).

Monitoring dietary intake has been emphasised as a key component of DM management (Forouhi et al., 2018; Pancheva et al., 2021). In the context of DM management, attention to the body is often centred on physical aspects such as weight, food intake and eating behaviours. However, at present, there is limited research available examining the impact of such devices on the relationship to food and eating behaviours

(Wallace et al., 2023). Given that people living with DM alter their eating behaviours for survival, investigating what this means to people is important and thus, there is a need for this to be explored further to minimise burden.

Figure 1

Timeline of Technological Advancements in DM Management



1.3.4 Relationship with Food and Eating Behaviour

Eating is a global activity that involves both internal and external aspects of an individual and is necessary for human survival and health (Sobal & Bisogni, 2009). Human food choice is directly influenced by perceptions, beliefs and responses to food-related cues (Mela, 1999). Human nutrition is closely related to lifestyle and relationships with food are shaped by broader the social, cultural and economic environment. Eating behaviour is a complex process between physiological factors and the surrounding food environment (Stover et al., 2023). Both emotions and behaviour influence individuals eating behaviours. As well as the process of eating and the food and the nutrients consumed, eating behaviour encompasses food preferences, decision-making and patterns of consumption (Yannakoulia, 2006).

Eating behaviour provides an essential role in the prevention and management T2DM and is important in the management of T1DM (Gal et al., 2024; Cradock et al., 2017). Individuals living with DM are required to make a series of daily decisions, particularly concerning eating behaviours and physical activity to effectively manage BG levels and maintain overall health (Yannakoulia, 2006; Pancheva et al., 2021). Many diabetes-related factors increase the risk of developing eating disorders, as individuals may experience concerns over body shape and weight and due to the nature of DM, individuals may be more focused on diet and control over their long-term condition (Nip et al., 2019). Nutritional interventions are one core component of DM management (Feinman et al., 2017; Krebs et al., 2016; Sami et al., 2017). For people with T2DM, dietary restrictions can aid in the prevention of DM as well as improve metabolic control for individuals (Salas-Salvadó et al., 2011). People living with DM are consistently advised to follow a healthy diet and implement life-long dietary modifications, including changes to food choices and meal patterns (Yannakoulia, 2006; Ajala et al., 2013). In the context of T1DM, insulin is used to manage BG levels however, weight gain is a common side effect of successful insulin treatment (Larger, 2005). The complex ways in which individuals may need to adjust their nutritional intake to manage DM, may affect their relationships with food and eating behaviours, and in some cases may contribute to the emergence of disordered eating behaviours (Broadley et al., 2020).

People with DM have shown to be an at-risk group for the development of disordered eating behaviours and eating disorders, in comparison to their non-diabetic peers (Nielsen, 2002; Broadley et al., 2020). Research indicates both clinical and subclinical eating disorder presentations are over-represented in people living with T1DM and T2DM

(Broadley et al., 2020; Nip et al., 2019; Hanlan et al., 2013; Young-Hyman & Davis, 2010). Subclinical disordered eating behaviour, in the context of diabetes, refers to symptoms which are not at a level of frequency and severity to be quantified as a diagnosable eating disorder (Olmstead et al., 2008; Hanlan et al., 2013). In the context of T1DM, eating disorder diagnoses such as Bulimia Nervosa and 'Other specified Feeding and Eating Disorders' are more common in those with T1DM (Dean et al., 2024; Mannucci et al., 2005; Young et al., 2013). Disordered eating behaviours appear more common in adolescents and young women with T1DM (Young et al., 2013). Individuals with T1DM may intentionally restrict insulin by skipping or limiting doses to prevent weight gain (De Paoli & Rogers, 2018; Dean et al., 2024; Pinhas-Hamiel et al., 2015). Disordered eating behaviours have been found to have an increased risk for DM-related complications for people with T1DM (Peveler et al., 2005) and insulin omission can have severe and life-threatening consequences, including diabetic ketoacidosis (Gibbings et al., 2021; Goebel-Fabbri et al., 2008). However, findings should be interpreted with caution due to the variability in study designs. Notably, there is a lack of consensus regarding how eating disorders are defined within studies. For example, some studies include subclinical eating disorder symptoms (Mannuucci et al., 2005; Colton et al., 2015). Additionally, many self-report questionnaires and diagnostic tools are not validated or applicable for those with T1DM, as they do not use cognitions and behaviours associated with T1DM, such as, fear of weight gain with insulin and insulin omission (Broadley et al., 2020; Young-Hyman et al., 2010; Markowitz et al., 2010; Pinhas-Hamiel et al., 2015). Many individuals with T1DM may also experience subclinical eating disorder symptoms which despite not meeting the threshold for clinical criteria, still contribute to psychological distress (Powers et al., 2017; Poos et al., 2023).

Much of the existing research, along with clinical and media attention, has focused on disordered eating behaviours in individuals with T1DM; however, disordered eating behaviours are also present in those with T2DM, yet this population remains under-researched (Broadley et al., 2020). Studies suggest that disordered eating behaviours, including, Night Eating Syndrome and Binge Eating Disorder may affect around 40% of people with T2DM (Abbott et al., 2018; García-Mayor & García-Soidán, 2017). Research also indicates that Binge Eating Disorder is more prevalent in people living with T2DM (Abbott et al., 2018). This may be as individuals with T2DM may have irregular meal timings and may skip meals or have inconsistent intervals.

1.3.5 Glucose Monitoring Technology and Relationship with Food

Some research has examined the impact of glucose monitoring technology on individuals eating behaviours and food relationships, although there remains limited research within this field. Wallace et al. (2023) conducted a qualitative study exploring the influence of glucose monitoring technology on eating behaviours and food relationships with adults with T1DM. Participants described CGM supported them to gain new insights into their bodily processes, changing where, what and how much participants chose to eat. Individuals found that being able to visualise data supported them with diabetes management through fostering a sense of self-control and self-efficacy in experimenting with foods (Wallace et al., 2023). Individuals living with DM have also described CGM as useful in supporting them to predict fluctuations in glucose levels, leading them to feel more confident in self-management of DM (Natale et al., 2023). However, being able to visualise data can also have negative implications as individuals can feel under scrutiny from data (Wallace et al., 2023) and people may skip meals to stay in range due to feeling the pressure of being constantly measured (Willis et al., 2025). For individuals with T2DM, CGM data may influence individuals to modify dietary behaviours and prompt them to make more considered food choices, consequently influencing their food relationships (Yost et al., 2020; Kang et al., 2022).

The Behaviour Change Wheel (BCW) seeks to understand how values-informed dietary change processes occur, capturing the factors that affect behaviours, and the different interventions that can be applied to change behaviours (Michie et al., 2011). It understands behaviour as being a function of Capability, Opportunity and Motivation-Behaviour (COM-B). The COM-B model therefore offers a useful framework for understanding dietary change and has been used within interventions to promote effective diabetes management (Willis et al., 2024). CGM may facilitate dietary behaviour change and increase time in range through mitigating COM-B barriers, enhancing capability (providing nutritional and bodily knowledge), providing opportunity (trend graph visualisation to understand how diet impacts BG levels) and motivation for dietary change (providing HbA1c goal setting, reflecting dietary feedback in real time). Through influencing these COM-B elements, CGM may encourage individuals to re-appraise their food choices in relation to glycaemic control. There is limited research available examining how CGM may influence eating behaviours and food relationships. Considering the impact both DM and glucose monitoring technologies can have on eating behaviours and food relationships, it is important to examine further how such technology may affect individuals with diabetes.

1.4 Rationale for Systematic Literature Review

Overall, existing literature highlights the need for further investigation into the psychological impact of glucose monitoring devices for people living with DM. While some studies report improvements in quality of life and reductions in diabetes-related distress, other research has highlighted emotional burden and informational overload as potential challenges associated with use of these technologies.

At present, there is a lack of knowledge on how CGM use may impact users' relationship with food and eating behaviours for people with DM, particularly those with T1DM. An initial scoping search of the literature revealed limited available research on the relationship between CGM devices and the relationship between food and eating behaviours for those with T1DM, highlighting the need for empirical research on this topic. It appears the evidence base has predominantly explored the experiences of using glucose monitoring devices and the impact this has on the relationship with food and eating behaviours for people with T2DM. Thus, the researcher felt it would be useful to further explore the evidence base to understand current knowledge on this topic, with the view for this to support the researcher's own knowledge development and understanding about CGM users' experiences, which could be useful when conducting the proposed research.

Chapter 2: Systematic Literature Review (SLR)

2.1 Chapter Overview

This chapter presents a systematic review of literature pertinent to the research question and aims of the study. A preliminary search of existing literature revealed a lack of research examining the impact of glucose monitoring technology on user's relationship with food and eating behaviours.

Initially (June 2024), the researcher aimed to conduct a systematic review of the influence of CGM on relationships with food and eating for people with T1DM, as this aligned well with the empirical study. Inclusion and exclusion criteria were developed, and three relevant databases were systematically reviewed. Unfortunately, there were limited papers in the T1DM field that explicitly explored the impact of CGM on food relationships to justify a systematic review. A recent, systematic review by Natale et al. (2023) explored qualitative experiences of CGM and sensor-augmented pump therapy across T1DM and T2DM, including quality appraisals. The researcher felt that the rationale for updating this review to focus specifically on food relationships in T1DM was insufficient, given the recency and comprehensiveness of the existing review, as well as the limited number of studies specifically focussing on the impact on food relationships.

A second SLR attempt was made (August 2024), aiming to understand experiences of CGM regarding food and eating within the general (non-clinical) population. The rationale for conducting this SLR was to contribute greater specificity to the understanding of how CGM influences food relationships, by including a broader range of studies that have utilised CGM to improve health outcomes e.g., the Zoe PREDICT 1 study (Bermingham et al. 2024). However, following a systematic review of four relevant databases, there was a paucity of studies for inclusion.

In response to this, the third and final SLR question aimed to explore how CGM impacts user's food relationships within the T2DM population (October 2024). To date, no systematic review has specifically sought to understand these relationships. It was therefore felt that this review would offer a valuable contribution to this emerging field and help to inform the development of future CGM technologies. Consequently, a systematic review of the empirical literature was conducted to answer the following question:

What does the literature tell us about experiences of Glucose Monitoring regarding relationship with food and eating for people with Type 2 Diabetes?

2.2 Study Design

Systematic reviews are methodical, comprehensive, transparent, and replicable. Overall, they aim to synthesise a body of research on a topic to develop robust and broad conclusions and implications (Baumeister, 2013), as well as to explain how studies fit together and how this can guide future research. A systematic review was conducted to address the research question, informed by guidelines outlined by Siddaway et al. (2019). The review protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO; registration number: CRD42024613828), prior to commencing the review (Schiavo, 2019). The PRISMA (2020) protocol for conducting systematic literature reviews informed this review to ensure methodological rigour (Page et al., 2021). Findings were presented through thematic synthesis.

2.3 Search Strategy Method

Initial consultations with researchers and clinicians in the field of diabetes and eating behaviours informed the pilot search strategy. The pilot search, conducted in October 2024 using Cumulative Index to Nursing and Allied Health Literature (CINAHL), informed the gathering of commonly used terms and relevant articles. These key terms were then reviewed in consultations with other researchers for additional synonyms.

Searches were then conducted using four bibliographic databases, Scopus, Medline, CINAHL and PubMed from October to November 2024. Databases were accessed using licences obtained by the University of Hertfordshire. These databases were selected as they specialise in disciplines related to health sciences, making them well-suited for diabetes research. Relevant articles were further screened for key terms to inform the search process. An additional search using Google Scholar yielded no new papers. The full search strategy is presented in Table 1.

Table 1

Search Terms

Concept 1: Terms relating to experiences		Concept 2: Terms relating to glucose monitoring		Concept 3: Terms relating to Type 2 Diabetes
Experience* OR “qualitative” OR “narrative” OR “impact” OR “psychosocial” OR “attitude” OR “opinion” OR “perce*” OR “belie*” OR “feel*” OR “know*” OR “understand*”	AND	Glucose monitor* OR “glucose sensor” OR “lingo” OR “biosensor” OR “Freestyle Libre” OR “Abbott” OR “Dexcom” OR “G6” OR “Medtronic” OR “Guardian connect” OR “Guardian sensor” OR “Eversense” OR “Senseonics” “FGM” OR “CGM” OR “FSL” OR “continuous glucose monitor” OR “real-time continuous glucose monitoring” OR “flash glucose monitoring”	AND	"Type 2 diabetes" OR "T2DM" OR “non-insulin dependent”

Following Siddaway et al.’s (2019) guidance, the topic was divided into key concepts to generate search terms. Variations such as synonyms, plurals, alternate spellings, classification terms and acronyms were also considered. If necessary, search terms were truncated to gain variations of words (e.g., perce*= perception, perceived, perceptions). Search terms were combined using Boolean operators ‘AND’/ ‘OR’.

2.4 Inclusion and Exclusion Criteria

Only papers published in English were included due to limitations on timescale and resources. Year of publication was not used as a parameter, as intermittent CGMs first became widely accessible in 2017, introducing a natural date limit for the review. Any results or discussion relating to adolescent's experience of glucose monitoring were omitted from the review. Studies exploring use of glucose monitoring health apps were included in the study as they provided continuous BG information. Due to the focus on recently developed CGM technologies, a decision was made to not exclude studies based on year of publication. Grey literature was not included in this review, presenting a limitation. Within public health practice, grey literature evaluations are frequently performed by the practitioners who designed and implemented the intervention. In the absence of peer-reviewed appraisal, this introduces a potential conflict of interest, which may also increase risk of bias (Adams et al., 2016). The inclusion of grey literature would have also required a broader search strategy and additional screening processes to assess quality, significantly increasing the time and resource demands of the review. Given the constraints of a doctoral project, this would risk impacting the depth of the thematic synthesis. Furthermore, the grey literature in this area is particularly heterogenous, often with varied or unclear methodological detail. This could have impacted the consistency of the quality appraisal, threatening analytical coherence of the synthesis. Finally, the focus of the thesis is in developing conceptual insights grounded in high-quality qualitative research, rather than mapping the entire field. Excluding grey literature supported the process to remain manageable, rigorous and transparent, supporting the integrity of the review. Table 2 presents a summary of inclusion and exclusion criteria.

Table 2

Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
Studies written in English language	Studies not written in English language
Peer reviewed journals using qualitative or mixed-method experimental designs	Websites and commentaries, case studies, reviews and conceptual or theoretical articles. Quantitative design.

Experiences of glucose monitoring technologies e.g. Flash glucose monitoring, real time continuous glucose monitoring, retrospective CGM or pumps, glucose monitoring apps	Conceptual, theory, efficacy or acceptability of CGM and not relating to experiences.
Experiences of people with Type 2 Diabetes	Experiences of other clinical populations e.g. Type 1 diabetes, Gestational diabetes
Qualitative research (interviews, semi structured interviews, focus group discussion). Mixed-methods research (i.e. questionnaires of qualitative nature with open-ended questions).	Quantitative studies without qualitative component. Studies only investigating improvements in glycaemic control.
Adult (18 or older) or older adult population	Adolescents (Under 18 years of age) and children. Adolescents were excluded as they represent a distinct developmental group with unique clinical, social and emotional needs. Their experiences with CGM and food relationships are shaped by parental involvement, unique school environments and peer contexts, differing substantially from adults. Inclusion would therefore risk introducing heterogeneity and reducing the relevance of findings to adult care.
	Self-monitoring of blood glucose (SMBG) that does not refer to CGM or FGM.

2.5 SLR Search Process

Figure 2 displays a flow chart of search results and the PRISMA screening process (Page et al., 2021).

The initial search identified 8,097 papers; 2,320 duplicates were removed upon import into Covidence (Innovation, 2021). Title and abstract screening against the inclusion criteria excluded a further 5,711, with 66 articles for full-text screening. Studies were excluded when based on the T1DM population (n=6), the paediatric population (n=2), other populations (n=4), or did not relate to glucose monitoring experiences (n=2) or did not explore qualitative experiences of CGM (n=38). Overall, 13 studies met criteria for inclusion in the review. The reference lists of selected articles were reviewed for studies that met the inclusion criteria. This identified no additional studies for inclusion.

Figure 2

Prisma Flow Diagram

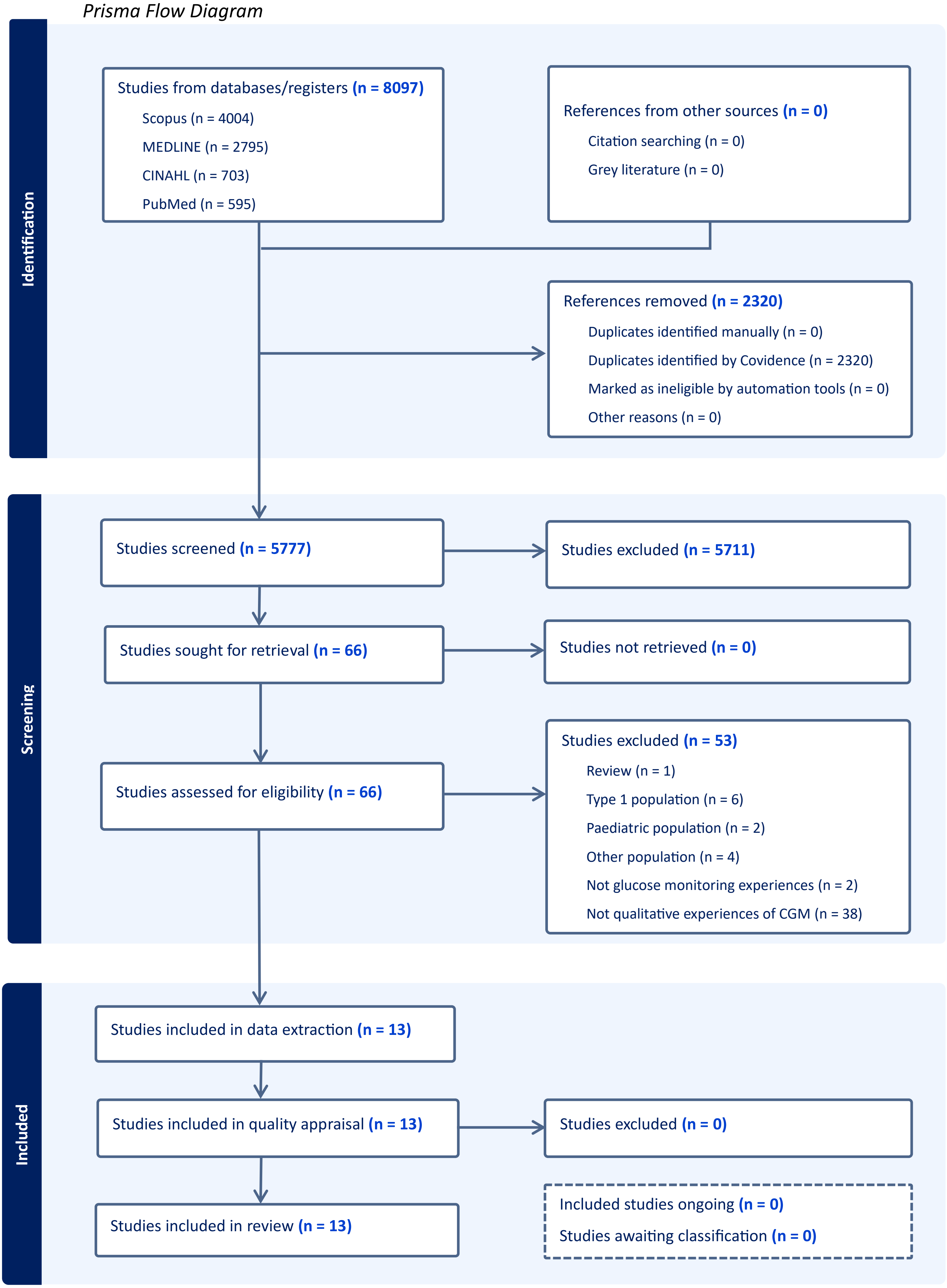


Table 3

Data Extraction

#	Author(s) and year	Title	Aims	Sample Details	Study Design	Glucose Monitoring Technology	Summary of Key Findings	Strengths and Limitations
1.	Bults et al. (2023)	Mobile Health Apps for the Control and Self-management of Type 2 Diabetes Mellitus: Qualitative Study on Users' Acceptability and Acceptance	To offer a comprehensive understanding of the perceptions of individuals with T2DM before (acceptability) and after (acceptance) using four distinct mobile health apps designed for diabetes control and self-management	**Participants**: n = 25, mean age: 63 (SD 7.6, range 47-77). Female (52%), Male (48%) **Ethnicity**: Not reported. More than half (14/25, 56%) of coresearchers had been diagnosed with T2DM ≥10 years ago. **Eligibility**: T2DM. **Recruitment**: Dutch Diabetes Association, posters, and adverts on social and regional media.	Semi-structured interviews and focus group discussions using naturalistic inquiry to explore expectations, perception and actions of individuals with T2DM before and after use of apps for diabetes self-management.	Four mobile health apps for control and self-management of T2DM. Clear.bio and FSL, mySugr, MiGuide & Selfcare	Personal health was the greatest motivator of app use. Most coresearchers believed that a healthy lifestyle would improve blood glucose levels. Learning to use the app was more effortful than anticipated. No coresearcher had a health care professional who provided app support. Insurance coverage and system acceptance were seen as important facilitating conditions.	**Strengths:** Collaborative approach with co-researchers (individuals with lived experience of T2DM). Co-researchers selected one of four pre-vetted apps based on personal preference. Study explored both pre-use (acceptability) and post-use (acceptance) perspectives. Findings contribute to understanding user engagement with digital interventions. **Limitations:** Sample likely had higher digital literacy and motivation than the general T2DM population (response bias). High baseline technology adoption and self-management may limit transferability. CGM use

								limited to five days, reducing insight into longer-term engagement.
2.	Chiu et al. (2019)	Impact of New Technologies for Middle-Aged and Older Patients: In-Depth Interviews With Type 2 Diabetes Patients Using Continuous Glucose Monitoring	1. To understand the factors associated with the adoption of new technology in diabetes care. 2. To understand the feelings and behaviours while using it. 3. To determine the changes in attitudes and behaviour after using the technology at the 3-month follow-up.	**Participants**: n = 20, range 53-72. Male (65%), Female (35%). **Ethnicity**: Taiwanese. **Recruitment**: Endocrinology outpatient department in a medical centre in southern Taiwan.	Semi-structured interviews on day of CGM removal and at 3 months after CGM-based counselling. Data was gathered regarding participants' feelings and experiences related to CGM device usage, and how it informed changes to diet and exercise. A phenomenological approach was used to analyse the data.	CGM (iPro 2)	Problem-solving and professional advice influence technology adoption. Professional CGM helped visualisation of glucose control. At three-month follow-up, technological interventions supported behavioural change. More women than men reported positive benefits from CGM in supporting dietary control.	**Strengths:** First Non-Western study examining CGM use in middle-aged and older adults with T2DM. Expands understanding of CGM impact in diverse cultural and healthcare contexts. **Limitations:** Small, homogenous sample from a single medical setting. Gender imbalance, with overrepresentation of male participants. Potential response bias due to self-selection of highly motivated individuals.
3.	Clark et al. (2024)	The Potential Impact of Continuous	1. To examine the impact of	**Participants**: n = 34, mean age = 58.9. Male (59%), Female (41%).	In-depth, semi-structured interviews were	Dexcom G6	Six themes emerged: 1) Making the Invisible Visible, reflecting	**Strengths:** Robust qualitative methodology. Explored both

		Glucose Monitoring Use on Diabetes-Related Attitudes and Behaviors in Adults with Type 2 Diabetes: A Qualitative Investigation of the Patient Experience	CGM introduction on diabetes-related attitudes. 2. To explore changes in self-care behaviours.	Graduated college (39%). **Ethnicity**: Non-Hispanic white (91%). **Recruitment**: A large project in Hancock County, Ohio, where all adults with T2DM were eligible to receive CGM at no cost for one year.	conducted with adults with T2D who had used CGM for 3–6 months within a larger community project in Ohio. Thematic analysis identified common themes across participants' experiences.		daily awareness of T2DM; 2) Effective Decision-Making, emphasizing use of real-time glucose data for immediate and long-term Choices; 3) Enhanced Self-Efficacy, describing renewed control and motivation. 4) Diabetes-Related Diet Modifications. 5) Changes in Physical Activity. 6) Changes in Medication Adherence. Participants reported that CGM promoted greater understanding of diabetes, leading to positive behaviour change.	attitudinal and behavioural changes related to CGM use. **Limitations:** Small, regionally restricted sample. Demographic skew towards white, late middle-age and male. Reliance on retrospective self-report introduced potential recall bias.
4.	Eer et al. (2023)	Feasibility and acceptability of the use	1. To explore the experiences of Indigenous Australians with	**Participants**: n=8. Mean age= 56 (35-75). Male (62.5%). Female (37.5%). **Ethnicity**:	Feasibility phenomenological study, nested within a 6-month,	FGM (Abbott Freestyle Libre 1)	Six themes emerged: 1) FGM was highly acceptable. 2) FGM convenience was its	**Strengths:** First study examining flash glucose monitoring (FGM) in an underrepresented Indigenous

		of flash glucose monitoring encountered by Indigenous Australians with type 2 diabetes mellitus: initial experiences from a pilot study.	T2DM using flash glucose monitoring (FGM).	Indigenous Australians. **Recruitment**: Rumbalara Aboriginal Co-operative in Mooroopna, Victoria, Australia.	non-blinded, randomised controlled trial (RCT) pilot study comparing effectiveness of FGM to SMBG.		biggest benefit. 3) FGM data informed lifestyle choice modification. 4) FGM required complementary health professional support. 5) FGM could support community engagement in diabetes management. 6) Cost of the device is a barrier to future use.	Australian population. Qualitative approach enabled culturally relevant insights and strategy development for diabetes management. **Limitations:** Small sample, recruited from a single clinic. Limited transferability to the broader Indigenous population. Most participants used only the FreeStyle Libre reader, leading to missing data. Increased service contact during study may have acted as a confounding variable.
5.	Fritschi et al. (2022)	"Something Tells Me I Can't Do That No More": Experiences With Real-Time Glucose and Activity Monitoring Among Underserved	To explore whether personalised diabetes self-management education and support (DSMES), alongside the use. Of Fitbits and CGM devices, are	**Participants**: n=8. Mean age=68 ±5.2. Female (100%). **Ethnicity**: Black African American. **Recruitment**: Convenience sample of underserved Black women were recruited in Chicago, Illinois, through study posters, online	In-depth, semi-structured interviews. Small acceptability trial applying content analysis to explore SR skills with real-time activity and glucose monitoring among Black	CGM and Fitbit devices	Content analysis identified themes corresponding to core self-regulation behaviours: experiential learning via self-monitoring, mental contrasting, and effects on behaviours, including both actual changes and motivation to change.	**Strengths:** Focused on the needs of an underrepresented population. Findings offer clear implications for clinical practice and service delivery. **Limitations:** No assessment of impact on glucose control. No follow-up period included. Small sample size, constrained by COVID-19 outbreak, limiting transferability.

		Black Women With Type 2 Diabetes	associated with core self-regulation behaviours, including self-monitoring, learning and mental contrasting (comparing current with goal values).	posts, and word of mouth.	women with T2DM.			
6.	Griauzde et al. (2022)	Continuous Glucose Monitoring With Low-Carbohydrate Nutritional Coaching to Improve Type 2 Diabetes Control: Randomized Quality Improvement Program	To compare changes in HbA1c levels among patients with sub-optimally controlled T2DM who were offered the opportunity to use an intermittently viewed continuous	**RCT Participants**: n=1584. Mean age=63.3. Female (46.71%). Male (53.26%). **Ethnicity**: Not reported. **EC-HR qualitative arm participants**: n=61, with n=21 participating in semi-structured interviews.	RCT 1. 12-month, pragmatic, randomised Quality-Improvement program. 2. Semi-structured interviews and thematic analysis of EC-HR arm.	CGM	HbA1c decreased by 0.41% (4.5 mmol/mol; *P*=.04) more from baseline to 12 months among participants in the EC-HR group than among those in UC-HR; however, only 61 (32.9%) of 185 EC-HR participants engaged in the program. Among the EC-HR participants who wore continuous glucose monitors (61/185, 32.9%), HbA1c was 1.1%	**Strengths:** Large-scale RCT with 12-month follow-up enhances validity. Integration of CGM with personalised low-carbohydrate nutrition coaching addresses combined behavioural and technological interventions. Qualitative arm provides insights into participant experiences and engagement barriers. Significant HbA1c reductions observed among engaged participants demonstrate clinical relevance.

			glucose monitor and receive personalised low-carbohydrate nutrition counselling (<100 g/day) versus those who received usual care (UC).	**EC-HR arm recruited via**: Invitation by postal letters, EHR-based electronic messages, and phone calls by a program team member.			lower at 12 months compared with baseline (*P*<.001). Thematic analysis produced three themes related to EC-HR participants' program engagement and CGM use: 1) Ability to understand how specific foods impact BG trends. 2) Ease of following a low-carbohydrate diet. 3) Ease of BG monitoring.	**Limitations:** Recruitment and intervention limited to a single US academic primary care clinic, reducing generalisability. Program delivery by a single dietician limits reproducibility. Variable intervals between baseline and follow-up assessments introduce potential bias. Lack of data on changes in antihyperglycemic medication use during the trial potentially confounds interpretation of glycaemic outcomes. Follow-up interviews limited to the intervention arm; experiences of usual care participants not explored. Study design did not isolate the comparative effectiveness of CGM, low-carbohydrate diet, or their combination.
7.	Johnston et al. (2022)	Perceived impact of continuous glucose	To understand the impact of CGMs for patients with	**Interview participants**: n=10. Demographic	Mixed-methods study. 1. Exploratory, semi-structured	FSL CGM (80%), Dexcom	Survey respondents reported lower A1c, better glucose control, and improved health and	**Strengths:** Mixed-methods design combining qualitative and quantitative data enhances depth and breadth

	monitor use on quality of life and self-care for patients with type 2 diabetes	T2DM and factors associated with impact.	information not reported. **Survey participants**: n=84. Male (64%). Female (36%). Mean age = 60. College graduates (64%). **Ethnicity**: Caucasian (93%). N=10 participants completed the interview. **Recruitment**: ICD-10 codes were used to identify potential participants from one healthcare service. Participants were recruited via email from EHR.	interviews were conducted to inform the development of CGM impact surveys addressing measurement gaps. 2. Subsequently, the survey was administered to a larger sample of patients (n=84).	CGM (20%).	quality of life with CGM use but not decrease in hypoglycaemia episodes. Participants reported: 1) Reduced diabetes management burden. 2) Greater, sustained glucose awareness supporting required food and activity adjustments. 3) Increased understanding of their diabetes and the factors affecting their glucose. 4) More frequent glucose checking. 5) Gaining more consistent glucose control. Some participants stated that CGM decreased their diabetes-related stress and increased confidence in long-term health outcomes. Cost concerns and sensor adhesion were reported concerns.	of findings. Semi-structured interviews informed development of a targeted survey, addressing measurement gaps. Survey captured patient-reported outcomes on quality of life, glucose control, and self-care behaviours. **Limitations:** Recruitment limited to a single healthcare service, limiting generalisability. Small qualitative sample. Survey sample predominantly Caucasian and well-educated, reducing population representativeness. Self-reported data may be subject to recall and social desirability biases. Lack of objective clinical data (e.g., verified A1c changes) reduces ability to confirm self-reported improvements.

8.	Litchman et al. (2022)	Continuous Glucose Monitoring Plus an Online Peer Support Community Reinforces Healthy Behaviours in Hispanic Adults With Type 2 Diabetes	To examine the experiences of Hispanic adults with T2DM engaging in a CGM and OPSC intervention.	**Participants**: n=26. Males (38%). Females (62%). Mean age=45.8 ± 9.5 years. High school education or less (57.7%) **Ethnicity**: Hispanic adults. **Recruitment**: Identified and recruited by bilingual Hispanic community health workers in one urban area, USA.	Semi-structured interviews conducted after 12-week combined CGM and OPSC intervention. Qualitative interpretative description design.	CGM	Three themes emerged: 1) CGM enhances understanding of the relationship between glucose levels and health behaviours such as healthy eating, physical activity, mediation adherence, stress reduction and improved sleep; 2) The OPSC intervention reinforced healthy decision-making through personal experiments, collective learning and social support; 3) CGM and OPSC facilitate behaviour change and boost confidence.	**Strengths:** Focus on an underrepresented Hispanic adult population, addressing health disparities. Combined intervention of CGM and online peer support community (OPSC) offers insight into multi-faceted behaviour change strategies. Use of bilingual community health workers for recruitment enhances cultural relevance and participant engagement. **Limitations:** Recruitment from a single urban area restricts broader transferability. Lack of quantitative or objective clinical outcome data limits assessment of intervention efficacy. Possible self-selection bias due to community-based recruitment approach.
9.	Ni et al. (2024)	Continuous Glucose Monitor: Reclaiming	To examine the experiences of Hispanic adults with T2DM participating in	**Participants**: n=28. Median age=56 (48-60). Male (25%). Female (75%). **Ethnicity**: Hispanic	Semi-structured interviews via telephone. Reflexive thematic analysis	FSL and FSL 2 CGM	Six themes emerged: 1) Initial expectations and overcoming barriers; 2) Convenience and ease	**Strengths:** Multi-site recruitment improves contextual diversity. Inclusion of multiple ethnic groups enhances representativeness

		Type 2 Diabetes Self-efficacy and Mitigating Disparities	a CGM and OPSC intervention. To investigate the CGM usage experience within the primary care setting among a US Medicaid population with T2DM at federally qualified health centres.	(57%), Non-Hispanic white (21%), Non-Hispanic Black (18%), Non-Hispanic Asian (3.6%). **Recruitment**: Convenience sampling from 11 primary care clinics, recruited via telephone.	(RTA) was applied to identify major themes and subthemes.		encourage daily use; 3) Increased knowledge enhances self-management; 4) Collaboration with healthcare providers and clinical teams; 5) Improved self-reported outcomes; 6) Barriers and burdens are generally tolerated.	within underserved populations. Semi-structured interviews with reflexive thematic analysis provided in-depth insight into user experiences. Exploration of both facilitators and barriers to CGM use informs practical implementation strategies. **Limitations:** Gender imbalance with predominance of female participants (75%) limits transferability. Convenience sampling may introduce selection bias. Lack of objective clinical data limits ability to verify self-reported improvements.
10.	Sergel-Stringer et al. (2024)	Acceptability and experiences of real-time continuous glucose monitoring in adults	To explore the lived experiences of individuals with T2DM using insulin when initiating real-time CGM.	**Participants**: n=12. Median=55. Range (37-64). Male (33%). Female (67%). **Ethnicity**: New Zealand European (83%), Māori (17%).	Qualitative study nested within RCT. Semi-structured interviews conducted over zoom with participants	Dexcom G6, rt-CGM	Three themes were developed: 1) rtCGM facilitated improved health behaviours. 2) rtCGM systems are more accepted than capillary BG testing. 3) Barriers to continual usage of rtCGM	**Strengths**: Semi-structured interviews enabled participant-led, experience-focused discussions. Diverse sample contributed a range of perspectives. Randomisation into the qualitative arm

		with type 2 diabetes using insulin: a qualitative study		**Recruitment**: Convenience sampling across three regions. Local healthcare professionals identified potential participants and gave permission for telephone contact from study team.	enrolled in the 2GO-CGM 3-month randomised controlled trial, investigating the effect of initiating Dexcom G6 rt-CGM on glycaemic outcomes.		Technology including connection difficulties, longevity, and local cutaneous reactions to the adhesive.	enhanced methodological rigour. **Limitations**: Small sample size, limiting transferability. Gender imbalance with overrepresentation of female participants. Convenience sampling may have favoured individuals with positive health behaviours. Potential recall bias due to retrospective questioning over several months. Predominantly European sample. Ongoing interaction with diabetes care team and medication optimisation may have influenced glycaemic outcomes.
11.	Shin et al. (2024)	Exploring the Initial Encounter with Continuous Glucose Monitoring among	To explore the inaugural experience of using a continuous glucose monitoring	**Participants**: n=28. Mean age = 51.4. Range: Not reported. Male (39.3%). Female (60.7%). **Ethnicity**: Not reported. **Recruitment**: Research poster on notice	Semi-structured interviews. Thematic analysis applied to interpret the data.	CGM	CGM use led to transformative changes in diet and relationships. Over two weeks, participants visually observed the effects of exercise and diet, discovering value in the	**Strengths:** Focus on initial experiences provides insight into early user adaptation to CGM. Captures both positive behavioural changes and practical challenges within a short timeframe. Education level diversity may enhance

		Individuals with Type 2 Diabetes: A Two-Week Trip	(CGM) system in patients with type 2 diabetes.	boards at Jeonbuk University hospital, posted from August 2022 to October 2022.			device. However, issues including high cost, inaccuracy, and skin irritation were noted, with calls for improvement.	transferability of findings within the sampled population. **Limitations:** Recruitment limited to a single healthcare service, reducing transferability. Recruitment via voluntary poster response introduces potential selection bias. Short duration (two weeks) restricts understanding of long-term experiences and adherence. Lack of detailed demographic data limits contextual interpretation.
12.	Vallis et al. (2023)	How Continuous Glucose Monitoring Can Motivate Self-management: Can Motivation Follow Behaviour?	To explore whether CGM enhanced motivation in self-management behaviours.	**Participants**: n = 13. Mean age: Not reported. Range: 84.6% between 25-65, 15.4% >65. Male (15.4%). Female (84.6%). **Ethnicity**: Not reported. **Recruitment**: Purposive convenience sample was recruited from the general	Semi-structured interviews. Thematic analysis applied to interpret the data.	FreeStyle Libre, FreeStyle Libre 2 flash glucose monitor or Dexcom CGM	Three themes were developed: 1) Improved self-management 2) Positive and negative experiences of glucose-sensing technology. 3) Positive impact of CGM on living with diabetes.	**Strengths:** Focus on motivation as a dynamic factor influenced by CGM use enhances understanding of behavioural mechanisms. Recruitment from the general population via social media increases accessibility and diversity potential. **Limitations:** Small sample size (n=13) limits transferability. Gender imbalance towards

				Canadian population via advertisements on social media sites of Diabetes Canada.				female participants (85%) restricts representativeness. Sparse reporting of participant demographics (e.g., ethnicity, exact age) limits contextual understanding. Convenience sampling may introduce selection bias.
13.	van Leersum et al. (2024)	Living with my diabetes–introducing eHealth into daily practices of patients with type 2 diabetes mellitus	To learn about the possible roles of eHealth apps in supporting patients with T2DM and their user experiences in daily practice.	**Participants**: n= 25. Male (48%). Female (52%). Age: 30-70+ across 3 steps. **Ethnicity**: Not reported. Nationality: Dutch. **Recruitment**: Study is part of TOPFIT Citizenlab research programme in the Netherlands. Participants identified with T2DM were invited to engage in interviews online, through telephone or at the University of Twente. Also recruited	Data Collection Process: 1. Semi-structured interviews explored participants' experiences with T2DM and attitudes toward eHealth. 2. Focus groups to discuss self-management tasks, roles, and challenges. 3. App testing phase, including: Pre-use interviews, eHealth app trial period (4 apps), post-use focus	Four eHealth apps using glucose monitoring.	Participants valued eHealth apps for helping them understand their bodies, track responses to food and activity, and support lifestyle changes. Key challenges included data interpretation, aligning data with bodily sensations, becoming overly focused on the disease, and difficulty integrating the apps into daily life and care routines.	**Strengths:** Multi-step, mixed-methods design incorporating interviews, focus groups, and app testing enhances data richness. Inclusion of diverse data collection methods increases accessibility. Participant sample balanced for gender and wide age range (30–70+ years). Engagement with multiple eHealth apps provides comprehensive insight into user experiences. Recruitment through multiple channels, increasing ecological validity. **Limitations:** Low representation of participants with lower digital literacy may

	via Dutch Diabetes Association, flyers, social and regional media.	groups. Content analysis was applied to all data. Emergent codes were synthesised into overarching themes.		bias findings toward more tech-literate users. Lack of detailed ethnicity data limits understanding of cultural factors affecting eHealth use. Long-term adherence was not assessed.

2.6 Summary of Extracted Data

2.6.1 Country of Origin

All 13 studies were conducted in the Global North, with this distinction being made in line with recommendations by Odeh (2010). Six articles were from the United States (Clark et al., 2019; Fritschi et al., 2022; Griauzde et al., 2022; Johnston et al., 2022; Litchman et al., 2022; Ni et al., 2024), two articles from The Netherlands (Bults et al., 2023; van Leersum et al., 2024), one article from Canada (Vallis et al., 2023), one article from Australia (Eer et al., 2023), one article from New Zealand (Sergel-Stringer et al., 2024), one article from South Korea (Shin et al., 2024) and one article from Taiwan (Chiu et al., 2019).

2.6.2 Included Study Aims

The 13 articles broadly aimed to examine the experiences of people with T2DM who were using CGM. Two studies explored the experiences of people using e-health apps which measured glucose (Bults et al., 2023; van Leersum et al., 2024). Five studies explicitly explored changes in attitudes and behaviours at the end of a trial (Clark et al., 2024; Sergel-Stringer et al., 2024, Vallis et al., 2023) and follow-up (Bults et al., 2023; Chiu et al., 2019). Four studies further explored the feasibility and acceptability of CGM (Chiu et al., 2019; Eer et al., 2023; Fritschi et al., 2022; Litchman et al., 2022). Three studies explored the impact of combining CGM with additional approaches, such as diabetes self-management education and support (Fritschi et al., 2022), an online peer support community (Litchman et al. 2022) and personalised low-carbohydrate nutrition counselling (Griauzde et al., 2022). One study further explored the impact of CGM and nutrition counselling on changes to HbA1c from baseline and at 12 months (Griauzde et al., 2022).

2.6.3 Study Design

In total eleven studies used qualitative designs. Seven studies used semi-structured interviews (Chiu et al., 2019; Clark et al., 2024; Fritschi et al., 2022; Litchman et al., 2022; Ni et al., 2024; Shin et al., 2024; Vallis et al., 2023). Two qualitative studies were nested within broader RCT's reported elsewhere (Eer et al., 2023; Sergel-Stringer et al., 2024). Two qualitative studies used semi-structured interviews and focus groups (Bults et al., 2023; van Leersum et al., 2024). One study was mixed methods, combining exploratory interviews and a survey (Johnston et al., 2022). One study was an RCT, combining a 12-month randomised, quality improvement programme with semi-structured interviews (Griauzde et al., 2022). Only the qualitative results were included in this SLR.

2.6.4 Sample and Participant Demographics

Sample sizes across articles ranged from eight (Eer et al., 2023; Fritschi et al. 2022) to 34 participants (Clark et al. 2024). The mean average sample size was 19.2. Eleven articles included a frequency breakdown of male/female ratio for semi-structured interviews, and two articles did not include this information (Fritschi et al. 2022; Griauzde et al. 2022). Within studies reporting this information, six were weighted towards females, three were weighted towards males and two were evenly weighted. Combined, the thirteen studies represented 258 interviewed participants. Of the eleven studies reporting sex (representing 227 participants), 96 were male (42.3%), and 131 were female (57.7%). All thirteen studies included a participant sample with an adult population. Four studies aimed to gain perspectives on feasibility and acceptability of CGM from under-represented populations, including middle-aged and older patients (Chiu et al., 2019), indigenous Australians (Eer et al., 2023), black American women (Fritschi et al., 2022) and Hispanic adults (Litchman et al., 2022).

