UK dietitians' attitudes and experiences of formula very low- and low-energy diets in clinical practice

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Summary
Despite evidence that formula very low-energy diets (VLED) and low-energy diets (LED) are both effective and safe as treatments for obesity and type 2 diabetes, these diets remain underutilized in the United Kingdom. The aim of this study was to explore UK dietitians' attitudes and experiences of using formula VLED and LED. A cross-sectional survey was disseminated between September 2019 and April 2020 through websites, social media platforms and dietetic networks using snowball sampling. In total, 241 dietitians responded to the online survey with 152 participants included in the final analysis (female [94.1%], mean age 40.8 years [SD 9.5]; median 12 years [interquartile range 8, 22] within dietetic practice). One hundred and nine (71.7%) participants reported currently using VLED/LED in clinical practice and 43 (28.3%) did not. Those with lower motivation and confidence in implementing VLED/LED in clinical practice were less likely to use them. Cost and adherence were the two highest reported barriers to use. Dietitians perceived VLED/LED were effective, but concerns remained about long-term effectiveness, particularly for some patient groups. Dietitians also reported that further education, funding and service infrastructure, including access to clinic space and administrative support, were required to help embed VLED/LED into routine clinical practice. With clinical services now regularly offering VLED/LED programmes in the United Kingdom, dietitians are ideally placed to provide long-term support. However, understanding, reporting and addressing the potential barriers (funding/infrastructure and education) appear to be key requirements in increasing the delivery of VLED/LED programmes nationally.

KEYWORDS
attitudes, dietitians, formula diets, obesity, type 2 diabetes remission, very low/low-energy diets

What is already known about this subject
- Formula very low-energy diets (VLED) and low-energy diets (LED) are efficacious and safe for the management of both obesity and type 2 diabetes within clinical practice in the United Kingdom.
- Despite this VLED/LED remain underutilized in the United Kingdom and there is a lack of understanding about the experiences and attitudes of dietitians who use them.

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1 | INTRODUCTION

In 2016, it was estimated there were approximately 650 million people living with obesity globally. Obesity is associated with an increased risk of type 2 diabetes (T2D), heart disease, stroke and some cancers and has resulted in worldwide focus. Despite this, there remains a paucity of interventions that have been shown to be effective in reducing the prevalence of obesity. Therefore, effective treatments for obesity and its related co-morbidities continue to be key priorities globally.

Formula very low-energy diets and low-energy diets (VLED/LED) are specially formulated products, that come in the form of liquid soups, shakes or porridges, as well as bars. VLED are defined as having ≤800 kcal (3300 kJ) and LED between 800 and 1200 kcal (3351–5021 kJ). There is now increasing evidence that using formula VLED/LED results in clinically significant weight loss and T2D remission. Weight loss of between 10% and 15% has been reported within the initial total diet replacement (TDR) phase, and have been shown to be maintained for up to 4 years. Despite substantial scientific evidence and recent UK Government support for the use of LED, both formula VLED/LED are infrequently used in dietetic practice and issues concerning their use persist including poor adherence, potential side effects and long-term efficacy.

From the limited data on the use of VLED in practice, all of which have originated from Australia, VLED/LED are only offered to patients by 3%–7% of healthcare professionals (HCP), including dietitians, as a weight-loss treatment. As such, the views and perceptions of VLED/LED held amongst dietitians in the United Kingdom remain unknown despite them often being the primary HCP delivering these interventions. Given that a national pilot is currently being delivered by NHS England for their use in T2D remission, it is essential that UK dietitians feel equipped to deliver such programmes.

The aim of this study was to explore dietitians’ attitudes and experiences of using formula VLED and LED in current clinical practice in the United Kingdom.

2 | METHODS

Dietitians were recruited through online advertisement to complete an online cross-sectional survey between August 2019 and March 2020. Recruitment invitations were disseminated through the British Dietetic Association (BDA) website, social media advertisement including Facebook, Twitter and dietetic networks using snowball sampling. Potential participants gained access to the survey through a link using University College London (UCL) Opinio platform. Eligible participants were required to be a registered dietitian and aged between 20 and 65 years.

All participants were provided with an electronic participant information sheet and gave informed consent (electronically) prior to participating. After which participants provided demographic data including age, gender, country of residency, years since dietitian registration and the area of clinical practice they worked in. The survey comprised of the following three sections and included both open and closed questions:

1. Attitudes and experiences of dietitians using formula VLED/LED in current practice.
2. Attitudes and experiences of delivery protocols at the different stages of the formula VLED/LED programmes, e.g. TDR, reintroduction of food and weight loss maintenance, including the use of rescue packages (reusing a VLED/LED for up to 4 weeks to treat weight regain) to correct weight regain.
3. Motivation, confidence and barriers experienced by dietitians when implementing formula VLED/LED in current practice.

