

### RESEARCH ARTICLE

## Barriers and enablers to engagement with a type 2 diabetes remission project in the North East of England: qualitative perspectives of patients

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(Received 10 November 2023 – Revised 20 January 2024 – Accepted 29 March 2024)

*Journal of Nutritional Science* (2024), vol. 13, e28, page 1 of 11

doi:10.1017/jns.2024.30

### Abstract

This qualitative research sought to identify factors influencing patient choice of, and patient-related internal and external enablers and barriers to engagement with, type 2 diabetes (T2D) remission strategies offered by the Remission in diabetes (REMI.D) project. Patients had a choice of three diets: Total Diet Replacement (TDR)-Formula Food Products, TDR-Food, and Healthy lifestyle approach; and three activity pathways: Everyday life, General Practitioner referral, and Social hub. Semi-structured interviews were recorded and transcribed. Thematic analysis used the Framework Method and NVivo 12 to assist with generation and organisation of codes, inductive and deductive (Theoretical Domains Framework). The REMI.D project was a place-based approach (place in this case being defined as two local authorities with significant rates of deprivation) situated in the North East of England. Twenty patients out of a possible 65 patients took part. Areas of interest included: patient choice, patient intention, patient adherence, patient non-adherence, and patient stigma. Addition of a more moderate dietary strategy (not dissimilar to the diet in the Healthier You NHS Diabetes Prevention Programme) to the existing NHS England T2D Path to Remission programme may enable more patients to achieve remission or delayed progression with deprescribing of diabetes medications. Embedding a tailored physical activity path within or as a bolt-on to the NHS programme requires consideration. Limited resources should be targeted towards patients who identify with more barriers or fewer opportunities for health behaviour modification. Further research on use of virtual programmes in deprived areas is warranted.

**Key words:** Patient interviews: Qualitative research: Remission strategy: Type 2 diabetes

### Introduction

The impact of type 2 diabetes (T2D) and its complications places a significant burden on adults living with the condition. Recent evidence offers the possibility of long-term T2D remission through weight reduction.<sup>(1,2)</sup> The Diabetes UK<sup>1</sup> position statement on T2D remission recommends an individualised approach, recognising that people with T2D have achieved remission using various dietary interventions, including the Mediterranean ('healthy') diet, calorie-controlled (low-fat) diets, low carbohydrate diets as well as the total diet

replacement (TDR).<sup>(3)</sup> Nationally, one quarter of adults with T2D live in the most deprived areas of England.<sup>(4)</sup> This Sport England-funded primary care-based project questioned whether T2D remission is possible for adults in two of the most deprived local authorities (Middlesbrough, Redcar and Cleveland) in England.<sup>(5,6)</sup> Adults with T2D may struggle to complete, or decline to take part in, the multiple dietary and lifestyle strategies for the management of T2D. Known patient-related internal and external barriers and enablers to T2D self-management are explored below.

An improvement in physical and psychological wellbeing, coupled with a sense of achievement as a result of weight loss

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and improved glycaemia, motivated lasting health behaviour change.<sup>(7,8)</sup> Clearly defined intentions and goals, for example, to lose weight, were dominant themes in a recent lifestyle intervention to prevent T2D.<sup>(9)</sup> Self-distraction, for example, patchwork and quilting, helped some patients overcome poor eating habits.<sup>(8)</sup> A fear of diabetes-related complications motivated others to manage lifestyle changes.<sup>(10)</sup> A multinational study, including the views of patients living with type 1 diabetes and T2D, identified a frustration with the diagnosis of diabetes and associated unrealistic expectations which hampered self-management.<sup>(11)</sup> Similarly, Peng, *et al.*<sup>(12)</sup> noted blindly optimistic attitudes, and Cheng, *et al.*<sup>(13)</sup> negative T2D appraisal as dietary barriers. Physical barriers to activity included fatigue, muscle and joint pain, and other co-morbidities. T2D and depression were seen as interrelated.<sup>(14)</sup> The initial motivation for dietary behaviour change waning as the reality of perceived long-term restraint brought negative emotions. While patients with low health literacy reportedly ‘misunderstood diabetes management, showed passive attitudes towards seeking information, and had difficulty obtaining detailed information’.<sup>(15)</sup> Studies have observed that a reoccurring driver for positive lifestyle behaviour change was social support from family, friends or co-workers.<sup>(8,16)</sup> Establishing good habits was linked with positive diabetes outcomes. Rehackova, *et al.*<sup>(8)</sup> cited removing food from the environment, planning, and avoidance of tempting situations as helpful decisions. Preliminary evidence from a narrative review suggests technological advances, in particular the use of real-time blood glucose monitoring devices, may be an adjunct to lifestyle behaviour adherence in patients with T2D<sup>(17)</sup>; rapid weight loss and positive changes to clinical diabetes markers providing ongoing motivation.<sup>(7,16)</sup> An ineffective therapeutic relationship between the care provider and the patient, including reports of weight-related stigma, hindered strategies for the management of T2D. Patients described ‘inconsistent provision of information and resources to assist them in tackling their weight problems’.<sup>(18)</sup> Patients described feeling confused by conflicting advice received from health professionals, friends, family, internet and diabetes organisations.<sup>(19)</sup> Additional reports of feeling ‘rushed and not heard’ in consultations resulted in poor ongoing engagement with general practice. Other patient barriers were time constraints,<sup>(20)</sup> incomplete diabetes-related knowledge and skills,<sup>(21)</sup> social aspects (social functions interfering with dietary regimens, family members diverting patient from dietary goals)<sup>(22)</sup> and socio-economic factors.<sup>(23)</sup>