2.6.5 Data Collection

The period of participant CGM use was wide-ranging: five days (Chiu et al., 2019), ten days (Sergel-Stringer et al., 2024), two weeks (Shin et al., 2024), six weeks (Fritschi et al., 2022), three months (Litchman et al., 2022), four months (van Leersum et al., 2024), six months (Clark et al., 2024; Eer et al., 2023; Vallis et al., 2023), up to 12 months (Griauzde et al., 2022). Some articles did not report a specified period of CGM use, instead reporting a period of data collection (Bults et al., 2023; Johnston et al., 2022; Ni et al., 2024). Frequency of CGM use was only reported in one study (Ni et al., 2024).

2.6.6 Findings and Analysis

All 13 articles explored participants experiences with CGM, broadly describing how it contributed towards an enhanced sense of glycaemic awareness and control, informed decision-making, felt intuitive and introduced barriers. A summary of how the results answered the research question for this SLR is described (Appendix J). No included studies introduced researcher reflexivity, with no mention of epistemological or ontological position.

2.6.7 Strengths and Limitations

All 13 articles contributed towards developing an understanding of the literature gap within a specific population. Ten articles described limitations regarding the sample, including sample size (Chiu et al., 2019; Clark et al., 2024; Eer et al., 2023; Fritschi et al., 2022; Jonhston et al., 2022; Sergel-Stringer et al., 2024; Vallis et al., 2023), sample representativeness (Bults et al., 2023; van Leersum et al., 2024), reliance on retrospective data (Clark et al., 2024), and gender imbalances above 65% (Chiu et al., 2024; Ni et al., 2024; Sergel-Stringer et al., 2024; Vallis et al., 2023). Many articles also recruited from one setting (Chiu et al., 2019; Clark et al., 2024; Eer et al., 2023; Griauzde et al., 2022; Johnston et al., 2022; Shin et al., 2024).

2.6.8 Clinical and Practical Implications

Of the articles, 12 included clinical recommendations aimed at improving the engagement and experience of CGM users. The remaining article recommended further prospective research to further clarify how CGM effects unfold (Clark et al., 2024). Recommendations for clinicians to adapt their practice to support CGM engagement were given by seven articles (Bults et al., 2023; Chiu et al., 2019; Eer et al., 2023; Fritschi et al., 2022; Litchman et al., 2022; Vallis et al., 2023; van Leersum et al., 2024). Examples of adaptations to support CGM engagement for HCPs and patients included: enhancing HCP familiarity with eHealth approaches for T2DM, integrating app use within care as usual, providing HCPs with CGM guidelines and matching CGM to each person's needs, goals and skill level. Personalised education and feedback were recommended by five articles (Bults et al., 2023; Fritschi et al., 2022; Griauzde et al., 2022; Sergel-Stringer et al., 2024; Shin et al., 2024;). Efforts to improve the technology to reduce barriers such as skin irritation were recommended by three articles (Sergel-Stringer et al., 2024; Shin et al., 2024; Vallis et al., 2023). Recommendations for CGM to become more affordable were made by six articles (Bults et al., 2023; Eer et al., 2023; Johnston et al., 2022; Litchman et al., 2022; Ni et al., 2022, Sergel-Stringer et al., 2024).

2.7 Assessing Study Quality

Studies included in the review were quality assessed using three method-specific quality appraisal tools.

The eight qualitative studies were evaluated using the Critical Appraisal Skills Programme tool (CASP, 2023). The CASP is a well-recognised appraisal tool, used to appraise the strengths and limitations of qualitative research. It was felt the most suitable appraisal tool for the current study as it was devised for assessing quality of health-related research and has been endorsed by the World Health Organisation and Cochrane (Noyes et al., 2019; Hannes & Macaitis, 2012).

The three mixed methods studies were assessed using the Mixed Methods Appraisal Tool (MMAT; Hong, 2018). Evaluating empirical literature across methodologies and demonstrating good reliability and validity (Pace et al., 2012), the MMAT was selected as the most appropriate tool. Comparative to method-specific appraisals, the MMAT is less rigorous. For example, it only uses four items per category of study design, relies on a 'cannot tell' response to address poor reporting, which could produce positive bias, and only one set of items for the evaluation of qualitative and mixed-methods, with a need for items that address specific qualitative approaches, e.g., grounded theory (Hong et al., 2018). However, the MMAT is short and comprehensive, and the challenge of effectively appraising studies with varying designs within one appraisal tool is an ongoing endeavour in research.

Both RCT's were appraised using the Critical Appraisal Skills Programme (CASP) Checklist for Randomised Controlled Trials (CASP, 2020). The quality appraisal frameworks applied are included (Appendix C).

None of the included studies failed to meet the quality appraisal criteria. Therefore, no direct action such as paper exclusion was required. However, a notable finding from the appraisal was the absence of researcher reflexivity across all included papers. Specifically, authors did not discuss their positionality, the contexts from which they approached the research, or how their experiences and perspectives may have influenced the study process or interpretation. This gap is an important consideration, as it may shape how findings are developed and reported, also influencing the ability to embed reflexivity throughout the review process.

A Moment for Reflection

Whilst engaging with the CASP checklists for qualitative research and RCT's, and the MMAT, I reflected on the epistemological assumptions embedded within these frameworks. As a scientist-practitioner, I recognise their utility in promoting systematic, transparent appraisals. However, I am increasingly aware that their constructs for 'quality' are also rooted in Western, positivistic paradigms that may not fully accommodate the complexity and contextual richness of research conducted in non-Western settings. Furthermore, I wondered if their application could inadvertently encourage reductionistic approaches to research evaluation, privileging approaches which most closely align with more linear, positivistic assumptions, at the potential expense of approaches which are counter hegemonic. For example, whilst the CASP tool emphasises researcher reflexivity, its operationalisation may overlook collective worldviews or indigenous knowledge systems that frame knowledge co-production differently. In reflecting on my own positionality as a practitioner trained in evidence-based frameworks, yet striving to validate alternative epistemologies, I recognise the importance of situating appraisal tools within their epistemological context and applying them with cultural humility and methodological flexibility. Moving forward, I recognise the value of adapting these tools to better reflect local knowledge systems and participatory approaches so that quality appraisal can be more ethically grounded and culturally responsive.

2.8 Synthesis Strategy

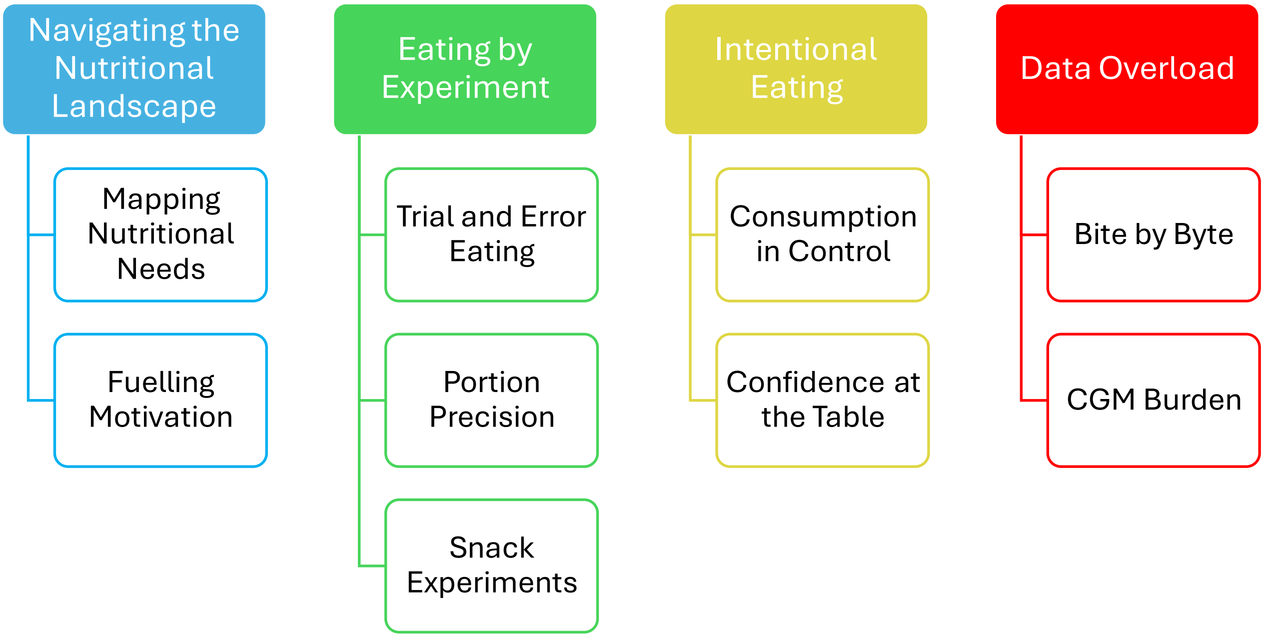
The review applies the thematic synthesis approach introduced by Siddaway et al. (2019) to construct meaning from the data. This followed a process of familiarisation with the articles, systematically coding both the results and discussion data for each study, and constructing patterns of meaning that specifically addressed the question: *What does the literature tell us about experiences of Glucose Monitoring regarding relationship with food and eating for people with Type 2 Diabetes?*

Codes were assimilated and re-configured upon further review of the articles, eventually producing four themes and nine subthemes (Figure 3). Appendix J presents a copy of the extraction table developed to support this process.

2.9 Findings: Thematic Synthesis of Results

Figure 3

SLR Findings, Themes and Subthemes



2.9.1 Theme: Navigating the Nutritional Landscape

In all 13 articles, participants described how CGM supported their ability to navigate their nutritional needs more effectively than with self-monitoring of BG (SMBG). Overall, CGM enhanced awareness of BG level fluctuations, with comparisons to baseline rates also fostering motivation to make dietary changes.

Subtheme: Mapping Nutritional Needs

In particular, the visualisation of bodily information supported participants to better understand the association between nutrition and BG levels (Bults et al., 2023; Chiu et al., 2019; Clark et al., 2024; Fritshi et al., 2022; Griauzde et al., 2022; Johnston et al., 2022; Ni et al., 2024; Sergel-Stringer et al., 2024; Shin et al., 2024; Vallis et al., 2023; van Leersum et al., 2024). Participants described how their ability to visualise data supported their understanding of their unique bodily patterns (Bults et al., 2023; van Leersum et al., 2024) and asymptomatic periods out of range: “*If you’re diabetic and you don’t have it, then you don’t know if you’re high or low…it’s a lifesaver for me working outside in the heat.*” (Ni et al., 2024, p.6). The visualisation feature also supported participants to develop an understanding of their windows of food sensitivity, which previously went unrecognised: “*every morning I would wake up and I felt not great […] I found out that my blood sugar is always high early in the morning and it’s due to the fact that I was eating stuff at night that I shouldn’t have been eating.*” (Fritschi et al., 2022, p.82). The ability to clearly map nutritional information with CGM represented a significant factor in enhancing participants’ understanding and engagement with food across different domains.

Subtheme: Fuelling Motivation

The ability to retrospectively review visual data over periods of time supported further clarity and pattern recognition, increasing users’ awareness of the distance between actual and goal rates of BG and motivating healthier eating across 11 articles (Chiu et al., 2019; Clark et al., 2024; Fritshi et al., 2022; Sergel-Stringer et al., 2024; Shin et al., 2024; Vallis et al., 2023; van Leersum et al., 2024). These experiences were articulated through a direct quote from a participant in van Leersum et al. (2024): “*Once you notice the results you will be even more healthy. It is a kind of making aware, because you are going to visualise everything and making unconscious behaviour visible.*” (p.9). The positive reinforcement of continuous, instantaneous feedback on the association between BG and eating behaviours increased users’ sense of agency in managing their condition, encouraging attitudinal shifts (Chiu et al., 2019) and reinforcing adaptive dietary changes (Vallis et al., 2023). Immediate, detailed feedback from CGM also promoted greater engagement with diabetes management, with participants increasing their monitoring of BG levels (Clark et al., 2024; Fritshi et al., 2022; Vallis et al., 2023). Furthermore, alarms and visual negative feedback alerted participants to areas where they could consider making changes to their diet (Fritshi et al., 2022; Johnston et al., 2022; Vallis et al., 2023): “*It’s really showed me what picks up my sugars like to an extreme level. Just by it letting me know ‘hey, this isn’t working or this is working*” (Ni et al., 2024, p.4). Altogether, the CGM supported participants’ insight regarding how their bodies interacted with food, enabling users to develop a baseline understanding of their nutritional needs and increasing coherence around their food relationships. Having a better understanding of their baseline, participants were then able to compare their BG data retrospectively and in real-time, supporting the development of goals and incentivising food-related behaviour change.

2.9.2 Theme: Eating by Experiment

The influence of CGM directly informing dietary intake was reported across all 13 articles.

Subtheme: Trial and Error Eating

Participants described using the continuous data from the CGM to experiment with different foods in real-time, observing the impact on their BG levels and then using this information to inform whether they should keep or cut foods. This led to surprising discoveries, such as the impact of fruit on BG (Shin et al., 2024). Participants appreciated the personalised approach to decision-making, which could recognise deviations in BG that were outside of their usual fluctuations (Griauzde et al., 2022). The CGM was described as continuously judging users' food choices: "*I was stress-eating, and the [CGM] helped me. It was like a judge that would ask me 'What are you eating? That's bad for you*." (Litchman et al., 2022, p.453), alerting participants about when to refrain from them (Fritshi et al., 2022; van Leersum et al., 2024). Over time, these foods were increasingly experienced as "*not buddies*" (Clark et al., 2024, p.705) and could result in them being "*cut out*" (Griauzde et al., 2022, p.8), even when they were favourites: "*I almost stopped eating my favourite fruits or bread. So, I ate half a bowl of rice or half a serving of noodles, replacing the rest with vegetables*" (Shin et al., 2024, p.3528). CGM was therefore influential in directing users' relationships with foods, acting as an adjudicator in food decision-making.

Subtheme: Smart Snacking

Participants also described developing a greater appreciation and curiosity for foods that flattened their trend lines (Clark et al., 2024; Eer et al., 2023; Johnston et al., 2022; Litchman et al., 2022; Shin et al., 2024; van Leersum et al., 2024), encouraging subtle, incremental adjustments to their diets and food routines: *"I would like to try if it helps* *control my blood sugar levels when I make adjustments to my diet."* (Chiu et al., 2024, p.8). Exemplifying this, participants' relationship with snacking shifted incrementally across three studies (Chiu et al., 2019; Clark et al., 2024; Fritshi et al., 2022). Participants reduced their food intake and developed a preference for snacks that were more fibrous and protein-rich, as opposed to sugary: "*The Snickers bar I would have grabbed a year ago that I didn't think mattered. Now I realise it matters. I grab a little pack of almonds to carry me over. I think about fibre and protein levels.*" (Clark et al., 2024, p.704). Participants also used healthy snacks to help manage their overall portion sizes (Clark et al., 2024), illustrating a trend towards grazing eating behaviours and reduced portion sizes (*Subtheme: Portion Precision*). These changes to food relationships were described across seven studies (Chiu et al., 2019; Clark et al., 2024; Eer et al., 2023; Griauzde et al., 2022; Litchman et al., 2022; Ni et al., 2024; Shin et al., 2024). Participants specifically described a decision to reduce the amount of carbohydrates in their food portions (Griauzde et al., 2022) and choosing to reduce portion sizes, even when they were not necessarily changing dietary choices: "*As for eating, (laughs) honestly, I find it hard to control. I can reduce the quantity, but not the variety*." (Shin et al., 2024, p.3530). Overall, CGM appeared to increase participants' discernment, introducing a quantifiable, scientifically informed approach to food relationships.

2.9.3 Theme: Intentional Eating

Across 12 articles (except Bults et al., 2023), CGM supported the development of accountability and attentiveness to dietary intake, empowering users' relationships with food.

Subtheme: Consumption in Control

The CGM was reported to be both intuitive and convenient (Sergel et al., 2024; Shin et al., 2024) which, as hypothesised by Sergel-Stringer et al., (2024), may be associated with widespread increases in frequency of BG measurement (Chiu et al., 2019; Eer et al., 2023; Griauzde et al., 2022; Johnston et al., 2022; Sergel-Stringer et al., 2024). Participants described feeling more able to effectively plan meals (Chiu et al., 2019; Litchman et al. 2022), which encouraged more active engagement with their dietary needs (Clark et al., 2024; Fritshi et al., 2022; Griauzde et al., 2022; Shin et al., 2024) (*Subtheme: Consumption in*

Control). Illustrating this, participants modified their behaviour at the next meal when they recognised that their glucose levels were elevated: "*…I just ate this [treat] and it went up so much, then when it's dinnertime, I won't eat dinner. I'll just drink a shake and that's it*." (Litchman et al., 2022, p.454). Clark et al. (2024) theorise that CGM enhanced participants' attention to glucose regulation, producing greater engagement and interest in diabetes management. They reflect that these attitudinal changes may have facilitated ideal conditions for learning and clarifying personalised goals for everyday eating, supporting accountability. Aligning with this hypothesis, a participant in Vallis et al. (2023) reflected on these specific processes: "*And now with the sensor…I'm paying a little bit more attention to what I'm eating in terms of I'm now writing things down, sort of thing*" (p.439). Three other articles (Johnston et al., 2022; Ni et al., 2024; van Leersum et al., 2024) also discussed the positive health impact of CGM on a range of self-care behaviours: "*It's helping me stay alive because I wasn't taking care of myself without it*" (Ni et al., 2024, p.5). CGM therefore provided an intuitive, easy to access approach to navigating food, fostering an attitudinal shift in their food relationships and self-care behaviours.

Subtheme: Confidence at the Table

Across seven studies (Chiu et al., 2019; Clark et al., 2024; Eer et al., 2023; Griauzde et al., 2022; Ni et al., 2024; Shin et al., 2024; Vallis et al., 2023), participants described how CGM enhanced their confidence with food. Participants' enhanced familiarity with their BG levels may have encouraged more relaxed (Chiu et al., 2019; Clark et al., 2024; Vallis et al., 2023), flexible (Griauzde et al., 2022; Ni et al., 2024) and self-reliant eating styles: "*You're constantly looking at the readings and then I think 'oh, I've got good readings so I'm doing the right thing, so yeah it does change what you eat*" (Eer et al., 2023, p.6). The confidence gained from the CGM further translated into a sense of empowerment for many participants, restoring their relationships with foods: "*I feel more empowered with what I eat and more empowered with my diet and exercise*" (Ni et al., 2024, p.5), "*…there are times in my diabetic life that I've been a deer in the headlights. This gave me an empowerment to say, okay, I see this and I feel now like I've got this, I've got the reins on this*" (Vallis et al., 2023, p.440). CGM therefore offered participants an opportunity to rekindle their relationships with foods, which prior to technological support, may have felt uncertain and anxiety-provoking. Overall, CGM encouraged participants to conscientiously interact with food, supporting a sense of self-assurance and organisation in their eating behaviours.

2.9.4 Theme: Data Overload

Seven studies introduced narratives suggesting that CGM could potentially impact user's relationship with food and eating in ways that may be restrictive, burdensome, or potentially risky (Chiu et al., 2019; Clark et al., 2024; Eer et al., 2023; Griauzde et al., 2022; Litchman et al., 2022; Ni et al., 2024; van Leersum et al., 2024). Griauzde et al. (2022) recognised that although CGM can empower and motivate participants, it could also increase diabetes-related distress.

Subtheme: Bite by Byte

Participants reported a dependence on CGM to know what to eat, when and how much to eat, potentially forming rigid rules for eating behaviours (Clark et al., 2024) (*Subtheme: Bite by Byte*). Participants also described how the CGM could draw too much attention to diet, experiencing it as being overly restrictive: *That was hard because everything on it is stuff that I eat. I'm not a big fish eater, um...so it was hard, 'cause I know with the carbs, you know, breads and pasta and...that's the kind a stuff I like to eat"* (Griauzde et al., 2022, p.8). The increasing dependence on data also meant that participants sometimes felt encouraged to skip meals to maintain time in range (Chiu et al., 2019), impacting on intuitive eating habits (Litchman et al., 2022). Participants could also find the CGM data confusing: "*I was completely lost when the scores of my previous meal showed*" (Bults et al., 2023, p.7). Discussing their findings, van Leersum et al. (2024) reflected on how outputs from the CGM could be confusing, particularly if users were unsure about how to interpret the data, which could risk negatively impacting user's food relationships. They suggest that false-positive healthy messages from the CGM could inadvertently reinforce risky eating dynamics, and over-acting on information. Particularly in the absence of support and knowledge, over-dependence on CGM could therefore encourage food practices that felt too restrictive and critical, damaging food relationships.

Subtheme: CGM Burden

Participants across five studies reflected on the cognitive and emotional cost of trying to maintain high levels of control with CGM (Chiu et al., 2019; Eer et al., 2023; Griauzde et al., 2022; Ni et al., 2024; van Leersum et al., 2024). Participants across four studies described how the burden of recording nutritional information had increased routine management behaviours: *"It's not easy to record what you have eaten if it was just a snack. For example, do I have to make a record even when I only have two or three peanuts? I think it is hard to record everything! This is too troublesome!"* (Chiu et al., 2019, p.8). Participants frequently described how the CGM could impact on their emotional wellbeing, with users experiencing frustration (Ni et al., 2024) and overwhelm: "*Using Clear made me nervous and insecure*" (van Leersum et al., 2024, p.8). Closely connected to these experiences, participants described a sense of demoralisation after receiving CGM feedback, particularly if they felt they had already made significant efforts to improve their time in range: "*Honestly sometimes it's useful and sometimes it's annoying and aggravating. I'm trying to change my diet all the time, as much as possible*" (Ni et al., 2024, p.6). Overall, the re-conceptualisation of food as data also introduced complications for participants' food relationships, sometimes introducing additional dietary restriction, complexity and ambiguity, impacting on their confidence and their emotional experience with food.

2.10 Discussion

2.10.1 Summary of Findings

This SLR aimed to understand the impact of glucose monitoring on food relationships and eating behaviours in people with T2DM. Thematic synthesis developed four themes conceptualising shared experiences in enhancing food clarity and motivation (*Theme 1: Navigating the Nutritional Landscape*), scientifically informed eating behaviours (*Theme 2: Eating by Experiment*), assertive food approaches (*Theme 3: Intentional Eating)* and insight regarding the potential costs of increasing reliance on CGM (*Theme 4: Data Overload*).

2.10.2 Relating findings to existing literature

CGM users valued how visualisation of bodily information supported their understanding of associations between nutrition and their BG levels. This informed a better understanding of their unique bodily patterns of functioning, including windows of food sensitivity and asymptomatic periods out of range (*Theme: Navigating the Nutritional Landscape*). Data visualisation methods are increasingly applied to highlight patterns and generate meaning in large complex data sets (Kehrer & Hauser, 2012). Methodological approaches, such as Tukey's (1977) exploratory data analysis, iteratively apply graphical displays to identify trends, patterns and outliers in data. Within the contemporary healthcare context, professionals are increasingly reliant on data visualisation tools to quickly and effectively identify patterns, track outliers and reach data-driven decisions (Sarker, 2021). These approaches have been found to produce more successful data analysis and decision-making within healthcare (Wang et al., 2018). The current study suggests that, despite limited understanding of methodological approaches, CGM users were also able to make sense of visual data in a way that was intuitive and greatly enhanced their understanding of their nutritional needs. Future developments of whole-person health visualisations may further incorporate individuals' personal values, preferences and nutritional goals to further inform care planning and intrinsic motivation (Holt et al., 2020).

The mechanism of continuous feedback from the CGM also supported participants in their ability to enact behavioural change in their diets (Theme: *Eating by Experiment).* Participants experienced the CGM as a "*judge*" (Litchman et al., 2022, p.453), providing verdicts on user's food behaviours (diet, carbohydrate intake and portion size) in real time and increasing appreciation for foods that flattened BG trends. These findings align with the wider literature for continuous feedback supporting behavioural change in dietary healthcare contexts. The 12-week MyPlanetDiet randomised-controlled trial found that personalisation of dietary feedback and nutritional needs were more efficacious and sustainable for dietary change in comparison to generic advice (Davies et al., 2024). Furthermore, Schembre et al.'s (2018) systematic review of RCT and within-subjects, single-arm interventions explored the content characteristics of feedback messaging used in diet and physical activity interventions. They found that, when device feedback was continuously available, personalised and actionable, it produced significant behavioural change outcomes as users were able to see the direct impact of their food choices and adjust behaviour accordingly.

The process of logging food choices, clarifying personalised goals for everyday eating, and applying insights to plan for future meals contributed towards participants' sense of accountability and confidence with food (*Theme: Intentional Eating*). Natale et al. (2023)

conducted a systematic review of patient's qualitative experiences with CGM and sensor-augmented insulin pump therapy across T1DM and T2DM. Aligning with the current SLR, one of their findings was that CGM was particularly effective in motivating management through supporting ownership and enhancing awareness of glycaemic control. Reinforcing self-management motivation, participants also developed confidence in managing their diabetes through developing operational skills, customising settings and increasing trust in the technology. This suggests that the development of confidence and self-management accountability with CGM are universal across T1DM and T2DM and may relate to current findings that CGM supported more relaxed, flexible and self-reliant eating styles.

Some participants experienced restrictive food relationships, and cognitive and emotional burden in attempting to maintain high levels of control over their BG levels. These consequences are also recognised in the wider CGM literature aiming to understand the impact of psychosocial factors such as knowledge and beliefs, emotional distress and behavioural coping skills on diabetes management (Gonzalez et al., 2016). In the REPLACE RCT of 224 adults from 26 European diabetes centres with T2DM, patients over 65 in the control group (SMBG) saw greater HbA1c reduction than the FSL group (Haak et al., 2017). Although the study was limited by not reporting the number of participants in the over 65 group, this suggests that the burden of glucose monitoring technologies may be experienced more acutely by certain populations, and that further research may be needed to better understand how to adapt technologies and improve support. This is particularly pertinent as diabetes is a recognised risk factor for cognitive impairment, with the combined prevalence of mild cognitive impairment in T2DM being estimated to be as high as 45% within a systematic review and meta-analysis of observational studies (You et al., 2021).

2.10.3 Strengths and Limitations

This SLR was the first to examine the impact of CGM on food relationships and eating behaviours in the T2DM population. The study was registered on Prospero to enhance transparency, reduce bias and prevent duplication in systematic reviews. The SLR neatly compliments Natale et al.'s (2023) systematic review of CGM and sensor-augmented insulin pump therapy for diabetes, by adding specificity to the field's understanding of how CGM uniquely impacts food relationships in T2DM, enhancing comprehensiveness.

The systematic review followed a rigorous methodology, which was another strength. The application of pre-defined inclusion and exclusion criteria supported rigour and transparency throughout the screening and review process. The author was also guided and informed by Boland et al. (2017) on conducting a critical systematic review, supporting a structured and comprehensive approach. An external researcher familiar with the field of clinical health research was also consulted with at different stages of the review, particularly during the quality appraisal stage, supporting rigour.

The review also highlighted critical gaps in the literature, particularly that the current understanding of CGM on food relationships in people recently diagnosed with T1DM is limited. The systematic review contributes towards an understanding of the impact of CGM on food relationships in people with T2DM, and these findings will inform the development of the current empirical study, which seeks to understand the impact of CGM on food relationships for people recently diagnosed with T1DM.

Regarding limitations, the SLR could have been strengthened further by the support of a second reviewer for the search and data extraction processes. This action would have improved the validity of decisions for inclusion of articles in the final review (Jeyaraman et al., 2020). Furthermore, inter-rater reliability could have been calculated using Cohen's kappa to support an understanding of the degrees of agreement throughout the research process, enhancing reliability.

The current review only included peer-reviewed studies written in English. This may have reduced the representativeness of the review in understanding food relationships from a global perspective. Four of the studies were included from countries where English is not the predominant language (i.e., Netherlands: Bults et al., 2023; van Leersum et al., 2024. South Korea: Shin et al., 2024. Taiwan: Chiu et al., 2019). All included studies were located in the global north, with the synthesis likely to have been influenced by western, educated, industrialised, rich and democratic (WEIRD) sociocultural and healthcare contexts. WEIRD contexts influence how diabetes is diagnosed and managed, as well as the predominant discourses surrounding the condition. Consequently, the findings may not reflect the experiences of people living with diabetes in the global majority, where factors such as food availability, cultural meanings of eating, healthcare access and family involvement in care may differ substantially. This limits the transferability of the review to the global majority, underscoring a need for research exploring food relationships and CGM use in more diverse contexts.

There was some variability between studies regarding how food relationships were defined and operationalised by researchers. The current review was able to account for this variability using clearly predefined inclusion criteria. However, future research would benefit from the inclusion of clearly operationalised terms regarding food relationships.

Over half of the included articles relied on convenience sampling and self-selection for participant recruitment. This may have introduced limitations on data representativeness, as people more interested in research may have been over-represented, weakening external validity. Due to ease of access, participants were often recruited from one geographical base, which could increase the risk of sampling bias. Five of the studies did not report ethnicity, limiting understanding of the diversity of the dataset. However, the remaining eight studies broadly reflected a wide range of ethnicities, age ranges, and education levels, improving heterogeneity of the overall sample when considering all studies combined.

2.10.4 Clinical Implications of the Review

This review highlights participants' perspectives on how CGM impacts their relationships with foods. People with T2DM found that CGM greatly improved their understanding of the relationship between food and their BG levels, enhancing their motivation for dietary behavioural change. Furthermore, CGM increased their sense of accountability and attentiveness to foods, increasing their confidence with dietary decision-making. CGM, therefore, introduced possibilities for participants to remarkably re-shape their relationships with foods and diabetes management, enhancing their quality of life and improving their adjustment to their health condition. However, despite these benefits, access to CGM for T2DM populations is not currently routine in the UK healthcare context (Ajjan et al., 2025). Even when T2DM patients are using CGM, evidence suggests that utilisation of CGM data by healthcare professionals to inform diabetes management is inconsistent (Seidu et al., 2024), with education regarding interpretation of CGM data being a key barrier for HCP's.

This review recommends that access to CGM should be greatly improved for the T2DM population, as it is likely to reduce the burden of care for patients and the healthcare system and support adaptive food relationships. Furthermore, the CGM is supportive in developing motivation for management, as participants experienced the data as more meaningful for developing realistic nutritional goals. HCPs could utilise CGM data to collaboratively develop goals with patients, potentially improving agency, communication of needs and patient-clinician rapport. This is important, as studies have demonstrated that patient-perceived communication quality (PPCQ) is associated with reduced diabetes distress, improved wellbeing and better self-care in T2DM (Polonsky et al., 2017).

The review found that some participants experienced the CGM as time-consuming and technologically demanding, increasing the burden of daily management behaviours. These findings suggest that patients being introduced to CGM should be informed about the demands of its use, including managing continuous data, alarm fatigue and how to engage in realistic, and sustainable data interpretation routines. For example, tailored educational support focussing on simplified data interpretation tools, such as effective use of trend arrows rather than full nutritional and glucose logs, could alleviate the burden of use for people recently introduced to CGM. Evidence suggests that Diabetes Self-Management Education and Support (DSMES) is associated with improvements in T2DM knowledge, and psychosocial and clinical outcomes (Powers et al., 2020; Lind et al., 2024).

Some participants also experienced frustration and confusion in response to continuous data. In addition to reducing the demands associated with CGM use described above, healthcare professionals could model compassionate approaches to management and utilise standardised measures, such as Type 1 Diabetes Distress Scale (T1-DDS; Joensen et al., 2013) and short-form Problem Areas in Diabetes (PAID-5; McGuire et al., 2009) to review areas of challenge within clinical appointments. Of note, these measures were developed prior to the NHS role out of FSL or CGM. Consequently, there is a strong need to update such measures to recognise further problem areas in diabetes, including identifying restrictive food relationships, and the impact of diabetes self-management and continuous data on distress.

2.10.5 Invitations for Future Research

Given the findings that CGM can potentially contribute towards food restriction and that there can be costs associated with its use, qualitative longitudinal studies could explore whether CGM contributes to or protects against disordered eating patterns in T2DM populations.

This SLR highlighted how the impact of CGM on food relationships are wide ranging and complex, with users experiencing associated benefits and burden to different degrees. Future research could aim to clarify the factors that support adaptive adjustment to CGM. For example, the benefit of pairing CGM with psychosocial interventions, such as compassionate nutrition training, in comparison to CGM alone could be explored within a RCT of people experiencing high diabetes-related distress. Quantitative studies are needed to elucidate the impact of various factors on successful adaptation to CGM, with the aim of identifying targeted support interventions that effectively address the needs of the population.

2.11 Critical Appraisal

The Critical Appraisal Skills Programme tool for systematic reviews (CASP, 2023) was selected to appraise the quality of this SLR. The CASP was completed in tandem with an external, secondary researcher peer. It was then reviewed by a healthcare professional familiar with clinical health research to reduce risk of bias. Each of the ten criteria were reviewed using the criteria '*Yes'* (1), '*Can't Tell*' (0), and '*No*' (0) (Boeije et al., 2011). The CASP score for this review was 9/10 (Table 4).

Table 4

CASP Quality Appraisal of SLR

CASP		
CASP criteria	**Quality Appraisal**	**Rating**
Section A: Are the Results of the Review Valid?		
Did the review address a clearly focused question? *Consider:* *a) The population studied* *b) The intervention given* *c) The outcome considered*	✓ The SLR answered a clearly focused question: *What does the literature tell us about experiences of Glucose Monitoring regarding relationship with food and eating for people with Type 2 Diabetes?* ✓ Information regarding question development is detailed in Chapter 1 (Section 1.4)	1
Did the authors look for the right type of papers? *Consider:* *a) If the studies addressed the review's question* *b) If the studies have an appropriate study design (Usually RCTs for papers evaluating interventions)*	✓ The SLR aimed to understand the *experiences* of CGM regarding relationships with food and eating. Thus, qualitative studies were included (as well as mixed-methods and RCT, reviewing qualitative data only). ✓ The results of the SLR suitably answer the research question	1
Is it Worth Continuing?		
Do you think all the important, relevant studies were included? *Consider:* *a) Which bibliographic databases were used* *b) Follow up from reference lists* *c) Personal contact with experts* *d) Unpublished as well as published studies*	✓ The author outlined all databases included in the study in Chapter 2 (Section 2.3) ✓ The author described searching reference lists in Chapter 2 (Section 2.5) × Grey literature articles were not included in the SLR. However, rationale was provided in Chapter 2 (Section 2.4) × Non-English language articles were not included in the SLR. Rationale for this decision was provided in Chapter 2 (Section 2.4)	0

e) *Non-English language studies*		
Did the review's authors do enough to assess quality of the included studies? *Consider:* a) *The authors need to consider the rigour of the studies they have identified*	✓ All included studies were quality appraised. Qualitative studies were appraised using the CASP tool for qualitative research (CASP, 2023. Mixed-method studies were appraised using the Mixed Methods Appraisal Tool (MMAT, 2018). Randomised Controlled Trials were appraised using the CASP Checklist for Randomised Controlled Trials (CASP, 2020).	1
If the results of the review have been combined, was it reasonable to do so? *Consider:* a) *Whether results were similar from study to study* b) *Whether results of all the included studies are clearly displayed* c) *Whether results of different studies are similar* d) *Whether any reasons for any variations in results are discussed*	✓ The results from the articles were similar from study to study. ✓ The results of each study are clearly outlined in the data extraction table in Chapter 2 (Section 2.5) ✓ Variations in results across studies are described by outlining how many studies supported each subtheme in the thematic synthesis. Appendix J illustrates how codes were developed into themes.	1
Section B: What are the Results?		
What are the overall results of the review? *Consider:* a) *If you are clear about the review's 'bottom line' results* b) *What these are (numerically if appropriate)* c) *How were the results expressed (NNT, Odds Ratio etc.)*	✓ The results are clearly expressed as is standard for a qualitative review. Results are further described in the discussion section.	1

How precise are the results? *Consider:* *a) Confidence intervals, if given*	✓ The results are as precise as is possible within qualitative research. A level of subjectivity is expected due to pervasive interpretation biases. The author has attempted to account for biases by inclusion of reflections which demonstrate considerations to acknowledge these.	1
Section C: Will the Results Help Locally?		
Can the results be applied to the local population? *Consider:* *a) Whether the patients covered by the review could be sufficiently different to your population to cause concern* *b) Your local setting is likely to differ much from that of the review*	✓ Although the sample is international, the results reflect a range of shared experiences with CGM and the impact on food relationships. The results are likely to be applicable to local populations.	1
Were all important outcomes considered? *Consider:* *a) Whether there is other information you would like to have seen*	✓ All important outcomes appear to have been considered in the SLR.	1
Are the benefits worth the harms and costs? *Consider:* *a) Even if this is not addressed by the review, what do you think?*	✓ There are material, consequential benefits to the SLR, with substantial contributions towards understanding how CGM technologies impact food relationships.	1

2.12 Conclusion

This systematic review identified 13 research studies related to experiences with glucose monitoring regarding relationship with food and eating for people with Type 2 Diabetes. The review was limited to English language articles from four databases. Additional research may therefore be accessible in other languages or databases.

Overall, the reviewed literature indicates that CGM has differential influences on food and eating relationships for people with Type 2 Diabetes. CGM influenced change in how users experienced food. Across the studies, food was re-appraised through the lens of data, and its influence on one metric of bodily functioning, BG. This process introduced a range of effects for different participants. For participants across the studies, this transformation supported their ability to make better sense of their diabetes, shedding light on complex bodily processes and motivating further engagement. CGM supported their ability to re-engage with food, introducing possibilities to experiment creatively with food choices as well as new skills and management confidence. Overall, for many participants, CGM reinforced a safer, more assertive relationship with foods. However, the process of re-appraising food through the lens of data also introduced distressing and burdensome influences on user's relationships with food. Across the studies, participants described how CGM diverted their attention towards their diet, increasing the demands of managing their diabetes and contributing towards a sense of increased burden. Participants also described a sense of food-related insecurity and restrictive behaviours, which may be associated with their increased exposure to feedback that could be experienced as negative or ambiguous, impacting their mood and producing discouragement.

Recommendations are made as to how increased access to CGM could better support the needs of the Type 2 population, whilst also tailoring support to monitor and mitigate potential unintended effects. Invitations for future research are provided to further clarify the factors related to successful adaptation with CGM, and the longitudinal impact of its use on food relationships.

2.12.1 Rationale for the Research Project

The empirical study that follows builds directly on Wallace et al.'s (2023) recommendations to investigate how glucose monitoring technologies impacts on food relationships in people recently diagnosed with T1DM. This population can provide useful insights in understanding how to support people navigating a chronic, life changing diagnosis whilst using glucose monitoring technology to self-manage this. Furthermore, the current research project investigates the impact of CGM as opposed to flash monitoring, which may differentially impact users' relationships with food. This is especially relevant as glucose monitoring technologies continue to evolve at a fast pace, and the impact of CGM on food relationships has not yet been explored, despite CGM increasingly becoming a routine aspect of care for people with diabetes (Vettoretti et al., 2018). The current study focus on people recently diagnosed with diabetes is directly informed by Wallace et al.'s (2023) findings that these participants expressed additional concurrent challenges related to adjustment to their diabetes diagnosis, adaptation to intensive insulin therapy and adjustment to FSL. These participants may have experienced the data as more overwhelming as they were processing anxiety-provoking information in the absence of lived experience, particularly regarding the risks of suboptimal diabetes management. Whereas, for participants who were diagnosed some time ago and whose diabetes management practices were based on historic, rigid, practices, the FSL was experienced as liberating. This suggested that having different points of comparison for the impact of FSL differentially influenced food relationships consequent to the device, as one group felt free to engage in new food relationships, whereas the other felt totally overwhelmed, perhaps encouraging more dietary restriction to gain a sense of control.

Secondly, the findings from the SLR on the impact of CGM on food relationships in T2DM also increases the rationale for the current research project, as the CGM impacted on food relationships in ways that were both supportive and burdensome for users. While there are features that overlap in the psychological and behavioural processes of food decision making across both T1DM and T2DM, such as navigating dietary advice, dietary decision making in the context of clinical care, and utilising CGM, the T1DM population has a distinct aetiology and management requirements. These differences include immediate insulin initiation, a reliance on real-time glucose data for dosing, different sociocultural framing and condition outcomes. These factors may differentially shape the ways CGM may interact with food relationships, potentially altering patterns seen in T2DM. Therefore, whilst there is an absence of studies directly examining the impact of CGM on food relationships in T1DM, it is important to acknowledge that applying insights from T2DM research to T1DM contexts has limitations. Consequently, while the SLR provides valuable conceptual grounding, the empirical study is designed to generate a context-specific understanding of CGM use in adults recently diagnosed with T1DM. Currently, no study to date has attempted to understand the impact of CGM on food relationships in T1DM.

2.12.2 Aims for the Current Research Project

Based on this rationale, the aims and research questions of the current study are:

Aims

- To examine the impact of CGM on users' relationships with food and eating behaviours.

Research Question

- What is the influence of CGM on food relationships in adults living with Type 1 diabetes?

Chapter 3: Methodology

3.1 Chapter Overview

This chapter details the qualitative methodology used to explore how people recently diagnosed with T1DM experience CGM, and the impact of CGM on their food relationships. It begins by considering the epistemology and positionality of the researcher and then outlines the rationale for employing reflexive thematic analysis, including details on participant recruitment and semi-structured interviews. Further consideration is given to ethical considerations and assessing the quality of the study.

3.2 Epistemology and Positionality

This study aims to understand the experiences of CGM users recently diagnosed with T1DM, focussing on how broader contexts may shape their relationship with food and eating behaviours. It aims to understand how these experiences and contexts shape individual's realities in using CGM to support diabetes self-management. Adopting a CR epistemological stance, this research recognises the objective reality of participants' experiences which can be observed and measured (Bhaskar, 2013). A CR epistemology integrates a realist assumption that the world has observable truths that can be understood through data representing 'reality', and a relativist perspective that truth is constructed through relationships and discourses, enabling multiple interpretations from the same data (Harper, 2011).

The current study aligns well with CR as it seeks to continuously consider how unobservable mechanisms, such as social discourses, may be influencing participant experiences of CGM and their relationship to food (Wynn & Williams, 2012). Overall, participants described their perception of CGM and its impact on their food relationships, which have been shaped and embedded within their cultural context. Reflexive thematic analysis (RTA; Braun & Clarke, 2019) has been applied to interpret participants' located realities of CGM. RTA recognises that the researcher is part of the world they wish to understand, and it encourages them to critically explore the cultural and linguistic lens from which they actively engage with the data (Braun & Clarke, 2022, pp169-170).

Adopting a CR stance, I acknowledge that my outsider position as someone without diabetes inevitably influenced my interpretation of participants' accounts. My understanding of diabetes is shaped by family experiences, supervisory clinical expertise, and independent study, all situated within my broader cultural context and personal assumptions. To address this, I began each interview by disclosing my position as an appreciative outsider. This framing aimed to minimise assumptions, promote open dialogue, and reduce perceived judgement of diabetes management. While this may have facilitated deeper discussion, my lack of lived experience may also have foreclosed nuanced explorations of participants' experiences. Ongoing reflexive engagement helped me to remain attentive to the influence of my positionality throughout the research process.

