

Transferability of the NHS Low Calorie Diet Programme: a qualitative exploration of factors influencing the programme's transfer ahead of wide-scale adoption.

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Published version

BURTON, Wendy, PADGETT, Louise, NIXON, Nicola, ELLS, Louisa, BROWN, Tamara, BAKHAI, Chirag, RADLEY, Duncan, HOMER, Catherine, MARWOOD, Jordan, DHIR, Pooja and BRYANT, Maria (2024). Transferability of the NHS Low Calorie Diet Programme: a qualitative exploration of factors influencing the programme's transfer ahead of wide-scale adoption. *Diabetic Medicine*.

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1 **Title:** Transferability of the NHS Low Calorie Diet Programme: a qualitative exploration of
2 factors influencing the programme's transfer ahead of wide-scale adoption.

3

4 **Running title:** Transferability assessment of NHS low calorie diet programme

5

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22 **Word count:** Abstract word count: 250 Manuscript word count: 3960

23

24

25

26 **Acknowledgements**

27 The authors would like to acknowledge Clare Helm from NHS England, who has worked on
28 the coproduction of this study; identification of study aims, gatekeeper to participants who
29 were previously unknown to the interviewers and provided feedback on an earlier draft of
30 this manuscript.

31

32 **Conflicts of Interest:** All other authors confirm that they have no conflicts of interest to
33 declare.

34

35 Novelty statement:

36

37● Low Calorie Diets (LCD) delivered through total diet replacement can lead to clinically
38 significant weight loss and remission of Type 2 diabetes.

39

40● To optimise transferability, a choice of a delivery models should be considered to promote
41 acceptability and accessibility and equitable referral strategies should be planned to prevent
42 issues of inequity.

43

44● Multidisciplinary working and establishing a multitude of communication strategies could
45 promote engagement from GPs and other health professionals.

46

47● Findings of this study can be considered by new sites of similar programmes to understand
48 the extent to which the intervention is well suited, and how to mitigate implementation
49 barriers.

50

51

52 **Abstract**

53 **Introduction:** Although behavioural interventions have been found to help control Type 2
54 Diabetes (T2D), it is important to understand how the delivery context can influence
55 implementation and outcomes. The NHS committed to testing a Low-Calorie Diet (LCD)
56 programme designed to support people living with excess weight and T2D to lose weight
57 and improve diabetes outcomes. Understanding what influenced implementation during the
58 programme pilot is important in optimising roll-out. This study explored the transferability of
59 the NHS LCD Programme prior to wider adoption.

60

61 **Methods:** Twenty-five interviews were undertaken with stakeholders involved in
62 implementing the LCD programme in pilot sites (health service leads, referring health
63 professionals and programme deliverers). Interviews with programme participants (people
64 living with T2D) were undertaken within a larger programme of work, exploring what worked,
65 for whom and why, which is reported separately. The conceptual Population-Intervention-
66 Environment-Transfer Model of Transferability (PIET-T) guided study design and data
67 collection. Constructs of the model were also used as a deductive coding frame during data
68 analysis. Key themes were identified which informed recommendations to optimise
69 programme transfer.

70

71 **Results:** *Population:* Referral strategies in some areas lacked consideration of population
72 characteristics. Many believed that offering a choice of delivery model would promote
73 acceptability and accessibility of the eligible population. *Intervention:* Overall, stakeholders
74 had confidence in the LCD programme due to the robust evidence base along with
75 anecdotal evidence, but some felt the complex referral process hindered engagement from
76 GP practices. *Environment:* Stakeholders described barriers to accessing the programme,

77 including language and learning difficulties. *Transferability*: Multi-disciplinary working and
78 effective communication supported successful implementation

79

80 **Conclusion:** Referral strategies to reach underrepresented groups should be considered
81 during programme transfer, along with timely data from service providers on access and
82 programme benefits. A choice of delivery models may optimise uptake. Knowledge sharing
83 between sites on good working practices is encouraged, including increasing engagement
84 with key stakeholders.