Objectives of this T2D remission project, Remission in diabetes (REMI.D) included (a) to identify factors influencing patient choice of T2D remission strategy, and (b) to explore the internal and external barriers and enablers to adherence to a 12-week dietary and physical activity intervention for patients living in an area of significant deprivation. A process evaluation for REMI.D is published elsewhere.<sup>(24)</sup>

## Methods

This local delivery pilot, REMI.D, was developed following a successful bid by a diabetes development group in the North East of England in 2020. REMI.D sought to tackle health

inequalities by working with multiple organisations to demonstrate a way of scaling up an effective T2D remission strategy which included both dietary and physical activity components.

REMI.D deviated from the UK Diabetes Remission Clinical Trial (DiRECT)<sup>(2,25)</sup> which used TDR-Formula Food Products, by including three dietary remission strategies (1) TDR-Formula Food Products, (2) TDR-Food, and (3) healthy lifestyle approach, and three activity pathways (1) Everyday life (walking, climbing stairs, getting off bus early) (2) General Practitioner (GP) referral (gym, swimming, chair-based exercises), and (3) Social hub (activity indirectly through social activities, day trips). The TDR-Formula Food Products (800-calorie diet based on commercial meal replacements) and TDR-Food (800-calorie prescriptive food-based diet) utilised the existing DiRECT trial remission resources.<sup>(26)</sup> The healthy lifestyle approach supported participants to set tailored goals based on other commonly used diets for T2D management: Mediterranean diet, portion controlled (lower carbohydrate, higher protein, lower calorie), and lower glycaemic index foods. All three dietary strategies sought weight loss-induced reversal of T2D; Fig. 1 summarises the T2D remission strategies offered.

The REMI.D project eligibility criteria followed the 2019 NHS Low Calorie Diet Pilot Programme model.<sup>(27)</sup> The REMI.D project intended for GPs and practice nurses within general practices, situated in one of four electoral areas, to identify suitable patients with T2D for inclusion in REMI.D. The dietary interventions were to be delivered by practice nurses at the general practices with initial support from the REMI.D project-funded dietitian based in secondary care. Due to loss of primary care stakeholder engagement (GP and practice nurse) during and following the COVID-19 (coronavirus) pandemic 2020–2022,<sup>(28)</sup> the REMI.D dietitian took sole responsibility for recruitment and delivery of the dietary interventions, the latter being relocated out of general practice.

The researcher (RCB) conducted semi-structured interviews during the 12-week intervention. Sample size for the qualitative research was 10 per remission strategy. Promotional posters, including information about a prize draw (£250 shopping voucher) for participation, advertised this qualitative research. The posters, written participant information sheets and consent forms were available to the REMI.D dietitian. The REMI.D dietitian actively discussed participation in this qualitative research with eligible patients. The names and contact telephone numbers of interested patients were emailed to the researcher (RCB). The Capability Opportunity Motivation - Behaviour (COM-B) model and Theoretical Domains Framework (TDF)<sup>(29)</sup> were used to develop the interview schedule (Supporting Information). Interviews were audio- or video-recorded using two devices.

The Framework Method (Ritchie & Lewis, 2003; p220) used in this qualitative research, accommodated both inductive and deductive (TDF domains) coding. Transcription files (cases) were imported and the TDF domains (codes) were added to NVivo 12 (qualitative data analysis software). The patient's voice was coded to the TDF domains. The NVivo codebook was used to add additional descriptions to ensure consistency in coding decisions (Table 1). The researcher (AH) independently coded 10% of the transcripts and looked for inconsistencies in the coding decisions across all of the transcripts. Coding



**Fig. 1.** Type 2 diabetes remission strategies, including the three interview groups, for this qualitative research.

inconsistencies not readily resolved by joint review (RCB, AH, and HJM) were referred to team member (AAL). Case classifications (attributes) were added including gender, age, index of multiple deprivation (IMD), weight lost at 12 weeks, HbA1c at 12 weeks, and diet option chosen. Codes were explored by running coding queries within NVivo 12. For example, one query sought to explore patient views coded to the TDF 'behaviour regulation' domain in patients who chose the diet option 'TDR-Formula Food Products' and achieved an 'HbA1c less than 48' at the end of the 12-week intervention. The creation of an analytical framework steered the application of coding query reports and refinement of data.<sup>(30)</sup> The patient

voice is reported in italics and each different voice noted, by P (for patient) and the participant number, in square brackets, for example [P1]. TDF domains are highlighted in italics.