Participants were asked to scale their understanding, confidence and motivation using a 10-point Likert scale from ‘1’ = least to ‘10’ = most. The study was granted ethical approval by the UCL Research Ethics Committee (REC number 16191/003). A copy of the survey questions is provided in Appendix S1.

2.1 | Data analysis

Descriptive data were summarized using means (standard deviation [SD]) for continuous variables depending on distribution. Categorical data were reported using counts (percentages). Normality tests were used to assess the distribution of the continuous data, and where data were not normally distributed data were presented as median (interquartile range [IQR]). All statistical analyses were conducted using SPSS version 24 with statistical significance being defined as a p-value <.05.
Differences between baseline characteristics were analysed using either independent sample t-test or Mann–Whitney U test for continuous data and chi-squared for categorical data. Correlations between categorical data and motivation and confidence were assessed using Spearman’s correlation coefficient.

Binomial and ordinal logistic remission alongside generalized linear models were used to identify factors that predicted understanding of formula VLED/LED, views on long-term weight loss and confidence and motivation of formula VLED/LED implementation. Covariates within the models were age, years of registration, current use of formula diet or not in practice and frequency of use in practice. Odds ratios, 95% confidence intervals (CI) and \( p \)-values were reported for ordinal and binomial logistic regression.

To explore predictors of beliefs of long-term weight loss, the question asking ‘Do you believe that VLED/LED can achieve long term weight loss’ was made into a dichotomous variable, where the responses, ‘No’ and ‘Maybe’, were added together to create the variable ‘No’ (0) while ‘Yes’ remained the same (1).

Qualitative data were collected using four open-ended free-text questions to gather greater insights into dietitians’ views and experience of using formula VLED/LED (see Appendix S1 for the five open-ended questions). Three authors independently coded the five open-ended questions (AB, NB, SWF) to identify the key themes and subthemes. Thereafter, through discussion, which included resolving any coding disagreements, the final themes, subthemes and supporting quotes were agreed.

3 | RESULTS

3.1 | Study population and baseline demographics

A total of 241 dietitians responded to the survey. Participants who did not give consent (\( n = 50 \)) did not complete 60% of the survey (\( n = 21 \)) or did not practice dietetics in the United Kingdom (\( n = 18 \)) were excluded leaving a total of 152 (63%) participants in the final analysis.

Most participants were female (\( n = 143 \), [94.1%]), with a mean age of 40.8 (SD 9.5) years and had been registered dietitians for a median of 12 years (IQR 8, 22). Over half of the participants resided in England (\( n = 99 \), [59.2%]) and 38 (25%) from Scotland. Regarding the areas of practice that participants worked in, 90 (59.2%) reported working in weight management and over half (\( n = 77 \) [50.7%]) worked in diabetes care (Table 1), with 64 (42.1%) working in two or more areas of clinical practice. Table 1 summarizes the demographic characteristics.

| Characteristic | Gender | Age, median (IQR) | Country of residency in the United Kingdom | Years since registration median (IQR) | Area of clinical practice<sup>ab</sup> |
|----------------|--------|-------------------|------------------------------------------|-------------------------------------|----------------------------------|
|                | Female | Years             | England                                  | Years                               | Weight management                 |
|                | Male   |                   | Scotland                                  |                                     | Diabetes                          |
|                |        |                   | Wales                                     |                                     | Bariatric Surgery                  |
|                |        |                   | Northern Ireland                          |                                     | Endocrinology                      |
|                |        |                   |                                          |                                     | Paediatrics                        |
|                |        |                   |                                          |                                     | Hepatology                         |
|                |        |                   |                                          |                                     | Other                             |

Abbreviation: IQR, interquartile range.
<sup>a</sup>Values are median (IQR).
<sup>b</sup>Multiple answers permitted.

3.2 | VLED/LED use within clinical practice

Of those surveyed, 109 (71.7%) reported currently using VLED/LED in clinical practice and 43 (28.3%) were not (Table 2). There was no difference in age or year of registration between participants that were using and not using VLED/LED. Of those using VLED/LED, the majority reported using them once or less per week (\( n = 92 \) [63.4%]), with only 14 (9.7%) used formula diets every day. Table 2 shows brands and types of diets used by participants, where Counterweight Pro800 and commercial meal replacements (e.g., Slim Fast; Tesco’s Ultraslim) were the most popular (46.2% and 33.8% respectively).

Over half of the participants reported using VLED/LED to treat overweight or obesity, while 75 (58.1%) used them for T2D remission and 67 (51.9%) as part of T2D management. Other areas of practice such as fertility and orthopaedic problems were reported (Table 2). Further analysis identified those working in weight management and diabetes were more likely to use VLED/LED compared to those who were not using them for these purposes (\( p = .045; p = .015 \), respectively).