3.3 Qualitative Approach Rationale

As explored in Chapter 1, the research aiming to qualitatively understand the impact of CGM on food relationships is limited. Most of the research has sought to understand the efficacy of CGM in improving glycaemic control (Beck et al., 2017; Rodbard, 2017), with standardised measures such as time in range or reduced HbA1c indicating improved health outcomes. However, unlike qualitative approaches, these quantitative designs do not capture the richness or details of people's experiences (Sofaer, 1999), e.g., the way they use CGM or its impact on their daily life. In contrast, the current study aims to centre their experiences within the contexts that shape their relationships to food, eating and CGM technology. The study may inform clinical practice, such as the process of T1DM consultation with professionals, highlight factors that may be relevant for identification of and early intervention for eating difficulties, or enhancing awareness of the psychological impact of CGM usage from the point of diagnosis and throughout the life course. Accordingly, application of qualitative methodology, actively seeking participants' experiences with CGM, should make meaningful contributions to the existing body of knowledge.

3.4 Rationale for Reflexive Thematic Analysis

RTA (Braun & Clarke, 2019, 2022) was evaluated, with alternative approaches, regarding its fit with the study question and aims.

Table 5

Rationale for RTA

Qualitative Methodology	Description	Rejection Reason
Grounded Theory (Charmaz, 2014; Strauss & Corbin, 1998; Glaser & Strauss, 1967)	Theoretically informed and rooted in a realist perspective, this inductive approach seeks to understand the social processes and factors that underlie phenomena (Charmaz, 2014). Generates a theory with explanations for how and why certain phenomena occur.	The current study does not aim to develop a grounded theory or explanatory model of the mechanism underlying a specific phenomenon.
Interpretative Phenomenological Analysis (Smith et al., 2022)	Theoretically informed. Small, homogenous sample (6-8). Research question focusses on individual experience and meaning making. Twofold focus on idiographic approach as well as theme development.	Exploratory nature of current study emphasises the development of themes across participants, rather than the analysis of individual experiences. IPA is less likely to capture the societal pressures informing health and diabetes management, limiting exploration of broader social, psychological or technological themes.
Narrative Analysis (Andrews et al., 2013)	Theoretically informed. Seeks to understand how individuals organise their personal stories, the themes that emerge, and how these fit within broader social, cultural or historical contexts. Allows for exploration of personal identity, agency and how individuals construct meaning from their lived experience.	Current study seeks to explore a range of themes across participants, acknowledging broader social and psychological influences. NA is less able to identify the recurring themes or patterns within the data relating to the impact of CGM on food relationships.

RTA was identified as the most suitable approach for addressing the research question and aligning with its theoretical assumptions. RTA offers flexibility to explore the breadth of a topic, whilst also generating collective meaning from the detailed and complex accounts of participants’ realities (Braun & Clarke, 2022). This is especially valuable given the limited research on people’s experiences with CGM and their food relationships. RTA also aligns with the study’s CR stance, recognising participants’ ‘situated realities’ (Braun & Clarke, 2022). Rather than presenting an objective, decontextualised truth, the CR position allows for interpretation of participants’ experiences with CGM, their positioning in relation to it, and its impact on food relationships. While CGM has a material presence in people’s lives, their experiences are shaped by wider social discourses, such as those surrounding health technologies, assumptions about food and diabetes, and the cultural and relational contexts of eating. RTA facilitates an exploration of these broader psychological and social influences. Applying RTA through a CR lens enables an understanding of how participants make meaning of their experiences with CGM, while attending to the social narratives that inform these meanings (Braun & Clarke, 2022; Willig, 2013).

RTA actively involves the researcher in coding and constructing analytical and interpretative themes from patterns of meaning within the dataset. It incorporates both inductive and deductive approaches to developing themes, recognising that these approaches exist on a shared continuum. Although it is not possible to analyse data from a completely inductive position without theoretical influence (Braun & Clarke, 2019), the current study was strongly informed by an inductive approach where themes were grounded within the data. Data was coded at the manifest and latent level to interpret the content of interviews as well as the underlying patterns of meaning within participants’ discourse. A coding template was not applied as the study is exploratory and novel, within an emerging field of research.

3.5 Participants

Eligible participants were members of the public, diagnosed with T1DM in the last five years, and using a CGM device for a minimum of 6 months. Participants were required to have received their T1DM diagnosis within the past five years to capture the perspectives of those recently diagnosed, whose experiences were found to differ from those with long-established diabetes (Wallace et al., 2023). This timeframe also aligns with the period in which CGM has become more widely available in the UK, ensuring that participants’ experiences reflect current technology and healthcare contexts. A minimum of six months CGM use was specified to allow participants time to move beyond initial adaptation, as relationships with CGM and food may shift quickly in the early stages of use. Participants were required to consent to participate in the study and speak English. Table 6 presents the participant inclusion and exclusion criteria.

Table 6

Participant Inclusion Criteria

Inclusion criteria	Exclusion criteria
Over 18 years old	Under the age of 18
English speaking	Unable to speak English
Diagnosed with T1DM in the last five years	Diagnosed with T1DM more than five years ago
Have been using CGM for at least 6 months	Diagnosed with T2DM

3.5.1 Recruitment

Recruitment was achieved primarily through criterion-based opportunistic sampling to gain ‘information rich’ participants (Patton, 2015) who could maximise understanding of the impact of CGM on food relationships. Organisations regularly involved in diabetes research, including Diabetes UK and BreakthroughT1D were contacted to support recruitment between August and December 2024. Organisational applications for recruitment were completed so that the study could be promoted on the Diabetes UK and BreakthroughT1D forums and research pages. The study poster, participant information sheet, debrief form, risk management protocol, interview schedule, study protocol and consent form were sent to these organisations (Appendix D-I). A copy of the research ethics committee approval letter was also sent (Appendix F). BreakthroughT1D also circulated the study with their ‘Insights and Experience Panel’, a network of people living with diabetes who regularly volunteer in diabetes research.

The study was also advertised via a recruitment poster on social media platforms (Twitter/X, Instagram and Reddit) using hashtags and forums used by people diagnosed with T1DM. The poster included a URL and QR code which took participants to Qualtrics, an online survey platform. The Qualtrics survey presented the participant information sheet, consent form, demographic information form, and provided contact details to arrange interviews and request further information. Finally, snowball sampling was used in collaboration with other researchers working in the field of diabetes to promote the study.

Recruitment targeted a diverse participant pool, with BreakthroughT1D prioritising volunteers identifying as ethnicities other than White British. Ten interviews were conducted remotely via Microsoft Teams between 1st October and 24th December 2024. After the final interview, non-responding participants were notified by email that recruitment had concluded and were thanked for their interest.

The study initially aimed to recruit 12-17 participants, consistent with the RTA approach, which emphasises developing meaning through data interpretation, rather than extraction (Braun & Clarke, 2022). Time constraints imposed by the doctoral programme also limited recruitment and sample size. A recent systematic review suggests data saturation is typically reached with nine to 17 participants in qualitative research (Hennink & Kaiser, 2022). However, the concept of achieving data saturation has been scrutinised (Nelson, 2017), with significant variability in the use and operationalisation of the term (Saunders et al., 2018). Instead, Sandelowski (2008) refers to 'informational redundancy', while Grady (1998) suggests that repeating themes in interviews signals saturation.

3.5.2 Participant Demographics

Descriptive information, including age, ethnicity, gender, period of time with a diagnosis of T1DM, and length of time using CGM were collected. Table 7 describes the rationale for this information being collected.

Table 7

Rationale for Demographic Information Collection

Demographic information	Rationale for Collection
Age	Younger and older participants may relate differently to the adoption and use of FSL. Older adults are less likely to use the internet and other online technologies compared to younger people (Arcury et al., 2018). Guo et al., (2015) found that factors such as threat appraisal and coping appraisal factors influence adoption intention in mobile health (m-health), and that age and gender play different moderating roles on these factors.

Gender	According to Social Identity Theory, there may be gender-based differences with regards to information access regulation (Bingley et al., 2022). Studies such as Kim et al., (2017) have identified gender differences regarding use of health-related technology. Males may require additional attention as current research indicates that they are significantly less likely than females to seek help for an eating disorder (Thapliyal et al., 2018).
Ethnicity	There is significant inequality regarding how health technologies are prescribed, with consistent evidence showing that patients of white ethnicity who are English speaking have greater access to digital health technologies (Woolley et al., 2023). Patients who are note English speaking and require a translator may therefore be less likely to gain the opportunity to access the FSL. Racial and ethnic disparities in CGM use persist even after adjusting for factors such as socioeconomic status, insurance, health literacy, self-reported diabetes distress, self-management behaviours, numeracy, education level and type of care setting (Agarwal et al., 2021).
Length of time with diagnosis of T1DM	The study aims to understand the experiences of participants with a recent diagnosis of T1DM (fewer than five years). This builds on the rationale stated above.
Length of time using FSL technology	This will inform whether the pooled sample are relatively experienced, or new to using FSL technology. Length of time using FSL may impact on participants relationship to food and eating behaviours.

3.5.3 Interview modality

Individual semi-structured interviews were conducted remotely to explore participants' experiences with CGM and its influence on their food relationships and eating. This interview format is advantageous, allowing for flexibility and adaptability in acquiring in-depth information from participants. It provides space for exploring apparent contradictions, whilst also holding direction (Ruslin et al., 2022). All participants selected remote interviews to facilitate their participation (Heath et al., 2018).

Virtual interviewing widened reach (Hooley et al., 2011), as participants were not required to travel to a location and could engage comfortably from a chosen environment. This was particularly adaptive as participants were based across the UK and it was not feasible to visit participants. Virtual interviews have demonstrated comparable visual cues to face-to-face encounters (Sullivan, 2012). However, communication cues may be applied differently, with fewer non-verbal gestures and longer transitions between speakers, encouraging a more formal interaction (Sedgwick & Spiers, 2009). The virtual format also presents other unique challenges, such as engaging in a way that feels de-contextualised, potentially impacting rapport development which is crucial for better understanding and the free exchange of ideas (Fontana & Frey, 2005). In overcoming this potentially difficulty, participants were encouraged to engage in the interview whilst enjoying a beverage, which has been indicated to support a more natural encounter, with reduced focus on the computer (Adams-Hutcheson & Longhurst, 2017). Furthermore, although the researcher asked for participants to engage in a private, distraction-free environment, their environment may not have felt truly confidential or focussed, potentially impacting on responses.

3.6 Ethical Considerations

Ethical approval for this study was granted by the University of Hertfordshire's Health, Science, Engineering & Technology Ethics Committee (LMS/PGR/UH/05670) (Appendix F). Several measures were implemented considerations to ensure ethical rigour, guided by the British Psychological Society's Ethical Guidelines (Oates et al., 2021), and communicated to participants via the information sheet.

Before participation, prospective participants received the participant information sheet (Appendix E), which included details of support contacts and relevant services in case of disclosure of harm to self or others. It also outlined the confidentiality policy, describing data handling procedures to ensure anonymity, such as separate storage of demographic information, use of password-protected files. To manage potential disclosures, a risk management protocol was developed (Appendix H). Participants were informed that no identifiable information would be published or made available to other organisations and that anonymised information may be stored by the principal supervisor for up to five years. This was done to comply with institutional policies to allow for audits, to support transparency and research integrity for peer review, to support opportunities for secondary analysis of data and future research, and to support transparency and accountability in the event of an audit by an ethics committee. Participants were informed that they could withdraw their transcripts from the study within two weeks following interview. If they felt comfortable with this, participants were then invited to complete the consent form.

3.7 Patient and Public Involvement and Engagement (PPIE)

To support the study in representing the interests and needs of the T1DM population, an Expert by Experience (EBE) was consulted throughout the research process. The current study builds on the recommendations of Wallace et al. (2023), which sought patient perspectives in the conception of the research proposal and the overall approach. The current study sought the perspectives of an EBE in shaping the direction of the research study (Appendix A). The EBE was recruited through their friendship with the researcher and were contacted via videocall to provide information about the research proposal and discuss consultation methods.

Engagement with the EBE was explicitly framed from the outset as an opportunity for them to critically appraise, challenge and introduce alternative perspectives to the researcher's interpretations and decisions. This framing made clear that disagreement was welcomed and were considered valuable to highlight potential blind spots and question assumptions. To reduce potential bias, structured agenda-led meetings were scheduled for key stages (e.g., interview schedule refinement, reviewing themes), with feedback sought before researcher interpretations were shared to avoid priming. The researcher used clarifying questions to deepen understanding of their perspective, exploring areas of agreement and points of divergence. An audit trail of EBE input was maintained, and opportunities for both verbal and written feedback were provided to allow reflection. This process was designed to support EBE involvement to remain open, critical and meaningful.

The EBE was asked to review and co-develop the semi-structured interview schedule, as well as the participant information sheet. They also agreed to participate in a pilot interview to offer feedback and their experience of engaging. The EBE was also asked to advise on where and how findings should be disseminated. This supported findings to be disseminated in an accessible format, using appropriate platforms. To thank them for their time and contributions to shaping the research, the EBE was gifted a gift voucher by the researcher.

The researcher also engaged in consultation with a regional diabetes consultant. This provided valuable information on the provision of diabetes technologies in the UK healthcare context and informed clinically relevant recommendations based on the findings.

3.8 Data Collection

3.8.1 Resources

Please refer to the participant information sheet (Appendix E), for detailed information on data collection procedures.

3.8.2 Interview Schedule

The interview schedule (Appendix I) was developed through consultation with the supervisory team and through developing questions based on related research. The supervisory team reviewed the interview questions and suggested additional items to ensure alignment with the research aims and contemporary diabetes management practices. The EBE then offered their reflections on the schedule, and indicated no changes were required. The interview schedule comprised five parts: Experience of diabetes diagnosis in relation to wellbeing and eating habits; Changes in eating habits since using CGM; Changes in checking blood sugar levels since using CGM; Helpful and unhelpful aspects of CGM for managing T1DM; Experience and interpretation of CGM data.

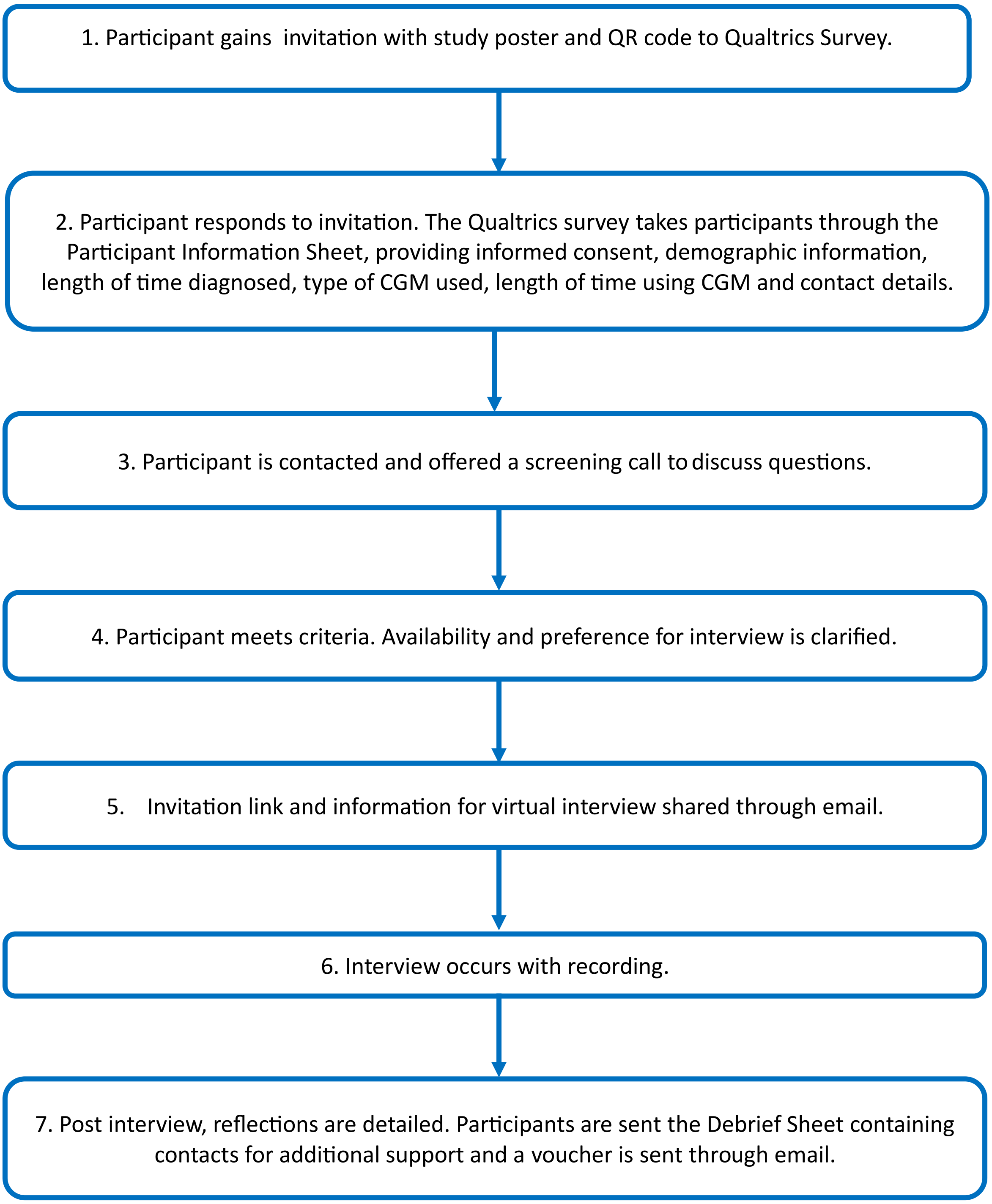
3.9 Interview Procedure

The researcher initially introduced himself and outlined the procedure should disconnection occur. Participants were asked if their space was confidential for the interview, and the researcher then reviewed the information sheet with participants, asking if they had any questions. The researcher then introduced his status as someone not living with T1DM, but whose grandfather had lived with it. This was shared with the intention of building trust and rapport, and to orientate participants to describe their experiences without an assumption of immediate understanding. Participants were then given the opportunity to review the interview questions before beginning. The researcher reminded participants that they are not working within a diabetes team and that their answers would not impact their diabetes care. As the topic of chronic health issues could evoke psychological distress in participants, they were informed that should this happen during the interviews, the researcher could pause or terminate it at any time. The researcher could then draw on their skills as a trainee clinical psychologist to support the participant. If any immediate risk were identified within the interview, the researcher would contact their supervisor, and the risk management protocol (Appendix H) would be used.

Aligning with the approach of RTA, a non-linear approach to interviewing was permitted to reflect more natural discourse. This meant that, for some interviews, the interview schedule was adapted to allow participants to discuss their experiences in a way that was intuitive for them. Before closing the interview, the researcher checked that all sections had been covered and invited the participant to add any further reflections or thoughts. They were then informed that recording would be stopped. On completing the interview, participants were provided with a debrief information sheet containing the research team contacts as well as professional sources of support. They were then offered a £10 online voucher in thanks for their contribution. Figure 4 summarises the interview procedure.

Figure 4

Flowchart of Interview Procedure



1. Participant gains invitation with study poster and QR code to Qualtrics Survey.

2. Participant responds to invitation. The Qualtrics survey takes participants through the Participant Information Sheet, providing informed consent, demographic information, length of time diagnosed, type of CGM used, length of time using CGM and contact details.

3. Participant is contacted and offered a screening call to discuss questions.

4. Participant meets criteria. Availability and preference for interview is clarified.

5. Invitation link and information for virtual interview shared through email.

6. Interview occurs with recording.

7. Post interview, reflections are detailed. Participants are sent the Debrief Sheet containing contacts for additional support and a voucher is sent through email.

3.10 Data Analysis

The researcher applied RTA to analyse data via NVIVO14 qualitative software (Dhakal, 2022). The analysis process is detailed in Table 8 and is informed by Braun & Clarke's (2013; 2019; 2022) and Bryne's (2022) six step guide to RTA. This supported identification and attention to the key analysis aspects. The coding extracts and process of theme development process is shown (Appendix K, L).

Table 8

Braun & Clarke's (2006; 2013; 2019; 2022) and Bryne's (2022) Six Step Guide to Reflexive Thematic Analysis

Phase	Task
Familiarisation with the data	Reading and re-reading the entire dataset. This could include manual transcription of the data and actively listening to audio recordings. In reviewing the dataset a second time, notes and analytic observations may be recorded beside data items.
Generating initial codes	Developing succinct descriptive labels for any information that may be relevant to the research question. The entire dataset is coded systematically, with codes entered as 'comments' in the margins of the document. This process involves coding the entire dataset multiple times until no further codes emerge. The process of developing codes is iterative and it may be necessary to review and revise codes that are similar. Therefore, tracking the evolution of codes will support transparency and clarity.
Generating themes	The coded data is reviewed and analysed to find ways that it may be aggregated into themes or sub-themes with shared meaning. Often, codes that share an underlying concept are collapsed to form a single code. Additionally, a code may represent a discourse throughout the dataset and may represent a theme or sub-theme. The resulting themes convey meaningful clusters of codes that help to answer the research question.
Reviewing potential themes	A recursive review of the candidate themes is undertaken in relation to coded data items across the entire dataset. Themes that do not provide information that addresses the research question are revised. Additionally, themes that include contradictory codes, are not discrete, or lack coherence are reviewed. Codes or themes may be revised or removed to facilitate a more meaningful interpretation of the data.
Defining and naming themes	A detailed analysis of the thematic framework is undertaken, with each theme and sub-theme being defined and illustrated in relation to both the dataset and the research question. Themes should be internally consistent and provide a coherent story within the dataset that other themes cannot convey. Together, the themes should

	convey a clear narrative that is consistent with the wider dataset and research question.
Producing the report	This stage is likely to be recursive but should aim to establish the order in which themes are reported to build a logical and meaningful narrative of the data. The analysis is contextualised in relation to the experiences of the researcher and existing literature.

Phases were sometimes re-visited later in the analysis considering new developments, as the process of RTA is recursive.

3.11 Validity, Quality and Self-Reflexivity

3.11.1 Assessing Methodological Quality and Validity

The researcher used the Critical Appraisal Skills Programme tool (CASP, 2023) to assess the quality of the current study. To support rigour and reflect on researcher subjectivity, codes and themes were shared with the supervisor, an RTA methods group, and an EBE. This collaborative feedback informed the coding approach and encouraged further reflection on enhancing rigor. Stages of analysis and the research process were documented via an audit trail (Appendix K, L). A reflective journal (Appendix A, B) was also maintained to examine assumptions, biases and contextual factors that may have influenced data interpretation.

Member checking was not employed, as RTA is an interpretative process whereby the researcher actively constructs meaning. Therefore, divergence between participant and researcher interpretations is not considered a limitation. Furthermore, although member checks are widely used, the positivistic assumptions underlining this process does not fit epistemologically with the CR approach of the current study and may complicate data analysis (DeCino & Waalkes, 2019). There is also a discrepancy in knowledge and power between researchers (etic and theoretical) and participants (emic and experiential) (McConnell et al., 2011), which may lead to challenges and misunderstandings (Madill & Sullivan, 2018). Related to power dynamics, there are additional considerations for expectancy effects and attempting to align with researcher's interpretations (Reilly, 2013). Similarly, investigator triangulation was deemed incompatible with the study's CR epistemological stance, as this holds assumptions regarding the ability to triangulate towards a singular 'truth' (Varpio et al., 2017). However, the decision not to use member checking also introduced limitations, as there was lost opportunity to clarify meaning, increasing the risk of interpretive bias and reflecting an outsider lens rather than participants' intended meanings. Participants did not have the opportunity to confirm, challenge or expand on interpretations. Member checking could have supported greater co-construction, potentially enhancing the richness of findings with collaboratively refined themes.

3.11.2 Self Reflexivity

As discussed in Chapter 1 (Section 1.2), the current study is informed by my assumptions and experiences, particularly as RTA is an interpretative process. As someone who does not have diabetes, I am aware that I brought an outsider lens to the study. However, my grandfather also lived with T1DM throughout his life and so I have witnessed the impact of diabetes on his life. I chose to disclose these experiences at the start of interviews with several intentions in mind. Firstly, I wished to deepen rapport with the hope that this would encourage honest, clear descriptions of participants' experiences, privileging first-hand experiential knowledge over the use of colloquial specialist terms or assumed understanding. I explicitly named and owned my position as an outsider and requested support with clarifying concepts as someone holding an open, non-judgemental curiosity. This may have supported participants to explore aspects of their diabetes management that may otherwise have been omitted or even scrutinised within their regular clinical consultation appointments. However, my outsider position may also have inadvertently hindered my ability to ask questions which explored deeper relationships with food which may have been more accessible to an insider researcher.

In attempting to mitigate the risk of misunderstanding, I continuously developed my understanding of diabetes management practices through reading peer reviewed journals, NHS guidance, NICE guidelines and reviewing the grey literature on diabetes management practices. I also regularly consulted with the supervisory team and local diabetes consultants to enhance my understanding of diabetes management practices and how they are evolving with improving access to technologies. Within supervisory meetings, I reflected on my own relationship with food and how this could be influencing the direction of the research. My social graces (Burnham, 2018) as a White, British, able-bodied young man and my unique positionality with food was considered in relation to similarities and differences with supervisors and an EBE, introducing opportunities for reflexivity. These processes supported my decision-making to become more lucid and explicit (Appendix A).

To support my reflexivity, and to develop an intuitive understanding of participant experiences, I wore a CGM for two weeks in February/March 2024 and reflected on my experiences with the supervisory team. I kept a daily record of my eating habits, emotions and thoughts in response to the CGM data, along with reflections on wearing the device and interpreting the data (Appendix B).

A Moment for Reflection

Wearing a CGM as an outside researcher for two weeks introduced more than data into my life. It challenged my core assumptions about health, food and self-monitoring. I have not previously used health-tracking devices, but given my intersectionality as being young, able-bodied and technologically adept, I entered the experience with some confidence, assuming it would be manageable. However, tracking every meal quickly became burdensome and unsustainable for me. The constant reviewing of nutritional information and logging data quickly became exhausting, particularly as I regard myself as a more intuitive eater. This experience enhanced my awareness of how much effort and cognitive supply is required to maintain this kind of monitoring over time. I even found myself resenting the constant vigilance the process demanded.

My relationship with food, typically functional and centred on fuelling exercise, began to shift. One moment stands out to me: a post-training meal of jerk seasoned chicken breast, wholegrain rice, and broccoli, which I had always considered a "healthy" staple. Minutes later, the CGM alerted me to a blood sugar spike with an orange warning symbol. I suddenly felt shocked and felt the need to remind myself that my pancreas would shortly produce its own insulin to correct. This meal which was long aligned with my sense of health and discipline, now felt potentially harmful, temporarily disrupting my trust in my food routines.

This experience, though brief and voluntary, underscored my positionality - I could remove the device at any time. I reflected that for people living with diabetes, this was not a *possibility that would be well received by care teams. Overall, it left me with a deeper appreciation for the psychological labour embedded in daily health management and a reminder that technological "insight" often brings emotional complexity. I was also invited to question my assumptions about the assumed neutrality of "healthy eating", and the hidden moral weight that we can attach to food, data and control over our bodies.*

Chapter 4: Results

4.1 Results Overview

This chapter presents the qualitative analysis of the ten semi-structured interviews, conducted using RTA (Braun & Clarke, 2019, 2022). Four themes were constructed and are illustrated in Figure 5. These reflect participants' experiences of CGM in relation to its influence on their relationship with food and eating: *Empowerment and Autonomy, Data-Driven Diets, The Burden of Control,* and *Re-Evaluating Diabetes*. Each theme comprises several subthemes, which are explored in detail with direct quotes from participant transcripts. Quotes capturing the most salient aspects of a theme or subtheme were carefully selected. Hence, in the interest of conciseness, it was necessary to omit words as demonstrated by '…'. Despite the constraints of prose, the process of constructing themes was not linear (Appendix L). Each theme reflects a different aspect of the way CGM has influenced participants' food relationships. Pseudonyms were applied to maintain participant anonymity, whilst also illustrating the contribution of all participants to support themes.

4.1.1 Descriptive Results

A total of 18 participants self-selected and responded to invitations to interview via the Qualtrics survey link. Unfortunately, three participants did not meet the inclusion criteria, and five participants stopped responding to requests to interview. Consequently, 10 participants were eligible and consented to be interviewed about their experiences. These participants were recruited from BreakthroughT1D (n=8), Diabetes UK (n=1), social media (n=1), and snowball sampling (n=1). The recruitment method successfully yielded enough participants who met the inclusion criteria. The average age of participants was 39.4 years, with most participants stating an ethnicity of White British.

The 10 participants who engaged in individual interviews produced a rich set of data for the current study. Appendix K and L illustrates the breadth and depth of the original data and how it was organised. Table 9 displays demographic information for the 10 participants recruited.

Table 9

Participant Demographic Information

Pseudonym	Age	Gender	Ethnicity
Blanca	27	Female	White British
Diana	41	Female	White British
Gavin	59	Male	White British
Kendra	36	Female	White British
Lena	24	Female	White British
Max	28	Male	White British
Maya	55	Female	White British
Saul	31	Male	White British
Sanaa	61	Female	African Indian
Tariq	32	Male	White British

Figure 5

Themes and Subthemes for How CGM Influenced Food Relationships

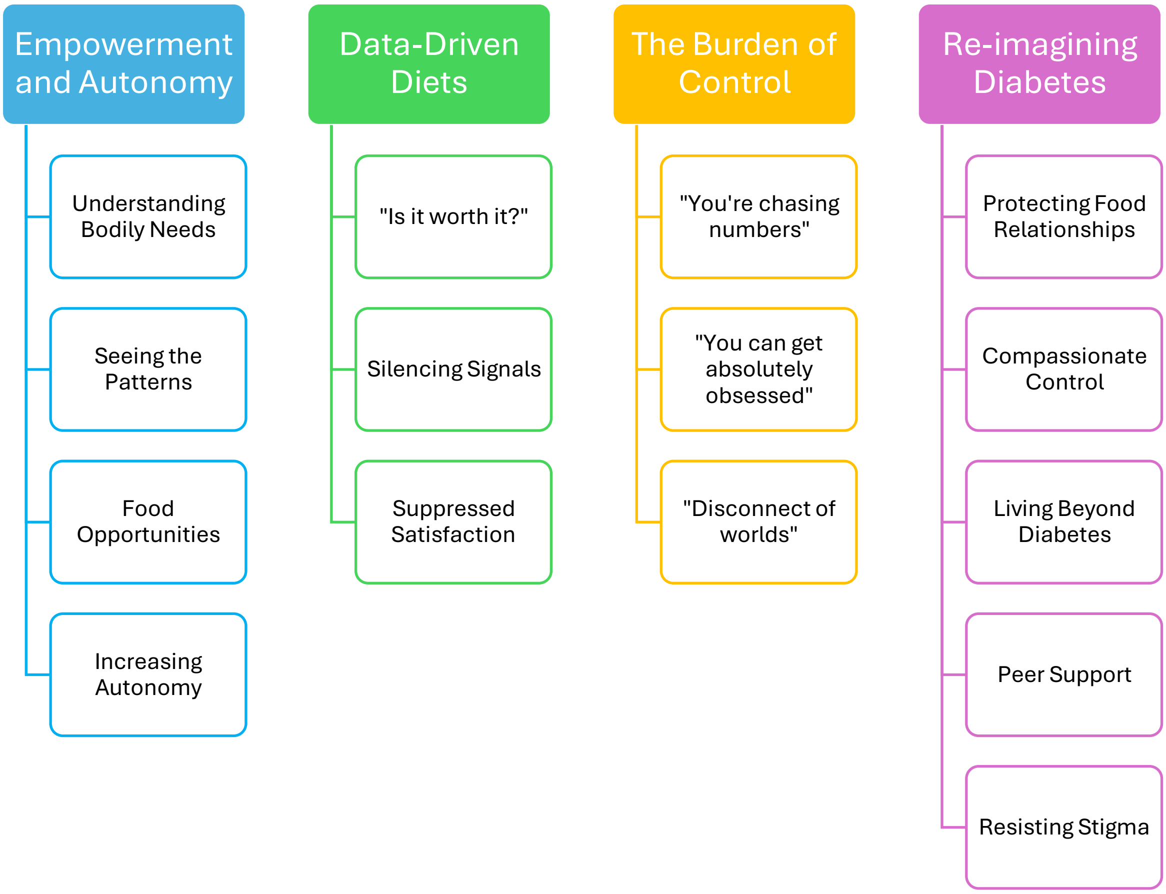
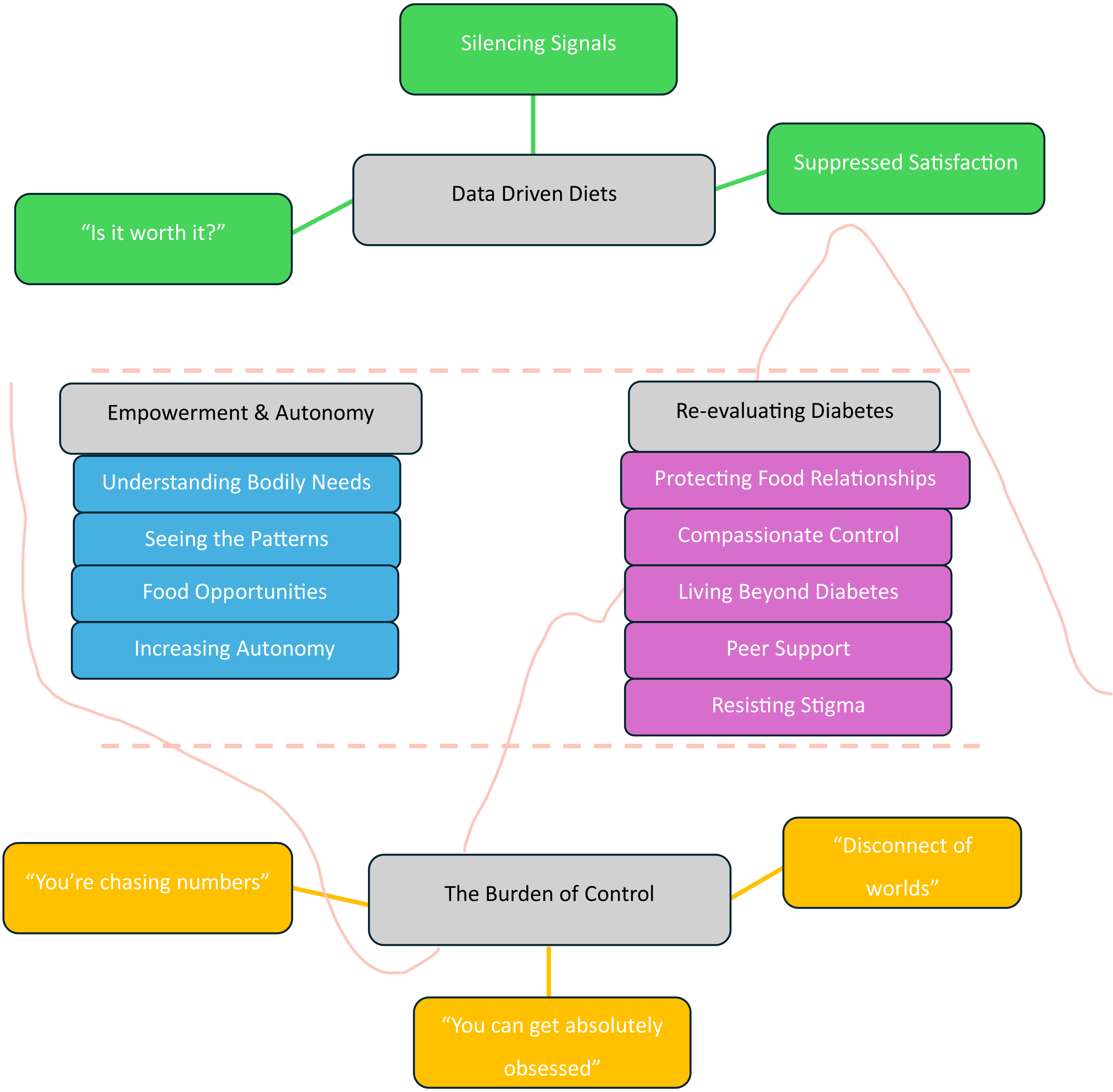


Figure 6

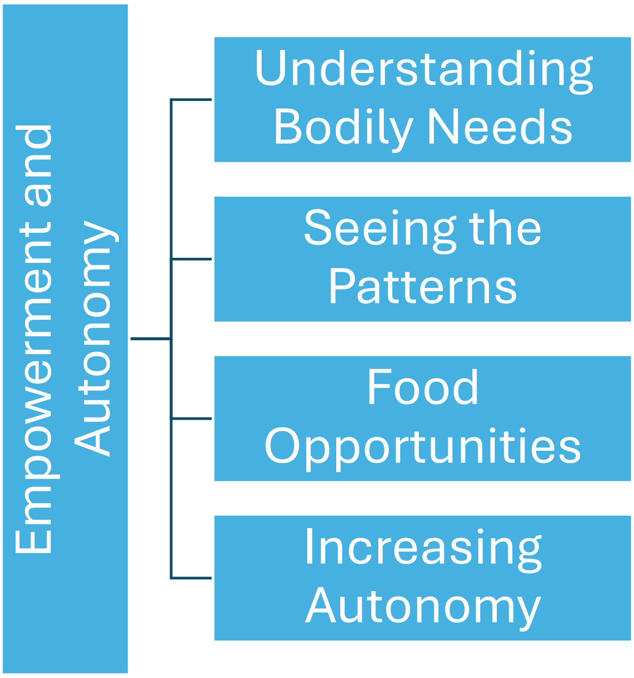
Conceptual Illustration of Themes and Subthemes



4.2 Theme: Empowerment and Autonomy

Figure 7

Theme: Empowerment and Autonomy



This theme captures the ways that CGM has enhanced participants' overall sense of agency in managing their health condition. Participants highly valued the CGM, with it being referred to it as a *"Godsend" (Gavin).* CGM empowered participants through clearly illustrating their nutritional needs with graphs and a timeline of data, which also fostered a proactive approach to managing their BG. These insights supported participants to feel confident to gain new food opportunities and experiment with different eating habits. More broadly, CGM also influenced lifestyle opportunities including the ability to feel safe while exercising and driving.

4.2.1 Understanding Bodily Needs

This subtheme reflects the various discoveries that emerged from using the CGM. Participants described having greater understanding of how food, portion sizes, activity and stress influenced their BG levels, and how to better support their bodily needs.

Many participants described how their relationships with certain foods in their diet were re-appraised after more clearly understanding their impact on their BG levels.

> *In terms of alcohol consumption, I can see the spikes generally when I drink, so I probably drink less as a result of having the CGM as well. (Max)*

> *I've now got the space to go "OK, so that's why that did that". I know that certain foods will be complicated…A pizza has cheese on it, the cheese will slow down the absorption of the carbohydrates in the body, so then you might have to inject a couple of times over a period in order for it to be fully processed in the body. (Tariq)*

> *I never knew what it was before because I always had my cereal…And I would be like, "Why am I so high?" So, I looked back on my CGM for the past three days and I was like, "It's my cereal!" and I thought, for me personally, I would prefer to prevent that spike. Cereal's not that important to me. So, I would just not have it anymore. (Lena)*

Lena explores how long term CGM data supported her to identify that cereal had been responsible for her BG spikes. Consequently, she re-appraised her relationship with cereal and decided that preventing "*that spike*" was more important for her than maintaining this food relationship, removing it from her diet.

Participants also described how the insights available through the CGM evolved, as their bodily processes were more complicated than initially assumed.

> *It's about learning how your own body reacts. It's real trial and error and I'm still learning about what things my body reacts to in certain circumstances. You can do exactly the same thing in two days, and you'll get different numbers. It's not just the mechanics of "If I have 30 grammes of carbs at this time, then it will be the same every day". It just doesn't do that. Every day is different. (Gavin)*

The complex nature of the human body also led some participants to question why their bodies had responded in unpredictable ways.

> *Why have you reacted like that body? And trying to kind of like not see it as a bad thing…It's just that your body doesn't bring it back down. So you need to use something to do it for you.* (Blanca)

The CGM increasing awareness of bodily needs also supported an understanding of effective portion size management, as well as periods of insulin sensitivity.

> *I think my portion sizes are smaller because you realise how many carbohydrates are actually part of a meal. So, if I had chips I would get half the size of normal portion size that I used to have, because now I'm aware of the carbohydrate content it has. (Maya)*

Beyond food, the CGM also informed participants about the impact of factors such as movement, stress and fatigue on their BG levels.

> *I'm much more conscious about the importance of maintaining activity. This morning, I was in two hours of meetings, and I walked before it…because otherwise sitting still shoots my BG up, even if I haven't eaten a particularly calorific meal. Thanks to the CGM I know that if I'm anxious or stressed or tired, my BG goes up so I can manage that with a walk. (Sanaa)*

> *I make sure that I stay in range more by exercising in the mornings and walking the dog, because I know that my insulin sensitivities are much more in the morning than in the evening. (Diana)*

4.2.2 Seeing the Patterns

This subtheme illustrates how participants valued the visual illustration of their bodily needs via trend graphs. The trend graph provided a clear, immediate and accessible understanding of their trajectory. Participants also reflected on how the long-term visual information enabled them to experiment with more personalised and effective approaches to BG management.

> *CGM provided a visual background of what was happening (Tariq)*

> *It's much easier to see the trends and the patterns without involving the care team. Previously, you would take in the machine for the strips, and they would plug that into their computer and bring up all the reports…whereas with the CGM it uploads, and you can view it yourself. So, I can trend a little bit lower after breakfast and adjust my rate at that time. (Saul)*

> *You can't see a pattern with the finger pricking because you don't do it often enough. But you can see it with a CGM. And that's a big difference for people, people who visually need to see something. (Maya)*

Applying this long-term visual information, participants described how they had started to experiment with potentially more effective, personalised approaches to management.

> *With dawn phenomenon…I wake up, get out of bed and it skyrockets. So, over the last couple of weeks I've started waking up and taking a small dose of insulin even when it's in range as the CGM pre-empts me feeling bad. So, if I'm in range but it's starting to creep up, I can do something about it…and it will have been in range all night because I've got a good grip of what my long-acting insulin is. (Diana)*

For Diana, the CGM "*pre-empted*" situations where her BG was liable to "*skyrocket*". In recognising these patterns, she could "*do something about it*" before being required to be reactive. Furthermore, she was able to proactively adjust her insulin to support better control over night.

> *I've got this machine now overnight, I'll see my sugar levels. I won't have to set alarms for like 3:00AM or 5:00AM just to see what my sugars were in the night. (Lena)*

> *If I'm doing public speaking, I know I'm going to go high beforehand because I'm stressed, and as I start to present, I will go low because I'm expending so much energy, so I need juice to hand. I understand the dynamics of my emotions and my blood sugars and can now actively integrate my diet planning and consumption with my emotions and physical needs and that's a huge win. (Sanaa)*

> *Now, I effectively fast from 8:00PM through to midday the next day, which means I can have control of my blood sugar levels all the way during that period. I try to restrict carbohydrates where possible now, with more focus on vegetables or proteins and staying away from sugary drinks or sweets but not following a keto diet. So, I feel fine to eat pasta or rice, just within moderation, and generally in the evening rather than at lunch time. (Max)*

> *What you don't want is something that spikes you up…you need something that will just level it off…I eat loads and loads of peanuts. So, at 2:00pm, we usually have peanuts because they're low in carbs, but high in protein and they fill me up. For me, it's little and often and that's the way I manage it. (Gavin)*

Gavin describes how he was able to manage satiety more effectively with snacks that didn't cause a "*spike*". With feedback from the CGM, he was able to develop a routine of "*little and often*" eating behaviours that supported more effective management.

4.2.3 Food Opportunities

This subtheme details how participants were able to foster more flexible and adventurous relationships with foods since using the CGM. Participants described remaining cognizant of the foods they were eating, but they no longer felt required to adhere to absolute rules around certain foods.