## Results

Twenty patients participated in this qualitative research, 11 patients from the healthy lifestyle approach and nine patients from the TDR-Formula Food Products group. None of the participants chose the TDR-Food strategy following a consultation with REMI.D dietitian. Seventeen patients chose to be interviewed by telephone. One patient opted to be interviewed online using



**Table 1.** NVivo codebook: The Capability Opportunity Motivation - Behaviour model (3 components of behaviour change) with the Theoretical Domains Framework (14 domains or determinants of behaviour)

Capability component	Description of domains
Behavioural regulation	Self-monitoring, Action planning
Knowledge	Understanding of condition (T2D) and dietary/ activity treatments (including REMI.D and remission strategy)
Memory attention and decision processes	Ability to retain information and make choices
Skills	Memories which influence choice of whether to do one diet over another
	Competence in following task with practice
<b>Motivation component</b>	<b>Description of domains</b>
Belief about capabilities	Self-confidence, Self-efficacy, Self-esteem
	Why participant feels more confident
Belief about consequences	Expectations in relation to outcomes (diabetes-related complications, weight change)
Emotion	Personal anxiety, stress, depression, stigma, ill-health
Goals	Target setting
Intentions	Conscious decision to perform a behaviour/ act in a certain way
	Reason for doing REMI.D
Optimism	Confidence in achievement of goals, including unrealistic
Reinforcement	Rewards/ incentives or punishment
	Feedback from REMI.D team on progress made (bloods, weight, medication changes)
Social-Professional role and identity	Professional confidence, social identity, perception of self
<b>Opportunity component</b>	<b>Description of domains</b>
Environmental context and resources	Which help/ hinder change processes
	Responses relating to positives/ negatives of REMI.D (diet and activity), or other interventions they have participated in
Social influences	Group norms, peer pressure, social support (positives/ negatives)
	Family, friends (not healthcare professionals)

**Table 2.** Descriptive statistics for the qualitative sample and the full cohort who participated in the type 2 diabetes (T2D) remission project

Diet options	Qualitative sample		Full cohort	
	Healthy lifestyle	TDR-formula food products	Healthy lifestyle	TDR-formula food products
Number of participants	11	9	39	26
Current age <sup>a</sup> (years)	54 ± 7	50 ± 11	52 ± 11	52 ± 10
Duration of diabetes <sup>a</sup> (years)	1 ± 2	0 ± 1	2 ± 2	1 ± 2
Gender: male/ female (%)	73/27	11/89	54/46	19/81
Ethnicity: white/ other (%)	91/9	100/0	90/10	92/8
Index of Multiple Deprivation decile <sup>a</sup>	4 ± 3	3 ± 3	5 ± 3	3 ± 2
Smokers (%)	18	11	10	4
Current weight <sup>a</sup> (kg)	110.7 ± 18.6	105.7 ± 9.9	101.8 ± 19.4	108.9 ± 22.0
Current body mass index <sup>a</sup> (kg/m <sup>2</sup> )	36.8 ± 6.1	38.6 ± 3.2	35.2 ± 5.9	38.7 ± 6.6
Current HbA1c <sup>a</sup> (mmol/mol)	57 ± 18	52 ± 9	57 ± 15	59 ± 16
<b>12-week REMI.D intervention</b>				
Weeks completed <sup>a</sup> (out of 12)	12 ± 1	8 ± 4	9 ± 4	6 ± 4
Weight lost <sup>a</sup> (kg)	3.4 ± 2.9	10.5 ± 4.5	3.5 ± 3.2	8.9 ± 5.3
HbA1c achieved <sup>a</sup> (mmol/mol)	50 ± 11	49 ± 18	52 ± 10	50 ± 13
<b>Follow-up post intervention to 1-year</b>				
Weeks completed <sup>a</sup> (last recorded)	31 ± 10	20 ± 14	18 ± 12	15 ± 12
Weight lost <sup>a</sup> (kg)	3.8 ± 5.1	8.4 ± 5.7	2.9 ± 3.6	6.2 ± 5.9
HbA1c achieved <sup>a</sup> (mmol/mol)	49 ± 10	50 ± 16	54 ± 12	52 ± 13
Number of participants in T2D remission <sup>b</sup>	2	4	4	5

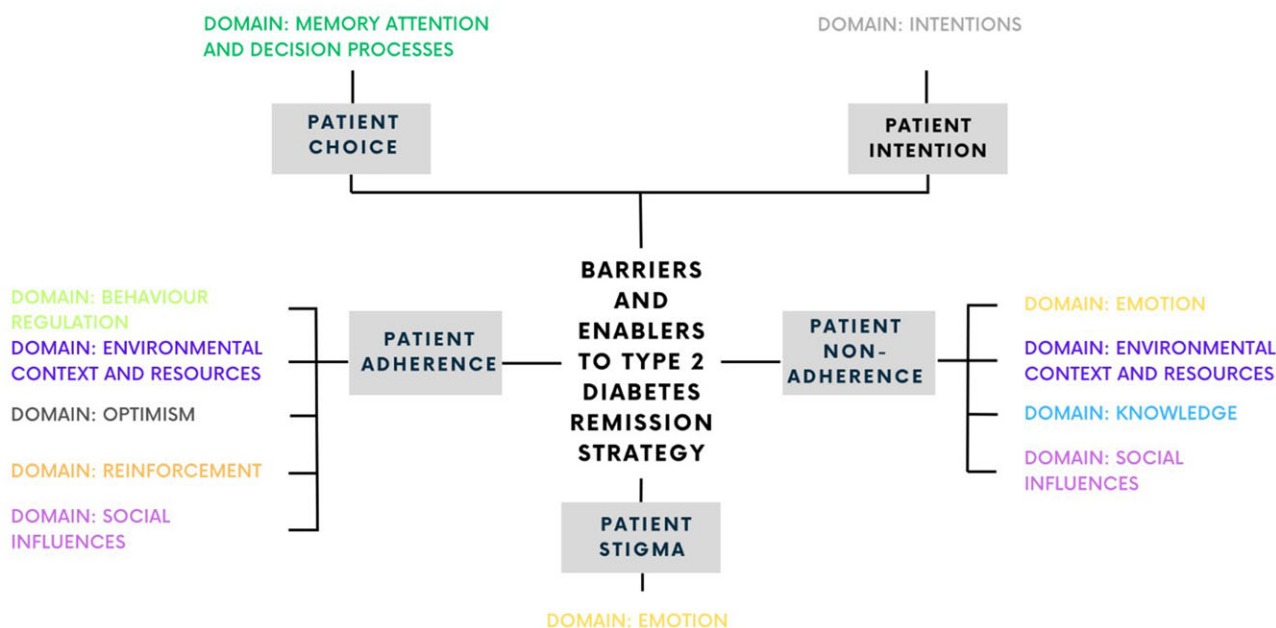
<sup>a</sup>mean ± SD.