Participants reported their understanding of using VLED/LED for treatment of obesity and T2D was high, with a median score of 8.0 out of 10 (IQR 7, 9) (Figure 1A). Comparison between the areas of practice that dietitians work in revealed that higher understanding scores were associated with participants working in T2D, T2D remission and fertility problems (\( r_s = 0.250; p = .01; r_s = 0.287; p = .003; r_s = 0.193; p = .047 \); respectively), while working in bariatric surgery was negatively associated with higher understanding (\( r_s = -0.337; p = .001 \)).
In addition, using Counterweight Plus Pro800 products was associated with a higher understanding of using VLED/LED for the management of obesity and T2D ($r_s = 0.259, p = .007$).

Most participants ($n = 97 [78.9\%]$) reported that dietitians should be the ones delivering VLED/LED, while 37.4% ($n = 46$) reporting a multidisciplinary team (MDT) approach should also be used (Figure 1B). Furthermore, participants felt that the best mode of delivery was through a combination of one to one and group delivery ($n = 69 [57\%]$), while a third of participants ($n = 40 [33.1\%]$) reported one to one delivery alone was the preferred method (Figure 1C).

When asked whether long-term weight loss was achievable following a VLED or LED, over half (52.6% [$n = 61$]) believed it was achievable, while only 6.0% ($n = 7$) believed it was not possible, with the remaining participants ($n = 48 [41.4\%]$) unsure (Figure 1D). Participants not currently using VLED and LED were 3.48 times more likely to report that long-term weight loss was not possible ($p = .015$) and were less likely to report greater understanding than those that currently using them (OR 0.37, 95% CI 0.16, 0.83; $p = .016$).

### 3.3 | Attitudes and experiences of using formula VLED/LED

#### 3.3.1 | Total diet replacement

Most participants (71.6% [$n = 83$]) reported using a TDR phase, in comparison to 28.4% ($n = 33$) who did not. Most dietitians reported that the TDR phase should last 12 weeks ($n = 105 [89.7\%]$), with 57.5% ($n = 69$) reporting that patients should be seen every 2 weeks during this phase (Table 3).

#### 3.3.2 | Food reintroduction

Participants suggested the median duration of food reintroduction should last 8 weeks (IQR 6, 12), with responses ranging from 2 to 52 weeks. Approximately half of the participants ($n = 64 [53.3\%]$) reported that patients should also be seen every 2 weeks during the food reintroduction phase (Table 3).

#### 3.3.3 | Weight loss maintenance including rescue packages

When asked about the duration of the weight loss maintenance phase, participants suggested a median duration of 10.5 months (IQR 6, 12), with 74.8% ($n = 89$) reporting patients should be seen monthly during this time (Table 4). Rescue packages to assist weight regain were viewed as a popular option by participants (72.6% [$n = 90$]), with participants reporting that patients would need to gain a median of 3.0 kg (IQR 2, 4) to trigger their use. Participants viewed the inclusion of behavioural support and patient contact as the top two strategies (67.8% and 60.2%, respectively) for achieving long-term weight loss maintenance.

#### 3.3.4 | Motivation and confidence in implementing formula diets

To further understand dietitians’ use of VLED/LED, participants were asked to score their motivation and confidence to implement them as part of clinical practice (Table 5). The vast majority reported having a

| TABLE 2 Very low-energy diets and low-energy diets utilization |
|---------------------------------------------------------------|
| **Survey questions**                                           |
| Do you currently use VLED/LED? ($n = 152$)                     |
| Yes                                                           | 109 (71.7) |
| No                                                            | 43 (28.3)  |
| **How often do you use VLED/LED? ($n = 145$)**                |
| One or less times a week                                      | 92 (63.4)  |
| 1–2 times per week                                            | 23 (15.9)  |
| 3–4 times per week                                            | 16 (11.0)  |
| Everyday                                                      | 14 (9.7)   |
| **What brands or types do you use with your patients?** ($n = 132$) |
| Counterweight Pro800                                           | 61 (46.2)  |
| Commercial meal replacement                                   | 45 (33.8)  |
| Optifast                                                      | 14 (10.6)  |
| Exante                                                        | 18 (13.6)  |
| Cambridge Weight Plan                                         | 8 (6.1)    |
| Lighterlife                                                    | 7 (5.3)    |
| Food only                                                     | 26 (19.7)  |
| Milk only                                                     | 17 (13.0)  |
| Other                                                         | 24 (18.2)  |
| **Using multiple brands**                                     |
| 1                                                             | 82 (62.6)  |
| 2                                                             | 25 (19.1)  |
| 3+                                                            | 24 (18.3)  |
| **What patient population do you use formula diets with?** ($n = 129$) |
| People with overweight and obesity                           | 69 (53.5)  |
| People with T2D                                               | 67 (51.9)  |
| People with T2D remission                                     | 75 (58.1)  |
| People with fertility problems                                | 20 (15.5)  |
| People with orthopaedic problems                              | 15 (11.6)  |
| People who have undergone or undergoing bariatric surgery     | 28 (21.7)  |
| Other                                                         | 16 (12.4)  |
| **Working with multiple patient groups**                      |
| 1                                                             | 50 (38.8)  |
| 2                                                             | 37 (28.7)  |
| 3+                                                            | 42 (32.5)  |

**Abbreviations:** LED, low-energy diet; T2D, type 2 diabetes; VLED, very low-energy diet.

*Multiple answers permitted.*
high motivation score (7 out of 10; \( n = 94 \) [81.1%]), while over two thirds (\( n = 79 \) [68.8%]) reported high confidence score (7 out of 10) to implement VLED/LED in clinical practice.