85

86 Keywords: Transferability, type 2 diabetes, low-calorie diet, total diet replacement, diabetes
87 remission, implementation

88

89

90 **1. Introduction**

91

92 Systematic reviews and clinical trials have evidenced that a Low-Calorie Diet (LCD)
93 delivered through a Total Diet Replacement (TDR) programme can lead to clinically
94 significant weight loss and support remission of T2D [1-4]. The NHS committed to testing a
95 LCD programme designed to support people living with excess weight and T2D to lose
96 weight and improve diabetes outcomes [5]. NHS England (NHSE) commissioned
97 independent service providers to deliver programmes, which included 12 weeks of TDR, six
98 weeks phased food re-introduction and a 34-week weight maintenance, with different
99 delivery models according to area, including in-person or remote one-to-one, in-person or
100 remote groups or digital (app-based) one-to-one. This programme was initially piloted in ten
101 geographically diverse areas in 2020, with a further 11 areas included in the second stage of
102 the pilot in 2022, ahead of national roll-out beginning June 2023. Prior research has
103 highlighted the role of the delivery context (e.g. local variations in delivery model and

104 challenges to recruiting participants) in influencing implementation and service user
105 outcomes [6, 7]. Therefore, it is important to understand how transfer of the LCD programme
106 from its pilot to the national roll-out can be optimised.

107
108 Understanding transferability of an intervention, means to understand the extent to which
109 successful intervention outcomes observed in a particular context, or contexts can be
110 replicated in a new (target) context [8]. Contextual factors that are considered during a
111 transferability assessment include the characteristics of the target population (e.g. health
112 status and perceived health needs), the organisational environment in which the intervention
113 is delivered (e.g. readiness and awareness) and the intervention itself (e.g. robustness of
114 evidence base), along with exploring the interactions between them [1, 2]. Undertaking a
115 transferability assessment of an intervention prior to wider roll-out helps commissioners to
116 understand the extent to which adaptations or improvements may be needed, and how to
117 mitigate barriers to implementation.

118
119 A theoretical model, PIET-T (Population, Intervention, Environment, Transfer), to assess
120 transferability was developed by Schloemer et al., (2018) [8]. *Population* is concerned with
121 an understanding of the service user characteristics and their needs, perceptions and
122 attitudes. *Intervention* content is considered, along with exploring how to balance useful
123 adaptations with maintaining the fidelity of the intervention. An understanding of the
124 *Environment*, or setting, in which the intervention is delivered includes consideration of the
125 skills, knowledge, attitudes and resources of the health care delivery team, and the
126 organisational and policy structure. The criteria for the *Transfer* process considers
127 knowledge transfer and communication between actors, strategies for optimum adoption and
128 implementation, evaluation requirements and intervention operational sustainability.

129
130 As part of the wider programme of evaluation (ReMission study [9]), we used the constructs
131 of the conceptual Population-Intervention-Environment-Transfer Model of Transferability

132 (PIET-T) to explore transferability of the LCD programme during of its national roll-out. This
133 transferability assessment was undertaken across 11 Integrated Care Systems (local
134 partnerships between NHS bodies, local authorities, and other local organisations) across
135 England (referred to hereon in as 'localities') who delivered the LCD programme during the
136 second stage of the pilot. The aim was to gain a broad understanding of factors that may
137 influence its transferability when delivered nationally. We sought the perspectives of three
138 stakeholder groups involved in the programme's implementation: health service leads
139 (referred to hereon in as 'locality leads') with responsibility for coordinating local mobilisation
140 of the programme; health care staff involved in referring individuals to the programme
141 (referred to heron in as 'referrers'), and representatives of the commercial service providers
142 that were responsible for delivering the programme (programme deliverers). The
143 perspectives of programme participants (people living with T2D) were explored within the
144 wider programme of work [10-12] and were considered in the development of this study. This
145 paper presents findings of the LCD programme transferability assessment and provides
146 recommendations of how other contexts may optimise delivery of the LCD or similar
147 programmes.