<sup>b</sup>T2D remission was defined as HbA1c <48 mmol/mol for at least 3 months without diabetes medication.<sup>(3)</sup>

Microsoft Teams, one patient in-person at their home and one patient in a meeting room at the university campus. Interviews lasted 30–60 min. This sample was recruited from the REMI.D project full cohort (n = 65). These patients were referred to the REMI.D project by practice nurses (n = 7; five general practices), Diabetes Specialist Nurses

(n = 3) or opted-in following an REMI.D invitational letter to patients on the Diabetes Education and Self-Management for Ongoing and Newly Diagnosed (DIAMOND)<sup>(31)</sup> waiting list (n = 10).

Table 2 uses descriptive statistics to compare the qualitative patient sample with the full cohort. Mean age and standard



**Fig. 2.** Visual representation of five areas of interest with associated theoretical domain framework domains.

deviation (SD) for the qualitative sample and full cohort were  $52 \pm 9$  and  $52 \pm 11$  years, respectively. Forty-five and forty per cent of participants in the qualitative sample and full cohort identified as male respectively. Sixty per cent of the full cohort selected the healthy lifestyle approach. Of those participants choosing the TDR-Formula Food Products, 89% of the qualitative sample and 81% of the full cohort identified as female.

Figure 2 illustrates the behavioural barriers and enablers to participation in, and completion of, the initial 12-week REMI.D T2D remission intervention, as identified by the patients who took part in this qualitative research. Five areas of interest emerged: patient choice; patient intention; patient adherence; patient non-adherence; and patient stigma; the results of which are summarised in Table 3 and reported in detail below.

### Patient choice

The TDF domain *Memory attention and decision making processes* was used to record factors influencing patient choice, in this case of one diet option over another: TDR-Formula Food Products or healthy lifestyle approach.

The **TDR-Formula Food Products** strategy appealed to patients due to the anticipated large rapid weight losses achievable over the 12-week intervention.

*'I want to see results and thought that this would be the best way...'* [P18].

*'I want to lose weight and hopefully reverse diabetes as quickly as possible...'* [P9].

One patient described the process as.

*'a bit like a renovation with a house, strip it down to the foundations and build it up again so you learn the right way'* [P8].

Similarly another patient shared their hope

*'With this being... like cutting everything out. You know, I should be able to do it more sensibly... like reintroduce'* [P4].

The experiences of others influenced patient choice too

*'I have a friend who actually came back from diabetes and that was through protein shakes'* [P8].

In summary, recollection of past success in others and a desire for rapid weight loss/ a fresh start, enabled participation in the TDR-Formula Food Product intervention.

The more popular **healthy lifestyle approach** was chosen largely in response to a negative perception of the TDR-Formula Food Products strategy.

*'I want to change for life. I don't want to be on a diet'* [P16].

*'I didn't think I could commit and stick to a tight calorie controlled diet'* [P14].

*'I'm still living with my mum... so it's difficult to say, right you aren't having that because I can't have it'* [P10].

One patient was successfully losing weight so saw no reason to change to the TDR-Formula Food Products.

*'Because I've been losing weight, we just kept the healthy eating and looked at what I'm eating...'* [P2].

Another patient explained that the healthy lifestyle approach made sense to them.

*'It's a matter of me having to choose to say... can I do some exercises... can I reduce my food portions... can I increase the healthier options... which I found doable'* [P7].

In summary, memories of previous failed diet attempts or recent successes with more moderate dietary strategies were barriers to participation in the TDR-Formula Food Product intervention.