Further analysis showed that participants not using VLED/LED in practice were less likely to report being motivated (OR 0.26, 95% CI 0.11, 0.61; \( p = .002 \)) or being confident (OR 0.08, 95% CI 0.03, 0.22; \( p < .0001 \)) in implementing VLED/LED in clinical practice. While older participants were more confident about implementation (OR 1.08 per year increase in age, 95% CI 1.01, 1.16; \( p = .024 \)). Furthermore, participants that used VLED/LED less than 3 times per week had a lower likelihood of reporting being highly motivated and confident to implement VLED/LED in clinical practice. While, using them once or less a week or once to twice a week had lower likelihood of being motivated (OR 0.16, 95% CI 0.04, 0.65; \( p = .011 \); OR 0.16, 95% CI 0.04, 0.73; \( p = .019 \), respectively) and confident of implementation (OR 0.12, 95% CI 0.03, 0.45; \( p = .001 \); OR 0.19, 95% CI 0.05, 0.79; \( p = .022 \), respectively).

### 3.3.5 | Barriers in implementing formula diets in clinical practices

Dietitians identified two key barriers to implementing formula VLED/LED in practice: first cost (66.1% \( [n = 78] \)) and second adherence (57.6% \( [n = 68] \)) (Figure 2A). While two thirds (67.2% \( [n = 78] \)) reported the cost of formula VLED/LED products should be shared between the patient and the service provider (Figure 2B).

The belief that weight regain was a barrier to using formula VLED/LED was negatively associated with both motivation and confidence \( (r_s = -0.255; p = .006; r_s = -0.239; p = .010, \text{respectively}) \). While adherence being a barrier was associated with lower motivation \( (r_s = -0.238; p = .010) \) and concerns about side effects/safety being associated with lower confidence \( (r_s = -0.292; p = .002) \). Furthermore, there was a positive association between the frequency of using VLED/LED in clinical practice and belief that cost was a barrier to using VLED/LED \( (r_s = 0.193; p = .036) \).

### 3.3.6 | Qualitative analysis

Three key overarching themes were identified from the open-ended survey responses: (1) perceptions of effectiveness, (2) level of

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**Figure 1** Responses to questions about dietitian’s views and understandings towards very low- and low-energy diets. (A) How would you rate your understanding of VLED/LED for treatment of obesity and T2D? (score out of 10); (B) Who should deliver VLED/LED?; (C) What is the best way to deliver VLED/LED?; (D) Do you believe that VLED/LED can achieve long-term weight loss? LED, low-energy diet; MDT, multidisciplinary team; T2D, type 2 diabetes; VLED, very low-energy diet. Note: *Median (IQR); *multiple answers permitted.

**Table 3** Responses of dietitians to questions about total diet replacement

| Question | (\( n = 116 \)) (\( n, \% \)) |
|----------|-----------------|
| Do you use TDR stage? | Yes 83 (71.6) No 33 (28.4) |
| How long on average do you think the TDR phase should last? \( (n = 117) \) \( (n, \%) \) | 4 weeks 10 (8.5) 8 weeks 24 (20.5) 12 weeks 71 (60.7) 16 weeks 2 (1.7) 20 weeks 4 (3.4) Other 6 (5.1) |
| How often do you feel a patient should be seen within the TDR phase lasting 12 weeks? \( (n = 120) \) \( (n, \%) \) | Every week 29 (24.2) Bi-monthly 69 (57.5) Monthly 10 (8.3) Other 12 (10.0) |

Abbreviation: TDR, total diet replacement.
intervention and (3) education and practice, with several subthemes grouped under each.

**Theme 1: Perceptions of effectiveness**

Overall, dietitians viewed formula VLED/LED interventions as an effective treatment for weight loss and T2D remission. At the same time, dietitians recognized that formula VLED/LED were a beneficial option for some patients, but were not suitable for everybody, and those using VLED/LED required substantial support including dietetic input. Dietitians reported that patient’s motivation appeared to be a key factor to the success of the diets and acknowledged the need for the inclusion of the wider MDT in delivering VLED/LED interventions, in particular the role of health psychology.