> *I've then learned that I need to eat a certain amount of carbs a day. I can still watch what I eat, because that makes me feel better, but I can eat what the hell I want. (Lena)*
>
> *There's nothing that I would eat before that I wouldn't now…I'd probably go for the lower carb thing, but if I really want a pizza, I'll still get the pizza. (Saul)*
>
> *I eat what I want, when I want. I don't have set time of meals. I don't shy away from heavy carb meals…with the pump and the CGM, the closed loop[1] will auto correct. Whereas before, there was no auto correct. It was all on yourself and learning how your body manages things differently. (Tariq)*

Participants also described how the CGM supported their experimentation with alternative foods that "*flatten the trend*" and "*taste good and are enjoyable*", allowing them to protect their relationships with certain foods.

> *You're trying to find things that taste good and are enjoyable but are not as bad for you as they could be. There are lots of low carb breads now, so that's quite easy. You can then see if brown pasta helps to flatten the trend, and you can see the difference between white and brown pasta. (Gavin)*
>
> *Where I would have made chapatis. I now buy low carb wraps instead sometimes.* (Sanaa)
>
> *More maybe just varieties of foods I was already having, so trying to go for wholemeal foods where possible. Maybe a few more low sugar yoghurts, but not*

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[1] Closed loop systems coordinate three components: 1) CGM, 2) an insulin pump, and 3) a control algorithm to automatically adjust insulin delivery, maintaining glucose levels within target range without user intervention (Bekiari et al., 2018).

> *necessarily changing food types. Just trying to choose the more sensible version of existing foods. (Max)*

4.2.4 Increasing Autonomy

This subtheme relates to aspects of living that were supported by the CGM. Participants described now feeling able to exercise safely, representing a restoration of their autonomy.

> *It helped get back into exercise…Now, I'm out and about running and I would never have done that before. The CGM helps because it can learn the patterns and you can see if you're going up or down…I feel confident that it's just sort of taken care of. And if anything starts to go awry, it just shouts at you very loud, so it's safe. (Saul)*

Many participants reflected on how the CGM removed other barriers that had impacted their ability to live their lives as they would like to. For Gavin and Maya, the pain-free, continuous data reduced their anticipatory anxiety, supporting a more "*positive*" approach to management.

> *Doing your finger prick hurt, so you would limit how often you would do it…there was this big, sort of building up of tension "Oh, my God. I'm going to go and check my numbers". Whatever those numbers were was going to impact what you could eat, and it suddenly became this big thing. Whereas the glucose monitor spreads that data out so you can see it. (Gavin)*

> *I think it was just the easiness of using it…you feel mentally positive and not so frightened. (Maya)*

The CGM also removed limitations on management due to the finite number of lancets and strips provided to participants. Saul described how previously he had felt uncomfortable to request additional supplies, despite his felt need.

> *They don't like to give you more (lancets and strips) than what you're prescribed. They ask you to use les, which is quite hard…The sensors have really helped take a bit of stress off, because you can check all the time…before, that would have been a strip used. (Saul)*

Lena and Max speak to how CGM enabled them to live a more "normal" life, removing barriers that diabetes management had exerted on their lives.

> *If I wanted to go see my friends they're at Uni in Liverpool, Manchester and near Birmingham and I wouldn't want to make that drive. But with the CGM I felt a lot safer. I thought "actually, I can just check it if I need to, and it will tell me if I go high or low". It definitely helped me lead a more normal life. (Lena)*

> *I think having that data provides reassurance that what you're doing is fine is working, can live a normal lifestyle. (Max)*

Before CGM, Lena described feeling compromised in her ability to socialise and integrate effectively with her friends. For Max, the CGM provided him with reassurance, removing behaviours that perhaps felt necessary but were also self-limiting.

Sanaa also describes how before CGM, her diabetes management was unbalancing her relationship with her daughter, suggesting that she had felt like a patient and her daughter had felt like her carer.

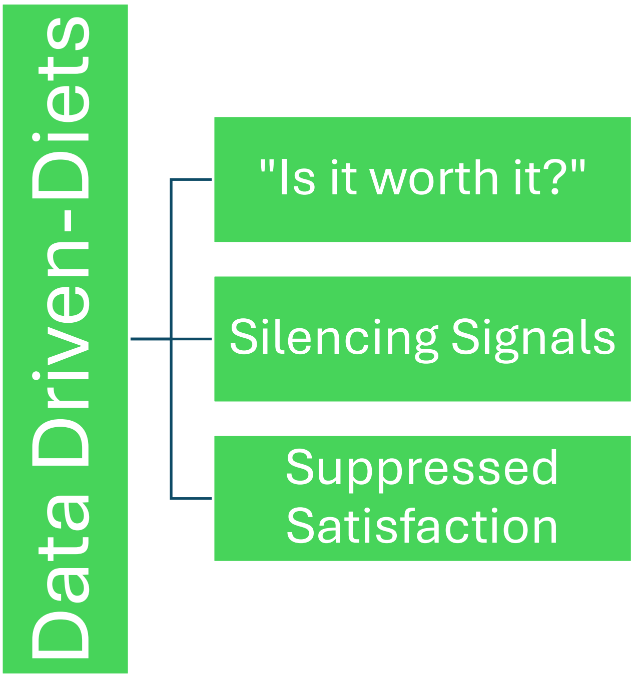
> *It allows me to use a follow characteristic on the app. So my daughter can see what my BG is without having to ask…it takes off feeling like a patient with her. We've always had a very balanced relationship and it was becoming quite tortuous for both of us…So, it's reduced her level of fears and concerns, and it's put our relationship back where it normally is, which is us being us. Not "my mum's got T1D and how do I manage that?" (Sanaa)*

Sanaa's description of *"tortuous",* reflects the severity of how her previously *"very balanced"* relationship with her daughter was becoming strained. It speaks to the significant relational demands that diabetes imposes on people, as well as the meaningful impact that CGM has had on their lives.

4.3 Theme: Data-Driven Diets

Figure 8

Theme: Data-Driven Diets



This theme highlights how CGM directly influenced participants' relationships with food, producing a shift from intuitive, enjoyment-based eating, towards a cognitive, data-driven relationship. The prioritisation of glycaemic data meant that food required evaluation before it could be enjoyed, sometimes also resulting in the suppression of hunger and satiety signals. Participants described experiencing internal conflict between maintaining glycaemic control and attempting to preserve food-related pleasure, with some individuals reporting disordered eating behaviours. These narratives underscore the ways that CGM can mediate food-related decision-making.

4.3.1 "Is it worth it?"

This subtheme relates to participants evaluating whether it was worth maintaining a relationship with certain foods, even if it was their favourite.

> *When I'm about to eat, I always question "***Is it worth it*** to deal with everything afterwards?". I absolutely love Chinese food, but sometimes I'll weight it up and think "no, it's not worth it". I'll tell my other half, "No, not having it tonight because I really want a good night's sleep". (Lena)*

> *I probably eat less chocolate and less biscuits than I used to, because I don't want to be shooting up just for the sake of a biscuit. (Sanaa)*

> *I'm dying to have a packet of starbursts and I've not had one for four years…So, skittles and all those things that I used to love…we had to cut all the sweets away. (Gavin)*

> *I've always loved focaccia it's that thing I like. But it's fine. You find other things. (Maya)*

Several participants reported initially restricting their diets to a very limited range of foods to achieve better control.

> *I just remember eating a lot of eggs to stop it being affected too much (laughter). (Blanca)*

> *There was a period where I ate very similar things throughout the day…and only having 20 grams for breakfast. I would have the same things just so that I was in a routine, and I knew exactly what to inject. (Saul)*

Diana describes how her previously healthy relationship with bananas became "*really unhealthy*" since using the CGM. Bananas became associated with coming out of range and consequently receiving a "*telling off*" from her consultant. She describes how her response to this double bind was to "*eat everything*" and avoid the data.

> *I stopped eating bananas because that was the worst thing in the world. Bananas absolutely shouldn't be something that you have an unhealthy relationship with. I shouldn't be saying to myself, I've got to eliminate bananas from my diet because I won't be in range, and I might get a telling off by me consultant...I had that really unhealthy relationship where I didn't want to eat certain foods and come out of range. And when I did come out of range, I was like, "So what? Now I'm going to eat everything. And I'm not going to look at the CGM". (Diana)*

Diana's repeated use of "*shouldn't*", reflects her sense of loss and frustration with being caught in an internal conflict between her food relationship and her need to be in range. Kendra describes how her relationship with food eventually became so strained that she avoided meals or social situations where other people were eating, despite this being counterproductive to her overall wellbeing.

> *I wouldn't even have meals…I used to just avoid eating anything at all If it wasn't where I wanted to be…I'd go out of the office when people were having lunch. Like, just avoid anything that was socially around food. But it was counterproductive as well, because I trained to row and obviously you can't do that without fuel, and it took me quite a while to realise that doesn't really work. (Kendra)*

Tariq reflects that his strained relationship with food following diagnosis did not improve with the CGM. He describes how he was averse to using insulin and that this developed into an "*eating disorder*", which was only alleviated after starting the hybrid closed loop system.

> *I put myself into that head space where it wasn't healthy at all, but that carried on even once I got the Libra in that the less carbs I ate, the less I had to inject. And there was a kind of fear, "why would I put a chemical in my body that I've never had to put*

> *in before?"…I would still have a mind blowing, excruciatingly painful eating disorder, if it wasn't things like the pump and auto correcting based on your blood sugars (Tariq)*

Although not all participants felt that the CGM had a restrictive impact on their food relationships.

> *I wouldn't say that I have a dietary restriction. If people are asking for dietary requirements, I wouldn't say anything. I'll just be cognizant of what the menu is and try order something which is perhaps a bit less carbohydrate intensive or just something which I think is slightly better for me. I don't find it stressful or restrictive. (Max)*

4.3.2 Silencing Signals

Many participants described how the CGM impacted on their ability to eat intuitively. Participants reported silencing strong interoceptive hunger cues. This presented as feeling required to seek permission from the CGM to eat when hungry, and also being directed to eat when they were not feeling hungry.

> *I definitely miss the control of being able to eat when I want, or not eat when I want… Sometimes I have to eat something if my blood sugar is low. I'm like "I'm not even hungry now I don't want to eat at this point"… With having dinner it's like, "Oh wait, let me just check this thing and then I'll get back to you with whether I can eat". So sometimes I feel like it ruins the flow of life. (Blanca)*

Blanca's quote "*it ruins the flow of life*" reflects how some participants felt the need to seek permission from the CGM to eat.

> *Sometimes I have to eat to be able to do something, but I don't always want to do that. I want to eat when I'm hungry and then live my normal life like everyone else would. (Lena)*

Lena’s description of having to eat despite not wanting to, potentially speaks to a sense that the CGM can, at times, impose an abnormal life, where satiety signals need to be silenced.

> *From about 4:30 you're thinking “I have to go look at my number. I don't want to look at it. I don't want to spoil my wife's dinner”. And that just that raises the number up in the first place. So, we do it the other way around now. (Gavin)*

Gavin’s use of “*I have to*” and “*I don’t want to*” further emphasises his anticipatory dread in seeking permission to eat from his CGM. In recognising its impact on his flow of life and time in range, Gavin began to check his numbers after his dinner.

Participants described the intense discomfort and anger they were willing to endure so that they could maintain time in range and avoid insulin. Participants felt that they could not snack or, in some cases, felt that they could not safely eat regular meals at all.

> *The idea of having to inject for a snack because I feel a bit peckish just makes me so cross. I'll opt for a drink or a water when I'm starting to feel a bit peckish sometimes. If I'm absolutely on the floor starving, then I'll go and inject and have something to eat. And that would be because I was absolutely starving and at that point, I don't care if I'm going to spike or not, so I just have some insulin and eat it almost at the same time. It's like a screw it. (Diana)*

> *I didn't have a normal kind of meal plan really because it would be based on what my numbers were doing. Let's be honest, being hungry is rubbish. But it would be like it's that or I lose my time in range. And then it was kind of finding the balance really because it wasn't. It was unrealistic for me to be 95% time in range all time. (Kendra)*

Diana’s statement that she only grants herself the opportunity to eat when she is “*absolutely on the floor starving*” and is beyond caring reflects how powerful the signals from the CGM are for her. Her description of "*a screw it*" reflects her exasperation with needing to give in to her bodily signals over the signals from the CGM.

4.3.3 Suppressed Satisfaction

This subtheme relates to how participants' ability to gain pleasure from food could become suppressed due to external pressures from the CGM. Participants reflected on how they felt preoccupied with consequences, removing them from a present-centred focus on enjoying food.

> *I think it does then change your relationship with certain meals; how you eat them and when you eat them. It becomes less enjoyable because you're like "Remember what that did last time". (Blanca)*

> *You look at everybody and go "Oh my God. My numbers are high". And then you're sitting there eating, thinking "I shouldn't really be eating this because my numbers are high". (Gavin)*

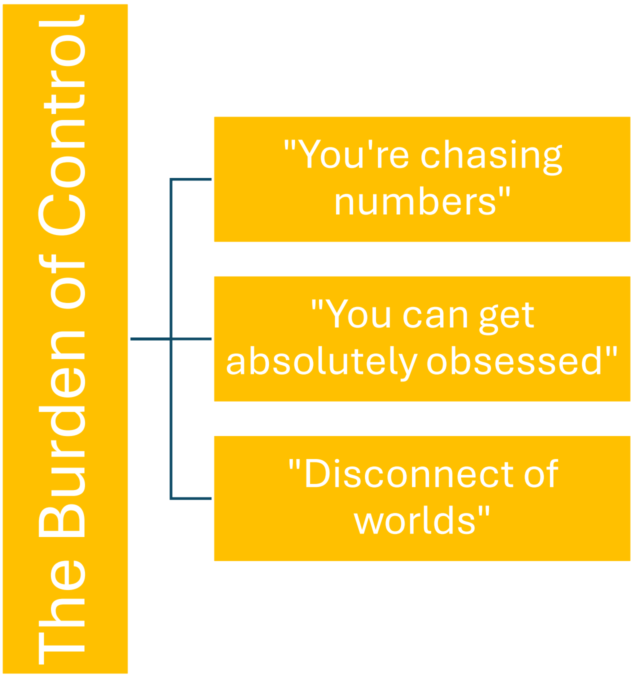
> *I would just see food as a really bad thing and everything was on the food, rather than I've miscalculated something or if there are other things impacting…and so I just saw it as an evil thing really. (Kendra)*

Blanca's precautionary principle of "*remember what that did last time*" foreshadows the pleasure gained from certain foods, changing her approach to how and when she eats them. Similarly, Gavin's experience of enjoying food with everyone is immediately diminished when he comes to realise that he "*shouldn't*" be eating it. Although he continues to eat it, he experiences remorse about this previously pleasurable experience. For Kendra, food was no longer associated with pleasure and perhaps even became analogous with the "*evil*" of pleasure being withheld.

4.4 Theme: The Burden of Control

Figure 9

Theme: The Burden of Control



This theme explores the cognitive, emotional and behavioural ramifications of CGM use. The phenomenon of “*chasing numbers*” led participants to experience heightened stress, obsessive monitoring and dysregulated eating in attempting to avert *“being told off” (Diana)* or feeling exposed to danger “*I’ve got to eat or die” (Sanaa).* Participants described becoming preoccupied with visual feedback, including arrows, colours and alarms, which could contribute to emotional decision-making, health anxiety and burnout. The CGM could introduce a sense that “*perfect control*” *(Blanca)* was possible, producing shame, self-criticism and reduced self-efficacy when these expectations were not met. These experiences were further reinforced by a perceived “*disconnect of worlds*” between their lived experience and the medical system, with some participants experiencing burden from feeling exposed to constant surveillance and performance pressure.

4.4.1 "You're chasing numbers"

Many participants described the impact of "*chasing numbers*". The analogy of a roller coaster ride going on for days, and the associated feelings of panic and nausea, illustrates their experiences of trying to gain control and flatten the trend on the CGM.

> *If you're not careful, **you're chasing numbers**...and that's really dangerous to do because then you've gone low and you better eat something. And of course they shoot back up again. And the slopes of the highs and lows make you feel really rotten because they're so sharp. (Gavin)*

> *I used to get big spikes, and then I would struggle to bring the sugars down, and then I would go into a hypo. So, it was sort of a roller coaster just going up and down for days on end. (Saul)*

The impact of chasing numbers was particularly pronounced within the context of potentially severe consequences for not responding at all, but also for responding too aggressively.

Unlike with finger pricking, CGM visually illustrates steep trends with arrows or the colour red. In the context of potentially severe consequences for inaction, participants described how these stark visual cues may have inadvertently encouraged highly emotive decision-making.

> *I think I still freak out if I see double arrows down...I'm literally drinking and eating anything that's in sight to try and stop that…if my levels were high, I'd get really angry and then I would probably over inject and end up low, and it just ends up being a massive rollercoaster. (Kendra)*

> *As soon as I see the reds, I start to panic because I don't like the lows. And when I get to 3.5, I drop quickly…I usually panic so bad that I go and raid the fridge and the chocolate drawer, and then it goes to orange thirty minutes later and continues there for a long time. (Diana)*

> *I was trying to run after this thing that was almost going out of control. It was like having media updates...You're panicking because you want to make it OK, but you don't know if your panic is actually making it worse. (Blanca)*

> *If my numbers are going through the floor, I don't have time to go "Oh my God, if I eat this, it's going to take me too high." I've got to eat or die…if I don't take care of that, I leave my daughter without her only parent. (Sanaa)*

4.4.2 "You can get absolutely obsessed"

Most participants acknowledged a tendency to potentially become "*obsessed*" with the CGM. In a process of negative reinforcement, they describe working hard to avoid the uncomfortable experience of critical clinical feedback or alarms sounding.

> ***You can get absolutely obsessed** with your numbers and the alarms going off…I can do a test when I'm driving because, you know, I just think, oh, I'll just double check what it is and I can do that quite easily, just hold the phone underneath and I still obviously have one hand on the wheel, I'm just doing it really quickly. Probably not allowed by the DVLA…but you can't always stop on a motorway. (Maya)*

> *It's a bit obsessive. I could probably look at my CGM less than I do, but I have to, especially after my last appointment trying to make sure that I stay in range, so I don't get slapped again…On Saturday and Sunday, I probably check more than every hour and through the night as well. So, I don't sleep through the night and when I wake up, the first thing I do is pick my phone up and look at my CGM. (Diana)*

Maya and Diana describe how their motivation to check the CGM outweighed the potentially significant consequences of dangerous driving or sleep deprivation. For Diana, the motivation to check the CGM was associated with attempts to avert negative interactions within her consultations.

Participants described how the continuous cognitive and emotional demands could also lead to burnout.

> *And then other times, if I completely feel burnt out, I just sort of think, yeah, I'll just, I'll have it and see if I don't have to inject and we'll see how it plays off in a couple of hours…and then my sugars are at 18+ and I'll regret it. (Lena)*

> *It took a long time after having access to all that data to not think I'm doing something really wrong, that I'm really bad and I can't eat this or that. I didn't have a normal meal plan…I probably could have avoided burnout in my first three years if that had been a conversation. It was a really hard fight, to be honest. (Kendra)*

> *I went through a phase where you can get into health anxiety quite easily. So you think something's wrong. And therefore, because you think it's wrong, you worry. And if you worry, [BG] goes up. So, you end up in a spiral where it just spirals up and out, and that's like a health anxiety spiral. (Gavin)*

By using colours and trend lines to visually represent time in range, the CGM may also reinforce to participants a sense that "*perfect control*" is possible, or even realistic. As well as burnout, participants described feeling exposed to shame and failure for not having better control, particularly within situations involving social comparison or clinical feedback. These feelings persisted, even with knowledge that their ability to achieve control was only partial.

> *I do feel like a bit of a guinea pig…I'm like "God, is this actually good for me?"…I follow people on Instagram who share their numbers. You get obsessed with having perfect control and it's so hard when you know you're ill or your hormones are changing, and you can't do anything about it, and you just see this screen going "You're doing **** at your illness" (Blanca)*

> *And I think through that cycle of having to go, you may love data, but you're now getting far too nerdy about your data and it's causing emotional stress that doesn't need to be there…I don't want to understate just how demanding it is mentally. There's that feeling you're failing. Even the language is judgmental and negative. (Sanaa)*

> *When someone like me goes in say my time is 80%, I'd like it to be 90% and they've just seen somebody who's potentially losing a limb…there's a slight "No, you're fine, 80% is good, keep going". Whereas I'm like, "No, I want to keep going and getting better". (Saul)*

Participants who were motivated to maintain a high time in range expressed frustration that the healthcare system could not keep pace with their progress with CGM.

4.4.3 "Disconnect of worlds"

This subtheme explores how participants felt reduced down to their CGM data in medical consultations. Participants reflected that there was a fundamental "*disconnect of worlds*" between their experience of diabetes management, and the technical approach of their care teams. They describe being interacted with as part-objects, leaving a desire for care that recognises their lived experiences with CGM and contextualises their data.

> *I felt like a broken pancreas…There was a fundamental* ***disconnect of worlds*** *where they're on one planet saying "Technically, these are the solutions" and I'm on another planet saying "Physically and emotionally, this is what's happening for me"…There isn't the humane, dynamic from my experience…which is why I've challenged it to ask "Would you please see me as a person?" (Sanaa)*

> *The last appointment I had with my consultant, he told me off for being out of range because I was 35% in range, which was really bad. But that as a 41 year old woman who's only diagnosed just over a year managing this awful condition…has felt really uncomfortable trying to manage. (Diana)*

> *I would be told "Your numbers are fine. What are you worrying about?". I'd go into an appointment crying, and there was no conversation about why. And they can see how many times a day you're scanning. Why wasn't someone saying, "Hang on a minute? There's only so many hours in a day?" (Kendra)*

> *The things they teach you are very mechanical…"You push this button, this does that, that does that". What they failed to talk to you about is the whole interpreting it part and building it into real life. (Gavin)*

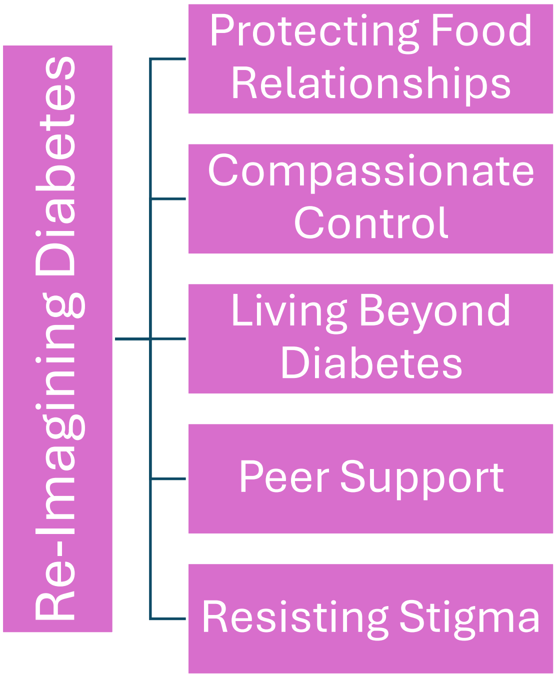
Blanca's evolving relationship with her medical team also positively influenced her relationship with the CGM.

> *When I got diagnosed, I didn't want a lot of appointments because I had a lot of medical trauma...But I realised I need to lean in to getting something out of these appointments. Once my mindset shifted, I was more open to what they were saying and everything changed, and that's definitely changed my experience for the better with the technology. (Blanca)*

4.5 Theme: Re-Imagining Diabetes

Figure 10

Theme: Re-imagining Diabetes



This theme illustrates how participants developed adaptive, identity-affirming strategies to foster psychological resilience and re-establish autonomy in their relationships with food, diabetes management and CGM. Individuals reported becoming flexible and self-compassionate, affording space to enjoy cultural and emotionally significant foods, rejecting perfectionist control narratives, and practicing *"reset(s)" (Maya)* to manage emotional distress following glycaemic variability. Many participants highlighted the importance of boundary-setting with CGM, and embracing broader roles beyond their illness identity, supporting their agency and wellbeing. Peer support emerged as a critical resource for emotional validation and practical knowledge-sharing, often filling the gaps of standardised care. Finally, participants demonstrated resistance to diabetes-related stigma by challenging social misconceptions, asserting their visibility and advocating for inclusion, framing these acts as both psychological coping and sociocultural resistance.

4.5.1 Protecting Food Relationships

This subtheme illustrates how participants re-imagined novel ways to protect and improve their relationships with food and diabetes. Participants developed flexible, compassionate approaches that resisted the construct of "*perfect control" (Blanca)*, by granting themselves permission to enjoy challenging foods and protecting intuitive eating. Participants also found ways to resist the influence of societal norms and practices that were experienced as marginalising.

> *I said I'm going out later for cake. If you tell a lot of people that you're a type one diabetic going out for cake, they'd look at you in horror and say, "You sure you should be doing that?" But that's what insulin is there for. (Tariq)*

> *For your birthday you're going to eat cake, on Christmas you're going to want to eat chocolate for breakfast. I need to know what the carb ratio is for a box of Ferrero Rocher's on Christmas morning because I don't eat them every day. But on Christmas, I want to treat myself. (Diana)*

> *I missed the wholewheat flour. So now I've made the choice that actually flavour is more important, and therefore I'll take the MDI (Multiple Daily Doses of Insulin) which I inject anyway. (Sanaa)*

> *I had a little bit of my husband's doughnut while I was in Germany and it was just enough… I'm quite content to have a cube if I want one. (Maya)*

> *Rice is a nightmare. Pizza is a nightmare. But I wouldn't avoid them now. (Kendra)*

4.5.2 Compassionate Control

This subtheme illustrates how participants learned to develop more compassionate relationships with their CGM, acknowledging that their control over BG is limited, and practicing an ability to have a "*reset*" overnight.

> *At the end of the day, some days it just doesn't work, and you go to bed and you go "Ok", and you reset overnight…Then you go "OK. Start again". (Gavin)*

> *You only have control to a certain level and it's hard when you don't. There are going to be times when you can't, and you have to be kind to yourself and say that's OK. You need to give yourself the grace to be OK with that. (Blanca)*

> *I have a kind of mental reset, so I might have a really bad day where nothing seemed to be in the right zone or anything else. And then I'll just go "That's fine. At midnight is the start of another day. Tomorrow will be better". (Maya)*

> *OK, I'm ill. I'll have to watch ketones. I have to do this. I have to do that. And I have to ignore the numbers. Otherwise, you become distressed about your time in range being rubbish and so on. (Sanaa)*

> *I'm not sure how helpful metaphors about fighting and wars are. You do have to be proactive but there's so much that's out of your control. I feel like if it does go wrong and my mindset is that I'm a warrior then it's my fault - I don't want to believe that because it's not. You feel like you should power through as this Type 1 warrior and don't let it win...I say "No. It's not worth powering through". (Saul)*

Saul's critique of the "*warrior*" discourse reflects the limits of the neoliberal approach to chronic health management, whereby individuals are solely responsible for their health outcomes, increasing the burden of management. Saul demonstrates self-compassion in rejecting this perspective with his acceptance of the limitations of his control.

4.5.3 Living Beyond Diabetes

This subtheme introduces the idea that participants needed some separation from their health condition to recognise their wider identities and livelihoods. In practice, this meant developing boundaries with the CGM and questioning whether it was always necessary to check the device.

> *For me, I need that slight bit of separation so I know that it isn't everything. My whole life isn't about this illness. It is part of me, but it's not my whole. My whole reason to live isn't to be a pancreas. (Blanca)*

> *I've got a watch that tells me my sugar levels. I could always be checking it if I need to. But sometimes I think, actually, I don't need that. (Lena)*

> *There's very little about T1D that distresses me now, apart from "Why the hell is the data doing that?" And then you go "Remember no why's. Go do something interesting". (Sanaa)*

4.5.4 Peer Support

This subtheme outlines participants' experience of including alternative forms of support and knowledge within peer relationships to inform personalised decision-making and healthy adaptation to CGM.

> *The professionals have got to give you the standard line…they can't cater for individuals. Whereas peer support and people who are experienced can turn around and say this is what I experience, but you may not experience it the same way as me. (Diana)*

> *I started a podcast talking about my experience of type one and all things that people don't talk about…A lot of people related to it and appreciated people talking about things that weren't always prevalent or weren't loads of research on. (Tariq)*

> *I probably could have avoided burnout in my first three years if that had been a conversation…if I had met other people in a similar situation. There are people out there, but if you don't know about it then what can you do? (Kendra)*

Peer support was particularly helpful in supporting participants to feel understood and acknowledged, without being required to explain themselves.

> *I think knowledge is power with type one diabetes and the community I've now found…I never thought that I'd need it before, but it's very nice to be able to talk to other people with the condition and you don't have to explain anything they just understand. (Lena)*

> *It makes such a difference. Even if somebody posts up to say they've had a **** night and ten other people go. Yep, me too. It's just a nod that says you're not the only one going through it, and it means a lot. (Sanaa)*

Some participants also alluded to the possible impact of social comparison, which could enable perspective taking and upwards or downwards comparison.

> *We're all learning from each other. You can say "I've had a really rubbish day" and somebody will look at your thing and go, "that looks all right to me because this was mine". And you go "and you're still standing? Ok, that's interesting". (Maya)*

4.5.5 Resisting Stigma

This subtheme illustrates how participants continued to navigate issues of stigma and prejudice while using the CGM.

> *You're finger pricking 3-4 times in a meeting. People don't know how to respond and it's very difficult. Mentally, I thought I need to stop finger pricking as soon as possible…It's a bit odd, but that stigma is still there. When I was diagnosed. They were like you're never going to be able to drink cider or cake again. It isn't even that long ago. (Tariq)*

Participants reflected on how the CGM could draw unwanted attention to their health condition, potentially increasing the risk of experiencing prejudice.

> *Some people are mean about it and imply that you can't control it. If your alarms are beeping then it's like you're not controlling it very well, even though it's natural to go up and down…But because you're hearing the alarms it's more obvious. (Blanca)*

> *Having the CGM physically on my arm, I don't really like that it's right there. I don't need everyone to see it. I like to have it hidden as much as I can because it's a physical reminder. And people will say, "What's that?" or "Is that a contraception patch?", or "Is that a nicotine patch?" I'm like, just go away. (Lena)*

For many participants, these experiences connected to prevalent assumptions about diabetes, misconceptions regarding food restrictions and societal barriers to inclusion. Although, these experiences may have contributed towards a sense of exclusion, participants also found creative ways to resist this.

> *The comments and gazes you'll get if you're looking at a metre, or if you're having to take a snap or shoot up...I've had a few people tell me I should go to the toilet to do that. I've simply said "No, it's unsanitary. I'm not going", and I've treated it very much the same as breastfeeding as a normalised activity for me. Why should I have to go and hide in a corner? Never mind somewhere insanitary. (Sanaa)*

> *I went to a diabetes conference and lunch was potato and leek soup, sandwiches and cake. That's the most carb loaded opportunity for anybody who's got diabetes. There was no opportunity for anything else. "Do they not get the irony here?" Nobody has any idea how many carbohydrates are in it because it wasn't packaged so we were all jabbing ourselves. (Maya)*

> *When you go to supermarkets around festive periods, it's lots of pushing boxes of chocolate or sweets. And if I was a young child with diabetes, I don't think that would*

> *be great. But now, it's not something that I need to worry about. I also don't really want to engage in trick or treating with loads of sweets. (Max)*

> *It's the confidence to ask and say can I change this? And if the answer is no, what can you do for me then that will make me feel that I'm part of this group? And not kind of sitting out on the edge. (Maya)*

However, the CGM also introduced opportunities for participants to feel visible and connected to others with diabetes.

> *I got to show off a badge that I was type one diabetic essentially. It was really good. (Tariq)*

A Moment for Reflection

Through engagement with an EBE and further reflection, my attention has increasingly been drawn to my position as outsider researcher who was first introduced to CGM through discussions with HCP's, scientific reading and wearing the CGM for two weeks.

At times, I have caught myself being led towards medicalised, scientist-practitioner understandings of participants' experiences, potentially foreclosing their unique experiences and insights. The draw that I experienced towards medicalised understandings underpins the challenges that exist in supporting people's lives within the field of chronic health conditions, where experiences are routinely diagnosed and distilled down to standardised units of meaning, occluding personal understanding and individuation.

The subthemes that were constructed from the interviews were initially named in ways that may have implicitly aligned with the scientific literature, straying from participants' experiences. For example, the 'Seeing the Patterns' subtheme was initially titled, 'Proactive Management'. Through conversations with an EBE and further reflection, I have hopefully presented the analysis in ways that have aligned closely with participants' narratives and experiences.

Chapter 5: Discussion

5.1 Overview

This chapter opens by discussing the four themes with regard to existing theory and research. This is followed by a critical appraisal of the study including its strengths and limitations. The clinical and research implications are then presented, followed by concluding remarks.

5.2 Summary of findings

This research aimed to investigate the experiences of adults diagnosed with T1DM in the last five years with CGM and its impact on their food relationships. This section discusses the primary research findings regarding the research question:

Examining the influence of continuous glucose monitoring on food relationships in adults living with diabetes

Through application of reflexive TA (Braun & Clarke, 2019, 2022), four themes were constructed from interviews with ten participants. The four themes included 'Empowerment and Autonomy', 'Data-Driven Diets', 'The Burden of Control' and 'Re-Imagining Diabetes'. In keeping with the epistemological stance of CR, the themes are not intended to represent an objective reality but rather represent an insight into the experiences of participants with CGM and its impact on their food relationships.

5.3 Relating Findings to Existing Literature

5.3.1 Theme: Empowerment and Autonomy

Participants described how they felt that CGM had enhanced their overall sense of agency in managing their health condition. Participants described gaining a greater understanding of how food, portion sizes, activity and stress influenced their BG levels (*Subtheme: Understanding Bodily Needs*). These findings align with literature, whereby CGM has supported participants to gain new insights into their bodily processes, changing where, what and how much participants chose to eat (Wallace et al., 2023), and develops awareness of the effect of hormones, stress (Sørgård et al., 2019) and sleep (Vloemans et al.,

2017) on glycaemic levels. Several participants in this research described how CGM enhanced recognition of how their body reacted to lifestyle choices in real time, prompting some re-appraisals and immediate changes to their diet. Max's experience of "*seeing the spikes*" when he drank alcohol and deciding to "*drink less as a result of having the CGM*" is one example of the immediate impact of CGM on dietary decision-making.

Participants' ability to visualise their bodily responses via the trend graph and make proactive adjustments to predictive information (*Subtheme: Seeing the Patterns*) is another contribution from CGM in promoting empowerment and agency. Natale et al.'s (2023) systematic review of qualitative studies exploring patient experiences with CGM widely recognises how, for the first time, participants could accurately "*predict*" fluctuations in glucose levels, supporting users to feel "*much more on top of things*". Visualisation may be a key component to achieving glycaemic control, as trend information can support people to understand periods of the day where their BG is moving out of range (Sørgård et al., 2019). This has enhanced people's insulin regimen, as CGM users are able to more effectively time and calculate their dosages, supporting confidence in their BG control. In the current study, Diana's ability to visualise her glucose trends led to the discovery that her "*insulin sensitivities are much more in the morning*", encouraging her to take a small dose of insulin after waking, even when in range, to mitigate dawn phenomenon[2]. Adding to existing literature, the current study also highlights a pattern of dissonance between the perceived predictability of the body presented by CGM visualisation, and how complicated and unpredictable bodily processes really are. For example, some participants felt they ought to have reliable and predictable control with the CGM, exclaiming "*why have you reacted like that body?*" (Blanca); whereas, for others, it fostered an appreciation of the limits of their agency in controlling their BG levels. There is high treatment satisfaction among CGM users, largely attributable to the instantaneous visualisation of data and the ability to analyse retrospective data to proactively manage future glycaemic trends (Lawton et al., 2018; Hommel et al., 2014; Tansey et al., 2011). The analysis of historical trends encourages a more restrained approach to management, decreasing management burden and improving time in range. CGM visualisation can also support interoceptive awareness of physical

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[2] Dawn phenomenon is an early morning rise in BG levels, cause by hormone-driven insulin resistance, particularly affecting people with diabetes (Carroll & Schade, 2005)

symptoms of hypoglycaemia such as lethargy (Kang et al., 2022). However, contrasting with this, participants in the current study also stated a fear of developing overdependence on CGM and losing their interoceptive awareness (*Subtheme: Bite by byte*). To mitigate this risk, they restricted their alarm range and used SMBG to maintain their sense of independence.

Participants in this study described developing a more flexible relationship with foods since using CGM. Applying visual insights, participants described revisiting complex foods that were previously too challenging, experimenting with low-carb alternatives and questioning rigid food rules (*Subtheme: Food Opportunities*). Foregrounding the current study, Wallace et al. (2023) qualitatively explored how FSL influenced users' relationship with food and eating. They found that the visualisation of data offered a perception of control, promoting self-efficacy in experimenting with foods that were previously perceived as being too challenging to eat. The FSL also encouraged users to re-engage in intuitive eating behaviours, such as spontaneous social eating, aligning with current study findings that CGM invited users to challenge strict food rules.

Exploring the influence of CGM on food relationships, a Korean study with 19 adults who had used the CGM for at least four weeks discovered that visualisation and continuous feedback influenced how users attributed value to foods (Kang et al., 2022). Following CGM use, participants became much more interested in foods that could help lower glucose levels, with participants engaging in additional food behaviours such as reviewing labels for nutritional information and calorific content. CGM technologies have also been linked to an increase in the consumption of pre-prepared meals, as this makes it easier to log foods (Lieffers et al., 2018). However, no participants in the current study reported this change in their dietary habits. Instead, they frequently reported choosing to substitute their routine foods for low carbohydrate and low sugar alternatives whenever possible, and "*choosing the more sensible version of existing foods*" (Max).

The development of food opportunities can also be understood through the lens of the Behaviour Change Wheel (BCW), which provides a framework for identifying the mechanisms and interventions that influence behaviour. Central to the BCW is the COM-B model, conceptualising behaviour as the result of Capability, Opportunity, and Motivation (Michie et al., 2011). CGM appears to address several COM-B components to facilitate dietary behaviour change. It enhances capability by increasing individual's understanding of nutrition (*Subtheme: Seeing the Patterns*) and their physiological responses to food (*Subtheme: Understanding Bodily Needs*). It also creates opportunity by offering real-time, accessible trend data that visually links dietary intake with BG patterns (*Subtheme: Food Opportunities*), helping users interpret and act on these insights. Finally, CGM supports motivation by enabling goal setting around glycaemic control and offering immediate, personalised feedback, which can reinforce health positive dietary decisions and encourage sustained engagement (*Subtheme: Increasing Autonomy*). Overall, CGM may encourage a re-appraisal of foods in accordance with these functions, with foods not aligning with target outcomes at risk of replacement by a "*more sensible version*" (Max). In a novel application of BCW, Willis et al., (2024) designed an intervention to inform how to apply CGM to guide nutrition-informed food choices for people with T2DM, demonstrating how behavioural theory could be further applied to enhance dietary decision-making for people with diabetes.

Participants emphasised that CGM had enhanced their sense of empowerment and autonomy by removing barriers to management such as finger-pricking, which had produced discomfort and anticipatory anxiety around testing (*Subtheme: Increasing Autonomy*). Overend et al.'s (2019) audit of patient experiences with FSL aligned strongly with these experiences. Their participants also described how finger-pricking was a significant barrier due to additional difficulties with neuropathic pain and dexterity difficulties, which are prevalent in this population (Leelarathna & Wilmot, 2018). Chronic health conditions, particularly diabetes, can contribute to difficulties in relationships as the dynamics of care can disrupt patterns of relating (Wiebe et al., 2016). Within the current study, the 'follow characteristic' supported a re-balancing of a relationship between a participant and her daughter, which prior to CGM, had become "*tortuous*" for them. Indeed, CGM has contributed towards sharing the burden of diabetes with partners and family, which has supported intimacy and autonomy in relationships (Ritholz et al., 2014). Furthermore, sharing predictive CGM information within relationships has been associated with reductions in moderate and severe hypoglycaemic events (Adolfsson et al., 2018).

Participants reported that CGM had provided them with confidence and reassurance to be able to re-engage in meaningful activities of living, such as exercise and being able to travel without fear of hypoglycaemia. The impact of these opportunities has been hypothesised to contribute towards an enhanced sense of independence and personal control (Rashotte et al., 2014; Pickup et al., 2015) that previously had felt too challenging (Ritholz et al., 2014). Kang et al. (2022) hypothesise that CGM provides opportunities to clarify how daily activities impact glycaemic stability, which could increase their motivation and confidence in their capacity for self-care. Participants have described an ability to be more spontaneous and flexible in the way that they live (Sørgård et al., 2019), which is likely to have indirect positive impacts on their diabetes management and approach to food relationships. For people with additional needs such as learning disabilities, CGM has been experienced as highly accessible and supporting of autonomy, "*I can use it on my own*" (Overend et al., 2019).

5.3.2 Theme: Data-Driven Diets

The theme *Data-Driven Diets* introduces how participants' diets became increasingly motivated by data, rather than bodily signals such as hunger or pleasure. Participants described continually weighing up foods in relation to their impact on the trend line, glucose levels and sleep (*Subtheme: "Is it worth it?")*. Despite their cravings and "*love*" (Maya) for their favourite foods, participants described having to "*cut*" (Gavin) them out, sometimes restricting their diet to a limited range of foods such as "*eating a lot of eggs*" (Blanca) to reduce BG variability. These findings align with Yost et al.'s (2020) mixed methods study of CGM with T2DM, with many participants emphasising the need to change previous eating habits to make "*the right choice*", particularly when experiencing cravings. In their study, participants described experiencing strong discordance "*my mind knew better, but my mouth wanted certain things"*. This could suggest that CGM data had influenced participants' relationships with their favourite foods into calculated choices, producing internal conflict and dietary restriction. Expanding on dietary decision-making in the context of CGM initiation and nutritional advice, Willis et al. (2025) investigated how a 'yes-or-less' nutritional approach to food influenced food perceptions. Participants described relying on the CGM to guide "*every decision about food*", overhauling their previous food value system. Participants described "*losing the craving*" for 'less' foods because they were "*not worth it*". Regarding 'yes' foods, they experienced "*more satisfaction with my vegetables*" after observing CGM feedback. However, for people who were not able to make substantial changes to their food behaviours, they reported an increased gap between their food knowledge and their perceived ability to make changes, describing themselves as "*poor eaters*". These findings relate to the current study, as participants described how their appraisals of consumed food could also impact on their sense of themselves as patients with diabetes. It was felt that CGM data could expose users who had eaten the wrong foods, resulting in a "*telling off*" (Diana), and impacting their sense of self.

Privileging data over intuitive eating patterns also impacted participants eating routines and their response to hunger signals (*Subtheme: Silencing Signals*). The CGM ultimately directed participants' ability to eat or not eat, removing choice. Participants described being directed to eat when they were not hungry, producing an unenjoyable experience. Furthermore, when participants were hungry, they described conditioning themselves to ignore hunger signals if the data was not permissive. Some researchers have interpreted these experiences as supporting people to feel "*safe*" to experience hunger signals (Willis et al., 2025). However, many participants in the current study described experiencing internal conflict between tolerating hunger or losing their time in range; only granting themselves permission to eat if they were "*absolutely on the floor starving*" (Diana).