**Table 3.** Summary of patient barriers and enablers, under the five areas of interest, for the qualitative sample who participated in the type 2 diabetes (T2D) remission project

Areas of interest	Barriers	Enablers
<p><b>Choice</b> (barriers and enablers to choosing Total Diet Replacement (TDR)-Formula Food Product intervention)</p>	<ul style="list-style-type: none"> <li>• I want a change for life, not a diet</li> <li>• Food-based diet working</li> <li>• Couldn't stick to TDR</li> <li>• Healthy lifestyle approach more realistic, more cost-effective, and offers a long-term solution</li> </ul>	<ul style="list-style-type: none"> <li>• I want to see results quickly</li> <li>• I want to get it done and dusted</li> <li>• Peer recommended TDR</li> <li>• Professional advised TDR</li> <li>• Previous failed food-based diets</li> <li>• I want to get fitter</li> <li>• I want to have a long and healthy retirement</li> <li>• I want to be able to play with my children</li> <li>• I want to care for my family</li> <li>• I want to look better</li> </ul>
<p><b>Intention</b> (enablers other than T2D remission and weight reduction)</p>		<ul style="list-style-type: none"> <li>• Supportive family and friends</li> <li>• Online forums good</li> <li>• REMI.D professionals encourage</li> <li>• I can see the benefits</li> <li>• Walking makes me happy</li> <li>• Results give me drive and motivation</li> <li>• I've got loads more energy</li> <li>• I've dropped two clothes sizes</li> <li>• Family and friends are noticing</li> <li>• I now bring my blood glucose meter to work</li> <li>• I write a meal plan</li> <li>• I walk kids to nursery, walk during my break, park further away</li> <li>• I eat regularly</li> <li>• I've halved my portions</li> </ul>
<p><b>Non-adherence</b> (barriers to engagement with REMI.D intervention) and <b>Adherence</b> (enablers to engagement with REMI.D intervention)</p>	<ul style="list-style-type: none"> <li>• Online information contradicts itself</li> <li>• I feel ashamed of my diabetes</li> <li>• I eat when I'm stressed</li> <li>• Weight has a negative effect on my mental health</li> <li>• I lost interest in my food diary and feel guilty</li> <li>• I am part of a drinking culture</li> <li>• I end up having a takeaway as I don't plan</li> <li>• Stuff happened and I fell off the wagon</li> <li>• I eat more processed food as live alone</li> <li>• I have issues with my knees so stopped exercising</li> <li>• I don't get breaks at work</li> <li>• I want the professional to tell me what to eat</li> <li>• I work long shifts so can't go to gym</li> <li>• Dizzy spells stop me exercising</li> <li>• I drive for work and stop at cafes</li> <li>• I crave something different at weekends</li> <li>• People stare and think I'm lazy</li> <li>• GP called me fat</li> <li>• People assume I can't be exercising</li> <li>• Influencers with their belly out to here</li> <li>• At least I am not as fat as her</li> <li>• Overweight practice nurse judged me</li> </ul>	
<p><b>Stigma</b> (barriers to engagement with REMI.D intervention)</p>		

### Patient intention

The TDF domain *intentions* was used to collate patients' reasons for doing the REMI.D project. The primary outcomes for the REMI.D project were greater than 10kg weight reduction and a HbA1c of less than 48mmol/mol without diabetes medication, following the 12-week intervention.

These goals were voiced by many of the patients.

*'Wanting to lose weight... I'm not getting any younger and want to be healthier with my food' [P10].*

*'To try and get into remission and not have medication that was one of my goals' [P2].*

*'The main aim is to come off medication and not have diabetes' [P4].*

Other intentions reported by patients included physical appearance.

*'If I can manage to put on all my t-shirts without looking too big in the tummy that will help' [P7].*

Knowledge of the complications associated with a diagnosis of T2D was voiced as a reason for taking action.

*'I've had a lot of relatives, friends who I know have been struggling with diabetes, and some of them nearly lost their lives' [P7].*

*'Think I'm just really worried at getting them diseases associated with diabetes such as your kidneys, your feet, your heart and your eyes... they really concern me' [P2].*

*'I think my motivation was fear... I've got my wife and two young daughters and it's not a good position to be in... all the health negatives with diabetes... I was quite anxious' [P14].*

For many patients, the perceived benefits to physical and mental wellbeing were the strongest drivers for health behaviour change.

*'To not feel sluggish and lethargic all the time and unwell' [P18].*

*'Doing things with the grandkids, being able to join in with them' [P4].*

*'I really want to try and get it sorted so I can have that quality of life with them (2 young children)' [P20].*

*'I've been reading around mental health and mental health problems but I feel if I do some exercises, I'm doing a lot towards (improving) that' [P7].*

In summary, reasons enabling participation in the REMI.D included clinical parameters, physical measures and quality of life indices.

### Patient adherence

This area of interest sought to identify behaviours which enabled patients following either diet option to achieve one or



both of the primary outcomes of weight reduction and improved glycaemic control. The TDF domain *Behaviour regulation* saw patients offer up solutions resulting in health behaviour changes.

*I have bitten the bullet, I now bring it (blood glucose meter) into work' [P10].*

*I'm walking the kids to nursery, rather than driving them' [P20].*

*'Around week six, I found a guy on YouTube and he does walking videos . . . so I've been doing that maybe once a week' [P18].*

*I think you need to plan what you want. Look up recipes, make your list and then go and just get what you need' [P18].*

*I've been and asked them if I can take my own sugar-free bottles (to the pub)' [P4].*

*I rang ahead and asked if they would be able to do me a bowl of vegetables and they did' [P18].*

Strong reinforcement came through positive changes to weight and HbA1c, alongside a reported improvement in quality of life.