A very important option for individuals who want to lose weight and/or achieve diabetes remission. Achieving weight loss and diabetes remission is not a ‘one size fits all’ therefore having options are essential and increase likelihood of compliance. Participant 101

It has a place in clinical practice but must be used carefully, by experts and within an MDT with access to psychology. Participant 9

I think they need to be carefully supervised to prevent weight re-gain. Weight loss and adherence to the diets is generally good but intensive follow up and transition to a normal healthy diet with a dietitian’s support is essential. Participant 74

Work very well with highly motivated individuals. Participant 129

The majority of the dietitians surveyed identified that the reintroduction of food following the TDR phase was challenging for patients and viewed the need for additional support and guidance from dietitians as crucial.

**Theme 2: Level of intervention**

Dietitians typically viewed formula VLED/LED as a short-term intervention, in order to achieve rapid weight loss, T2D remission or as a pre-bariatric surgery intervention for ‘liver shrinkage’.
They have their place for the right individual, who understands that this is a short-term measure and is motivated to continue on to the 2nd phase of food reintroduction.  

Participant 3

Some dietitians raised concerns around the long-term safety of formula VLED/LED, risk of developing eating disorders and lack of evidence for long-term outcomes.

...I worry about the potential for VLCD to increase disordered eating and binge eating disorder. Participant 134

Happy to use them provided people have been adequately screened for eating disorders. Participant 148

Dangerous, harmful, promoting disordered eating. Participant 151

They work short term (e.g., pre-op) but are challenging for some patients to stick to and query the long term effectiveness (without Bariatric surgery) in terms of maintenance of and significance of lost weight. In bariatrics pre-op they appear effective in reducing some weight (reducing liver size) but am unsure of the overall significance per available data. Participant 103

Theme 3: Education and practice

Some dietitians identified there were gaps in their training and education on the use of formula VLED/LED interventions, with the lack of delivery protocols resulting in limited or reluctant use of formula VLED/LED in practice. In contrast, those dietitians delivering the Counterweight-Plus LED intervention reported a model of care that addressed the issues of training by providing ongoing education and support. There was also a sense that supervision or mentorship was needed to help with greater implementation within practice.

Adequate training and ongoing support if required. Participant 61

We use the Counterweight Plus programme which is very robust with clear guidance on implementation in clinical practice and excellent support from the Counterweight team for medical queries etc. Participant 121

Training, booklets, peer supervision and contact with questions (senior dietitian or specialist team). Participant 67

Dietitians reported differing funding arrangements for the implementation of formula VLED/LED programmes across the United Kingdom, e.g., central funding, or local commissioning. The lack of funding and guidance for commissioning formula VLED/LED interventions were consistently reported as a barrier to formula VLED/LED delivery. Dietitians also viewed the lack of infrastructure to support service delivery, e.g., clinic space/facilities, administrative support, formula diet product, lack of diverse resources and dietetic capacity, as a key implementation barrier. Furthermore, short-term funding was reported as an obstacle to expanding formula VLED/LED provision where they were already being delivered.

Commissioner guidance and funding, protocol for medical management in primary care. Participant 128

Time, staff, venue cost, primary care buy in (for weight management), cost sharing, printed info, data clerk. Participant 116
Time, evidence-based programme, agreed process for funding of product, clinic space, funding and peer support.
Participant 38

Resources need to accommodate a more diverse population, including meal plans for individuals or family based meals once food reintroduction is achieved. Participant 147

4 | DISCUSSION

Our study is the first in the United Kingdom to explore dietitians’ views and experiences of using formula VLED/LED and showed that the majority of dietitians surveyed were currently using formula VLED/LED in clinical practice. This suggests a considerable number of clinical dietetic services in the United Kingdom are now using these dietary approaches particularly within weight management and diabetes services, which is in contrast to previous evidence showing VLED/LED are rarely used by HCP or dietitians. Most dietitians felt VLED/LED were effective in some patients but not all, with patient motivation reporting to be a key aspect of success with VLED/LED interventions.

There was a strong sense from participants that dietitians should be core members of the delivery team of VLED/LED, with an effective MDT also being important, which reflects advice from current National Institute for Health and Clinical Excellence (NICE) guidance. Furthermore, it was acknowledged that clinical psychology was considered an essential part of the MDT to help support long-term weight loss and adherence, despite there being limited access to psychology in current practice. This suggestion is likely to be due to multiple factors including reflection of national guideline for specialist service provision, also, evidence is emerging for the role of third-wave cognitive therapies, e.g., acceptance and commitment therapy and their benefit for both weight loss and weight loss maintenance. Dietitians also felt that a lack of effective infrastructure to help support service delivery, including facilities, administrative support and capacity, meaning that using VLED/LED was negatively impacted. These points highlight the importance of ensuring that VLED/LED programmes have the access to the appropriate staffing and support services prior to commencing to ensure long-term success which may present a challenge for NHS services to effectively incorporate VLED/LED programmes without additional funding.