Cognitive dietary restraint refers to the effort to monitor and limit food intake to achieve a desired body weight. Rather than innate cues such as hunger or satiety, this behaviour is driven by cognitive processes (Herman & Mack, 1975). Further distinguishing between restrained and unrestrained eaters, dietary restraint theory proposes that high levels of restraint over time can disrupt regular eating behaviours due to the constant pressure of self-regulation. Kahkoska et al. (2017) further applied these processes to T1DM, recognising that the internal cognitive boundary around food is further reinforced by an external, medically imposed boundary focused on managing BG levels. As reflected in the current study, this dual burden may be further exacerbated in the context of relying on CGM data to regulate eating behaviours. Additionally, research by Martyn-Nemeth et al. (2014) found that women with T1DM who had poorer glycaemic control demonstrated significantly higher levels of restrained eating and interpersonal distress. This could suggest that elevated dietary restraint may be linked to disordered eating patterns, increased diabetes-related distress and poorer glycaemic outcomes.

The CGM also impacted on participants' food routines, sometimes promoting rigidity in their eating behaviours or potentially even interfering with their ability to maintain any "*normal kind of meal plan*" (Kendra). Several participants in Willis et al. (2025) also reported a tendency to skip meals to stay in range, as they felt they were "*always*" being measured. Whilst the CGM introduced flexibility to user's diets (*Subtheme: Food opportunities*), it could also encourage the development of inflexible food routines. Wallace et al.'s (2023) subtheme '*Rigid Routines'* discusses how participants frequently forfeited intuitive eating experiences with friends to maintain their time in range. This suggests that although CGM can improve diet flexibility, it can also interfere with the natural rhythms of people's eating behaviours, developing rigidity in their diets or disrupting food routines.

In contrast to subtheme '*Food Opportunities'*, participants also reflected on how, with CGM, they felt more preoccupied with food consequences, removing the experience of pleasure from food (*Subtheme: Supressed Satisfaction*). These experiences could even impact on participants whilst they were enjoying their favourite foods: "*I shouldn't really be eating this*" (Gavin). To protect their food relationships, participants even developed routines where they would deliberately not review their numbers, suggesting that data-driven diets pose a significant challenge to experiencing food satisfaction. In some cases, data-driven diets severely strained some users' relationships with food: "*I would just see food as a really bad thing…as an evil thing*" (Kendra). Even foods that were originally associated with health, such as bananas, could subsequently become "*the worst thing in the world*" (Diana) upon reviewing their impact on BG levels with CGM.

These experiences with CGM align with recent research attempting to understand the interactions involved in development of Type 1 Disordered Eating (T1DE), involving the deliberate omission or manipulation of insulin for weight loss (Partridge, 2020). Harrison et al. (2021) conducted semi-structured interviews with women with T1DE and developed a development/maintenance model, recognising how factors including adverse life events, perfectionist traits, difficult experiences around T1DM diagnosis and continuous daily management could sensitise people to eating, weight and shape cues. The model recognises how people with diabetes may also actively omit insulin and make severe dietary restrictions to further reduce the requirement for insulin (Partridge, 2020), experiences which were described in relation to reviewing CGM data in the current study. The model recognises how

CGM-related behaviours, such as excessive monitoring or avoidance of BG, could contribute towards the maintenance of T1DE. Furthermore, findings from the current study and Wallace et al. (2023) suggest that CGM could additionally impact for better or worse on other associated variables, such as feeling out of control, triggers such as CGM data and data comparison, sensitisation to weight, shape and eating and negative thoughts about diabetes, eating, weight and shape.

5.3.3 Theme: The Burden of Control – the margin in this section is strange

The theme '*Burden of Control'* explores participants' experiences of the costs associated with interacting with the CGM. T1DM is recognised as one of the most demanding chronic illnesses, involving constant observation and decision-making regarding management needs (Shrivastava et al., 2013). The efficacy of CGM in improving glycaemic control is well recognised, with significant dose-response effects for greater CGM use and HbA1c reduction (Szypowska et al., 2012). Although previous studies have found that CGM achieves its benefits without imposing additional burdens on users (Hommel et al., 2014), the current study has found potential costs associated with its use. For example, participants spoke extensively about the capacity to become "*obsessed*" with CGM data (*Subtheme: "You can get absolutely obsessed").* Participants with impaired awareness of hypoglycaemia in Vloemans et al. (2017) qualitative study also reported that they had become "*somewhat obsessed*" with continuously checking the CGM. This reinforced an identification with "*feeling like a diabetic*", as opposed to living with diabetes. Building on the processes of continuous reinforcement and identification with technology, Wallace et al. (2023) reported that participants became increasingly aligned with the concept of "*good control*" over time. Consequently, participants began to interact with their body as a data-producing system, believing that it should be feasible to maintain high levels of control with the correct inputs.

The use of game design elements in non-game contexts, referred to as 'gamification' (Deterding et al., 2011), involves application of intervention rationales that aim to motivate health-related behaviour change, known as Behaviour Change Techniques (BCTs) (Cradock et al., 2017). BCT's, such as earning points, are recognised as enhancing user experience and motivating usage (Miller et al., 2016). In the CGM context, the real-time BG score, trend arrows, time in range percentages and alarms as negative reinforcement may function as a form of contingency management for users, especially as results are delivered immediately, which is known to enhance reinforcement (Raiff et al., 2021). Related to contingency management, participants in the current study repeatedly described a sense of "*failing*" (Sanaa), with alarms representing a signifier of negative reinforcement. Studies have also described how reviewing retrospective data can feel like a catalogue of personal errors (Sørgård et al., 2019). In Wallace et al.'s, (2023) study, the subtheme '*Got to be better'* illustrates how participants engaged in negative self-talk and frustration when the FSL graph showed unexpected results, experiencing this as criticism. They describe how the sense of personal failure was enhanced with the colour coded areas, impacting on user's emotional wellbeing. Randomised controlled trials have also demonstrated an overall decline in CGM use for users over time (Olivier et al., 2014), suggesting that the contingency associated with managing a chronic health condition may not be sustainable for many users in the long term.

The rollercoaster metaphor was used by Saul and Kendra to illustrate the fear and loss of control associated with sudden attempts to avert hypoglycaemia and then "*over*" injecting insulin (*Subtheme: "You're chasing numbers"*). Contrasting with the previous theme (*Empowerment and Autonomy*), the availability of continuous data can also promote panicked decision-making, reducing time in range and producing distress. The dual effect of enhanced confidence in management and less controlled, more reactive responses to data has been reported in a narrative review of engagement with CGM (Barnard-Kelly et al., 2024). They found that whilst the visibility of data, trends and alerts reduced uncertainty, the amount of data is frequently experienced as overwhelming, which can be a major contributor towards CGM cessation (Tanenbaum et al., 2017). This impact from CGM could be especially burdensome, particularly as UK surveys of people living with diabetes report that 7 out of 10 people feel overwhelmed with day-to-day demands (Diabetes UK, 2019).

Applying the critical incident technique (CIT) to understand CGM use, Sørgård et al. (2019) found that feeling overwhelmed was associated with constant exposure to excessive BG fluctuation information, building on previous research identifying enhanced awareness as negatively impacting on wellbeing and sense of control (Vloemans et al., 2017). This effect was observed with participants in the current study, who described how excessive focus on BG levels could result in over-treating with insulin and hypoglycaemia. Participants in Wallace et al. (2023) also found the availability of data with FSL monitoring overwhelming, as scanning the device frequently could create a sense that users needed to act on the data. Consequently, users may be encouraged to focus on smaller details, increasing the burden of management. Findings from the current study, with those using real-time CGM, appear to build on this hypothesis, with some participants feeling the need to set alarms throughout the night to review their numbers.

CGM has regularly been associated with reduced, shorter episodes of hypoglycaemia (Rodbard, 2017). Despite this, the fear of hypoglycaemia (FOH) remains highly prevalent for people using CGM. FOH can impact on fear related to sleeping, setting alarms during the night and deliberately keeping BH levels high, negatively impacting the wellbeing of people who experience it (Kraaijeveld, 2021). FOH is understood to affect one in seven people with diabetes (Diabetes UK, 2019), resulting in heightened and prolonged anxiety and poorer self-management behaviours (Böhme et al., 2013). Studies aiming to understand fear as a primary outcome of CGM use are limited.

Talbo et al.'s (2023) systematic review and meta-analysis of fifty-one studies exploring the effect of diabetes technologies on fear of hypoglycaemia found a consistently small to moderate effect of CGM reducing hypoglycaemia-related worries in adults with T1DM. However, CGM had limited impact on behaviours used to avoid hypoglycaemia, suggesting the reassurance of data visibility and alarms may not be followed by effective self-management behaviours. Key limitations of the meta-analysis include discrepancies in baseline characteristics across the studies, reliance on descriptive statistics, and a recognition that current approaches (e.g., Hypoglycaemic Fear Survey [HFS & HFS-II]) do not differentiate between adaptive and maladaptive behaviours (Gonder-Frederick et al., 2013). Consequently, it is unclear whether CGM technologies promote adaptive or maladaptive behaviours related to hypoglycaemia. The results of the current study could suggest that participants are liable to experience the CGM as both reducing worry (*Subtheme: Seeing the Patterns*), and promoting it (*Subtheme: "You can get absolutely obsessed*"), with possibilities for both promoting adaptive behaviours (*Theme: Empowerment and Autonomy)* as well as potentially maladaptive behaviours (*Subtheme:* "*You're chasing Numbers" & "You can get absolutely obsessed"*).

The current study found that CGM has the capacity to empower users but can also contribute towards management burden as participants reported loss of control. This is supported by a narrative review of user experiences, finding that CGM both enhances self-efficacy as well as learned helplessness (Barnard-Kelly et al., 2024). Loss of control has been identified as one of the three dimensions of diabetes burnout within the Diabetes Burnout Scale, along with exhaustion and detachment (Abdoli et al., 2020). Diabetes burnout refers to both psychosocial awareness and a state of experiencing exhaustion and frustration, interconnected with inflexible daily demands of illness management, resulting in contradictory self-care attitudes (Anderson & Rubin, 2003). Diabetes burnout has been identified by 36% of individuals as a barrier to self-care behaviours and adherence (Nelson et al., 2018).

Kontoangelos' et al. (2022) systematic review of diabetes burnout reported that the psychological pressure from constantly managing diabetes contributes towards exhaustion and expressing symptoms of stress that negatively impact blood sugar levels and compliance. Furthermore, CGM requires users to effortfully sort helpful from unnecessary information, a process which is cognitively costly when applied continuously (Messer et al., 2019). CGM also has the potential to increase learned helplessness, as users report that no matter how hard they try, their self-management is never enough (Abdoli et al., 2021). Building on this picture, a survey of 127 clinician perspectives indicated they felt that over half of their patients did not understand what to do with the information or features of the CGM, and that 39% did not want to have more information about their diabetes (Lanning et al., 2020). This links with current study findings that people require more support with interpreting the data or finding ways to streamline it.

Participants in the current study reported that the technical approach to diabetes management did not support their needs adequately, with glycaemic numbers often being centred in conversations, instead of their holistic care needs. (*Subtheme: Disconnect of Worlds*). There are significant gaps between mental and physical health services, with patients reporting that diabetes services are often unable to meet their mental health needs (Diabetes UK, 2019). In the current study, the need for psychologically informed support was clearly voiced, with absence of this being associated with unchecked cycles of obsession, critique, shame, burnout and behaviours that could be maladaptive. Participants described feeling like "*a broken pancreas*" (Sanaa), and feeling "*told off*" (Diana) when they were not in range. These interactions may have influenced how participants experienced CGM, with deviations from time in range being experienced as "*failing*" (Sanaa).

The language used in diabetes appointments is highly influential in either motivating patients or encouraging a sense of failure. Therefore, awareness and application of the Language Matters (Lloyd et al., 2018) standards could be particularly relevant in supporting patients using CGM. The introduction of CGM may have also inadvertently encouraged a reactive response to BG data, reducing patient's needs to a single number. Funnel and Anderson (2004) describe the need for professionals to centre people with diabetes within a collaborative approach, recognising their expertise as active participants in their lives and exploring possibilities to promote self-efficacy and motivation in management behaviours.

5.3.4 Theme: Re-Imagining Diabetes

Participants described re-imagining approaches to protect and improve their food relationships and diabetes management in the context of CGM use. Recognising the limits of their control over BG levels and resisting perfect control, participants described how they became more compassionate in their relationship with food (*Subtheme: Protecting Food Relationships*), diabetes and their bodies (*Subtheme: Compassionate Control*). Participants developed novel approaches to continue to enjoy their favourite foods and in navigating setbacks, they described using compassionate approaches including positive self-talk, acceptance of uncontrollable factors, applying mental re-sets and distancing themselves from the data. The use of regular breaks has also been reported in the literature, and may mitigate burnout, whilst protecting user's confidence in management (Sorgard et al., 2019).

Wallace et al.'s (2023) subtheme 'It's not an exact science' also acknowledges the mental and emotional rituals that users recite when preparing to review their data. For example, by focussing on efforts rather than outcome, participants may be more able to achieve separation between the data and their sense of self. The practice of developing boundaries with CGM (*Subtheme: Living Beyond Diabetes*) builds on this, with participants reframing the data as just one aspect of their livelihoods and taking measures to reduce dependence on it. This relates to Barnard-Kelly's (2024) reflections that people with diabetes are seeking reduced burden, simplicity and personalisation to best support their unique needs in the context of their lived experience. The reductionism of using HbA1c as an absolute metric of wellness could instead be presented in flexible ways that are more responsive to people's changing needs, such as indication of where glucose is heading in the next few hours. Re-orienting CGM data in ways that prioritise flexibility, agency and spontaneity is therefore likely to minimise the burden of diabetes, facilitating improved wellbeing and better glycaemic control.

Participants also described how the context of support (*Subtheme: Peer Support*) was highly influential in supporting a more personalised, adaptive relationship with CGM and protection of foods relationships. As well as providing a source of understanding and acknowledgement, peer support also facilitated perspective taking and motivation. Aligning with this, Litchman et al. (2022) conducted semi-structured interviews following a 12-week combined CGM and Online Peer Support Communities (OPSC) intervention with Spanish-speaking participants with T2DM. They found that the OPSC was supportive in the "*how*" of living with diabetes, making healthier choices through personal experiments, collective learning and social support. The combination of CGM and OPSC produced a positive feedback loop optimising healthy behaviours, enhancing confidence to attempt behavioural experiments, and then using OPSC to gain emotional support and problem-solving techniques. Participants in the current study also alluded to the influence of social comparison. Festinger (1954) proposed a 'universal drive upward' theory, whereby comparison is motivated by the desire for self-improvement. Arigo et al.'s (2018) study of social comparisons in adults with T2DM found that they were most likely to select comparison targets who would boost confidence in their ability to manage diabetes and to gain useful information about how to improve. Festinger's (1954) social comparison theory proposes a unidirectional drive upward in ability evaluations, meaning that people tend to compare themselves to others perceived as more skilled, seeking inspiration and motivation to improve themselves. Participants in the current study described using social comparison to gain additional information as well as social affiliation. This aligns with a mastery-approach goal orientation, as seeking upward comparisons introduce learning opportunities to improve abilities in diabetes self-care (Bounoua et al., 2012), whereas downward comparisons provide information about behaviours to avoid.

Participants described the duality of the CGM both drawing attention towards their diabetes identity through alarms and being attached to their bodies, and discrete management via their phones without additional equipment. Stories of navigating prejudice and stigma (*Subtheme: Resisting Stigma*) often involved navigating the imposition of assumptions by people without diabetes. Stigma is the co-occurrence of labelling, stereotyping, ostracization, status loss and discrimination within the context of power being exercised (Link & Phelan, 2001). It is socially constructed and, despite variance in its expression, people across the world with T1DM report stigmatization in multiple aspects of life. Jaacks et al.'s, (2015) commentary on diabetes stigma in China illustrates how structural discrimination and cultural norms such as *guanxi wang* (familial networks of support) frequently interact to impinge on life opportunities and management approaches, such as skipping insulin injections. Investigating the prevalence and impact of stigma on health outcomes, Liu et al. (2017) conducted an online survey with 12,000 people with diabetes. Seventy six percent of people with T1DM reported diabetes-related stigma, finding that it was significantly associated with higher HbA1c and related to multiple aspects of people's lives, including emotional wellbeing, diabetes management and social engagement. In developing recommendations to reduce diabetes stigma, participants in Liu et al.'s (2017) study felt that increasing diabetes education for the public regarding aspects such as causation would be most efficacious. This aligns with experiences of participants from the current study, as misconceptions regarding food rules, limited awareness of CGM technology and ostracization relating to diabetes management frequently interacted to produce discrimination, impacting on people's sense of self and their ability to self-manage effectively.

Wallace et al.'s (2023) subtheme '*Visibility'* further explored how CGM features such as audible alarms could draw negative attention to users, creating situations where people felt they needed to explain themselves and justify their management. As with participants in the current study, CGM users reported trying to hide the device with long sleeves, avoiding tight-fitting clothing, or placing it in areas to decrease visibility (Kang et al., 2022). Experiences of prejudice in the context of CGM use has also influenced people's relationships with their bodies, feeling perceived as having a machine-like extension (Ritholz et al., 2010). However, aligning with current study findings, the CGM also reduced the number of BG checks, reducing the likelihood of unwanted interactions with others (Pickup et al., 2015).

Managing stigma was a prevalent subtheme, impacting on participants' sense of self, particularly in relationship to food relationships. Writing about epistemic injustice in medicine and healthcare, Carel and Kidd (2017) describe how people with diabetes do not experience their illness as a localised bodily need, but as a pervasive '*mode of being*', which can come to fully encompass their sense of self and how they are represented by others. Consequently, people with diabetes are particularly vulnerable to forms of epistemic injustice (Carel & Kidd, 2014), such as knowledge asymmetry relating to how forms of knowledge such as medical, are privileged over others such as lived experience.

Epistemic injustice is particularly prone to playing out through power dynamics existing between medical professionals and patients, as reported by participants in the current study. For participants, CGM devices contributed towards reducing knowledge injustice through empowering them to have agency in their appointments. However, it could also exacerbate knowledge injustice, through upholding the primacy of glycaemic values, contributing towards feeling vulnerable to shaming experiences and reducing opportunities to centre their lived experiences of diabetes and managing CGM devices.

A Moment for Reflection

I found the process of writing the discussion intellectually stimulating and exciting, as well as feeling emotionally weighted. I found that discussing the theme 'Re-Imagining diabetes' was a powerful experience in connecting rich, deeply personal accounts to applied sources of understanding. What struck me most was participants' creativity and resilience in developing mental resets, connecting emotionally and pragmatically with peers, and reframing CGM data as just one part of a much fuller life. These responses felt like more than just coping strategies but acts of resistance against a system that often privileges glycaemic precision over lived quality of life. In considering epistemic injustice, I became aware that the CGM could serve as a tool of empowerment but could also potentially disadvantage participants within their clinical appointments.

In writing this section, I appreciated that my own body, social identity and health practices were not subject to the same scrutiny or potential moral judgements. I applied this awareness to intentionally engage with the data in ways that did not unintentionally over-

simplify the complexity of their experiences, particularly in relation to distress associated with visibility, judgement, or data-driven shame. Overall, I was left with a deepened appreciation for the importance of language, power and nuance in representing participants' experiences, with a commitment to centring compassion and complexity in future research.

5.4 Strengths and Limitations

5.4.1 Strengths

The current study builds upon the findings and research recommendations of Wallace et al. (2023), addressing a gap in the literature to understand the experiences of people recently diagnosed with diabetes who are using the CGM, and its impact on their food relationships. The SLR also addresses a gap in the wider literature, reviewing the impact of CGM on food relationships for people living with T2DM. Together, the empirical study and SLR contribute towards an in-depth understanding of how people with diabetes engage with CGM, how it informs their food-related decision-making, and the recursive influences it has on their food relationships, wellbeing and sense of self. These findings contribute towards a better understanding of how healthcare providers, CGM companies, and users can support better adaptation with CGM. Current study findings could inform straightforward, effective adaptations towards psychologically informed consultations with healthcare professionals, user-informed adaptations to CGM technologies and packages of support to identify and engage with users struggling with aspects of CGM engagement. These developments could be realised with appropriate training for healthcare professionals, clear recommendations for future versions of CGM technologies, and the integration of psychologically informed recommendations to standard diabetes practices, e.g., Dose Adjustment For Normal Eating (DAFNE) courses, and NICE guidelines.

The current study was informed by regular consultation with healthcare professionals, EBE's, and researchers who were contributors in the field of diabetes technologies and eating behaviours. The heterogeneity of perspectives supported a diverse, informed approach to the design, implementation and interpretation of findings. This represents a strength, particularly as it encouraged a critically engaged and reflexive approach to every stage of the study. This is particularly invaluable as the researcher approached the study from an outside position, which without these consultations, might otherwise have remained uninformed by perspectives outside of the scientific literature. The outsider position may have also limited the influence of researcher bias in engaging with the study (Dwyer & Buckle, 2009), enabling a more adequate conceptualisation of CGM experiences, while recognising the diversity of perspectives within the diabetes population. Overall, as Serrant-Green (2002) has recognised, there appears to be an equal number of arguments for outsider research as against it, with the same issues being raised both for it and against it.

The research was rigorously and conscientiously engaged with within a CR epistemological frame of understanding. The CR approach represents a strength for the study, providing a clear set of working principles to inform the development and implementation of semi-structured interviews, as well as the construction of themes across the dataset. The synergy of RTA and CR supported the researcher to critically engage with their own positionality, whilst considering broader influences such as how social discourses can influence meaning (Braun & Clarke, 2022; Willig, 2013).

5.4.2 Limitations

In qualitative research, purposive, non-probability sampling is employed to intentionally recruit specific populations, either to explore a particular topic or when the wider population is difficult to access or unknown (Akkaş & Meydan, 2024). As the aim of the current study was to provide an in-depth understanding of the impact of CGM on food relationships in people diagnosed with diabetes in the last five years, participants in the current study were recruited through purposive sampling. One limitation of this approach is that many participants who took part are volunteers who regularly participate in clinical research on behalf of research organisations and charities. The self-selecting sample may have characteristics that could potentially limit transferability to wider T1DM populations. For example, participants may be highly motivated and engaged with technological developments in diabetes, positively influencing their relationships with CGM and food. Additionally, participants may have experienced significant difficulty with CGM and may be motivated to inform clinical research in particular ways. However, the study was limited by the lack of research funding and time constraints, and purposive sampling is highly advantageous requiring less resources than other approaches (Stratton, 2024).

The current study did not apply for NHS ethics, despite its engagement with a clinical population, applying for university ethics instead. However, recent diabetes service evaluations indicate high rates of non-attendance for young adults (19-25) with T1DM (Hitchcock & Heath, 2022), with many people instead being under the care of their GP. As this population are more likely to have been diagnosed in the last five years than older adults[3], and will be recent adopters of CGM, recruiting from NHS services could have limited participation from this crucial population. Furthermore, the use of NHS services could also risk sampling bias, as participants would only be representative of one service region of the UK, which may have unique characteristics that could impact on CGM experiences. Instead, participants were recruited nationally, and therefore were not confounded by one region, representing diverse experiences with healthcare services and CGM.

Most participants recruited to the study self-identified as White British, limiting transferability of findings to people from other ethnic or cultural backgrounds whose experiences with food, CGM and diabetes management may differ due to variations in cultural dietary practices, healthcare access, language and health beliefs. It is possible that the recruitment methods relying on social media and third-sector organisations did not effectively reach or engage all communities. Potential barriers may have included ability to access the study, lack of resonance with the study framing which may not have fully reflected culturally specific understandings of food and health, or trust due to historical experiences with healthcare and research. As discussed earlier, there was likely an over-representation of participants with research experience, which may have contributed to more research-positive perspectives, potentially underrepresenting less engaged voices. Future research should seek to partner with community-based organisations, such as cultural associations, faith groups, and grassroots health charities to ensure recruitment approaches are culturally relevant and accessible. This could involve co-developing recruitment materials that reflect culturally meaningful food practices and using diverse channels for their dissemination, such as community groups or media.

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[3] Type 1 diabetes usually starts in children and young adults (NHS, 2024)

Cultural, emotional and social aspects relating to food relationships may have been limited in the study. This may be partly due to the semi-structured interview questions, which tended to focus more on the practical management of CGM and eating, rather than explicitly prompting for cultural or emotional narratives. My positioning as an outsider researcher, influenced by my scientist-practitioner role may have biased attention towards psychological and behavioural aspects, aligning more closely with the wider research and the influence of medicalising discourses. Participants' exposure to medicalising discourses framing food choices through the lens of glycaemic control or adherence to medical advice, rather than through cultural or social meaning, may have also influenced their responses. Furthermore, many participants' prior experience with research, often in biomedical contexts, may have primed responses towards technical, medical orientations, with less emphasis on subjective or cultural narratives. Use of NVivo software could have also encouraged early clustering, limiting subtler narratives. Future research could address these issues by designing interview guides that explicitly invite discussion of cultural, social, and emotional food experiences, use reflexive researcher prompts, and utilise alternative approaches that resist premature clustering to capture additional perspectives.

5.5 Critical Appraisal

The Critical Appraisal Skills Programme tool (CASP, 2023) was selected to facilitate quality appraisal of the current study. Each of the 10 criteria were reviewed by the primary researcher and an external researcher to enhance rigour and reduce risk of bias. This CASP scored 10/10. Quality appraisal scores are summarised in Table 10.

Table 10

CASP Quality Appraisal of Research Study

CASP		
CASP criteria	**Quality Appraisal**	**Rating**
Section A: Are the Results Valid?		
Was there a clear statement of the aims of the research? *Consider* *a) What was the goal of the research?* *b) Why was it thought to be important?* *c) It's relevance*	✓ The research aims, rationale and relevance are clearly outlined in Chapter 2 (Section 2.12.1; 2.12.2).	1
Is a qualitative methodology appropriate? *Consider* *a) If the research seeks to interpret or illuminate the actions and/or subjective experiences of research participants* *b) Is qualitative research the right methodology for addressing the research goal?*	✓ The qualitative methodology was appropriate to address the research aims, which were to understand and examine the *experiences* of people with T1DM regarding how CGM impacted on their food relationships. ✓ The researcher has justified their reason for using a qualitative methodology to address the research question in Chapter 3 (Section 3.3).	1
Is it Worth Continuing?		
Was the research design appropriate to address the aims of the research? *Consider* *a) If the researcher has justified the research design (e.g., have they discussed how they decided which method to use)*	✓ The research design was appropriate as it directly addressed the aims of the study. An overview of the development of the research design is explored in Chapter 3 (Section 3.3; 3.4).	1
Was the recruitment strategy appropriate to the aims of the research?	✓ A detailed recruitment strategy is detailed in Chapter 3 (Section 3.4.2).	1

Consider *a) If the researcher has explained how the participants were selected* *b) If they explained why the participants they selected were the most appropriate to provide access to the type of knowledge sought by the study* *c) If there are any discussions around recruitment (e.g., why some people chose not to take part)*	✓ The recruitment strategy was appropriate to recruit participants who met the inclusion criteria and had specific knowledge and experience with CGM. ✓ Reasons for participants not taking part in the study were discussed.	
Was the data collected in a way that addressed the research issue? *a) If the setting for the data collection was justified* *b) If it is clear how data were collected (e.g. focus group, semi-structured interview etc.)* *c) If the researcher has justified the methods chosen* *d) If the researcher has made the methods explicit (e.g. for interview method, is there an indication of how interviews are conducted, or did they use a topic guide)* *e) If methods were modified during the study. If so, has the researcher explained how and why* *f) If the form of data is clear (e.g. tape recordings, video material, notes etc.)* *g) If the researcher has discussed saturation of data*	✓ Data collection methods are clearly discussed and justified in Chapter 3 (Section 3.8). ✓ Participants were offered different interview modalities, and their preferences were facilitated. ✓ A clear description of how the interview schedule was developed is provided, including details of how consultation was applied in this process. The interview schedule is attached (Appendix I). ✓ The form of data is clear (Audio tapes from MSTeams, and subsequent transcriptions). × The researcher has not discussed data saturation. This concept is critiqued in Chapter 3 (Section 3.4.1)	1
Has the relationship between researcher and participants been adequately considered? *Consider:* *a) If the researcher critically examined their own role, potential is and influence during (a) formulation of the research questions (b) data collection, including sample recruitment and choice of location*	✓ The relationship between researcher and participants is reflected upon throughout the study through reflection boxes and extracts (Appendix A). ✓ The researcher has explored their positionality as an outside researcher throughout to reflect on its potential impact on the study.	1

b) How the researcher responded to events during the study and whether they considered the implications of any changes in the research design		
Section B: What are the results?		
Have ethical issues been taken into consideration? *Consider:* *a) If there are sufficient details of how the research was explained to participants for the reader to assess whether ethical standards were maintained* *b) If the researcher has discussed issues raised by the study (e.g., issues around informed consent or confidentiality or how they have handled the effects of study on the participants during and after the study)* *c) If approval has been sought from the ethics committee*	✓ Ethical approval was granted from the University of Hertfordshire ethics committee, protocol number: aLMS/PGR/UH/05670(1) ✓ Throughout the research process, the researcher followed ethical guidelines. The researcher explained how ethical considerations were discussed with participants prior to taking part in the research and after participating in the study. ✓ The researcher has provided examples of the participant information sheet and debrief form (Appendix E, G).	1
Was the data analysis sufficiently rigorous? *Consider:* *b) If there is an in-depth description of the analysis process* *c) If thematic analysis is used. If so, is it clear how the categories/themes were derived from the data* *d) Whether the researcher explains how the data presented were selected from the original sample to demonstrate the analysis process* *e) If sufficient data are presented to support the findings* *f) To what extent contradictory data are taken into account* *g) Whether the researcher critically examined their own role, potential bias and influence during analysis and selection of data for presentation*	✓ There is an in-depth description of the data analysis process (Chapter 3, Section 3.10). ✓ Evidence of thematic maps illustrate how themes were developed from the data (Appendix K, L). ✓ Themes and subthemes are sufficiently supported by direct quotations for every point made. ✓ Contradictory data is considered, with quotes used to illustrate these differences	1

	✓ The researcher routinely engaged in reflexive exercises through bracketing (Appendix A) and reflective boxes throughout to critically examine their role and position in relation to the research.	
Is there a clear statement of findings? *Consider:* *a) If the findings are explicit* *b) If there is adequate discussion of the evidence both for and against the researcher's arguments* *c) If the researcher has discussed the credibility of their findings (e.g. triangulation, respondent validation, more than one analyst)* *d) If the findings are discussed in relation to the original research question*	✓ The findings of the research are explicit and discussed in relation to the research questions. Conclusions explicitly answer these questions. ✓ Research findings are discussed in Chapter 4 (Section 4.2; 4.3; 4.4; 4.5). Each theme and subtheme are discussed in detail regarding evidence that is supportive or contradictory. ✓ Findings are discussed in relation to existing literature and theories. ✓ Credibility of findings are considered in Chapter 3 (Section 3.9.1) in assessing reliability and validity.	1
Section C: Will the results help locally?		
How valuable is the research? *Consider:* *a) If the researcher discusses the contribution the study makes to existing knowledge or understanding (e.g., do they consider the findings in relation to current practice or policy, or relevant research-based literature)* *b) If they identify new areas where research is necessary* *c) If the researchers have discussed whether or how the findings can be transferred to other populations or considered other ways the research may be used*	✓ The researcher discusses the contribution the study makes to current knowledge and understanding about the topic area in Chapter 5 (Section 5.3). ✓ The clinical implications of the study are discussed in detail (Chapter 5, Section 5.6.1) ✓ Recommendations for future research are discussed (Chapter 5, Section 5.6.2)	1

5.6 Clinical Implications and Invitations for Future Research

5.6.1 Clinical Implications

The current study emphasises the importance of acknowledging the emotional and psychological impact of CGM on diabetes management and care. This study has highlighted the need for clinicians to incorporate more psychologically informed approaches to managing T1DM and when providing training for staff. Firstly, it is recommended that NICE guidelines on T1DM and T2DM are updated to include guidance on the importance of identifying emotional and psychological support needs in all diabetes care. This aligns with consistent evidence that people living with diabetes experience higher levels of psychological distress (Diabetes UK, 2019), particularly depression (Rotella & Mannucci, 2013) and are at risk of unique psychological difficulties that require consideration including diabetes distress (Snoek, 2015), and T1DE (Partridge, 2020). The association between increased psychological distress and worsening diabetes management is well established, with high diabetes distress predicting higher average blood glucose levels in both type 1 (Hessler, 2017) and type 2 diabetes (Fisher, 2010). Guidance on T1DM for adults (NICE, 2015) recognises these links but continues to lack guidance on identifying and responding to these needs. Secondly, DAFNE is an educational training course for adults with T1DM and aims to support people to lead a normal life, whilst maintaining healthy BG levels. DAFNE is considered the 'gold-standard' training course for supporting people to manage T1DM and is also offered to healthcare professionals. However, DAFNE does not currently incorporate psychological aspects of care (DAFNE, n.d.). Participants in the current study emphasised the need for such training programmes to incorporate these needs to mitigate the impact of management burnout.

The findings from the current study closely align with guidance and recommendations issued by Diabetes UK in their report on the future of diabetes (Diabetes UK, 2017), advocating for systematic care provision, comprehensive support planning and better communication between patients and healthcare professionals. This has since been expanded to further recognise the need and local implementation of personalised care (Sachar et al., 2023). For example, individuals could be provided with psychological resources as part of routine diabetes care, such as those recommended by Diabetes UK, including *'Diabetes and Emotional Health'* (Hendrieckx et al., 2019). Furthermore, clinicians should ensure they are person-centred within their approach to ensure consultations feel more ‘humanising’ for people with diabetes. Healthcare professionals should receive training to situate and contextualise diabetes management within the broader scope of the individuals’ life. This includes incorporating routine questions assessing, for example, how individuals are coping with using CGM and exploring any unintended consequences to maintaining high time in range with CGM.

The TD1M Outpatient Transformation Framework (NHS England, 2022) highlights how every clinical interaction is an opportunity to discuss specialist care availability and accessibility. The Kings College Health Centre provides a model framework for personalised diabetes care practices (NHS England, 2022), for example, it offers monthly multidisciplinary specialist clinics to support people with T1DM. The clinic also provides comprehensive support, clinical advice, prescribing and personalised care plans. Patient surveys of their one-stop-shop provision and joint monthly MDT clinic found that 78% were satisfied or extremely satisfied, highlighting the impact of personalised and holistic service provision for patients.

The findings of the current study indicate that CGM may contribute to the development of disordered eating behaviours in some individuals. To support early identification of such behaviours and the initiation of discussions around eating habits, it is recommended that clinicians should consider the use of routine screening measures, such as the mSCOFF (Zuijdwijk et al., 2014; Wallace et al., 2023). These tools can serve as an initial method for screening disordered eating behaviours and can support with identifying underlying needs that might be complicated by CGM. Further screening tools, such as the T1-DDS (Joensen et al., 2013), may be used to elicit individual psychological barriers to insulin use.

For people recently diagnosed with T1DM and using CGM, the current study found that peer support groups could provide shared understanding and emotional support. Participants described peer support as beneficial for providing shared knowledge of diabetes management beyond medical frameworks of understanding. However, participants described struggling to find these support groups. Participants also mentioned that if they had access to peer support sooner, this could have prevented burnout. Through increasing professional awareness of third sector resources and improving referral processes and signposting, people with CGM could access timely support for their diabetes management. It is recommended for commissioned third-sector groups to have more trained mental health workers to facilitate peer workshops and support adaptive integration to using CGM technology.

In addition, clinical pathways could incorporate CGM-focused psychological check-ins at 3 months and 12 months after initiation to proactively identify and address changes in eating behaviours. Multidisciplinary teams could also include technology-specific psychological roles to bridge the gap between device data and emotional wellbeing. Providing tailored cultural competence training would help clinicians recognise and respond to how cultural food practices intersect with CGM use, ensuring advice is relevant and sensitive. Finally, structured partnerships with community-based organisations could extend peer support beyond clinical settings, improving access to health and psychological care for underrepresented groups.

5.6.2 Implications for Future Research

This research addresses a gap in the literature concerning the impact of CGM on individuals' relationship with food and their eating behaviours; nonetheless, there is limited available research on this topic area. To date, research has primarily focused on the physiological and medical benefits of CGM technology, with limited research exploring how CGM technology can influence eating behaviours. As identified by Wallace et al. (2023), this research also suggests it would be valuable to apply qualitative methodologies to additional populations to further explore the impact of CGM on eating behaviours. For instance, girls and women with T1DM have a heightened risk for developing eating disorders (Colton et al., 2015). Findings from the current study indicate that CGM devices may play a role in shaping eating behaviours in ways that could, for some individuals, contribute to or intensify disordered patterns of eating, highlighting the need to further understand the impact on this population. Pioneering research in this field by Williams (2025) suggests that CGM devices are capable of both increasing and mitigating disordered eating behaviours.

The current study demonstrated a diversity of experiences regarding the influence of CGM on food relationships. In line with recommendations by Vloemans et al. (2017), future studies are needed to understand how individual differences relating to attitudes and coping styles may influence self-management behaviours during and following CGM use, and how these may impact on glycaemic control.

Future research should consider investigating the impact of CGM devices and eating behaviours with younger populations, including adolescents and children, as their experiences could differ from those of adults. Wallace et al. (2023) highlights that recruiting adolescents may provide valuable insights as young people are likely to be practicing being more independent with managing T1DM and making decisions about food and eating behaviours. Young adults moving from paediatric to adult services are a high-risk population for loss to follow-up and poor health outcomes (Pyatak et al., 2014), and future research can help to inform a safe transfer of care with minimal disruption and distress.

Technology plays an increasingly crucial role in managing diabetes, with continual advancements in technology leading to an array of devices designed to support people with T1DM (Agarwal et al., 2022). The technological landscape of diabetes management is rapidly evolving beyond CGM, with the improving utilisation of closed loop systems, continuous ketone monitoring and non-invasive glucose monitoring using infrared light on the skin (Diabetes UK, n.d.). It will be important to continue to assess how these developments in technology are impacting on eating behaviour and psychological well-being. Some participants within the current study described how their relationships with food and eating behaviours changed after the addition of closed loop systems to CGM, improving their relationships with food after it was negatively impacted by CGM. It would be useful for future research to further explore the impact of closed loop systems on food relationships. Such research can provide useful insights into how feedback from CGM devices is interpreted and acted upon by the user.

Future research could also utilise different designs to widen the scope of understanding. Comparative studies examining cross-cultural variations in CGM-food relationships could help clarify how cultural food practices and healthcare contexts shape outcomes. Furthermore, longitudinal designs could be used to track how food relationships evolve from the point of initial CGM adoption over time. Partnerships with community organisations should be prioritised to increase diversity within participant samples and address key gaps in representation.

5.7 Dissemination of Research

Table 11

Dissemination Strategy

Audience	Dissemination Strategy

Clinical health researchers	A poster presentation (Appendix M) has been given at the first international Diabetes and Disordered Eating (DADE) Conference 2025, Copenhagen, Denmark. Mackie, S., Heath, J., & Wallace, T. (2025, June). An examination of the influence of continuous glucose monitoring on food relationships in adults living with diabetes.
Clinical health researchers	The current study will be disseminated via a peer-reviewed publication with relevance to the field of diabetes, clinical health psychology and digital and automated health technologies.
Diabetes practitioners	A poster presentation will be presented at the Clinical Health and Neuropsychology thesis event on behalf of an NHS Foundation Trust.
Regional T1DE services	An infographic and poster presentation will be given to regional teams involved in supporting patients with diabetes and disordered eating.
Participants	An infographic of the study findings will be fed back to participants involved in the current study.
Charity teams	An infographic and poster presentation will be given to charity teams who supported the current study (BreakthroughT1D, Diabetes UK,) or organisations who may benefit from its findings.

Chapter 6: Conclusion

This thesis has contributed a critical synthesis of existing literature relating to the impact of CGM on food relationships in people with T2DM. It has also produced a thorough understanding of the impact of CGM on food relationships for people recently diagnosed with T1DM. These findings are important, as relationships with food are central to effective diabetes self-management and overall quality of life. Given the growing integration of CGM technologies into routine care, it is recommended that clinicians adopt person-centred, psychologically informed approaches during consultations. Clinical practice guidelines should also incorporate the identification and support of patients' emotional and psychological needs. To mitigate CGM-related distress and potential burnout, patient education should address psychological aspects of care. It is possible that, for some individuals, CGM use could play a role in the development of patterns associated with disordered eating. To support early identification of this, and to initiate discussions around eating habits, clinicians should consider the use of routine screening measures. Peer support may also be a valuable addition to the care provision in T1DM.

Appendices

Appendix A

Reflective Research Journal Extracts

Diary Extracts Following Interviews

14.10.2024

Today I spoke with a participant who described themselves as "nerdy" and enthusiastic about the future of technology — very pro-tech. He had previously experienced disordered eating, particularly in relation to carbohydrate restriction, before he accessed CGM and insulin pump therapy. He shared that he had once followed a dangerously restrictive keto diet and became caught in obsessive cycles around food and glucose data. He described checking his CGM nearly 50 times a day, highlighting how technology, while enabling, can also feed into disordered patterns when unbalanced.

However, since starting on the insulin pump, he now checks his CGM only five times per day — a significant and healthy reduction. He seems to have reclaimed a sense of calm around food and his diabetes management. What struck me most was his joyful anticipation of celebrating his five-year 'diaversary' with a syrup-soaked cake — a food he was told he would never be able to eat when he was first diagnosed.

I found myself really respecting this decision. It wasn't just about eating cake; it seemed symbolic — a small but meaningful act of reclaiming pleasure and autonomy. I wondered what the cake represented for him beyond the taste: perhaps a defiant gesture against the rigid food rules imposed at diagnosis, or a marker of how far he has come in making peace with food and diabetes.

This moment also made me reflect on how CGM, while potentially overwhelming and obsession-inducing in its early use, has the potential to evolve into a supportive, regulative tool in combination with insulin pump therapy. This transformation could suggest that perhaps technological tools alone aren't inherently helpful or harmful. It may be that surrounding context, education, and social support are also relevant in shaping the impact of CGM on someone's relationship with food.

Ultimately, I was left feeling encouraged by how far this person has come in rebuilding a sense of freedom, pleasure, and defiance around eating — especially in choosing cake not as a "bad food," but as a symbol of celebration, recovery, and agency.

29.10.2024 *Today I spoke with an articulate and engaging participant whose professional background in project management and technology shaped how she had approached her diabetes management. What struck me most was how she described the role of CGM in reshaping not just her own sense of safety and agency, but her relationship with her adult daughter. As a single mother, CGM technology has allowed them both to monitor blood glucose remotely, significantly alleviating the anxiety that once pervaded their daily lives. It reframed her condition from an invisible threat into something shared, trackable, and manageable.*

*Regarding diabetes management, she reflected on finding a careful balance: respecting CGM data and using it to inform safer choices, while also knowing when to lean into peer support, intuition, and non-biomedical forms of knowledge**.** This nuanced approach was compelling. It made me curious about what personal, cultural, or experiential factors had shaped her relationship with data - one that is not uncritical, but discerning. This contrasts with more medicalised engagements with CGM data that I've encountered in other narratives, and it highlights the diversity of lived experience.*

Her account of being initially misdiagnosed and dismissed - her condition later reframed as "just Type 1 Diabetes" - was deeply affecting. She described feeling abandoned, left to educate herself without access to psychology or structured peer support. Clinical interactions, in her words, failed to treat her as a whole person. Instead, she felt like an object onto which medical theory was applied, rather than a participant in her care. One particularly distressing moment was when a device was inserted into her body without prior explanation. For me, this served as a stark reminder of how medical technologies, though life-enhancing, can also be experienced as invasive or dehumanising when not paired with consent and care.