*I've seen improved results from blood glucose testing . . . currently my seven day average is 6.4 and I think the 90 day average is about 6.7. A few months ago I was getting averages in the mid to high 7s' [P14].*

*I've seen a higher blood sugar, I'm looking and I'm thinking, oh, maybe I should have had only one wrap instead of two wraps' [P10].*

*I'm taking fasting glucose levels, levels after meals and so on. But yes, by drawing graphs and charts and being able to look at the trend, I can actually say look this is getting better' [P1].*

*I've dropped two clothes sizes. Trousers are down to a 36 (inch waist)' [P9].*

*I'm feeling a lot more positive about things . . . just getting out, music and just walking . . . I didn't realise how happy you can actually be just doing that' [P10].*

Opportunities were key to success for many patients. In this category, *social influences* played a positive role for patients who met one or both of the primary outcomes.

*I want to go up the hills but I won't go on my own. So the hubby is going to come with me' [P16].*

*We're trying to help each other (partner), not to reach for the phone and load up Just Eat (app) if we're having a bad day' [P20].*

*The girls (at work) are right . . . what are we doing? . . . What shake are you having? . . . You're doing really well' [P18].*

*My daughter will research things on the internet because I'm not very good with computers' [P4].*

*Very, very supportive group of lads (veterans) round me and they know' [P9].*

Optimism was expressed by patients.

*It's working (healthy lifestyle approach), I feel more educated than I have been' [P2].*

*I'm very confident (in REM.I.D) because of the benefits I can see physically' [P7].*

For patients who saw an improvement in physical and clinical markers, *environmental context and resources* were favourable. One-to-one contact with the REM.I.D dietitian and physical activity professional was highly rated compared to previous experiences.

*I feel like I'm listened to (by REM.I.D dietitian) . . . and not dismissed' [P4].*

*He (physical activity professional) gave me loads of tips. He did a plan for me. I'm more or less 90% doing what he suggested' [P16].*

*It was nice to have that one-to-one time. Never had that throughout my life if I'm honest, around weight' [P2].*

Work and living arrangements offered space and opportunity for health behaviour change.

*I work part-time and I've got time to do extra things as well as exercise . . . I've got an elliptical thing, an exercise bike and a treadmill in the garage which is ideal on days when it's pouring with rain' [P8].*

*I live on my own, diet doesn't impact others' [P9].*

*I think I'm at an advantage because I'm a working person/ family so we can afford the healthier options as it were' [P7].*

*My partner works in Tesco's . . . Slimfast (TDR) was on offer and he got a discount (employee)' [P4].*

*We (me and my husband) make sure we don't have a lot of things in the house that we can't eat' [P2].*

In summary, reasons enabling adherence to the REM.I.D intervention included a pro-active approach, the support of others, and improvements in health-related outcomes.

#### Patient non-adherence

This area of interest sought to identify behaviours which prevented patients following either diet option achieving one or both of the primary outcomes of weight reduction and improved glycaemic control.

Opportunity (TDF domains *environmental context and resources* and *social influences*) was the key barrier to health behaviour change for these patients. Work and living arrangements offered barriers to achievement of goals.

*You don't get designated breaktimes (at work) anymore now . . . ' [P11].*

*I sit at a desk all day long whereas before I'd be out walking (support worker)' [P2].*

*I'm out in the van and I'm doing three or four jobs in a day, I know where all the little cafés are' [P19].*

*Convenience is a big factor when living alone. The idea of making a Sunday lunch for one is kind of madness, so of course you default to more processed food' [P1].*

*Circumstances happened at home . . . I fell off the wagon, went back to eating all the rubbish foods and sweets and it (weight) went back up again' [P19].*

*She (daughter) goes in (to work) for about eight o'clock . . . would need to take me to the park (safe place)' [P8].*

Social interactions presented challenges to health behaviour change.

*The culture of my friends is around drinking. If the culture was around hiking and healthy eating I would be happy doing that instead' [P1].*

*I look after my grandkids two days a week . . . have treats for them. We (patient and partner) buy them and eat them before the kids come' [P16].*



Incomplete *knowledge*, misinformation and poor understanding of role of healthcare professionals likely impacted patient non-adherence.

*He (patient) just didn't understand what he could eat and what he couldn't eat . . . I (patient's partner) thought that somebody would need to come in and obviously speak to him' [P13].*

*I would find it handy if say somebody (dietitian) had prepared like say meals . . . give us suggestions and maybe for the first couple of weeks just stick to that type of diet' [P11].*

*It kind of depends on whether I know why it (blood glucose level) was high or not . . . there are still some days where I can't make any sense of it' [P20].*

*I was told about the DESMOND (type 2 patient education), which doesn't do anything for me because I'm not on medication' [P3].*

*I went on T2D course. It just bored me silly . . . I used to put it on and walk away . . . I felt that my opinion wasn't worth anything' [P4].*

*It's (type 2 education course) all online now. I started to do it and then I just got a bit bored of it so I didn't complete it' [P16].*

*I wasn't getting any form of help (from my GP)' [P7].*

The other TDF domain of note in this section was *emotion*. Patients expressed various emotions relating to the diagnosis and management of T2D.

*Only two people know about my diabetes . . . this notion of shame to me is a significant thing. I guess with diabetes it's almost a lack of control . . . you're eating excessively and you've given yourself this illness' [P1].*

*I look at myself and there's a sort of self-loathing there . . . I don't want to be that massive whale-like person' [P10].*

*I started to do it (keep a food diary) then I just lost interest in it . . . I feel guilty' [P11].*

Poor physical and mental health hindered adherence to plans.