Our data show a lack of agreement from dietitians on how VLED/LED should be delivered within practice, with many services appearing to be replicating how research studies have delivered their programmes in terms of intensity and timing. The food reintroduction phase was reported to be the most challenging phase by dietitians, which agrees with evidence from qualitative evaluations that have also identified the food reintroduction phase as the most challenging for patients and highlights the need for additional dietetic support during the crucial phase. The use of ‘rescue packages’ for preventing or treating weight regain was popular with dietitians in our survey. The mean threshold for weight regain before the use of ‘rescue packages’ should be considered was suggested as 3 kg compared to 2 kg within DiRECT.

The updated review of the NICE obesity guidelines in 2014 recommended that VLED should not be used routinely within clinical practice, could be used for no longer than 12 weeks and required specialist input. These recommendations may have in part impacted the decision and confidence of UK dietitians to implement VLED within practice. However, it should be noted that the guidelines only included research studies up to the year 2000 therefore excluded high-quality studies for the use of VLED between 2000 and 2014, and furthermore only focused on VLED and did not include evidence for LED, which are now more commonly used in research trials and clinical practice. Therefore the recently published high-quality studies over the last decade were omitted demonstrating their effectiveness, and there have been suggestions there is a need for a review of the NICE recommendations to help better guide practice.

The barriers to implementation of VLED/LED by dietitians appeared to be driven mainly from beliefs about cost and a lack of adherence, alongside a lack of funding and guidance for commissioning. Data supports the view that cost is a barrier to wider use, with patients having to self-fund being identified as a particular barrier to continuation of the programme, although self-funding was not mentioned specifically as an issue by the participants. However, in comparison when looking at adherence, the views held by dietitians appear contrary to the available evidence. With systematic review data comparing VLED against control (food-based low-energy/fat diet) finding no difference in levels of adherence, which may suggest that no matter what diet patients choose, adhering to it will be challenging. Furthermore, qualitative data suggests that although people initially found transitioning to a VLED/LED challenging, it quickly eased, was easier than expected and they enjoyed the simplicity of the VLED/LED, which all facilitated adherence. Also, a recent both narrative and systematic review has shown VLED/LED to be the most effective treatment for T2D remission.

Motivation and confidence have been suggested to play key roles in determining human behaviour, with confidence indicating one’s ability to perform the behaviour and motivation their desire to engage in that behaviour. Within this study, we measured both in relation to belief about implementation of VLED/LED with people living with obesity and T2D and showed a higher degree of both was present in dietitians currently using them in practice compared to those that were not and dietitians infrequently using VLED/LED negatively impacting their motivation and confidence in implementation. Taken together these associations might in part explain why some dietitians use VLED/LED and others do not, and might suggest that in order to help increase implementation that education and training to help increase motivation and confidence could be key.

Dietitians typically view formula VLED/LED as short-term interventions, which reinforces the view that following weight loss using VLED/LED weight regain is inevitable. This historical view may well in part be driving dietitian’s beliefs that these diets are not suitable for achieving weight loss maintenance and limiting their...
Despite the sample from this group was small, therefore this should be acknowledged as a limitation of our study. Finally, it was not clear from our data whether patient motivation being important to success was an opinion held by dietitians about their patients or whether they had measured motivation. Therefore, it is important dietitians do a comprehensive assessment to gauge motivation directly to ascertain if motivation is an important factor to success when using VLED/LED or simply an opinion of the dietitians surveyed.

5 | CONCLUSIONS

This novel study sheds new light on the attitudes and experiences of using VLED/LED held by dietitians in the United Kingdom. This expands our understanding of how current practices are working, and identifies key areas that need addressing if these dietary interventions are going to be embedded in practice. With clinical services now wishing to implement VLED/LED programmes, particularly to engender T2D remission, understanding and detailing the potential barriers and facilitators are essential for commissioners, service providers and clinicians. This study highlights the importance of training and education in the delivery of TDR programmes. It is therefore key that national educational programmes are developed to help increase confidence.
and understanding of how to effectively use and implement VLED/LED in a wide, diverse patient population living with obesity.

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CONFLICT OF INTEREST

Adrian Brown reports grants from Cambridge Weight Plan, outside the submitted work; and is the Vice-Chair of Specialist Obesity Group of the BDA, on the Strategic Council for APPG Obesity and on the Medical Advisory Board and shareholder of Reset Health Clinics Ltd. Rachel L. Batterham reports personal fees from Novo Nordisk, other from Novo Nordisk, personal fees from Pfizer, personal fees from International Medical Press, personal fees from Boehringer Ingelheim, personal fees from ViVi, from null, outside the submitted work. Stuart W. Flint reports grants from Johnson & Johnson, grants from Novo Nordisk, personal fees from Novo Nordisk, outside the submitted work. Naomi Brosnahan has received funding for PhD fees and conference attendance from Cambridge Weight Plan Ltd, and is a current employee and shareholder in Counterweight Ltd. Dorsa Khazaei and Jed Wingrove have no conflicts.