Her reflections made me consider more fully what it must be like to navigate the constant physical and emotional presence of diabetes technologies - devices worn, inserted, tracked, and sometimes misunderstood by healthcare professionals. It challenged me to think about the fine line between empowerment and overmedicalisation, and the importance of choice and informed consent, especially for people who already feel marginalised in healthcare systems.

Lastly, she shared that the CGM supported her during a charity mountain climb, where the receiver had helped her navigate energy levels and trends. Despite acknowledging the emotional weight of trend data, she was clear and unwavering: CGM should be universally accessible. Her words were not merely technical advocacy; but felt grounded in lived truth and in the emotional labour of managing a complex condition in a sometimes unsupportive system.

I left the conversation with deep admiration for her resilience and clarity, but also with sharper awareness of how much context (social, cultural, and emotional) shapes how people relate to CGM, food and their bodies. This conversation reminded me that no device, however advanced, is neutral. Its meaning is made in relationship, with the self, with others, and within systems of care.

Extract from Diary Following Discussions with Expert by Experience

2.10.2024

My consultation today with an Expert by Experience (EBE) who has used CGM for several years was deeply impactful. They shared how CGM had shifted their relationship with food from one driven by fear and rigid rules towards flexibility over time. In the early stages of diagnosis, they described "reactive eating" to correct low glucose levels, often overcompensating out of fear. However, with continued CGM use they began to recognise patterns in their data, cultivating what they described as a "gentler, more natural approach" to eating.

One powerful example they shared was attempting to eat rice and a traditional mooncake desert known as "yue bing" (月餅) during mid-autumn festivities with family. Prior to CGM, they had chosen to avoid rice and deserts for years due to its glycaemic impact. This was challenging for them, as rice represented a staple part of their Cantonese diet and food was expected to be shared as it is a highly valued cultural practice. With the confidence developed with CGM they felt able to revisit rice and traditional dishes, which felt like a return to social harmony.

They described observing their levels returning to range with the CGM, experiencing it as "healing". This experience represented more for them than merely re-introducing food but being able to let go of a long-held fear. Their narrative helped me to realise how CGM can facilitate not just physiological insight, but emotional repair in food and social relationships.

The EBE also described the emotional labour of interpreting CGM data, especially when the trends did not align with their effort. They admitted to "spiralling" after high readings, experiencing guilt or failure. In understanding how they managed these experiences, they described learning to experience the data as "feedback, not judgement" through learning from peers.

Their feedback included practical suggestions for the interview design, encouraging inclusion of prompts regarding:

- *Emotional responses to food and glucose trends over time,*
- *How people may learn to avoid foods and whether this can be turned around,*
- *The social context of eating while using a CGM.*

They also suggested inviting participants to reflect on "firsts" — such as the first time they reintroduced a feared food or felt in control with CGM. These kinds of moments, they said, often hold rich emotional significance and could add depth to the findings. This consultation has reinforced the importance of viewing CGM use not in isolation, but as entangled with food, emotion, memory, and identity. Their perspective will directly shape the interview guide and my positionality when coding and developing themes. I am grateful for their openness and the reminder that technology is only truly meaningful when understood in the context of lived experience.

Extracts from Diary During Transcribing and Coding

7.10.2024

Transcribing this interview really encouraged me to think about how I will approach coding for CGM adaptation, identity, and the concept of 'diabetic control'. At first, I almost felt like I was being interviewed as I found myself justifying my rationale and explaining why I am doing this work as an outsider researcher. This sparked reflections for me on the participants' lived experience of living with diabetes and being required to justify their food-related decision making to HCPs. This shift in dynamic also encouraged me to reflect on how much of my analysis is being shaped by the assumptions that I bring as an outside researcher? Am I listening for what aligns with my research questions, or can I allow space for what feels most important to the participant?

Their ability to articulate their journey, from painful finger pricks to CGM and closed-loop tech was incredibly fluent. At times I felt I was merely summarising and reflecting back what they already knew deeply. But those moments gave me insight: how might I code for tech-enabled self-understanding, when someone uses data not just to "manage" but able to reclaim narrative control*?*

Their reflections on cutting carbs to avoid injections and the progression into what they called a "mind-blowing, painful eating disorder" made me pause. When coding for disordered eating, how do I capture these layered causal pathways, from fear of insulin to carbohydrate avoidance, to burnout due to constant mental effort? Furthermore, how do I distinguish between clinical language (e.g. ED) and his own lived framing?

They described a striking sense of before and after, depicting the chaos and anxiety of finger pricking versus the ease and trust that he now has with the pump. This highlighted for me that emotional responses to data aren't always conscious or reactive, sometimes they might fade as trust in the system builds. Could I code this as technological habituation? Or perhaps emotional restoration?

Their comments about reclaiming the ability to eat "whatever I want" made me realise that I also need to track food freedom - both perceived and actual. I want to be alert to where CGM narratives could reflect an invitation to enjoy food again, re-enter social life or reframe what's "allowed."

By the end of the interview, I noted a strong sense of rapport. I want to be cautious not to over-interpret their drive for mastery, but it makes me think: how do I code for self-driven approaches such as podcasting, peer-building, or tech experimentation? Not just what people use*, but how they* author *their experience? Ultimately, I was left reflecting on how CGM can act as a mediator of identity and autonomy, not just glycaemic data. When coding, I will also be more alert to examples of control being reclaimed, where data can become empowering or overwhelming, and how people's relationship with food can shift from being a source of threat to a symbol of freedom.*

20.02.2025

Coding this interview challenged me to reflect more deeply on the emotional toll CGM data can take, especially when linked to difficult food relationships. I found myself wondering how often we as researchers and clinicians assume that access to more data will automatically empower, rather than overwhelm? Their experience disrupted that assumption for me. Her account of fasting to "stay in the green zone" made me pause. Are we equipping people with data, but not with the support required to make adaptive use of it?

In reflecting on the transcript, I notice that I would have liked to have explored aspects relating to diabetic control, possible obsessional tendencies and developing disordered eating in further depth. Why was I too quick to move on? Was I uncomfortable with the depth that was being shared? Or was I too focused on covering all my questions? I want to be more intentional about giving people space, especially when they are sharing something so personal.

Their description of trying to "stay high to avoid a hypo" left me with some discomfort. It encouraged me to think about whether clinical targets can sometimes silence real fears? And what we are potentially not listening to or noticing when "numbers are fine"? I was struck by how powerful it was for her to finally be asked what was working for her. I wonder how often that simple question is missed in care.

The interview left me with new thoughts and ideas for exploration, such as: how does it feel to become dependent on technology that can fail? What psychological toll does this bring? And how can we better support people in navigating trend data without internalising blame?

Overall, this interview reminded me that CGM often becomes deeply embedded in people's emotional lives, as well as their food relationships. As a researcher, I need to hold space for that complexity, even if it means slowing things down.

Appendix B

CGM Reflective Journal Extracts

Day 3

Wearing the CGM so far today has given me a new level of insight into the constant awareness that people with diabetes live with. Even though I don't need to act on the data, I found myself checking the graph regularly, which I was surprised to notice. Watching the line stay green so far today felt unexpectedly rewarding, like I'd passed a test. I chose to eat more healthily than yesterday because my data had been out of range at times, which left my feeling a bit concerned. I feel like I need to prove to myself that I can achieve this for some reason!

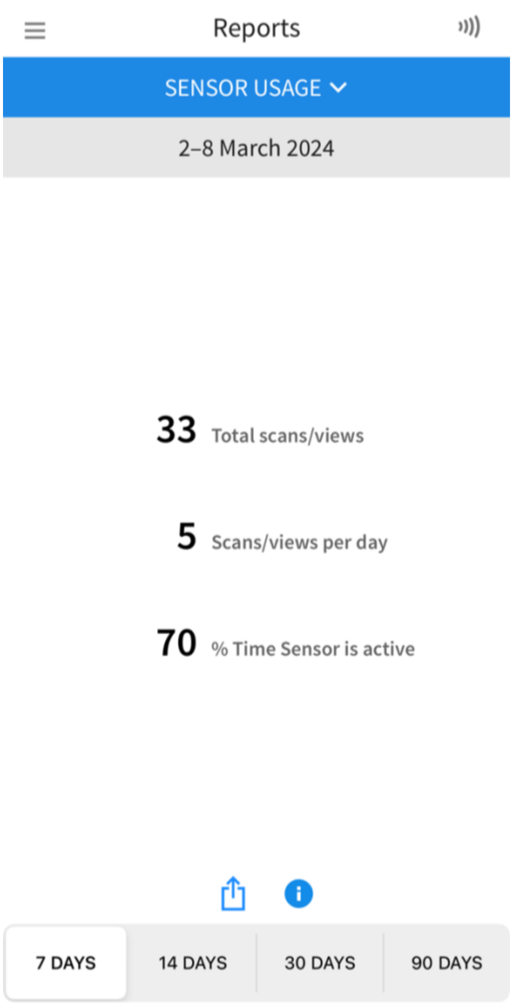
Food diary so far:

- ***Breakfast****: Wholegrain toast with one boiled egg*
- ***Morning snack****: Greek yoghurt with a handful of blueberries*
- ***Lunch****: Lentil and vegetable soup with seeded crackers and hummus and breadsticks*

Plan for the afternoon/evening*:*

- ***Afternoon snack****: Apple slices*
- ***Dinner****: Grilled salmon with roasted potatoes, carrots and steamed broccoli*

I noticed a gentle rise after breakfast and again after lunch, but nothing dramatic. Still, I found myself wondering: if I had diabetes, would I have been required to act on this information? How would I feel about needing to respond even when I have tried to eat healthily? This experience is introducing a lot of curiosity about how my body is working, but for others, it's daily life. I am starting to feel me much more aware of the psychological and behavioural labour behind the data.



2–8 March 2024

33 Total scans/views

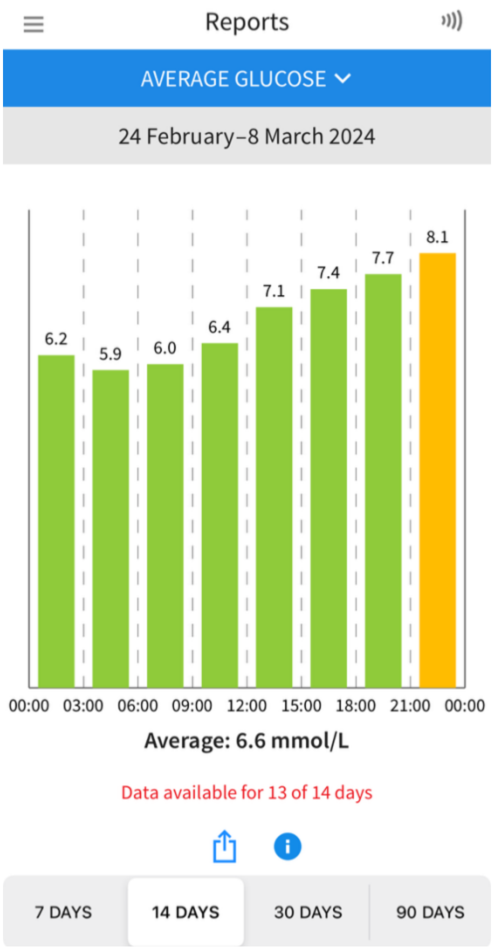
5 Scans/views per day

70 % Time Sensor is active

Day 14

Over the past seven days, I have scanned the CGM just 33 times, around five times per day. It is a noticeable shift from the initial phase use where I was checking a lot more. At first, the numbers felt reassuring and even exciting. Now, I'm beginning to feel a subtle fatigue with tracking, particularly around food logging which I am no longer consistent with.

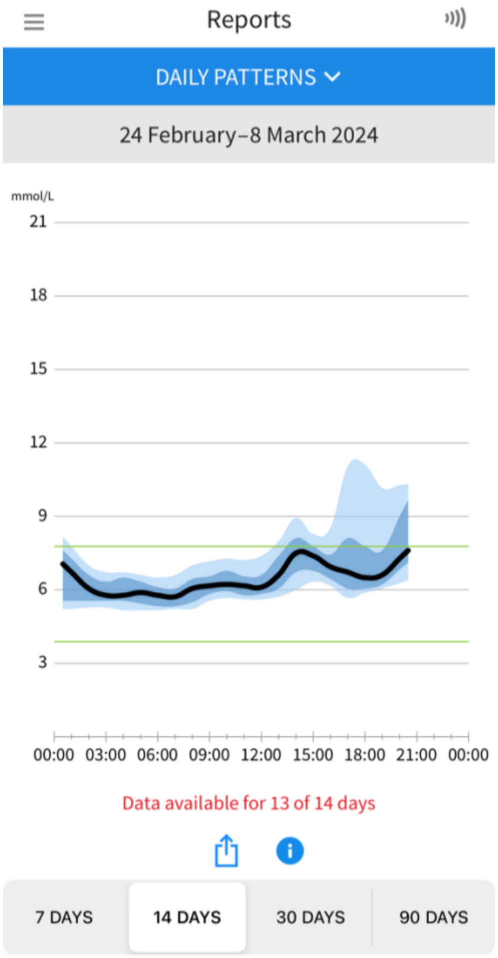
I have noticed a growing sense of resistance. Not quite burnout, but a quiet heaviness. I'm asking myself: what am I hoping to see that I haven't already learned? Is the data still useful, or is it becoming background noise? I can see now how easily this kind of tracking could blur the line between awareness and over-monitoring. It makes me reflect on what it must be like to do this long term, when the stakes are higher.



24 February–8 March 2024

Average: 6.6 mmol/L

Data available for 13 of 14 days



24 February–8 March 2024

Data available for 13 of 14 days

Day 14

After two weeks of wearing the CGM, I have spent some time reviewing my glycaemic trends — and they've left me with mixed emotions. There's a clear and consistent pattern: a gradual rise throughout the day, with some mild hyperglycaemia most often occurring after lunch and more noticeably after dinner. I never dipped into hypoglycaemia, but I've regularly exceeded the recommended range, sometimes reaching levels around 11 mmol/L.

Seeing the graph shift into the orange zone triggered something surprisingly visceral — a feeling of discomfort, even disappointment. I hadn't expected a colour to carry so much emotional weight. I found myself feeling less excited about meals I usually look forward to. My go to dinner of peri-peri chicken, rice, and broccoli suddenly felt problematic. It was frustrating to see such a steep rise after what I had always considered a balanced plate. Going forward, I will give myself less rice, but I am still sitting with the realisation rice could be so impactful for me.

This graph has left me feeling somewhat concerned, and curious. There's a part of me that wants to understand more, to test alternatives, to smooth the curve. But there's another part that feels the beginnings of tracking fatigue, especially around food logging, which I struggled to sustain consistently. How do people living with diabetes manage this every day, indefinitely?

I have come away from this experience with a growing respect for the psychological labour that comes with self-monitoring. For me, this is temporary. Whereas, for many, it is constant. The effort, vigilance, emotional negotiation with numbers, it's a lot to manage. I am fortunate that my body can respond effectively without my input, because I think the CGM output would make me feel even worse if the consequences could potentially be severe.

I also find myself wondering what my CGM data might look like after a month… or six months. Would I gain more clarity about how different foods affect me? Would it support better choices? Or would my diet slowly become more restricted, shaped more by avoidance than understanding?

This 14-day snapshot has motivated me to be more mindful of what I eat and when, with a desire to feel more in tune with my body. And yet, I'm also learning that some variation in glycaemic control is normal. The challenge for me was navigating the line between controlled awareness, output anxiety and resisting the urge to disengage from the CGM. This is a line that people living with diabetes must navigate daily.

Appendix C

Quality Appraisal Tools

Critical Appraisal Skills Programme (CASP) Checklist for Qualitative Research (2024)

Authors	1. Was there a clear statement of the aims of the research?	2. Is a qualitative methodology appropriate?	3. Was the research design appropriate to address the aims of the research?	4. Was the recruitment strategy appropriate to the aims of the research?	5. Was the data collected in a way that addressed the research issue?	6. Has the relationship between researcher and participants been	7. Have ethical issues been taken into consideration?	8. Was the data analysis sufficiently rigorous?	9. Is there a clear statement of findings?	10. How valuable is the research?	**Rating** Yes (1), No (0), Can't tell (0),	Comments
Bults et al. (2023)	✓	✓	✓	✓	✓	×	✓	✓	✓	✓	9/10	Q6. Does not report on relationship between researcher and participant. Does not report own biases. Q8. Data analysis process described although the researchers do not describe critically examining their own role, potential bias and influence during analysis and selection of data for presentation.

Chiu et al. (2019)	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	9/10	Q8. Data analysis process described although the researchers do not describe critically examining their own role, potential bias and influence during analysis and selection of data for presentation.
Clark et al. (2024)	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	9/10	Q8. Data analysis process described although the researchers do not describe critically examining their own role, potential bias and influence during analysis and selection of data for presentation.
Eer et al. (2023)	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	9/10	Q8. Data analysis process described although the researchers do not describe critically examining their own role, potential bias and influence during analysis and selection of data for presentation.

Fritsch et al. (2024)	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	9/10	Q8. Data analysis process described although the researchers do not describe critically examining their own role, potential bias and influence during analysis and selection of data for presentation.
Litchman et al. (2022)	✓	✓	✓	✓	✓	✗	—	✓	✓	✓	8/10	Q7. Mentions 'obtaining consent', does describe consent process. Does not report obtaining ethical approval for the research.
Ni et al. (2024)	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	9/10	Q8. Data analysis process described although the researchers do not describe critically examining their own role, potential bias and influence during analysis and selection of data for presentation.

Sergel-Stringer et al. (2024)	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	9/10	Q8. Data analysis process described although the researchers do not describe critically examining their own role, potential bias and influence during analysis and selection of data for presentation.
Shin et al. (2024)	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	9/10	Q8. Data analysis process described although the researchers do not describe critically examining their own role, potential bias and influence during analysis and selection of data for presentation.
Van Leersum et al. (2024)	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	9/10	Q8. Data analysis process described although the researchers do not describe critically examining their own role, potential bias and influence during analysis and selection of data for presentation.

Vallis et al. (2023)	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	9/10	Q8. Data analysis process described although the researchers do not describe critically examining their own role, potential bias and influence during analysis and selection of data for presentation.

Critical Appraisal Skills Programme (CASP) Checklist for Randomised Controlled Trials (CASP, 2024)

Griauzde et al., (2020)		
CASP criteria	**Quality Appraisal**	**Rating** Yes (1), No (0), Can't tell (0),
Section A: Is the basic study design valid for a randomised controlled trial?		
1. Did the study address a clearly formulated research question? *Consider:* *d) The population studied* *e) The intervention given* *f) Comparator chosen* *g) Outcome measured?*	✓ The study answered a clearly focused question: assessing whether CGM with low-carbohydrate coaching improves HbA1c among adults with sub-optimally controlled T2DM compared to usual care. ✓ Population = T2DM adults; Intervention = CGM + dietary counselling; Comparator = usual care; Outcome = change in HbA1c.	1
2. Was the assignment of participants to interventions randomised? *Consider:* *c) How was randomisation carried out? Was the method appropriate?* *d) Was randomisation sufficient to eliminate systematic bias?* *e) Was the allocation sequence concealed from investors and participants?*	✓ The study randomised all eligible adults with T2DM (n=1584) into intervention and control groups using 1:1 stratified randomisation by age, gender and BMI, which was appropriate. Although, it used a pragmatic randomisation prior to consent. ✓ The randomisation was sufficient to eliminate systematic bias × Allocation sequence was not concealed from investigators or participants.	1
3. Were all participants who entered the study accounted for at its conclusion? *Consider:* *f) Were losses to follow-up and exclusions after randomisation accounted for?* *g) Were participants analysed in the study groups to which they were randomised (intention to treat analysis)?* h) *Was the study stopped early? If so, what was the reason?*	✓ Participants were tracked from allocation through outcome measurement. ✓ Losses to follow-up and exclusions were accounted for. All post-randomisation exclusions/non-engagement were explained and visually represented in Figure 1. ✓ Analyses were intention-to-treat (difference-in-differences) and reasons for non-engagement were reported. ✓ The study was not stopped early. It ran the full 12 months as planned.	1
Section B: Was the study methodologically sound?		
4. A) Were the participants 'blind' to intervention they were given?	× Participants could not be blinded due to the nature of the intervention (wearing a CGM and dietary counselling).	0
4. B) Were the investigators 'blind' to the intervention they were giving to participants?	× The dietician and staff delivering the intervention were aware of group allocation. Blinding was not possible due to the behavioural nature of the study.	0

4. C) Were the people assessing/analysing outcome(s) ‘blinded’?	× Can’t tell. The study does not explicitly state whether the analysts were blinded to group allocation when analysing outcomes. However, this is unlikely in a pragmatic QI setting.	0
5. Were the study groups similar at the start of the randomised controlled trial? *Consider:* • *Were the baseline characteristics of each study group (e.g. age, sex, socio-economic group) clearly set out?* • *Were there any differences between the study groups that could affect the outcome(s)?*	✓ Baseline demographics and clinical characteristics (age, sex, BMI, HbA1c) were similar between groups and stratified during randomisation.	1
6. Apart from the experimental intervention, did each study group receive the same level of care (that is, were they treated equally)? *Consider:* • *Was there a clearly defined study protocol?* • *If any additional interventions were given (e.g. tests or treatments), were they similar between the study groups?* • *Were the follow-up intervals the same for each study group?*	✓ Usual care included standard dietician support and PCP care. The intervention added CGM and specific coaching, while otherwise maintaining routine care structures.	1
Section C: What are the results?		
7. Were the effects of intervention reported comprehensively? *Consider:* • *Was a power calculation undertaken?* • *What outcomes were measured, and were they clearly specified?* • *How were the results expressed? For binary outcomes, were relative and absolute effects reported?* • *Were the results reported for each outcome in each study group at each follow-up interval?* • *Was there any missing or incomplete data?* • *Was there differential drop-out between the study groups that could affect the results?* • *Were potential sources of bias identified?* • *Which statistical tests were used?* • *Were p values reported?*	✓ HbA1c, BMI, medication costs, CGM metrics, engagement rates and qualitative data were all clearly presented. p-values, means, and confidence intervals were reported. ✓ Difference-in-differences and subgroup analyses were used. × No power calculation was explicitly stated.	1
8. Was the precision of the estimate of the intervention or treatment effect reported? *Consider:*	✓ Confidence intervals and standard errors were provided for HbA1c changes and BMI.	1

- *Were the confidence intervals (CIs) reported?*	✓ Results were statistically significant with p=0.04 for primary outcome difference.	
9. Do the benefits of the experimental intervention outweigh the harms and costs? Consider: - *What was the size of the intervention or treatment effect?* - *Were harms or unintended effects reported for each study group?* - *Was a cost-effectiveness analysis undertaken? (Cost-effectiveness analysis allows a comparison to be made between different interventions used in the care of the same condition or problem.)*	✓ The intervention significantly reduced HbA1c without increased medication costs or adverse events. ✓ Reported harms (skin irritation, cost post-study) were minor. ✓ Cost-effectiveness was estimated via mediation cost change, but not formally analysed.	
Section D: Will the results help locally?		
10. Can the results be applied to your local population/in your context? *Consider:* - *Are the study participants similar to the people in your care?* - *Would any differences between your population and the study participants alter the outcomes reported in the study?* - *Are the outcomes important to your population?* - *Are there any outcomes you would have wanted information on that have not been studied or reported?* - *Are there any limitations of the study that would affect your decision?*	✓ The intervention is applicable to primary care and T2DM management. × Engagement was low, and participants were largely white, with access to Medicare/private insurance. This may limit generalisability to more diverse or underserved populations.	1
11. Would the experimental intervention provide greater value to the people in your care than any of the existing interventions? *Consider:* - *What resources are needed to introduce this intervention taking into account time, finances, and skills development or training needs?* - *Are you able to disinvest resources in one or more existing interventions in order to be able to re-invest in the new intervention?*	✓ This intervention may offer an effective alternative for patients struggling to control HbA1c despite usual care. ✓ It combines self-management with individualised dietary support, and offers potential for scalability, although resources (staff time and CGMs) would need consideration.	1

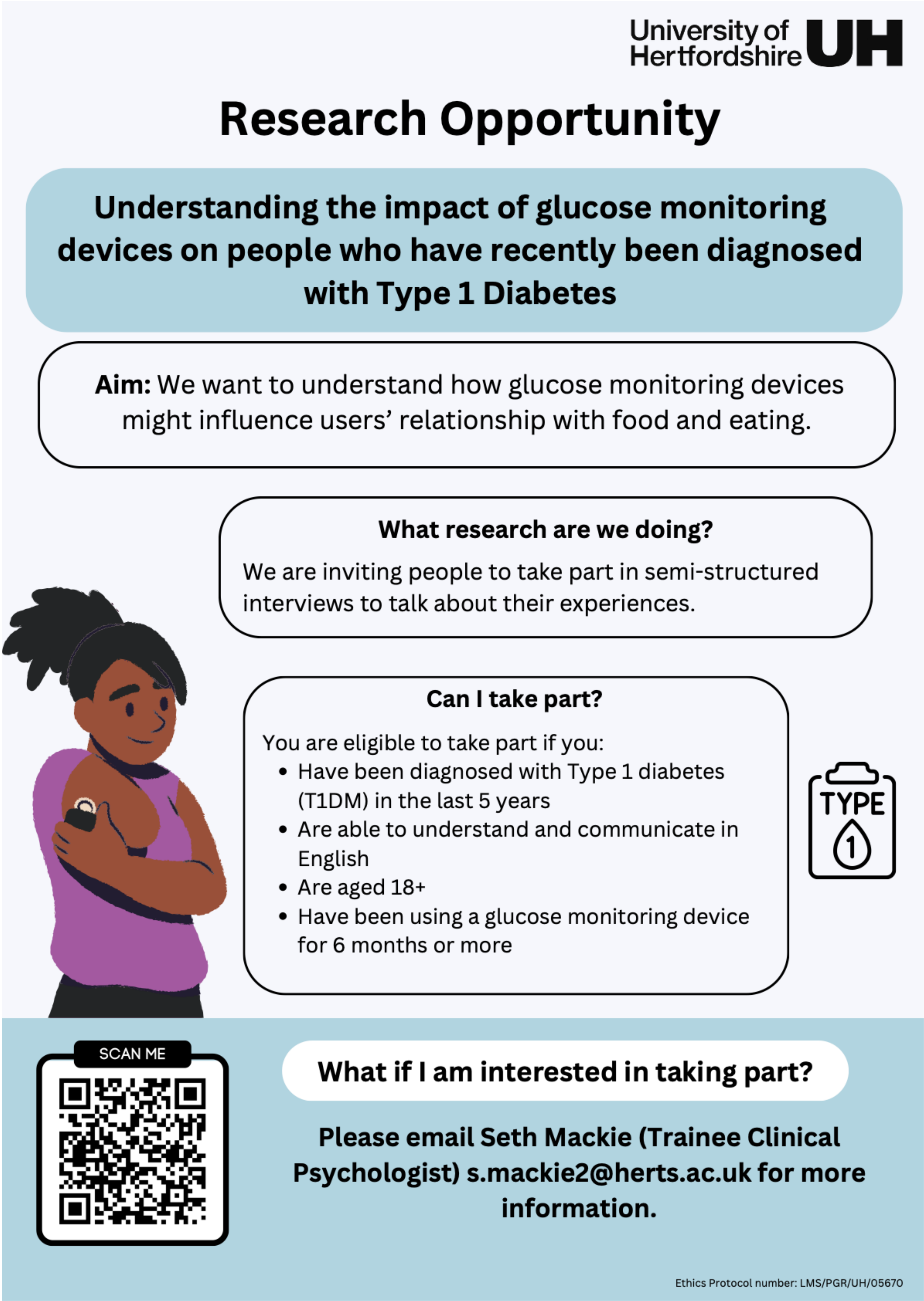
Quality Assessment of Mixed Methods Study Appraisal Tool (MMAT), version 2018 Table

Johnston et al., (2022)				
Category of study designs	**Methodological quality criteria**	**Responses**		
		Yes	No	Can't Tell
Screening questions (for all types)	S1. Are there clear research questions?	X		
	S2. Do the collected data allow to address the research questions?	X		
	Further appraisal may not be feasible or appropriate when the answer is 'No' or 'Can't tell' to one or both screening questions.			
1. Qualitative	1.1 Is the qualitative approach appropriate to answer the research question?	X		
	1.2 Are the qualitative data collection methods adequate to address the research question?	X		
	1.3 Are the findings adequately derived from the data?	X		
	1.4 Is the interpretation of results substantiated by data?	X		
	1.5 Is there coherence between qualitative data sources, collection, analysis and interpretation?	X		
2. Quantitative randomised controlled trials	2.1 Is randomisation appropriately performed?			N/A
	2.2 Are the groups comparable at baseline?			N/A
	2.3 Are there complete outcome data?			N/A
	2.4 Are outcomes assessors blinded to the intervention provided?			N/A
	2.5 Did the participants adhere to the assigned intervention?			N/A
3. Quantitative non-randomised	3.1 Are the participants representative of the target population?			N/A
	3.2 Are measurements appropriate regarding both the outcome and intervention (or exposure)?			N/A
	3.3 Are there complete outcome data?			N/A
	3.4 Are the confounders accounted for in the design and analysis?			N/A
	3.5 During the study period, is the intervention administered (or exposure occurred) as intended?			N/A
4. Quantitative descriptive	4.1 Is the sampling strategy relevant to address the research question?	X		
	4.2 Is the sample representative of the target population?	X		
	4.3 Are the measurements appropriate?	X		

	4.4 Is the risk of nonresponse bias low?	X		
	4.5 Is the statistical analysis appropriate to answer the research question?	X		
5. Mixed methods	5.1 Is there an adequate rationale for using a mixed methods design to address the research question?	X		
	5.2 Are the different components of the study effectively integrated to answer the research question?	X		
	5.3 Are the outputs of the integration of qualitative and quantitative results adequately addressed?	X		
	5.4 Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	X		
	5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?	X		

Appendix D

Study Advertisement Poster



University of Hertfordshire UH

Research Opportunity

Understanding the impact of glucose monitoring devices on people who have recently been diagnosed with Type 1 Diabetes

Aim: We want to understand how glucose monitoring devices might influence users' relationship with food and eating.

What research are we doing?

We are inviting people to take part in semi-structured interviews to talk about their experiences.

Can I take part?

You are eligible to take part if you:

- Have been diagnosed with Type 1 diabetes (T1DM) in the last 5 years
- Are able to understand and communicate in English
- Are aged 18+
- Have been using a glucose monitoring device for 6 months or more

What if I am interested in taking part?

Please email Seth Mackie (Trainee Clinical Psychologist) s.mackie2@herts.ac.uk for more information.

Ethics Protocol number: LMS/PGR/UH/05670

Appendix E

Participant Information Sheet

UNIVERSITY OF HERTFORDSHIRE

ETHICS COMMITTEE FOR STUDIES INVOLVING THE USE OF HUMAN PARTICIPANTS (‘ETHICS COMMITTEE’)

FORM EC6: PARTICIPANT INFORMATION SHEET

1 Title of study

Exploring the impact of continuous and other glucose monitoring devices on people who have been diagnosed with Type 1 Diabetes (T1DM) in the past five years and the impact on their relationship to food and eating behaviour.

2 Introduction

You are being invited to take part in a study. Before you decide whether to do so, it is important that you understand the study that is being undertaken and what your involvement will include. Please take the time to read the following information carefully and discuss it with others if you wish. Do not hesitate to ask us anything that is not clear or for any further information you would like to help you make your decision. Please do take your time to decide whether or not you wish to take part. The University’s regulation, UPR RE01, 'Studies Involving the Use of Human Participants' can be accessed via this link: https://www.herts.ac.uk/about-us/governance/university-policies-and-regulations-uprs/uprs (after accessing this website, scroll down to Letter S where you will find the regulation).

Thank you for reading this.

3 What is the purpose of this study?

The glucose monitoring device became widely available for people with T1DM in 2017. It is unclear how use of glucose monitoring devices may impact the risk factors and protective factors related to unhelpful eating behaviours. Consequently, it is important to understand the relationship people have with using technology and eating.

This study aims to understand the experiences of people who have received a recent diagnosis of T1DM, their experiences of using a glucose monitoring device and how this impacts their well-being and eating behaviours. This can provide useful insights in understanding how to support people navigating a chronic, life changing diagnosis whilst using glucose monitoring technology to self-manage their diabetes.

4 **Do I have to take part?**

It is completely up to you whether or not you decide to take part in this study. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form.
Agreeing to join the study does not mean that you have to complete it. You are free to withdraw at any stage without giving a reason. A decision to withdraw at any time, or a decision not to take part at all, will not affect any treatment/care that you may receive (should this be relevant). If for any reason, you would like to withdraw from this study – please email the researcher directly.

5 **Are there any age or other restrictions that may prevent me from participating?**

You will be eligible to take part in the study if you are:

- Aged 18 or over
- Have received a diagnosis of Type 1 Diabetes in the last 5 years and have been using glucose monitoring technology for 6 months or more
- Able to understand and communicate in English

6 **How long will my part in the study take?**

You will be asked to take part in a semi-structured interview which will last approximately 1 hour. You will only be asked to participate in one interview.

7 **What will happen to me if I take part?**

You will firstly be asked to complete a form to collect some basic demographic information. You will be asked to provide personal information such as your age, gender, ethnicity, length of time having a diagnosis of type 1 diabetes and length of time using a glucose monitoring device.
You will be asked to take part in a semi-structured interview with a trainee clinical psychologist. The interview will last around 1 hour and will be audio recorded. The interview will take place at a mutually convenient time and will take place either online or in person, depending on your preference.

8 **What are the possible disadvantages, risks or side effects of taking part?**

There is potential that you may feel upset during the interview when speaking about your experiences. If you wish to pause or terminate the interview at any point, please inform the interviewer.

Expressing your honest views about using a glucose monitoring device will not impact your care in any way. The researcher is not affiliated with or working for a diabetes service.

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

You will be able to voice your experiences and have the opportunity to contribute to the growing research on this topic. Your views may have the potential to contribute important gaps in research. Your views may also have important clinical implications for ensuring clinical services meet the needs of people who use these services.

10 **How will my taking part in this study be kept confidential?**

Any data that you provide will be kept confidential and will remain anonymous in accordance with the Data Protection Act (1998). The principal investigator will adhere to the principles of GDPR. Any published data will be kept anonymised. Pseudonyms will be used in the final study report to maintain participants anonymity.

11 **Audio-visual material**

Interviews will be audio recorded. Interviews will be transcribed by the researcher at the earliest opportunity.

12 **What will happen to the data collected within this study?**

The data collected will be stored electronically, in a password-protected environment, for 5 years, after which time it will be destroyed under secure conditions. Data will be anonymised prior to storage. Any information collected about you will be kept strictly confidential. Any identifiable information will be anonymised. Interview transcripts will be anonymised during data analysis. Any verbatim extracts used within the research write up will be fully anonymised. It may be possible for participants to identify quotes following publication. However, these will be anonymised so that it will not be possible for other people to identify you.

13 **Will the data be required for use in further studies?**

The data collected may be re-used or subjected to further analysis as part of a future ethically-approved study; the data to be re-used will be anonymised. The results of the study and/or the data collected (in anonymised form) may be deposited in an open access repository.

14 **Who has reviewed this study?**

This study has been reviewed by: The University of Hertfordshire Health, Science, Engineering and Technology Ethics Committee with Delegated Authority. The UH protocol number is LMS/PGR/UH/05670

15 **Who can I contact if I have any questions?**

If you would like further information or would like to discuss any details personally, please get in touch with me, by email: Seth Mackie (Trainee Clinical Psychologist) s.mackie2@herts.ac.uk. You may also get in touch with my supervisor, Jennifer Heath, j.heath@herts.ac.uk.

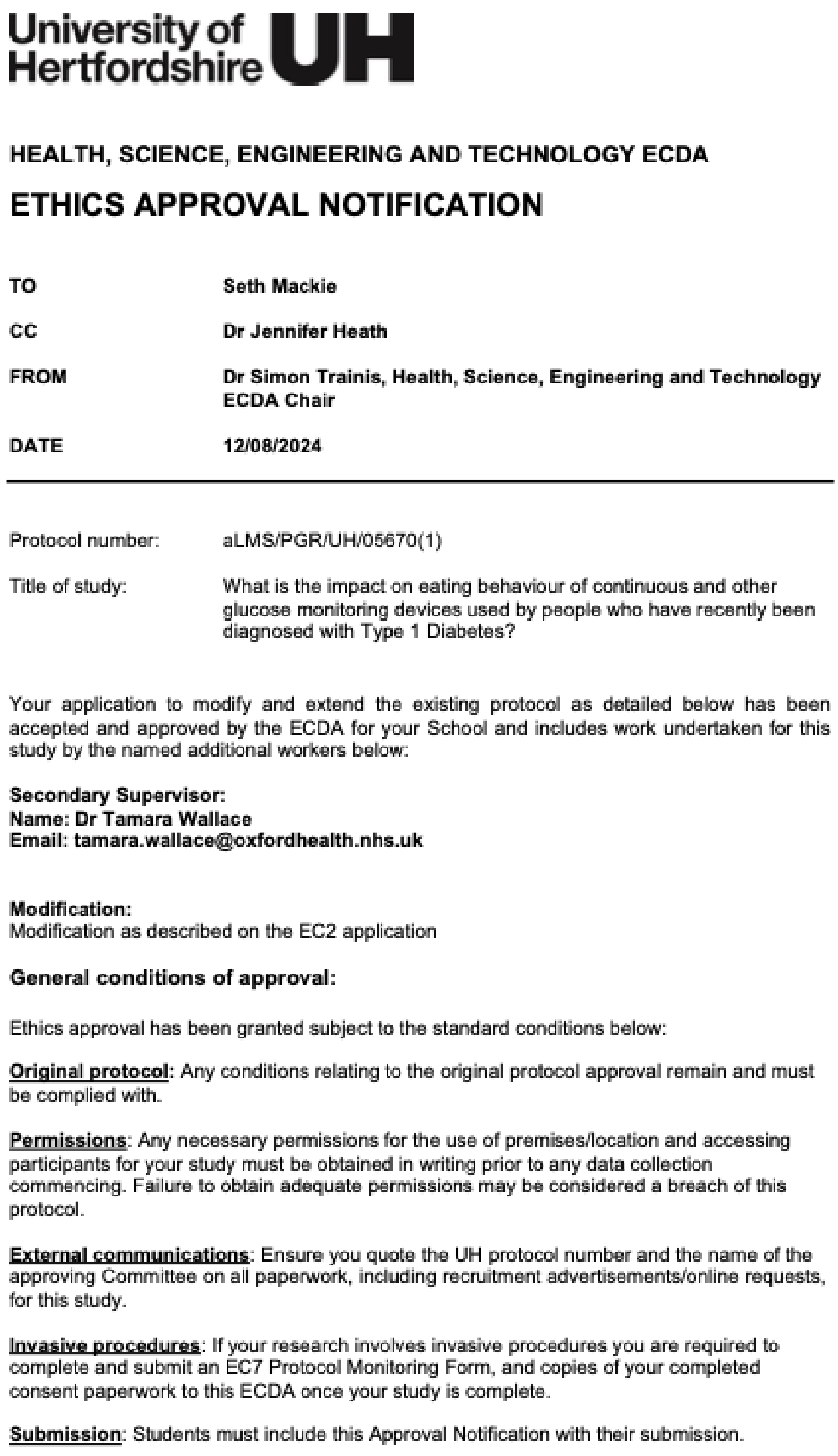
Although we hope it is not the case, if you have any complaints or concerns about any aspect of the way you have been approached or treated during the course of this study, please write to the University's Secretary and Registrar at the following address:

Secretary and Registrar
University of Hertfordshire
College Lane
Hatfield
Herts
AL10 9AB

Thank you very much for reading this information and giving consideration to taking part in this study.

Appendix F

University of Hertfordshire Ethical Approval



University of Hertfordshire UH

HEALTH, SCIENCE, ENGINEERING AND TECHNOLOGY ECDA

ETHICS APPROVAL NOTIFICATION

TO	**Seth Mackie**
CC	**Dr Jennifer Heath**
FROM	**Dr Simon Trainis, Health, Science, Engineering and Technology ECDA Chair**
DATE	**12/08/2024**

Protocol number:	aLMS/PGR/UH/05670(1)
Title of study:	What is the impact on eating behaviour of continuous and other glucose monitoring devices used by people who have recently been diagnosed with Type 1 Diabetes?

Your application to modify and extend the existing protocol as detailed below has been accepted and approved by the ECDA for your School and includes work undertaken for this study by the named additional workers below:

Secondary Supervisor:
Name: Dr Tamara Wallace
Email: tamara.wallace@oxfordhealth.nhs.uk

Modification:
Modification as described on the EC2 application

General conditions of approval:

Ethics approval has been granted subject to the standard conditions below:

Original protocol: Any conditions relating to the original protocol approval remain and must be complied with.

Permissions: Any necessary permissions for the use of premises/location and accessing participants for your study must be obtained in writing prior to any data collection commencing. Failure to obtain adequate permissions may be considered a breach of this protocol.

External communications: Ensure you quote the UH protocol number and the name of the approving Committee on all paperwork, including recruitment advertisements/online requests, for this study.

Invasive procedures: If your research involves invasive procedures you are required to complete and submit an EC7 Protocol Monitoring Form, and copies of your completed consent paperwork to this ECDA once your study is complete.

Submission: Students must include this Approval Notification with their submission.

Validity:

This approval is valid:

From: 12/08/2024

To: 06/06/2025

Please note:

Failure to comply with the conditions of approval will be considered a breach of protocol and may result in disciplinary action which could include academic penalties.
Additional documentation requested as a condition of this approval protocol may be submitted via your supervisor to the Ethics Clerks as it becomes available. All documentation relating to this study, including the information/documents noted in the conditions above, must be available for your supervisor at the time of submitting your work so that they are able to confirm that you have complied with this protocol.

Should you amend any aspect of your research or wish to apply for an extension to your study you will need your supervisor's approval (if you are a student) and must complete and submit a further EC2 request.
Approval applies specifically to the research study/methodology and timings as detailed in your Form EC1A or as detailed in the EC2 request. In cases where the amendments to the original study are deemed to be substantial, a new Form EC1A may need to be completed prior to the study being undertaken.

Failure to report adverse circumstance/s may be considered misconduct.
Should adverse circumstances arise during this study such as physical reaction/harm, mental/emotional harm, intrusion of privacy or breach of confidentiality this must be reported to the approving Committee immediately.

Appendix G

Participant Debrief Form and Support Information

Thank you for taking the time to participate in this research interview.

As mentioned, the aims of the research are: To understand how people newly diagnosed with T1DM adapt to the use of glucose monitoring devices and whether this impacts on their relationship to food and eating behaviours.

If our conversation today has left you feeling as though you would like further support with aspects of your diabetes management, please contact your GP or Diabetes service. You may also like to access further support from the following organisations:

Diabetes UK: https://www.diabetes.org.uk/. Diabetes UK have a number of forums for people living with type 1 diabetes.

BEAT Eating Disorders Charity: https://www.beateatingdisorders.org.uk/

If you feel unwell and are concerned about your diabetes management, please contact your GP or diabetes care team. If your situation is urgent, go to A&E. Contact 999 if you cannot get yourself to hospital and are in need of assistance.

The findings of this research will be written into a doctoral thesis and academic paper. If you have expressed an interest in receiving a copy of the final research report, this will be sent to you in due course.