*With the dizzy spells, they've (physical activity professional) put exercise on hold . . . they are going to find me some sitting exercises to do' [P13].*

*He (physical activity professional) phoned me . . . I said, oh yes, I am swimming but this last couple of weeks I haven't with cold and then with my leg it's been difficult' [P10].*

*I've just re-joined the gym again, but I've got issues with my knees' [P11].*

*I've suffered with weight gain . . . depression and anxiety issues . . . and COVID-19 was a bit of a killer. After what happened last time (regained weight lost), I'm not at all confident' [P14].*

In summary, reasons cited for non-adherence to the REMI.D intervention included an obesogenic environment, the impact of others, ambivalence, poor health literacy, low self-esteem and physical ailment.

### Patient stigma

The rich data set coming from the *emotion* TDF domain merited its own area of interest. Weight stigma is a form of discrimination based on a person's body weight, and presented a barrier to engagement with the REMI.D project.

Patients heard or perceived weight-related stigma targeted at them.

*I just think everyone wants to have a dig at my weight . . . you are fat'. [P22].*

*I'd been speaking to the doctor, he was very blunt with me that because I'm overweight, I can't be exercising . . . that must be the reason. And I'm like, dude, I'm with the personal trainer twice a week . . . you can't just say to me because I have that number on a piece of paper that that's the reason' [P6].*

*That (diagnosis of T2D) was horrific . . . I cried. It was a telephone appointment and he (GP) called me fat' [P23].*

*I think one of the reasons that I don't go out is I just feel too fat. Nobody says anything but you can see the look' [P6].*

Patients were conscious of noticing the body weight of others and drawing self-comparisons.

*Every time I go for my bloods (healthcare assistant talks about my weight) . . . so, I think she's overweight . . . she needs to be on them (beta-blockers) . . . so there is a bit of prejudgement' [P2].*

*I always think . . . at least I'm not as fat as her' [P16].*

*I know all these influencers and models say, but I'm very healthy. How can you when your belly is out here? It's not right' [P3].*

*I was watching something on Facebook (social media) the other day, and some woman was drinking one of these energy drinks, Prime, and she was a big built girl, and I thought, what the hell are you doing' [P11].*

In summary, further reasons for non-adherence to the REMI.D intervention included the concepts of feeling judged and being judgemental.

### Discussion

This qualitative research represents the views of patients with a recent diagnosis of T2D. Adherence to either of the two dietary strategies enabled a weight loss-induced improvement in glycaemia, with 1 in 7 of the full cohort achieving short-term reversal of T2D.

Weight loss, recorded in clinical trials, appears to be the best predictor of T2D remission,<sup>(32)</sup> with the use of TDR-Formula Food Products interventions offering favourable outcomes for people with T2D.<sup>(25,33,34)</sup> In 2022, Diabetes UK and the National Institute for Health Research (NIHR)<sup>2</sup> announced funding for the NewDAWN project which seeks to expand the range of weight loss programmes with the potential to offer T2D remission.<sup>(35)</sup> Parallels may be drawn between the NewDAWN project and this REMI.D project. Both include a TDR-Formula Food Products intervention, a TDR-Food, and more conventional diabetes dietary management strategies. At the time of writing, no publications from NewDAWN were available.

*Decision making processes* related to food choice is complex, influenced by personal behaviour, the food environment and social interactions. There was no uptake for the TDR-Food offer by REMI.D participants despite a previous successful feasibility study, DIAMOND, by Morris, *et al.*<sup>(36)</sup> This raises the question of whether a care provider should influence the choice of one diet over another. In this case, it could be argued that the strongest evidence for successful dietary T2D remission is the

<sup>2</sup>NIHR is a major funder of high quality global health research that directly addresses the diverse health needs of people in low and middle income countries.





TDR-Formula Food Products intervention. The NHS England T2D Path to Remission Programme, based on the TDR-Formula Food Products intervention, launched in 2020.<sup>(27)</sup> While clinical outcomes influenced the *intentions* of the REMI.D patients, mental and physical wellbeing were strong drivers for participation in REMI.D. An area of growing interest within public health nutrition is ‘food choice architecture’; how a food choice is framed through multiple means (food environment, patient and provider interactions, analysis of habitual menu cycles) and its influence on subsequent food selection.<sup>(37)</sup>

Findings reported within the area of interest ‘patient adherence’ add to the existing evidence base for facilitators; feelings of *optimism* with measurable improvements in physical and psychological wellbeing. The use of technology, including flash glucose monitoring,<sup>(38)</sup> provided strong *reinforcement* as an adjunct to dietary adherence in REMI.D participants. These findings add to the work of Taylor, *et al.*<sup>(17)</sup>

Positive *social influences* of family, friends and co-workers and *resources* (REMI.D team) proving key to successful primary outcomes in REMI.D. Adding to the findings of Rehackova, *et al.*,<sup>(8)</sup> *behavioural regulation* featured strongly in REMI.D participants who succeeded in achieving a HbA1c below 48mmol/mol and/ or a weight loss of 10kg or more. A novel approach within the REMI.D project was the establishment of good physical activity habits (walking children to school, accessing YouTube walking videos, planning ahead so daughter can take to park) in addition to helpful food and diabetes-related decisions (having TDR-Formula Food Products in cupboard at work, meal planning and making a shopping list, ringing venue to check if they can accommodate diet, seeking permission to bring own drinks to pub, taking blood glucose meter to work). The Diabetes Intervention Accentuating Diet and Enhancing Metabolism (DIADEM)-1 trial<sup>(39)</sup> which included physical activity support after a TDR intervention reported a remission rate of 61% compared with 46% in the DiRECT trial.<sup>(40)</sup> Further research on the benefits of combined tailored diet and physical activity strategies during and following interventions, building on the REMI.D project is required.