AUTHOR CONTRIBUTIONS

Adrian Brown conceived the study. Adrian Brown, Naomi Brosnahan and Rachel L. Batterham contributed to the study and survey design and methodology. Adrian Brown was responsible for the oversight of the study. Adrian Brown and Naomi Brosnahan contributed to the recruitment of participants. Adrian Brown, Naomi Brosnahan, Dorsa Khazaei, Jed Wingrove and Stuart W. Flint were responsible for the data analysis. All authors contributed to data interpretation and the writing of the manuscript. All authors contributed to the critical revision of the manuscript and gave final approval.

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REFERENCES

1. World Health Organisation. Obesity and Overweight Fact Sheet 2016.
2. Brown A, Leeds AR. Very low-energy and low-energy formula diets: effects on weight loss, obesity co-morbidities and type 2 diabetes remission – an update on the evidence for their use in clinical practice. Nutr Bull. 2019;44(1):7-24.
3. Johansson K, Neovius M, Hemmingsson E. Effects of anti-obesity drugs, diet, and exercise on weight-loss maintenance after a very-low-calorie diet or low-calorie diet: a systematic review and meta-analysis of randomized controlled trials. Am J Clin Nutr. 2014;99(1):14-23.
4. Parretti HM, Jebb SA, Johns DJ, et al. Clinical effectiveness of very low-energy diets in the management of weight loss: a systematic review and meta-analysis of randomized controlled trials. Obes Rev. 2016;17(3):225-234.
5. Lean ME, Leslie WS, Barnes AC, et al. Primary care-led weight management for remission of type 2 diabetes (DIRECT): an open-label, cluster-randomised trial. Lancet. 2018;391(10120):541-551.
6. Leeds AR. Formula food-reducing diets: a new evidence-based addition to the weight management tool box. Nutr Bull/BNF. 2014;39(3):238-246.
7. Brown A, Frost G, Taheri S. Is there a place for low-energy formula diets in weight management. Br J Obes. 2015;13(3):84-119.
8. Christensen P, Henriksen M, Bartels EM, et al. Long-term weight-loss maintenance in obese patients with knee osteoarthritis: a randomized trial. Am J Clin Nutr. 2017;106(3):755-763.
9. NHS England. Low Calorie Diets to Treat Obesity and Type 2 Diabetes. NHS England; 2020.
10. The Scottish Government. A Healthier Future: Framework for the Prevention, Early Detection and Early Intervention of Type 2 Diabetes. The Scottish Government; 2018.
11. Dyson P, Brown A. Formula very low and low energy diets. Dietetic Today. 2019;34-37.
12. Collins C. Survey of dietetic management of overweight and obesity and comparison with best practice criteria. Nutr Diet. 2003;60: 177-184.
13. Maston G, Franklin J, Gibson AA, et al. Attitudes and approaches to use of meal replacement products among healthcare professionals in management of excess weight. Behav Sci (Basel). 2020;10(9):136.
14. NICE. National Institute for Health and Clinical Excellence: Guidance. Obesity: Identification, Assessment and Management of Overweight and Obesity in Children, Young People and Adults: Partial Update of CG43. National Institute for Health and Care Excellence; 2014.
15. Hazlehurst JM, Logue J, Parretti HM, et al. Developing integrated clinical pathways for the management of clinically severe adult obesity: a critique of NHS England policy. Curr Obes Rep. 2020;9(4): 530-543.
16. Richards RJR, Whittle F, Hughes CA, et al. Development of a web-based, guided self-help, ACT-based intervention for weight loss maintenance: an evidence-, theory- and person-based approach. JMIR Form Res. 2022;6:e31801.
17. Lawlor ER, Hughes CA, Duschinsky R, et al. Cognitive and behavioural strategies employed to overcome “lapses” and prevent “relapse” among weight-loss maintainers and regainers: a qualitative study. Clin Obes. 2020;10(5):e12395.
18. Acton NM, Aveyard P, Nickless A, et al. Doctor referral of overweight people to low energy total diet replacement treatment (DROPLET): pragmatic randomised controlled trial. BMJ. 2018;362: k2760.
19. Brown A, Dornhorst A, McGowan B, et al. Low-energy total diet replacement intervention in patients with type 2 diabetes mellitus and obesity treated with insulin: a randomised trial. BMJ Open Diabet Res Care. 2020;8(1):e001012.
20. Rehakovka L, Rodrigues AM, Thom G, et al. Participant experiences in the Diabetes REMission Clinical Trial (DIRECT), Diabet Med. 2021;39: e14689.
21. Leslie WS, Ford I, Sattar N, et al. The Diabetes Remission Clinical Trial (DIRECT): protocol for a cluster randomised trial. BMC Fam Pract. 2016;17(1):20.
22. Brosnahan N, Leslie W, McCombie L, et al. Brief formula low-energy diet for relapse management during weight loss maintenance in the Diabetes Remission Clinical Trial (DIRECT). J Hum Nutr Diet. 2021; 34(3):472-479.
23. Johansson K, Neovius M, Lagerros YT, et al. Effect of a very low energy diet on moderate and severe obstructive sleep apnoea in obese men: a randomised controlled trial. BMJ. 2009;339:b4609.
24. Christensen P, Bliddal H, Riecke BF, et al. Comparison of a low-energy diet and a very low-energy diet in sedentary obese individuals: a pragmatic randomised controlled trial. Clin Obes. 2011; 1(1):31-40.
25. Brown A, McArdle P, Taplin J, et al. Dietary strategies for remission of type 2 diabetes: a narrative review. J Hum Nutr Diet. 2021;35(1):165-178.