We appreciate that sharing your experiences may have been difficult for you. If you would like any further support, you may find it useful to get in contact with one of the following organisations below:

Thank you again for your time.

Seth Mackie (Trainee Clinical Psychologist)
s.mackie2@herts.ac.uk

Appendix H

Risk Management Protocol

Risk Management Protocol - For Participants

Prior to any interview taking place, research supervisors will be made aware of the time and location of the interview so that the researcher is able to contact them (telephone or email) should any concerns arise.

Situation – A participant becomes distressed:

1. The interview will be paused and a break offered.
2. Researcher will employ therapeutic skills to contain the participants' distress. De-escalation skills can be used when required. Researchers will not provide advice or therapeutic support during at this time as participants have consented to research, they have not consented to therapy.
3. Participants will be reminded that they do not have to carry on with the interview and can terminate it at any time.
4. Researchers will check-in with the participant that they are safe to leave the interview room before they leave (using calming techniques if required). Supervisors contacted if required,
5. Before they leave, participants will be provided a de-briefing sheet which includes signposting to charities, foundations and help-lines.

Situation – B participant discloses risky experiences

Interview questions explore the impact of using a glucose monitoring device, but participants may disclose risky experiences (e.g. ignoring high readings, intentionally spiking their blood sugar levels, disclosure of significant anxiety regarding low blood sugar levels). As a researcher who does not have contact with their physical health teams, they will be recommended to make contact with their GP, diabetes team, A&E or 999 if they cannot get themselves to hospital if they are feeling unwell.

Risk Management Protocol - For Researchers

Prior to any interview taking place, research supervisors will be made aware of the time and location of the interview so that the researchers are able to contact them (telephone or email) should any concerns arise.

Research supervisors also have therapeutic skills which can be drawn on if needed post-interview.

Following lone-working guidance, supervisors will be provided information on location and time of interview. Supervisors will be informed when researcher has arrived, and then when departed. Should confirmation of safe departure not be received by supervisor, then action will be taken through the following steps: Supervisor will phone researcher, wait 30 mins and phone again, if no response after 1 hour, supervisor will report to police.

Appendix I

Interview Schedule

This provides an outline of topics that will likely be covered.

Thank you for agreeing to participate in this study. We're here today to talk about your experiences of diabetes, glucose monitoring, eating and wellbeing and how we make sense and relate to such experiences. The interview should take about one hour to complete. I appreciate that this could be challenging to talk about, so please let me know if you wish to pause or stop altogether. Anything you say will be kept confidential unless I am worried about your safety.

Check consent form signed

Demographic information – Can I just check:

- What is your age?
- What gender do you identify as?
- What is your ethnicity?
- For how long have you been diagnosed with Type 1 Diabetes? (Years, Months)
- Check device. For how long have you been using a Glucose Monitoring device? (Years, Months)

Introduction

- Introduction of researcher and context of the research.
- Pseudonym assigned.
- Voucher
- Contacts for further support

Permission to start recording

Diabetes diagnosis

- Broad - Can you tell me about your experience of being diagnosed with diabetes?
- If you can think back to when you were diagnosed with diabetes, do you remember if this affected your well-being at all?
- Do you have any family or friends with T1D?
- Can you remember how your eating habits were affected by the diagnosis?
    - Were there new foods you started eating? Anything you avoided?
    - Did you feel differently about any foods?
    - Have these changes been maintained?

CGM

- Broad - Can you tell me a bit about your experience of using the CGM device?
- How did you start using the CGM device? Did anything attract you to using it?
- What ways have you found the device helpful for managing your diabetes?
- What ways have you found the device unhelpful for managing your diabetes?
- Have you been doing anything differently since using the CGM? (e.g. regarding broader diabetes self-management and daily life)

- Since using the device, have you changed anything about your eating habits? (E.g., what you eat, your portion sizes, preparation techniques, eating with others)
- Have you noticed any new thoughts or feelings about food?

- Since using the device, how often on average do you check your blood sugar levels per day?
    - How does this compare to how often you would finger prick before using the CGM?
    - Can you tell me about what motivates you to scan the sensor/look at your phone/device?
- Since using device, has your awareness of your blood glucose level changed? (e.g. have you been more aware of when your glucose is high or low?)
- Can you tell me about the graph and the trend arrows that the device produces?
    - It is helpful/unhelpful?
    - How does it make you feel?
    - Do you notice any thoughts when you look at it?

- Is there any support you would have found helpful when using the device?
- Based on your experience of what you found helpful and unhelpful, is there anyone that you would not recommend the CGM to? (e.g., people of certain ages, personality types, physical issues etc.)
- How did you find out about this research?

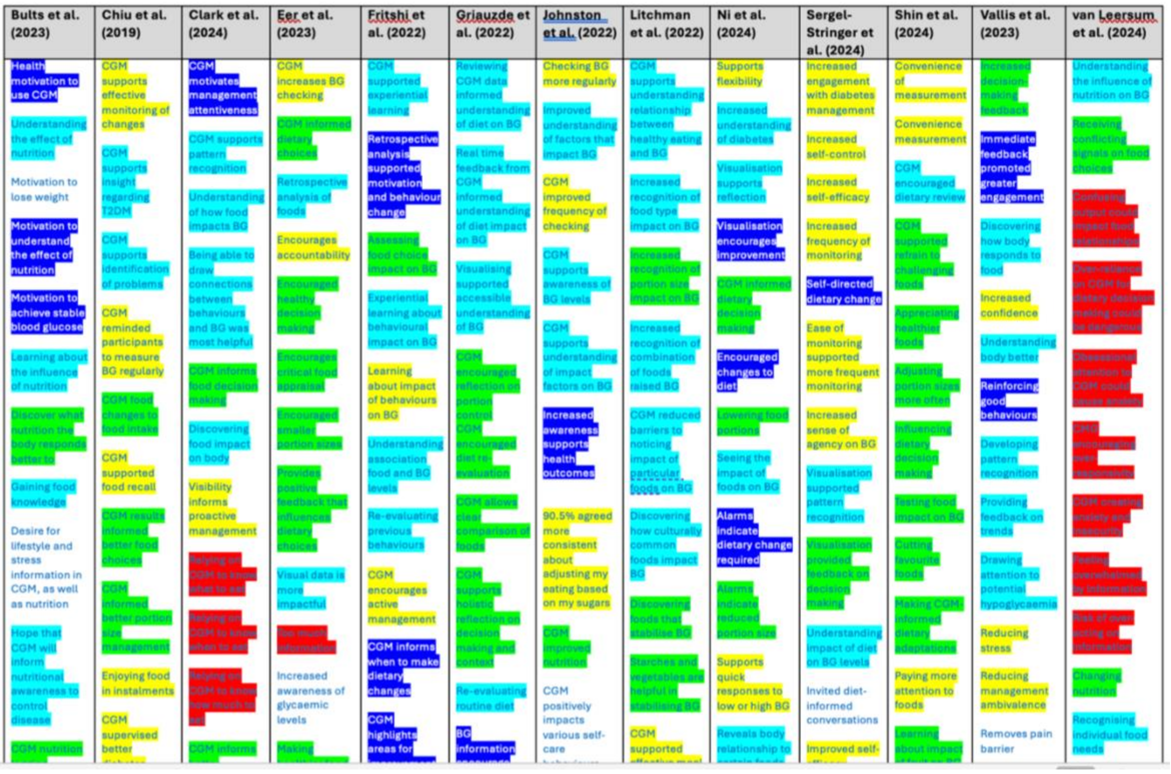
- Is there anything else that you would like to add before we finish?

- Thank you, we have now finished the interview. I will now stop the recording.

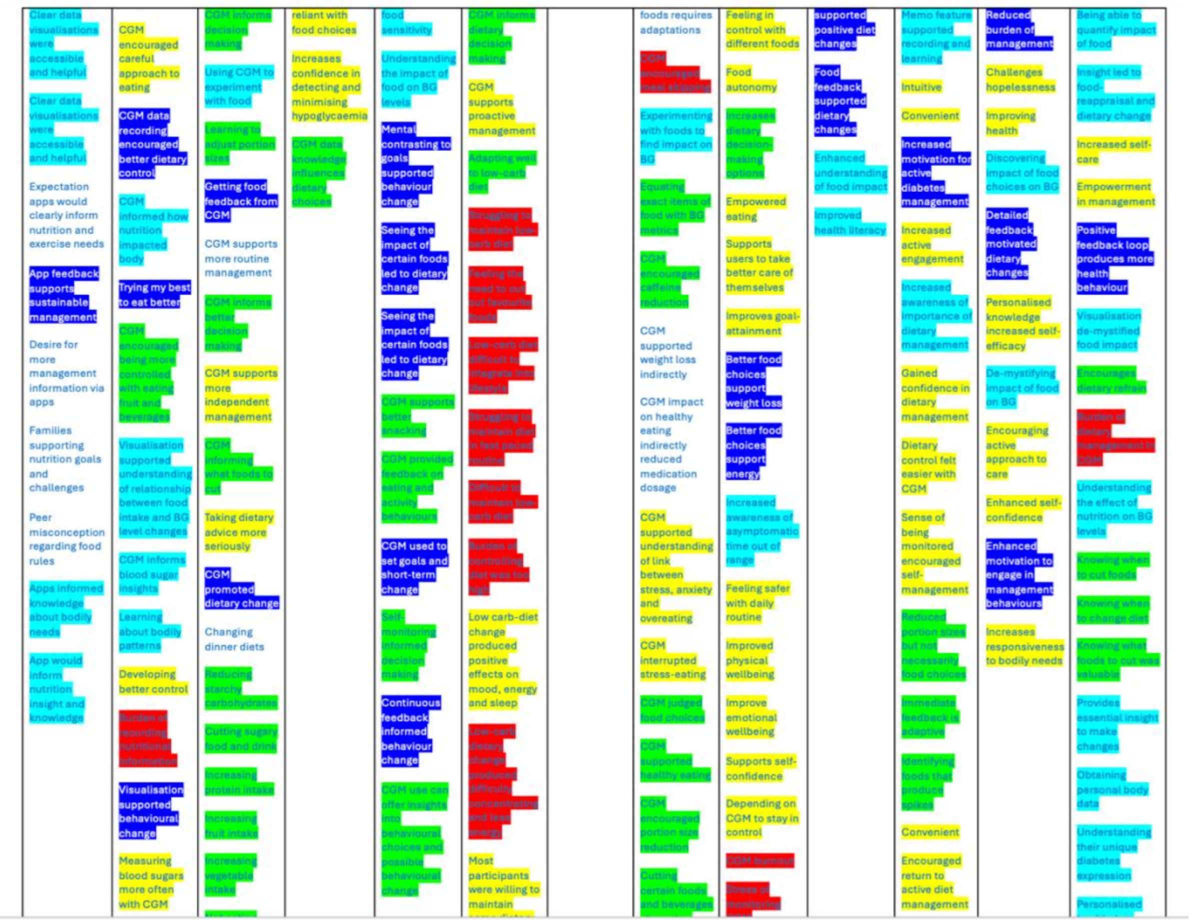
Appendix J

SLR Theme Development Process

Exploring the Nutritional Landscape + Fuelling Motivation
Data-Driven Diets
Intentional Eating
Data Overload



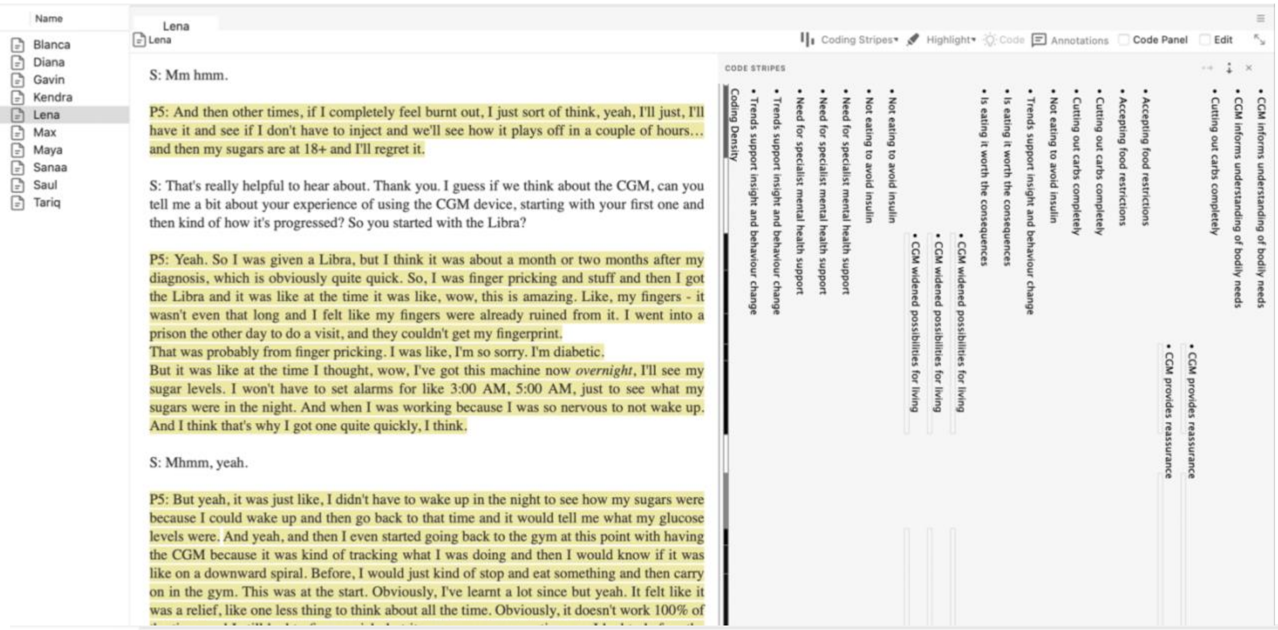
Bults et al. (2023)	Chiu et al. (2019)	Clark et al. (2024)	Eer et al. (2023)	Fritshi et al. (2022)	Griauzde et al. (2022)	Johnston et al. (2022)	Litchman et al. (2022)	Ni et al. (2024)	Sergel-Stringer et al. (2024)	Shin et al. (2024)	Vallis et al. (2023)	van Leersum et al. (2024)
Health motivation to use CGM Understanding the effect of nutrition Motivation to lose weight Motivation to understand the effect of nutrition Motivation to achieve stable blood glucose Learning about the influence of nutrition Discover what nutrition the body responds better to Gaining food knowledge Desire for lifestyle and stress information in CGM, as well as nutrition Hope that CGM will inform nutritional awareness to control disease CGM nutrition	CGM supports effective monitoring of changes CGM supports insight regarding T2DM CGM supports identification of problems CGM reminded participants to measure BG regularly CGM food changes to food intake CGM supported food recall CGM results informed better food choices CGM informed better portion size management Enjoying food in instalments CGM supervised better	CGM motivates management attentiveness CGM supports pattern recognition Understanding of how food impacts BG Being able to draw connections between behaviours and BG was most helpful CGM informs food decision making Discovering food impact on body Visibility informs proactive management Relying on CGM to know what to eat Relying on CGM to know when to eat Relying on CGM to know how much to eat CGM informs	CGM increases BG checking CGM informed dietary choices Retrospective analysis of foods Encourages accountability Encouraged healthy decision making Encourages critical food appraisal Encouraged smaller portion sizes Provides positive feedback that influences dietary choices Visual data is more impactful Too much information Increased awareness of glycaemic levels Making	CGM supported experiential learning Retrospective analysis supported motivation and behaviour change Assessing food choice impact on BG Experiential learning about behavioural impact on BG Learning about impact of behaviours on BG Understanding association food and BG levels Re-evaluating previous behaviours CGM encourages active management CGM informs when to make dietary changes CGM highlights areas for	Reviewing CGM data informed understanding of diet on BG Real time feedback from CGM informed understanding of diet impact on BG Visualising supported accessible understanding of BG CGM encouraged reflection on portion control CGM encouraged diet re-evaluation CGM allows clear comparison of foods CGM supports holistic reflection on decision making and context Re-evaluating routine diet BG information	Checking BG more regularly Improved understanding of factors that impact BG CGM improved frequency of checking CGM supports awareness of BG levels CGM supports understanding of impact factors on BG Increased awareness supports health outcomes 90.5% agreed more consistent about adjusting my eating based on my sugars CGM improved nutrition CGM positively impacts various self-care	CGM supports understanding relationship between healthy eating and BG Increased recognition of food type impact on BG Increased recognition of portion size impact on BG Increased recognition of combination of foods raised BG CGM reduced barriers to noticing impact of particular foods on BG Discovering how culturally common foods impact BG Discovering foods that stabilise BG Starches and vegetables are helpful in stabilising BG CGM supported	Supports flexibility Increased understanding of diabetes Visualisation supports reflection Visualisation encourages improvement CGM informed dietary decision making Encouraged changes to diet Lowering food portions Seeing the impact of foods on BG Alarms indicate dietary change required Alarms indicate reduced portion size Supports quick responses to low or high BG Reveals body relationship to	Increased engagement with diabetes management Increased self-control Increased self-efficacy Increased frequency of monitoring Self-directed dietary change Ease of monitoring supported more frequent monitoring Increased sense of agency on BG Visualisation supported pattern recognition Visualisation provided feedback on decision making Understanding impact of diet on BG levels Invited diet-informed conversations Improved self-	Convenience of measurement Convenience measurement CGM encouraged dietary review CGM supported refrain to challenging foods Appreciating healthier foods Adjusting portion sizes more often Influencing dietary decision making Testing food impact on BG Cutting favourite foods Making CGM-informed dietary adaptations Paying more attention to foods Learning about impact	Increased decision-making feedback Immediate feedback promoted greater engagement Discovering how body responds to food Increased confidence Understanding body better Reinforcing good behaviours Developing pattern recognition Providing feedback on trends Drawing attention to potential hypoglycaemia Reducing stress Reducing management ambivalence Removes pain barrier	Understanding the influence of nutrition on BG Receiving conflicting signals on food choices Confusing output could impact food relationships Over-reliance on CGM for dietary decision making could be dangerous Obsessional attention to CGM could cause anxiety CMG encouraging over-responsibility CGM creating anxiety and insecurity Feeling overwhelmed by information Risk of over-acting on information Changing nutrition Recognising individual food needs



Clear data visualisations were accessible and helpful Clear data visualisations were accessible and helpful Expectation apps would clearly inform nutrition and exercise needs App feedback supports sustainable management Desire for more management information via apps Families supporting nutrition goals and challenges Peer misconception regarding food rules Apps informed knowledge about bodily needs App would inform nutrition insight and knowledge	CGM encouraged careful approach to eating CGM data recording encouraged better dietary control CGM informed how nutrition impacted body Trying my best to eat better CGM encouraged being more controlled with eating fruit and beverages Visualisation supported understanding of relationship between food intake and BG level changes CGM informs blood sugar insights Learning about bodily patterns Developing better control Burden of recording nutritional information Visualisation supported behavioural change Measuring blood sugars more often with CGM	CGM informs decision making Using CGM to experiment with food Learning to adjust portion sizes Getting food feedback from CGM CGM supports more routine management CGM informs better decision making CGM supports more independent management CGM informing what foods to cut Taking dietary advice more seriously CGM promoted dietary change Changing dinner diets Reducing starchy carbohydrates Cutting sugary food and drink Increasing protein intake Increasing fruit intake Increasing vegetable intake	reliant with food choices Increases confidence in detecting and minimising hypoglycaemia CGM data knowledge influences dietary choices	food sensitivity Understanding the impact of food on BG levels Mental contrasting to goals supported behaviour change Seeing the impact of certain foods led to dietary change Seeing the impact of certain foods led to dietary change CGM supports better snacking CGM provided feedback on eating and activity behaviours CGM used to set goals and short-term change Self-monitoring informed decision making Continuous feedback informed behaviour change CGM use can offer insights into behavioural choices and possible behavioural change	CGM informs dietary decision making CGM supports proactive management Adapting well to low-carb diet Struggling to maintain low-carb diet Feeling the need to cut out favourite foods Low-carb diet difficult to integrate into lifestyle Struggling to maintain diet in fast paced routine Difficult to maintain low-carb diet Burden of controlling diet was too high Low carb-diet change produced positive effects on mood, energy and sleep Low-carb dietary change produced difficulty concentrating and less energy Most participants were willing to maintain		foods requires adaptations CGM encouraged meal skipping Experimenting with foods to find impact on BG Equating exact items of food with BG metrics CGM encouraged caffeine reduction CGM supported weight loss indirectly CGM impact on healthy eating indirectly reduced medication dosage CGM supported understanding of link between stress, anxiety and overeating CGM interrupted stress-eating CGM judged food choices CGM supported healthy eating CGM encouraged portion size reduction Cutting certain foods and beverages	Feeling in control with different foods Food autonomy Increases dietary decision-making options Empowered eating Supports users to take better care of themselves Improves goal-attainment Better food choices support weight loss Better food choices support energy Increased awareness of asymptomatic time out of range Feeling safer with daily routine Improved physical wellbeing Improve emotional wellbeing Supports self-confidence Depending on CGM to stay in control CGM burnout Stress of monitoring	supported positive diet changes Food feedback supported dietary changes Enhanced understanding of food impact Improved health literacy	Memo feature supported recording and learning Intuitive Convenient Increased motivation for active diabetes management Increased active engagement Increased awareness of importance of dietary management Gained confidence in dietary management Dietary control felt easier with CGM Sense of being monitored encouraged self-management Reduced portion sizes but not necessarily food choices Immediate feedback is adaptive Identifying foods that produce spikes Convenient Encouraged return to active diet management	Reduced burden of management Challenges hopelessness Improving health Discovering impact of food choices on BG Detailed feedback motivated dietary changes Personalised knowledge increased self-efficacy De-mystifying impact of food on BG Encouraging active approach to care Enhanced self-confidence Enhanced motivation to engage in management behaviours Increases responsiveness to bodily needs	Being able to quantify impact of food Insight led to food-reappraisal and dietary change Increased self-care Empowerment in management Positive feedback loop produces more health behaviour Visualisation de-mystified food impact Encourages dietary refrain Burden of dietary management in CGM Understanding the effect of nutrition on BG levels Knowing when to cut foods Knowing when to change diet Knowing what foods to cut was valuable Provides essential insight to make changes Obtaining personal body data Understanding their unique diabetes expression Personalised

Appendix K

Transcript Coding in NVIVO Extracts



S: Mm hmm.

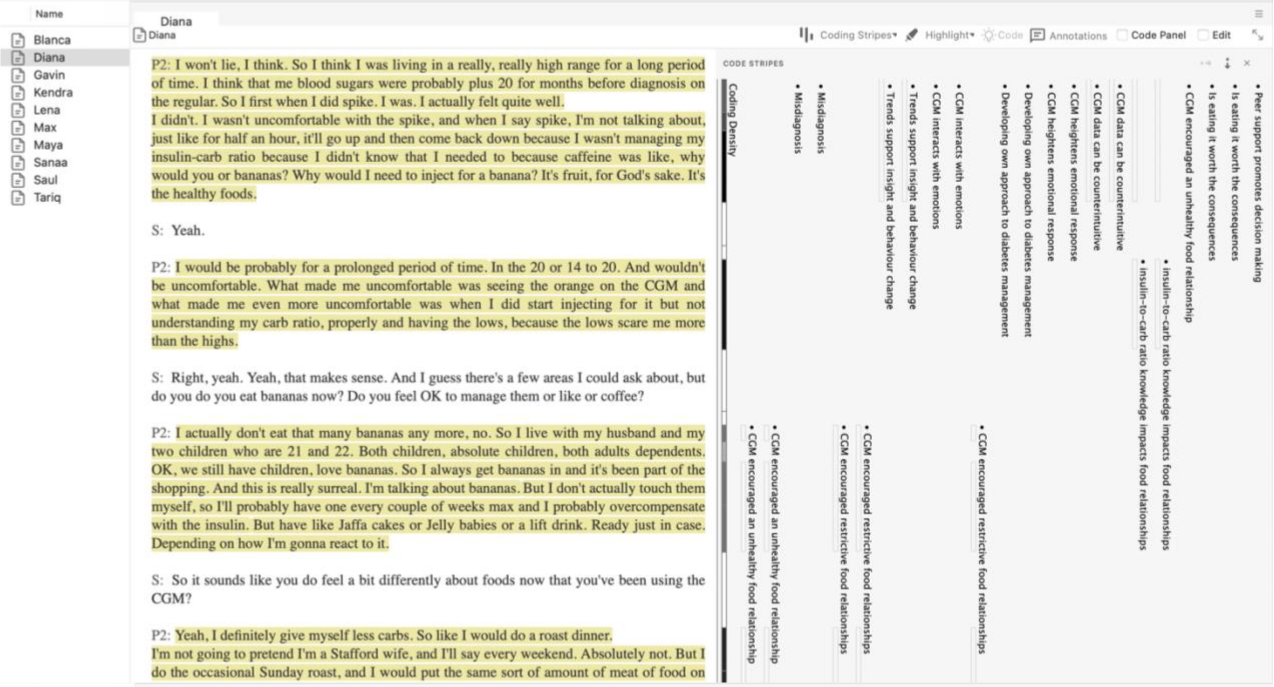
P5: And then other times, if I completely feel burnt out, I just sort of think, yeah, I'll just, I'll have it and see if I don't have to inject and we'll see how it plays off in a couple of hours… and then my sugars are at 18+ and I'll regret it.

S: That's really helpful to hear about. Thank you. I guess if we think about the CGM, can you tell me a bit about your experience of using the CGM device, starting with your first one and then kind of how it's progressed? So you started with the Libra?

P5: Yeah. So I was given a Libra, but I think it was about a month or two months after my diagnosis, which is obviously quite quick. So, I was finger pricking and stuff and then I got the Libra and it was like at the time it was like, wow, this is amazing. Like, my fingers - it wasn't even that long and I felt like my fingers were already ruined from it. I went into a prison the other day to do a visit, and they couldn't get my fingerprint.
That was probably from finger pricking. I was like, I'm so sorry. I'm diabetic.
But it was like at the time I thought, wow, I've got this machine now *overnight*, I'll see my sugar levels. I won't have to set alarms for like 3:00 AM, 5:00 AM, just to see what my sugars were in the night. And when I was working because I was so nervous to not wake up. And I think that's why I got one quite quickly, I think.

S: Mhmm, yeah.

P5: But yeah, it was just like, I didn't have to wake up in the night to see how my sugars were because I could wake up and then go back to that time and it would tell me what my glucose levels were. And yeah, and then I even started going back to the gym at this point with having the CGM because it was kind of tracking what I was doing and then I would know if it was like on a downward spiral. Before, I would just kind of of stop and eat something and then carry on in the gym. This was at the start. Obviously, I've learnt a lot since but yeah. It felt like it was a relief, like one less thing to think about all the time. Obviously, it doesn't work 100% of



P2: I won't lie, I think. So I think I was living in a really, really high range for a long period of time. I think that me blood sugars were probably plus 20 for months before diagnosis on the regular. So I first when I did spike. I was. I actually felt quite well.
I didn't. I wasn't uncomfortable with the spike, and when I say spike, I'm not talking about, just like for half an hour, it'll go up and then come back down because I wasn't managing my insulin-carb ratio because I didn't know that I needed to because caffeine was like, why would you or bananas? Why would I need to inject for a banana? It's fruit, for God's sake. It's the healthy foods.

S: Yeah.

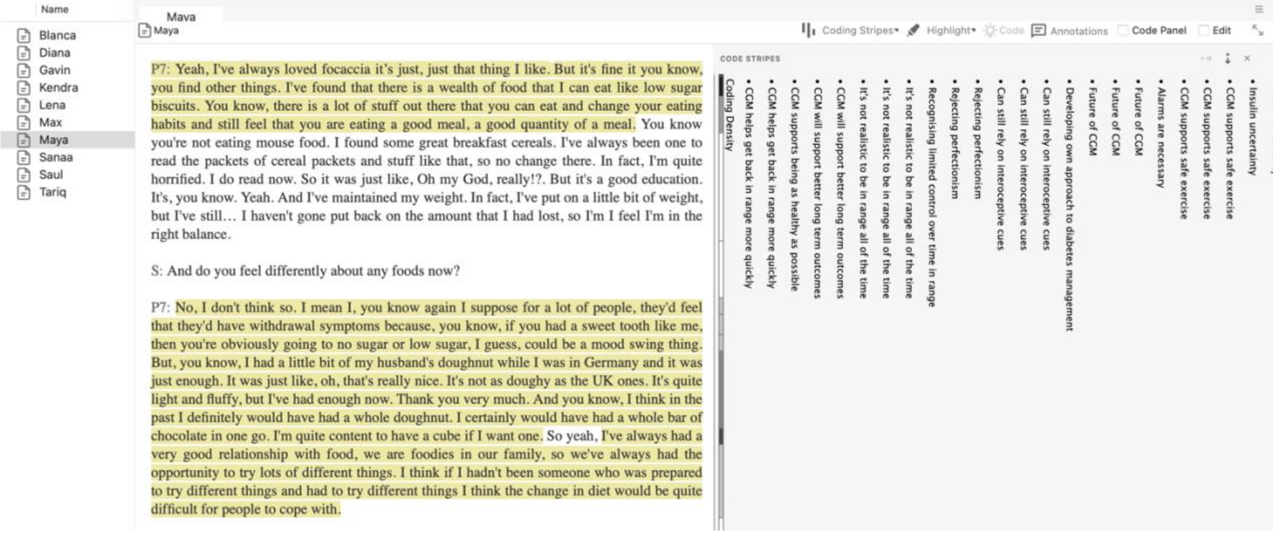
P2: I would be probably for a prolonged period of time. In the 20 or 14 to 20. And wouldn't be uncomfortable. What made me uncomfortable was seeing the orange on the CGM and what made me even more uncomfortable was when I did start injecting for it but not understanding my carb ratio, properly and having the lows, because the lows scare me more than the highs.

S: Right, yeah. Yeah, that makes sense. And I guess there's a few areas I could ask about, but do you do you eat bananas now? Do you feel OK to manage them or like or coffee?

P2: I actually don't eat that many bananas any more, no. So I live with my husband and my two children who are 21 and 22. Both children, absolute children, both adults dependents. OK, we still have children, love bananas. So I always get bananas in and it's been part of the shopping. And this is really surreal. I'm talking about bananas. But I don't actually touch them myself, so I'll probably have one every couple of weeks max and I probably overcompensate with the insulin. But have like Jaffa cakes or Jelly babies or a lift drink. Ready just in case. Depending on how I'm gonna react to it.

S: So it sounds like you do feel a bit differently about foods now that you've been using the CGM?

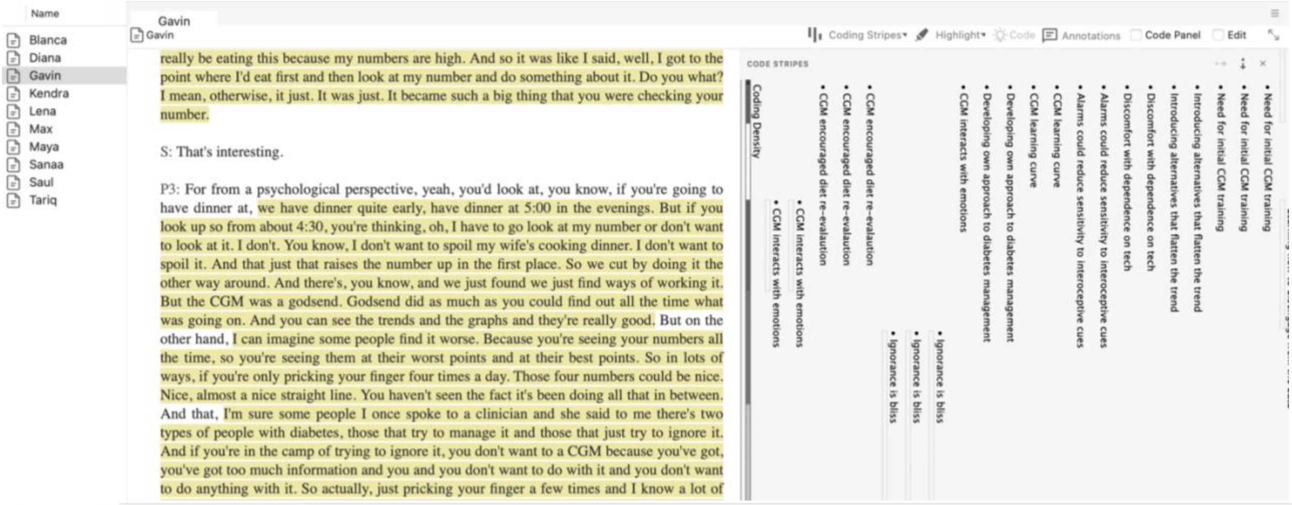
P2: Yeah, I definitely give myself less carbs. So like I would do a roast dinner.
I'm not going to pretend I'm a Stafford wife, and I'll say every weekend. Absolutely not. But I do the occasional Sunday roast, and I would put the same sort of amount of meat of food on



P7: Yeah, I've always loved focaccia it's just, just that thing I like. But it's fine it you know, you find other things. I've found that there is a wealth of food that I can eat like low sugar biscuits. You know, there is a lot of stuff out there that you can eat and change your eating habits and still feel that you are eating a good meal, a good quantity of a meal. You know you're not eating mouse food. I found some great breakfast cereals. I've always been one to read the packets of cereal packets and stuff like that, so no change there. In fact, I'm quite horrified. I do read now. So it was just like, Oh my God, really!?. But it's a good education. It's, you know. Yeah. And I've maintained my weight. In fact, I've put on a little bit of weight, but I've still… I haven't gone put back on the amount that I had lost, so I'm I feel I'm in the right balance.

S: And do you feel differently about any foods now?

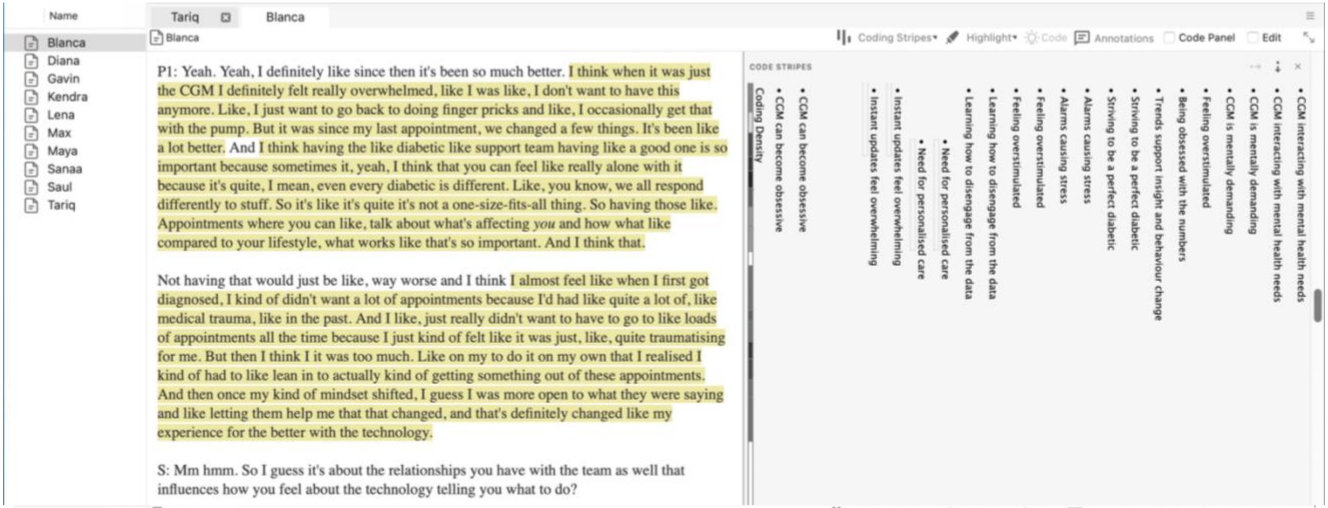
P7: No, I don't think so. I mean I, you know again I suppose for a lot of people, they'd feel that they'd have withdrawal symptoms because, you know, if you had a sweet tooth like me, then you're obviously going to no sugar or low sugar, I guess, could be a mood swing thing. But, you know, I had a little bit of my husband's doughnut while I was in Germany and it was just enough. It was just like, oh, that's really nice. It's not as doughy as the UK ones. It's quite light and fluffy, but I've had enough now. Thank you very much. And you know, I think in the past I definitely would have had a whole doughnut. I certainly would have had a whole bar of chocolate in one go. I'm quite content to have a cube if I want one. So yeah, I've always had a very good relationship with food, we are foodies in our family, so we've always had the opportunity to try lots of different things. I think if I hadn't been someone who was prepared to try different things and had to try different things I think the change in diet would be quite difficult for people to cope with.



really be eating this because my numbers are high. And so it was like I said, well, I got to the point where I'd eat first and then look at my number and do something about it. Do you what? I mean, otherwise, it just. It was just. It became such a big thing that you were checking your number.

S: That's interesting.

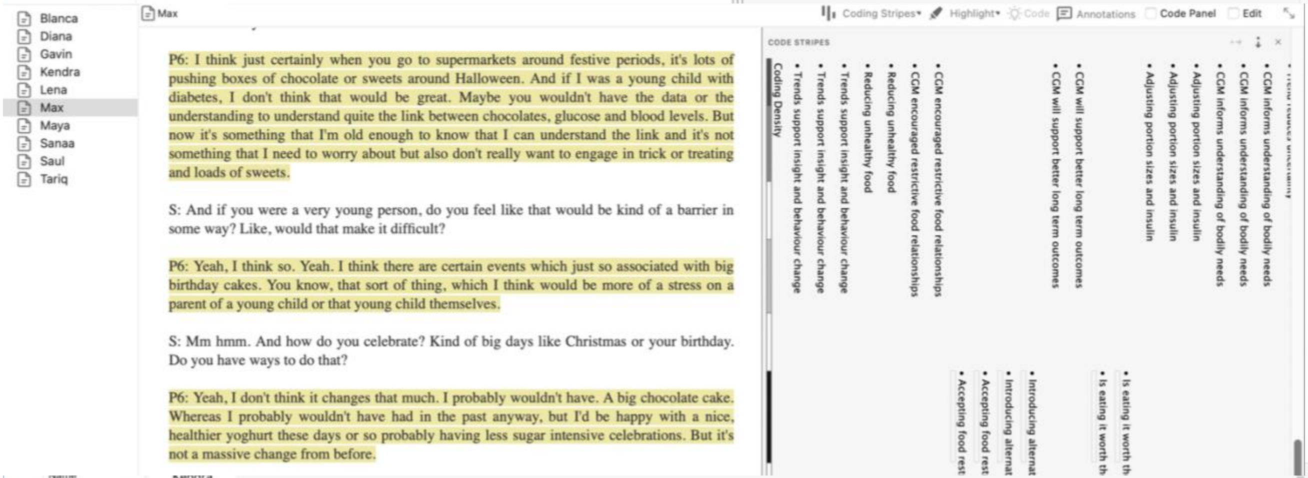
P3: For from a psychological perspective, yeah, you'd look at, you know, if you're going to have dinner at, we have dinner quite early, have dinner at 5:00 in the evenings. But if you look up so from about 4:30, you're thinking, oh, I have to go look at my number or don't want to look at it. I don't. You know, I don't want to spoil my wife's cooking dinner. I don't want to spoil it. And that just that raises the number up in the first place. So we cut by doing it the other way around. And there's, you know, and we just found we just find ways of working it. But the CGM was a godsend. Godsend did as much as you could find out all the time what was going on. And you can see the trends and the graphs and they're really good. But on the other hand, I can imagine some people find it worse. Because you're seeing your numbers all the time, so you're seeing them at their worst points and at their best points. So in lots of ways, if you're only pricking your finger four times a day. Those four numbers could be nice. Nice, almost a nice straight line. You haven't seen the fact it's been doing all that in between. And that, I'm sure some people I once spoke to a clinician and she said to me there's two types of people with diabetes, those that try to manage it and those that just try to ignore it. And if you're in the camp of trying to ignore it, you don't want to a CGM because you've got, you've got too much information and you and you don't want to do with it and you don't want to do anything with it. So actually, just pricking your finger a few times and I know a lot of



P1: Yeah. Yeah, I definitely like since then it's been so much better. I think when it was just the CGM I definitely felt really overwhelmed, like I was like, I don't want to have this anymore. Like, I just want to go back to doing finger pricks and like, I occasionally get that with the pump. But it was since my last appointment, we changed a few things. It's been like a lot better. And I think having the like diabetic like support team having like a good one is so important because sometimes it, yeah, I think that you can feel like really alone with it because it's quite, I mean, even every diabetic is different. Like, you know, we all respond differently to stuff. So it's like it's quite it's not a one-size-fits-all thing. So having those like. Appointments where you can like, talk about what's affecting *you* and how what like compared to your lifestyle, what works like that's so important. And I think that.

Not having that would just be like, way worse and I think I almost feel like when I first got diagnosed, I kind of didn't want a lot of appointments because I'd had like quite a lot of, like medical trauma, like in the past. And I like, just really didn't want to have to go to like loads of appointments all the time because I just kind of felt like it was just, like, quite traumatising for me. But then I think I it was too much. Like on my to do it on my own that I realised I kind of had to like lean in to actually kind of getting something out of these appointments. And then once my kind of mindset shifted, I guess I was more open to what they were saying and like letting them help me that that changed, and that's definitely changed like my experience for the better with the technology.

S: Mm hmm. So I guess it's about the relationships you have with the team as well that influences how you feel about the technology telling you what to do?



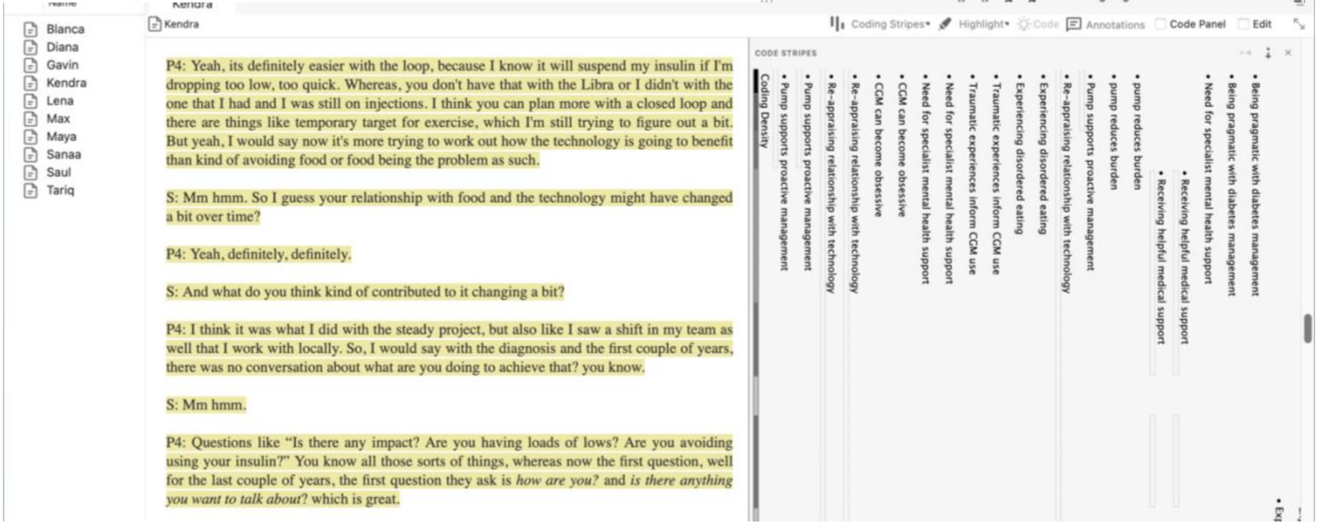
P6: I think just certainly when you go to supermarkets around festive periods, it's lots of pushing boxes of chocolate or sweets around Halloween. And if I was a young child with diabetes, I don't think that would be great. Maybe you wouldn't have the data or the understanding to understand quite the link between chocolates, glucose and blood levels. But now it's something that I'm old enough to know that I can understand the link and it's not something that I need to worry about but also don't really want to engage in trick or treating and loads of sweets.