Findings reported within the area of interest ‘patient non-adherence’ and ‘patient stigma’ add to the existing evidence base for barriers. In particular, rich data related to suboptimal *environmental context and resources* and unhelpful *social influences*. Physical activity was supported where active travel (walking) to school was feasible for REMI.D participants accompanying children. For other REMI.D participants assistance to travel, beyond local neighbourhoods, to safe recreational areas was deemed necessary to facilitate walking.

Work arrangements for REMI.D participants (sedentary job roles, work patterns and perceived limit to breaks, cultural pressure) add weight to the general consensus that the physical environment has an important influence on an individuals’ weight status. Likewise, reports of cheap, convenient, ultra-processed foods satisfying REMI.D participants’ multiple reasons for eating (hunger, habit, social, psychological, sensory) draws attention to the obesogenic environment described by the Foresight report more than 15 years ago<sup>(41)</sup> but still very much in evidence today.<sup>(42)</sup> These drivers of excess calorie intakes and low levels of physical activity arising out of this qualitative

research, provide ideas for local place-based initiatives to support population-level weight change.

REMI.D participants’ *emotions*, associated with the diagnosis and management of T2D offered valuable insights. REMI.D participants were not immune to prevailing social norms of adequate body weight and shape; feelings of shame, self-loathing, low self-esteem, guilt, anger, judgement and defensiveness fuelled unhelpful attitudes and behaviours. Sutin, *et al.*<sup>(43)</sup> found weight discrimination to be associated with a 60% increased mortality risk, even when body mass index was controlled for. Patient reports of weight discrimination in healthcare are well documented.<sup>(44,45)</sup> Talumaa, *et al.*<sup>(46)</sup> offers stigma reduction strategies for healthcare and calls for a move away from a solely weight-centric approach to a health-focused weight-inclusive one. REMI.D, like other T2D management strategies, has a primary outcome of weight reduction; any rollout into primary care warrants compassionate and knowledgeable care providers.

The REMI.D participants were recruited during or immediately following the COVID-19 pandemic; *knowledge* was incomplete even accounting for a recent diagnosis of T2D, and access to online learning evaluated negatively. A reminder that digital innovations in diabetes do not suit everyone. The REMI.D data emphasises the value of an effective patient: care provider relationship and synchronous tailored advice.

### Limitations

A patient preference for conducting the qualitative interview by telephone (85% of sample) was unexpected. A recent Swedish study by Azad, *et al.*<sup>(47)</sup> identified advantages and challenges, experienced by participants and researchers, to using mobile phones for conducting interviews. Advantages included convenience, greater anonymity and emotional distance. Challenges are presented as ‘loss of human encounter, intense listening, worries about technology, and sounds or disturbances in the environment’. The quality of some of the audio recordings of the telephone interviews was impacted where the patient’s voice did not carry well over speaker phone.

Recruitment to this qualitative research was challenging leading to ethical amendments to improve recruitment through a financial incentive and advertising. The full cohort has a small sample size which limited the interpretation of the quantitative statistics. As researcher (RCB) conducted the qualitative interviews during the first 12 weeks, the patient’s voice in relation to weight loss maintenance was limited.

### Conclusion

A scalable choice of dietary and physical activity interventions may enable more patients to achieve T2D remission or delayed progression with deprescribing of diabetes medications. Humanising patient: care provider encounters with the dietitian and physical activity professional resulted in a more empathic environment in which patients felt heard and understood. For the narrative around obesity in healthcare settings to change, erroneous assumptions and beliefs about obesity need to be identified and challenged. Limited resources should be targeted



towards patients who identify with more barriers or fewer opportunities for health behaviour modification. At risk patients include those who are deprived and those with poor mental or physical health. Rewards, incentives and patient-centred feedback are strong motivators for diet and physical activity change.

### Abbreviations

**COM-B:** Capability Opportunity Motivation – Behaviour; **COVID-19:** Coronavirus; **DIADEM:** Diabetes Intervention Accentuating Diet and Enhancing Metabolism; **DIAMOND:** Diabetes Education and Self-Management for Ongoing and Newly Diagnosed; **DiRECT:** Diabetes Remission Clinical Trial; **GP:** General practitioner; **IMD:** Index of multiple deprivation; **NIHR:** National Institute for Health Research; **REMI.D:** Remission in diabetes; **TDF:** Theoretical domains framework; **TDR:** Total diet replacement; **T2D:** Type 2 diabetes.

### Supplementary material

The supplementary material for this article can be found at <https://doi.org/10.1017/jns.2024.30>

### Acknowledgements

RCB designed the study, collected and analysed the data with input from AH, HJM, and AAL. RCB drafted the manuscript. All authors contributed to the manuscript and approved the final version. Funding from Teesside University (£1000, transcription costs) and Sport England (£250, prize voucher draw) is declared. Ethical Approval was granted by the Health Research Authority and Health and Care Research Wales on 21 May 2020 (REC Ref: 20/LO/0615). There are no conflicts of interest.

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