26. Astbury NM, Albury C, Nourse R, et al. Participant experiences of a low-energy total diet replacement programme: a descriptive qualitative study. PLoS One. 2020;15(9):e0238645.

27. Rehakova L, Araújo-Soares V, Adamson AJ, et al. Acceptability of a very-low-energy diet in type 2 diabetes: patient experiences and behaviour regulation. Diabet Med. 2017;34(11):1554-1567.

28. Harper C, Maher J, Grunseit A, et al. Experiences of using very low energy diets for weight loss by people with overweight or obesity: a review of qualitative research. Obes Rev. 2018;19(10):1412-1423.

29. Churuangsuk C, Hall J, Reynolds A, et al. Diets for weight management in adults with type 2 diabetes: an umbrella review of published meta-analyses and systematic review of trials of diets for diabetes remission. Diabetologia. 2022;65:14-36.

30. Dixon A. Motivation and Confidence: What Does It Take to Change Behaviour?. The King's Fund; 2008.

31. Sumithran P, Prendergast LA, Delbridge E, et al. Long-term persistence of hormonal adaptations to weight loss. N Engl J Med. 2011;365(17):1597-1604.

32. Purcell K, Sumithran P, Prendergast LA, et al. The effect of rate of weight loss on long-term weight management: a randomised controlled trial. Lancet Diabetes Endocrinol. 2014;2(12):954-962.

33. Christensen PBH, Bartels E, Leeds A, Astrup A, Christensen R. Long-term intervention with weight loss in patients with concomitant obesity and knee osteoarthritis: the LIGHT study – a randomised clinical trial. T5: S25.54. Obes Rev. 2014;15(S2):152.

34. Read S, Logue J. Variations in weight management services in Scotland: a national survey of weight management provision. J Public Health. 2016;38(3):e325-e335.

35. Wadden TA, Neiberg RH, Wing RR, et al. Four-year weight losses in the look AHEAD study: factors associated with long-term success. Obesity. 2011;19(10):1987-1998.

36. Seimon RV, Wild-Taylor AL, McClintock S, et al. 3-Year effect of weight loss via severe versus moderate energy restriction on body composition among postmenopausal women with obesity – the TEMPO Diet Trial. Heliyon. 2020;6(5):e04007.

37. Anderson JW, Konz EC, Frederich RC, et al. Long-term weight-loss maintenance: a meta-analysis of US studies. Am J Clin Nutr. 2001;74(5):579-584.

38. Brown TJ, O’Malley C, Blackshaw J, et al. Exploring the evidence base for Tier 3 weight management interventions for adults: a systematic review. Clin Obes. 2017;7(5):260-272.

39. Dalle Grave R, Calugi S, Compare A, et al. Weight loss expectations and attrition in treatment-seeking obese women. Obes Facts. 2015;8(5):311-318.

40. Lean MEJ, Leslie WS, Barnes AC, et al. Durability of a primary care-led weight-management intervention for remission of type 2 diabetes: 2-year results of the DIRECT open-label, cluster-randomised trial. Lancet Diabetes Endocrinol. 2019;7(5):344-355.

41. Taheri S, Zaghoul H, Chagoury O, et al. Effect of intensive lifestyle intervention on bodyweight and glycaemia in early type 2 diabetes (DIADEM-I): an open-label, parallel-group, randomised controlled trial. Lancet Diabetes Endocrinol. 2020;8(6):477-489.

42. da Luz FQ, Hay P, Gibson AA, et al. Does severe dietary energy restriction increase binge eating in overweight or obese individuals? A systematic review. Obes Rev. 2015;16(8):652-665.

43. Raymond NC, de Zwaan M, Mitchell JE, et al. Effect of a very low calorie diet on the diagnostic category of individuals with binge eating disorder. Int J Eat Disord. 2002;31(1):49-56.

44. McCombie L, Brosnahan N, Ross H, et al. Filling the intervention gap: service evaluation of an intensive nonsurgical weight management programme for severe and complex obesity. J Hum Nutr Diet. 2019;32(3):329-337.

45. Kelle U. Combining qualitative and quantitative methods in research practice: purposes and advantages. Qual Res Psychol. 2006;3:293-311.

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Additional supporting information may be found in the online version of the article at the publisher’s website.

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