S: And if you were a very young person, do you feel like that would be kind of a barrier in some way? Like, would that make it difficult?

P6: Yeah, I think so. Yeah. I think there are certain events which just so associated with big birthday cakes. You know, that sort of thing, which I think would be more of a stress on a parent of a young child or that young child themselves.

S: Mm hmm. And how do you celebrate? Kind of big days like Christmas or your birthday. Do you have ways to do that?

P6: Yeah, I don't think it changes that much. I probably wouldn't have. A big chocolate cake. Whereas I probably wouldn't have had in the past anyway, but I'd be happy with a nice, healthier yoghurt these days or so probably having less sugar intensive celebrations. But it's not a massive change from before.



P4: Yeah, its definitely easier with the loop, because I know it will suspend my insulin if I'm dropping too low, too quick. Whereas, you don't have that with the Libra or I didn't with the one that I had and I was still on injections. I think you can plan more with a closed loop and there are things like temporary target for exercise, which I'm still trying to figure out a bit. But yeah, I would say now it's more trying to work out how the technology is going to benefit than kind of avoiding food or food being the problem as such.

S: Mm hmm. So I guess your relationship with food and the technology might have changed a bit over time?

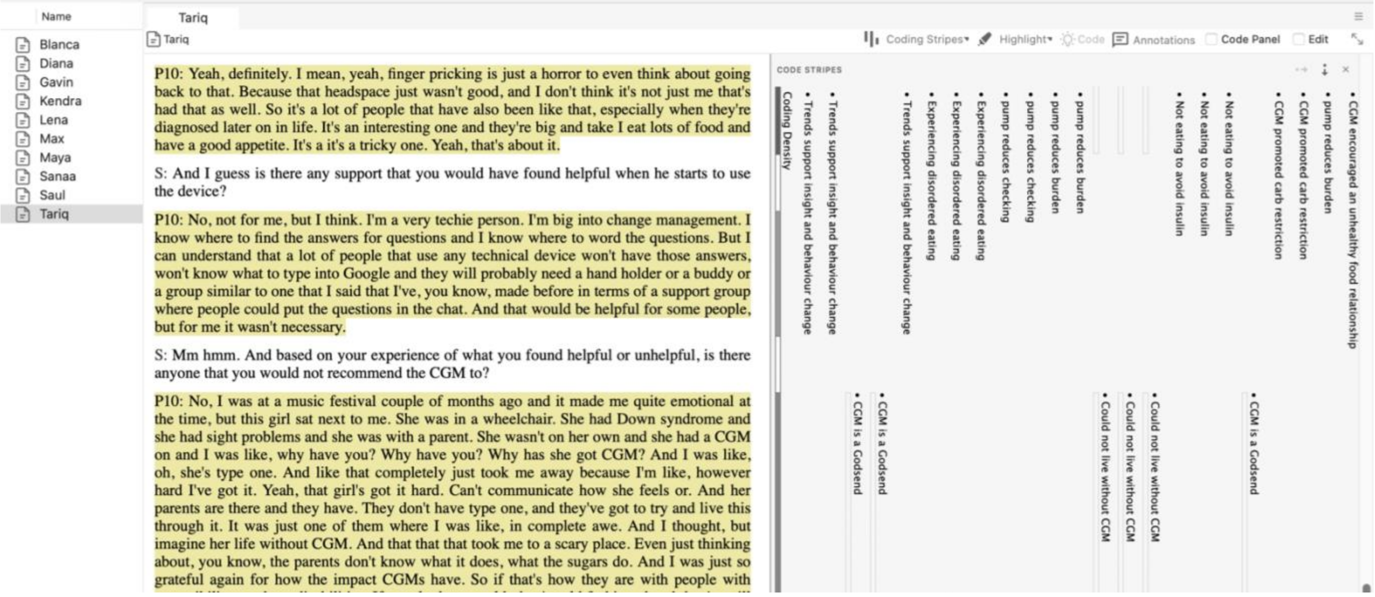
P4: Yeah, definitely, definitely.

S: And what do you think kind of contributed to it changing a bit?

P4: I think it was what I did with the steady project, but also like I saw a shift in my team as well that I work with locally. So, I would say with the diagnosis and the first couple of years, there was no conversation about what are you doing to achieve that? you know.

S: Mm hmm.

P4: Questions like "Is there any impact? Are you having loads of lows? Are you avoiding using your insulin?" You know all those sorts of things, whereas now the first question, well for the last couple of years, the first question they ask is *how are you?* and *is there anything you want to talk about*? which is great.



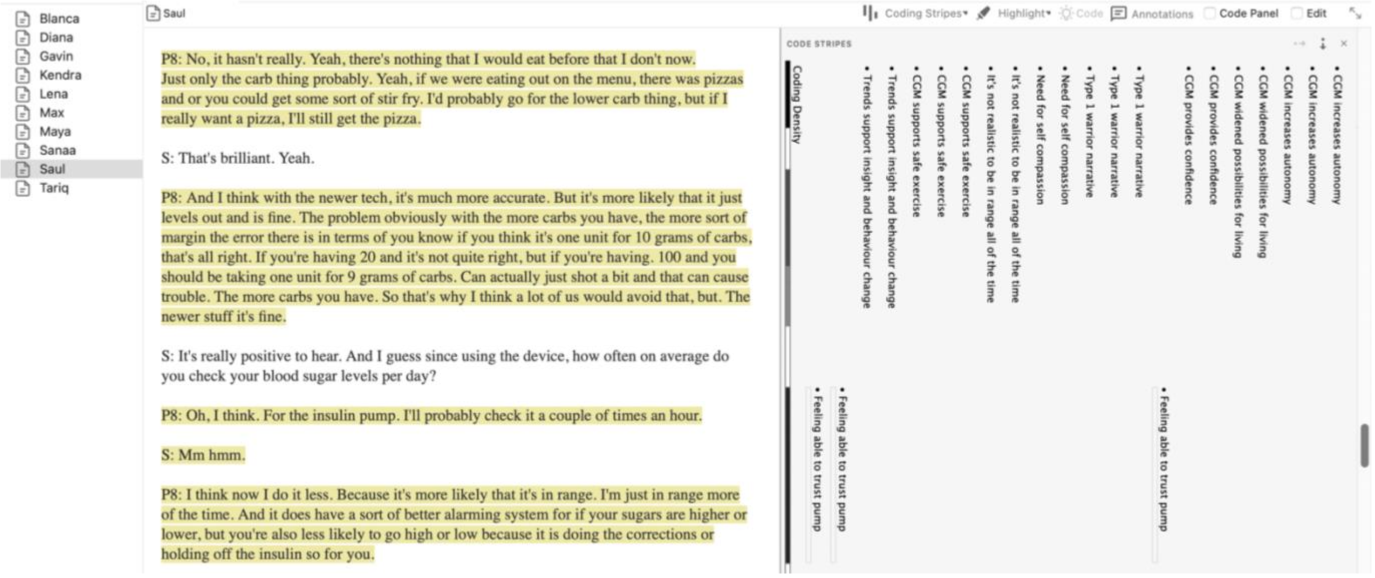
P10: Yeah, definitely. I mean, yeah, finger pricking is just a horror to even think about going back to that. Because that headspace just wasn't good, and I don't think it's not just me that's had that as well. So it's a lot of people that have also been like that, especially when they're diagnosed later on in life. It's an interesting one and they're big and take I eat lots of food and have a good appetite. It's a it's a tricky one. Yeah, that's about it.

S: And I guess is there any support that you would have found helpful when he starts to use the device?

P10: No, not for me, but I think. I'm a very techie person. I'm big into change management. I know where to find the answers for questions and I know where to word the questions. But I can understand that a lot of people that use any technical device won't have those answers, won't know what to type into Google and they will probably need a hand holder or a buddy or a group similar to one that I said that I've, you know, made before in terms of a support group where people could put the questions in the chat. And that would be helpful for some people, but for me it wasn't necessary.

S: Mm hmm. And based on your experience of what you found helpful or unhelpful, is there anyone that you would not recommend the CGM to?

P10: No, I was at a music festival couple of months ago and it made me quite emotional at the time, but this girl sat next to me. She was in a wheelchair. She had Down syndrome and she had sight problems and she was with a parent. She wasn't on her own and she had a CGM on and I was like, why have you? Why have you? Why has she got CGM? And I was like, oh, she's type one. And like that completely just took me away because I'm like, however hard I've got it. Yeah, that girl's got it hard. Can't communicate how she feels or. And her parents are there and they have. They don't have type one, and they've got to try and live this through it. It was just one of them where I was like, in complete awe. And I thought, but imagine her life without CGM. And that that that took me to a scary place. Even just thinking about, you know, the parents don't know what it does, what the sugars do. And I was just so grateful again for how the impact CGMs have. So if that's how they are with people with



P8: No, it hasn't really. Yeah, there's nothing that I would eat before that I don't now.
Just only the carb thing probably. Yeah, if we were eating out on the menu, there was pizzas and or you could get some sort of stir fry. I'd probably go for the lower carb thing, but if I really want a pizza, I'll still get the pizza.

S: That's brilliant. Yeah.

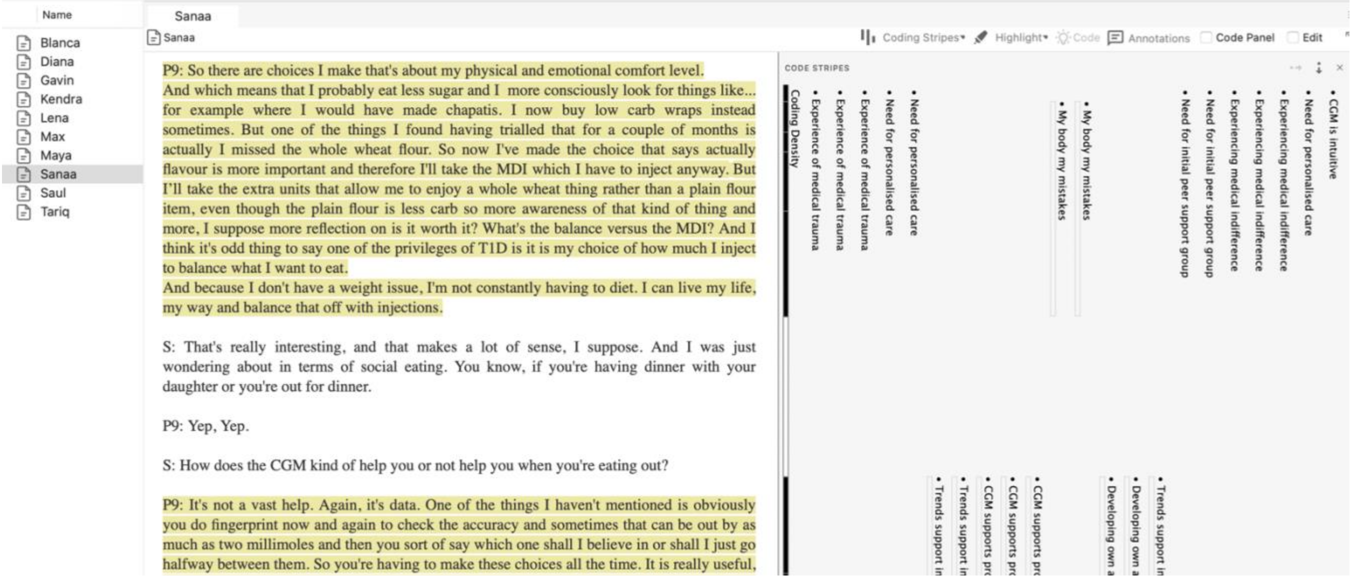
P8: And I think with the newer tech, it's much more accurate. But it's more likely that it just levels out and is fine. The problem obviously with the more carbs you have, the more sort of margin the error there is in terms of you know if you think it's one unit for 10 grams of carbs, that's all right. If you're having 20 and it's not quite right, but if you're having. 100 and you should be taking one unit for 9 grams of carbs. Can actually just shot a bit and that can cause trouble. The more carbs you have. So that's why I think a lot of us would avoid that, but. The newer stuff it's fine.

S: It's really positive to hear. And I guess since using the device, how often on average do you check your blood sugar levels per day?

P8: Oh, I think. For the insulin pump. I'll probably check it a couple of times an hour.

S: Mm hmm.

P8: I think now I do it less. Because it's more likely that it's in range. I'm just in range more of the time. And it does have a sort of better alarming system for if your sugars are higher or lower, but you're also less likely to go high or low because it is doing the corrections or holding off the insulin so for you.



P9: So there are choices I make that's about my physical and emotional comfort level.
And which means that I probably eat less sugar and I more consciously look for things like... for example where I would have made chapatis. I now buy low carb wraps instead sometimes. But one of the things I found having trialled that for a couple of months is actually I missed the whole wheat flour. So now I've made the choice that says actually flavour is more important and therefore I'll take the MDI which I have to inject anyway. But I'll take the extra units that allow me to enjoy a whole wheat thing rather than a plain flour item, even though the plain flour is less carb so more awareness of that kind of thing and more, I suppose more reflection on is it worth it? What's the balance versus the MDI? And I think it's odd thing to say one of the privileges of T1D is it is my choice of how much I inject to balance what I want to eat.
And because I don't have a weight issue, I'm not constantly having to diet. I can live my life, my way and balance that off with injections.

S: That's really interesting, and that makes a lot of sense, I suppose. And I was just wondering about in terms of social eating. You know, if you're having dinner with your daughter or you're out for dinner.

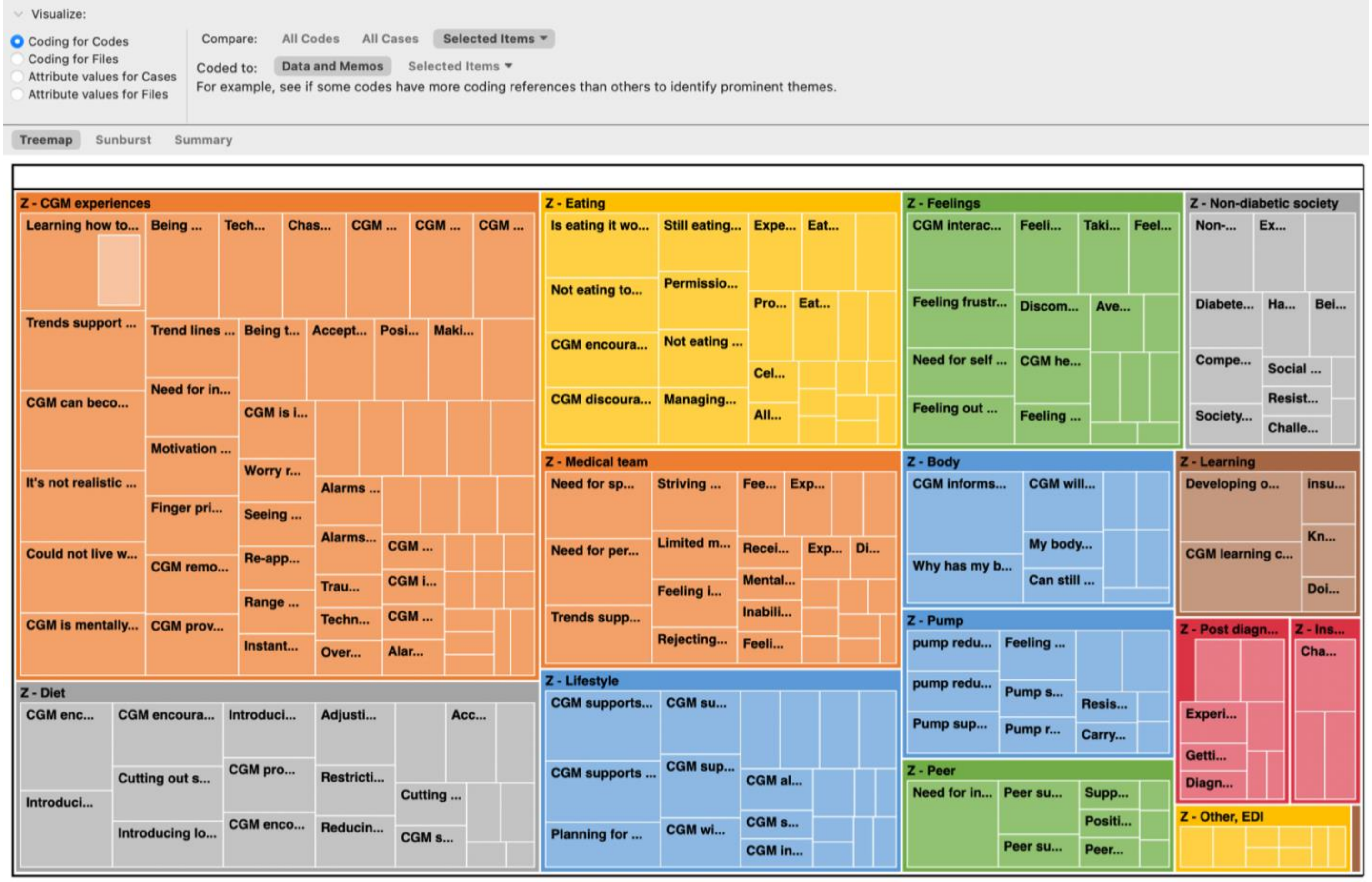
P9: Yep, Yep.

S: How does the CGM kind of help you or not help you when you're eating out?

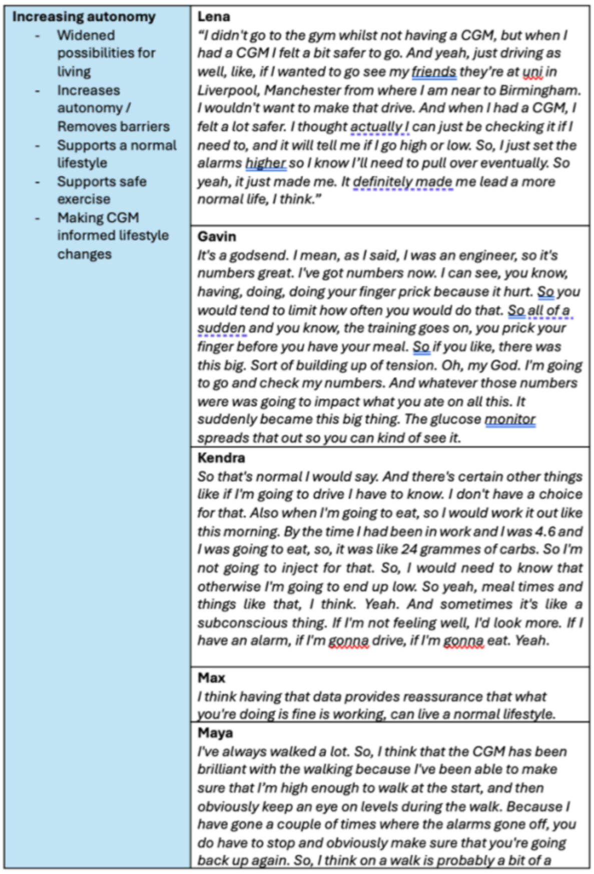
P9: It's not a vast help. Again, it's data. One of the things I haven't mentioned is obviously you do fingerprint now and again to check the accuracy and sometimes that can be out by as much as two millimoles and then you sort of say which one shall I believe in or shall I just go halfway between them. So you're having to make these choices all the time. It is really useful,

Appendix L

Research Study Theme Development Process



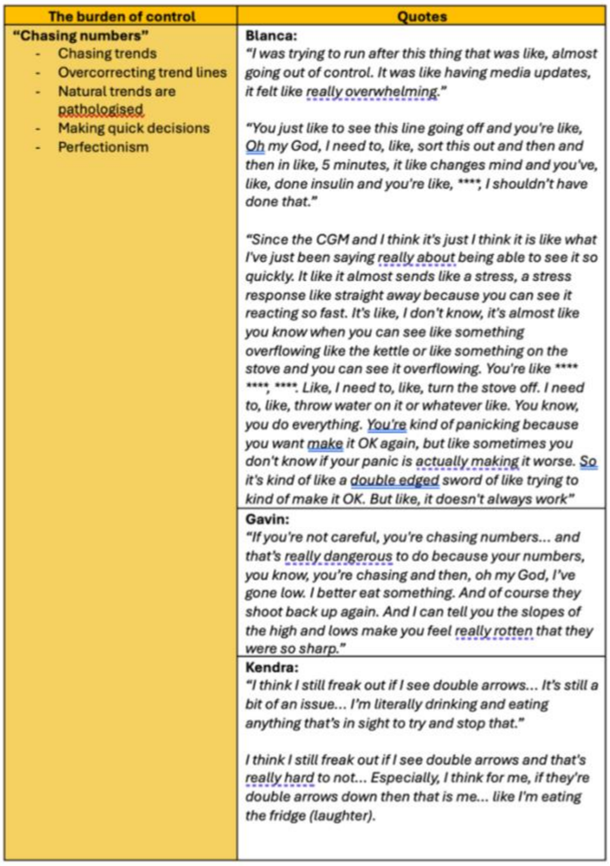
	because it just helps flatten it. And you can see the difference between white and brown pasta. *So we have about 5 different types of breads in the house. So at different times I'll have different types of bread depending on what else I'm eating with and they will have different carb values. So you know about all of those.*
	Max *More maybe just varieties of foods I was already having, so trying to go for a whole meal foods where possible. Brown bread. Maybe a few more low sugar yoghurts or those sort of snacks, but not necessarily changing food types. Just trying to choose the more sensible version of existing foods.*
	Sanaa *So there are choices I make that's about my physical and emotional comfort level. And which means that I probably eat less sugar and I more consciously look for things like... for example where I would have made chapatis. I now buy low carb wraps instead sometimes.*
	Saul *I was definitely eating more things where I knew exactly what was in it, you know? So I guess, like eating less takeaways and preparing foods, being really careful about what was in it, and then after a while I started to have less and less carbs anyway. So I tend to maintain a pretty low carb diet. Just partly because it's easier. Also, I guess sometimes it just feels a bit healthier. Replacing the heavy carb stuff like a pizza or a big bowl of pasta with something healthier.* *Yeah, there's nothing that I would eat before that I don't now. Just only the carb thing probably. Yeah, if we were eating out on the menu, there was pizzas and or you could get some sort of stir fry. I'd probably go for the lower carb thing, but if I really want a pizza, I'll still get the pizza.*
	Tariq *Yes, that's as I said, yeah, now, now they're essentially back to normal. So I eat what I want when I want. I don't have set time of meals. I don't shy away from heavy carb meals. I will eat whatever because the pump and the CGM, the closed loop will auto correct. Whereas when I was using things before. There was no auto correct. It was all on yourself and you're learning how your body manages things differently.*



Increasing autonomy - Widened possibilities for living - Increases autonomy / Removes barriers - Supports a normal lifestyle - Supports safe exercise - Making CGM informed lifestyle changes	**Lena** *"I didn't go to the gym whilst not having a CGM, but when I had a CGM I felt a bit safer to go. And yeah, just driving as well, like, if I wanted to go see my friends they're at uni in Liverpool, Manchester from where I am near to Birmingham. I wouldn't want to make that drive. And when I had a CGM, I felt a lot safer. I thought actually I can just be checking it if I need to, and it will tell me if I go high or low. So, I just set the alarms higher so I know I'll need to pull over eventually. So yeah, it just made me. It definitely made me lead a more normal life, I think."*
	Gavin *It's a godsend. I mean, as I said, I was an engineer, so it's numbers great. I've got numbers now. I can see, you know, having, doing, doing your finger prick because it hurt. So you would tend to limit how often you would do that. So all of a sudden and you know, the training goes on, you prick your finger before you have your meal. So if you like, there was this big. Sort of building up of tension. Oh, my God. I'm going to go and check my numbers. And whatever those numbers were was going to impact what you ate on all this. It suddenly became this big thing. The glucose monitor spreads that out so you can kind of see it.*
	Kendra *So that's normal I would say. And there's certain other things like if I'm going to drive I have to know. I don't have a choice for that. Also when I'm going to eat, so I would work it out like this morning. By the time I had been in work and I was 4.6 and I was going to eat, so, it was like 24 grammes of carbs. So I'm not going to inject for that. So, I would need to know that otherwise I'm going to end up low. So yeah, meal times and things like that, I think. Yeah. And sometimes it's like a subconscious thing. If I'm not feeling well, I'd look more. If I have an alarm, if I'm gonna drive, if I'm gonna eat. Yeah.*
	Max *I think having that data provides reassurance that what you're doing is fine is working, can live a normal lifestyle.*
	Maya *I've always walked a lot. So, I think that the CGM has been brilliant with the walking because I've been able to make sure that I'm high enough to walk at the start, and then obviously keep an eye on levels during the walk. Because I have gone a couple of times where the alarms gone off, you do have to stop and obviously make sure that you're going back up again. So, I think on a walk is probably a bit of a*

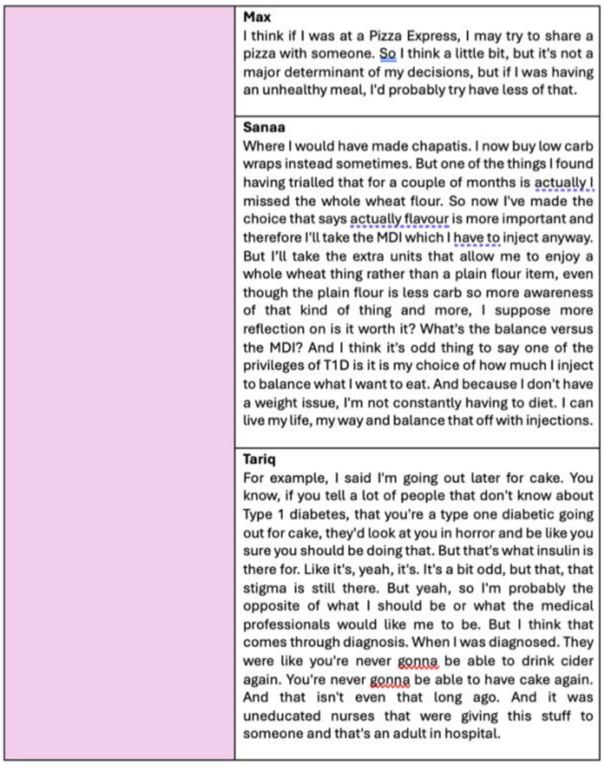
	Maya *Oh yeah, they changed immediately, so I've always had a sweet tooth, ironically (laughter). So that was it. Everything went out the window, you know. No chocolate, no sweets.*
Impact on intuitive eating - CGM discourages intuitive eating / Eating beyond satiety to stabilise blood sugar / Eating feels less intuitive	**Blanca** *I think I do definitely miss the control of like being able to eat when I want or, you know, not eat when I want.* *Sometimes I can't if like my blood sugar is low and I have to eat something and I'm like oh, I'm not even hungry now or you know, I just didn't want to eat at that point* *Just having dinner or having your food. It's like, oh, wait, let me just check this thing and then and then I'll get back to you in a second. Whether or not I can eat. So sometimes I feel like it ruins the, like, flow of life.*
	Diana *And then snacking on a whole new level because the idea of having to inject for a snack because I feel a bit peckish just makes me so cross with the whole disease or condition or whatever we want to call it.* *Whereas before Type 1 diagnosis, I was eating 5 meals a day. Like 5 small meals a day and snacking in between as well. If I was hungry and so it's a definite complete change and it's more about injecting, not injecting, I'm scared about the lows and managing that. Then there's also staying in the green, staying in that band.* *I'll opt for a drink or a water when I'm starting to feel a bit peckish sometimes. Because I mean, don't get me wrong, if I'm absolutely on the floor starving, then I'll go and inject and I'll have something to eat. And that would be because I was absolutely starving and at that point, I don't care if I'm going to spike or not. So, I just have some insulin and eat it almost at the same time. It's like a screw it.* *Yeah, definitely. And like you end up eating stuff you don't really want to eat because it's just you have to and then people are like, oh, you're not full. And I'm*

	like, yes, I am full. But my blood sugar isn't high. My blood Sugar's not high enough yet.
	Kendra *I didn't have a normal kind of meal. Plan really because it would be based on what my numbers were doing.* *Yeah. And like, let's be honest, being hungry is rubbish. Like, but it would be like it's that or I lose my time in range. And then it was kind of finding the balance really because it wasn't. It was unrealistic for me to be 95% time in range all time.*
	Lena *Yeah, I was obviously eating no carbs, but if I wasn't starving-starving, I just would not eat. Because I thought, even now sometimes to be honest, I think like my other half will have some popcorn or a chocolate bar or just anything really, protein bars... And I think, I can't bother to inject so I'm not going to have it. And I even feel like that now, to be honest. That's never changed. I sometimes think do I really need to eat that?* *Because sometimes I have to eat to be able to do something, but I don't always want to do that. I want to eat when I'm hungry. and then go to do my normal life like everyone else would. But sometimes I have to do... I have to eat sometimes.*
	Gavin *But I actually got to a point where I ate the meal first and then look at my number, because otherwise you just spoil your meal. You look at everybody and go "Oh my God. My number's high" And then you're sitting there eating, thinking I shouldn't really be eating this because my numbers are high. And so it was like I said, well, I got to the point where I'd eat first and then look at my number and do something about it. Do you what? I mean, otherwise, it just. It was just. It became such a big thing that you were checking your number.*



The burden of control	Quotes
"Chasing numbers" - Chasing trends - Overcorrecting trend lines - Natural trends are pathologised - Making quick decisions - Perfectionism	**Blanca:** *"I was trying to run after this thing that was like, almost going out of control. It was like having media updates, it felt like really overwhelming."* *"You just like to see this line going off and you're like, Oh my God, I need to, like, sort this out and then and then in like, 5 minutes, it like changes mind and you've, like, done insulin and you're like, ****, I shouldn't have done that."* *"Since the CGM and I think it's just I think it is like what I've just been saying really about being able to see it so quickly. It like it almost sends like a stress, a stress response like straight away because you can see it reacting so fast. It's like, I don't know, it's almost like you know when you can see like something overflowing like the kettle or like something on the stove and you can see it overflowing. You're like **** ****, ****. Like, I need to, like, turn the stove off. I need to, like, throw water on it or whatever like. You know, you do everything. You're kind of panicking because you want make it OK again, but like sometimes you don't know if your panic is actually making it worse. So it's kind of like a double edged sword of like trying to kind of make it OK. But like, it doesn't always work"*
	Gavin: *"If you're not careful, you're chasing numbers... and that's really dangerous to do because your numbers, you know, you're chasing and then, oh my God, I've gone low. I better eat something. And of course they shoot back up again. And I can tell you the slopes of the high and lows make you feel really rotten that they were so sharp."*
	Kendra: *"I think I still freak out if I see double arrows... It's still a bit of an issue... I'm literally drinking and eating anything that's in sight to try and stop that."* *I think I still freak out if I see double arrows and that's really hard to not... Especially, I think for me, if they're double arrows down then that is me... like I'm eating the fridge (laughter).*

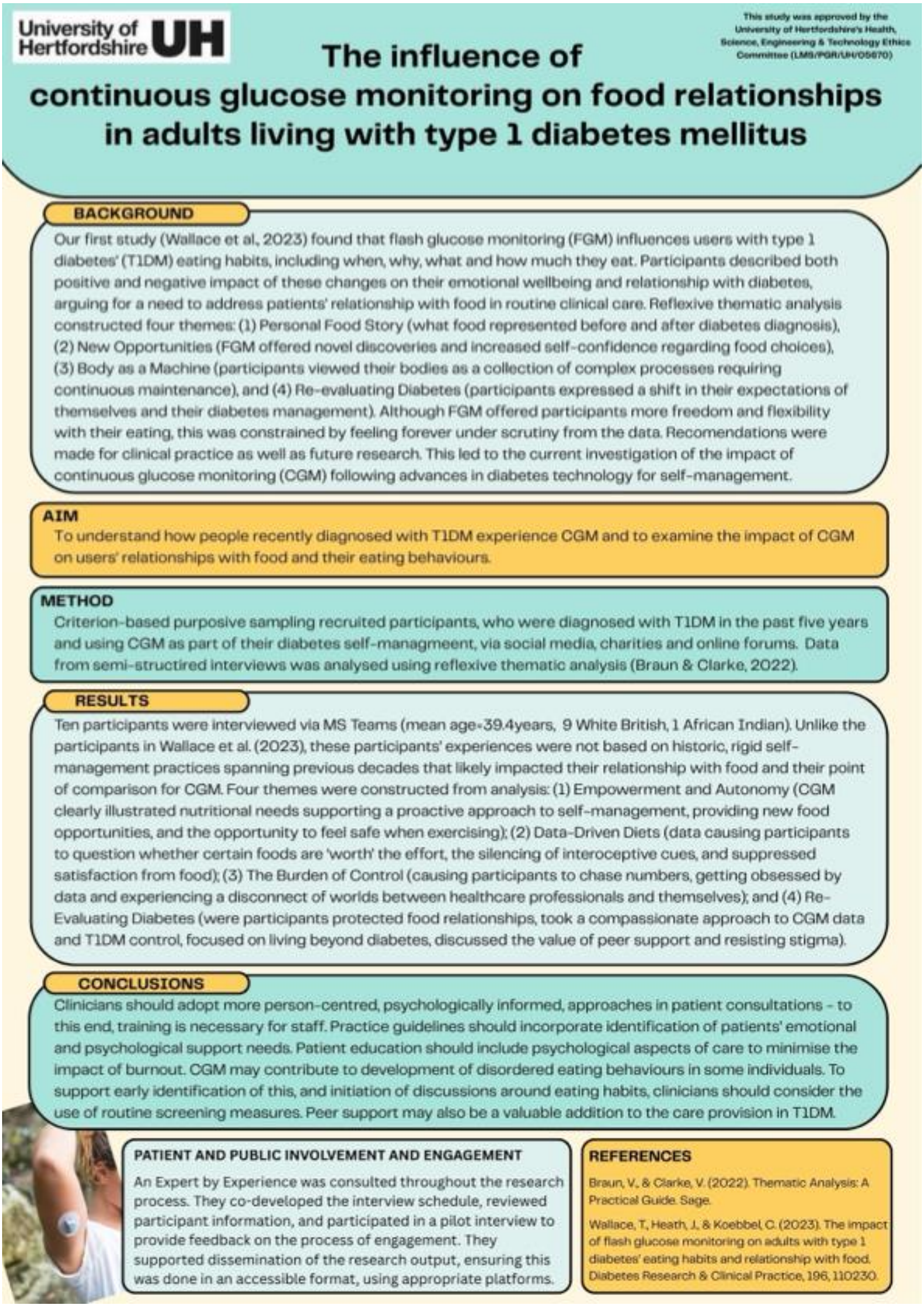
	"if my levels were high, I'd get really angry. And then I would probably over inject and end up low, and it just ends up being a massive rollercoaster. So, it would be "well that's not going to happen if I don't eat anything and then it will stay where it needs to be and I won't have to think about it". And then I also won't have to inject the insulin. So it felt like a bit of a win-win, but it wasn't really at all."
	Saul: *"I used to get sort of big spikes, and then I would struggle to bring the sugars down and then i would go into a hypo. So it was sort of a roller coaster just going up and down for days on end. And I think my time in range was about 40%. Which is what made me eligible. So then the CGM was originally great, but over the past year it just started getting worse and worse. And I wasn't really sure why. But now the pump, our timing range is about 90% and most of the time it just looks like a flat line. And if it does start to go up a bit, it just gives me a bit of insulin and sort out."*
	Sanaa: *"If my numbers are going through the floor, I don't have time to go, 'Oh my God, if I eat this, it's going to take me too high.' I've got to eat or die... if I don't take care of that, I leave my daughter without her only parent. I'm not doing that. So I have an emotional drive that says I'm going to take the best care of myself. I can for her, which comes before me as a mother. But that also means that that if you struggle with numbers, data, decision making, this is such a profound impact on your life. Because it is 24/7 and when the alarm goes off at stupid o'clock at night. You have got to respond. You've got to make that choice."*
	Maya: *"So I have gone from say 9, which is still in the Green Zone, up to 20 within an hour of eating something, taken a correction, and I've dropped down to 5. And so you know, it's a real peak and you can feel it, the change is too big then. And that's where the monitor will help you to make those decisions and decide."*
	Diana: *"And I panic a little bit when it's red, so I don't like the lows. I know that there's a delay between the CGM reading and if I take a monitor reading with me blood sugars. But as soon as I see the Reds, I start to panic a little bit because like I said, I don't. I don't really like the lows at all. I don't like the way they make me feel.*



Re-evaluating Diabetes	Quotes
Protecting food relationships - still eating desired foods - permission to enjoy challenging foods - protecting intuitive eating - allowing self to let go - flexible relationship was protective	**Diana** *You know, for your birthday you're going to eat cake, on Christmas you're going to want to eat chocolate for breakfast. And you got to prepare for stuff like that often. I need to know what the carb ratio is for a box of Ferrero rocher's on Christmas morning because I don't eat them every day. But on Christmas, I want to treat myself. And so things like birthdays, Christmas outings, things like that. You're not prepared unless you start testing and doing things in the right way.*
	Lena No, not having it tonight because I really want a good night's sleep and other times I'm like, yeah, I want Chinese and I'll just deal with it afterwards. But it just depends how I'm feeling. If I'm feeling confident and I know I can deal with the aftermath then it's OK.
	Maya But, you know, I had a little bit of my husband's doughnut while I was in Germany and it was just enough. It was just like, oh, that's really nice. It's not as doughy as the UK ones. It's quite light and fluffy, but I've had enough now. Thank you very much. And you know, I think in the past I definitely would have had a whole doughnut. I certainly would have had a whole bar of chocolate in one go. I'm quite content to have a cube if I want one. I've always had a very good relationship with food, we are foodies in our family, so we've always had the opportunity to try lots of different things. I think if I hadn't been someone who was prepared to try different things and had to try different things I think the change in diet would be quite difficult for people to cope with. I still love my food, not stopping me eating, or trying new things. I think that's the important thing.
	Saul No, it hasn't really. Yeah, there's nothing that I would eat before that I don't now. Just only the carb thing probably. Yeah, if we were eating out on the menu, there was pizzas and or you could get some sort of stir fry. I'd probably go for the lower carb thing, but if I really want a pizza, I'll still get the pizza.
	Max I think if I was at a Pizza Express, I may try to share a pizza with someone. So I think a little bit, but it's not a major determinant of my decisions, but if I was having an unhealthy meal, I'd probably try have less of that.
	Sanaa Where I would have made chapatis. I now buy low carb wraps instead sometimes. But one of the things I found having trialled that for a couple of months is actually I missed the whole wheat flour. So now I've made the choice that says actually flavour is more important and therefore I'll take the MDI which I have to inject anyway. But I'll take the extra units that allow me to enjoy a whole wheat thing rather than a plain flour item, even though the plain flour is less carb so more awareness of that kind of thing and more, I suppose more reflection on is it worth it? What's the balance versus the MDI? And I think it's odd thing to say one of the privileges of T1D is it is my choice of how much I inject to balance what I want to eat. And because I don't have a weight issue, I'm not constantly having to diet. I can live my life, my way and balance that off with injections.
	Tariq For example, I said I'm going out later for cake. You know, if you tell a lot of people that don't know about Type 1 diabetes, that you're a type one diabetic going out for cake, they'd look at you in horror and be like you sure you should be doing that. But that's what insulin is there for. Like it's, yeah, it's. It's a bit odd, but that, that stigma is still there. But yeah, so I'm probably the opposite of what I should be or what the medical professionals would like me to be. But I think that comes through diagnosis. When I was diagnosed. They were like you're never gonna be able to drink cider again. You're never gonna be able to have cake again. And that isn't even that long ago. And it was uneducated nurses that were giving this stuff to someone and that's an adult in hospital.

Appendix M

Research Conference Poster



University of Hertfordshire UH

This study was approved by the University of Hertfordshire's Health, Science, Engineering & Technology Ethics Committee (LMS/PGR/UH/05670)

The influence of continuous glucose monitoring on food relationships in adults living with type 1 diabetes mellitus

BACKGROUND

Our first study (Wallace et al., 2023) found that flash glucose monitoring (FGM) influences users with type 1 diabetes' (T1DM) eating habits, including when, why, what and how much they eat. Participants described both positive and negative impact of these changes on their emotional wellbeing and relationship with diabetes, arguing for a need to address patients' relationship with food in routine clinical care. Reflexive thematic analysis constructed four themes: (1) Personal Food Story (what food represented before and after diabetes diagnosis), (2) New Opportunities (FGM offered novel discoveries and increased self-confidence regarding food choices), (3) Body as a Machine (participants viewed their bodies as a collection of complex processes requiring continuous maintenance), and (4) Re-evaluating Diabetes (participants expressed a shift in their expectations of themselves and their diabetes management). Although FGM offered participants more freedom and flexibility with their eating, this was constrained by feeling forever under scrutiny from the data. Recomendations were made for clinical practice as well as future research. This led to the current investigation of the impact of continuous glucose monitoring (CGM) following advances in diabetes technology for self-management.

AIM

To understand how people recently diagnosed with T1DM experience CGM and to examine the impact of CGM on users' relationships with food and their eating behaviours.

METHOD

Criterion-based purposive sampling recruited participants, who were diagnosed with T1DM in the past five years and using CGM as part of their diabetes self-managmeent, via social media, charities and online forums. Data from semi-structired interviews was analysed using reflexive thematic analysis (Braun & Clarke, 2022).

RESULTS

Ten participants were interviewed via MS Teams (mean age=39.4years, 9 White British, 1 African Indian). Unlike the participants in Wallace et al. (2023), these participants' experiences were not based on historic, rigid self-management practices spanning previous decades that likely impacted their relationship with food and their point of comparison for CGM. Four themes were constructed from analysis: (1) Empowerment and Autonomy (CGM clearly illustrated nutritional needs supporting a proactive approach to self-management, providing new food opportunities, and the opportunity to feel safe when exercising); (2) Data-Driven Diets (data causing participants to question whether certain foods are 'worth' the effort, the silencing of interoceptive cues, and suppressed satisfaction from food); (3) The Burden of Control (causing participants to chase numbers, getting obsessed by data and experiencing a disconnect of worlds between healthcare professionals and themselves); and (4) Re-Evaluating Diabetes (were participants protected food relationships, took a compassionate approach to CGM data and T1DM control, focused on living beyond diabetes, discussed the value of peer support and resisting stigma).

CONCLUSIONS

Clinicians should adopt more person-centred, psychologically informed, approaches in patient consultations - to this end, training is necessary for staff. Practice guidelines should incorporate identification of patients' emotional and psychological support needs. Patient education should include psychological aspects of care to minimise the impact of burnout. CGM may contribute to development of disordered eating behaviours in some individuals. To support early identification of this, and initiation of discussions around eating habits, clinicians should consider the use of routine screening measures. Peer support may also be a valuable addition to the care provision in T1DM.

PATIENT AND PUBLIC INVOLVEMENT AND ENGAGEMENT

An Expert by Experience was consulted throughout the research process. They co-developed the interview schedule, reviewed participant information, and participated in a pilot interview to provide feedback on the process of engagement. They supported dissemination of the research output, ensuring this was done in an accessible format, using appropriate platforms.

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