148

149 **2. Methods**

150 **2.1 Study Design**

151 We used the STAR-LITE survey [13], a standardised tool to report behavioural weight
152 management programmes, to understand how the programme was delivered across the 11
153 localities. Stakeholders across the 11 localities were recruited to take part in a semi-
154 structured interview. This study received ethical approval from University of York Department
155 of Health Sciences Research and Ethics committee (HSRGC/2022/537/A) and is reported
156 using COREQ guidelines (see Additional File 1).

157 **2.3 Participants and sampling**

158 Survey participants

159 The survey was distributed via email (Qualtrics software) to one representative from each of
160 the five commercial service providers who delivered the programme across the localities
161 (three of which had also delivered the programme in stage one of the pilot). Where the
162 survey had already been completed as part of the wider ReMission study, providers were
163 asked to provide an update on any changes to their previous response. New providers were
164 asked to complete the survey in full. Specific questions relevant to assessing transferability
165 were: method of delivery, profession of programme deliverer, referral route, TDR product
166 range, nature of dietary and physical activity advice, and how programmes were tailored
167 according to population group.

168 Interview participants

169 Participants included: locality leads, referrers and programme deliverers. A purposive
170 sampling framework was used to ensure representation of the range of delivery models,
171 socio-economic status (informed by index of multiple deprivation score) and participant job
172 roles. Locality leads from all 11 localities were approached about taking part via email from
173 one of the researchers explaining the purpose of the research and to highlight their
174 independence from the programme, but four did not respond or declined. Locality leads were
175 asked to nominate health professionals that referred individuals to the programme to be
176 contacted about taking part. Programme deliverers from all five service providers were
177 represented. All interviews (n = 25) were undertaken between April and June 2023. (Table 1)

178 **2.4 Interview procedure**

179 Interviews took place and were recorded via the Zoom platform and lasted between 30 and
180 60 minutes. Interview topic guides (Additional file 2) were guided by PIET-T constructs and
181 the sub-constructs within them (see Table 2 for example). Emerging findings from the wider
182 ReMission evaluation also guided specific areas of interest to explore within the PIET-T

183 constructs (including patient experiences of the programme during stage one the pilot).
184 Three members of the research team undertook the interviews (WN, LP, NN), one with a
185 PhD in public health and two with a master's degree in a relevant discipline (clinical nutrition
186 and health research).

187

188 **2.6 Analysis**

189 Survey responses were analysed descriptively and summarised to provide a brief description
190 of programme characteristics across providers.

191 A deductive thematic analysis, using constructs of the PIET-T model as an *a priori* coding
192 frame was conducted on the interview data. Each interview transcript was coded by one
193 researcher (LP, WB or NN) before codes were organised into tables (MS Word) to present
194 data summaries according to PIET-T constructs, sub-constructs and stakeholder type.
195 Researchers (LP, WB & NN) familiarised themselves with each other's data summaries and
196 convened to discuss coding discrepancies and uncertainties, along with initial interpretations
197 of the data. The lead author (WB) further reviewed data coded to each construct and sub-
198 construct to explore characteristics of the data according to stakeholder type and delivery
199 model. Connections and relationships between sub-constructs were then considered to
200 identify themes within each of the broader PIET-T constructs. Themes were reviewed
201 against the constructs, sub-constructs and data summaries to ensure they were an accurate
202 representation of the data. Proposed themes were sent to the other team members (LP, NN)
203 for review before finalising.

204

205 **3. Results**

206

207 Between January and March 2023 survey responses were received from five service
208 providers (Table 3). One provider delivered the programme via one-to-one in-person

209 appointments, one via in-person group programmes, one used remote delivery of group
210 programmes and two offered a range of models dependent on area, both including a digital
211 (app-based) version of the programme.

212

213 Upon completion of the qualitative analysis, seven themes were constructed. The following
214 section presents these themes, along with exemplar quotes.

215

216 **3.1 Population**

217

218 **3.1.1 Consideration of population characteristics**

219 Within all stakeholder groups (locality lead, referrer, and programme deliverer) and across all
220 delivery models there was variance in knowledge around local population characteristics.

221 Some described a diverse range of sociodemographic and cultural characteristics, or a lack
222 of diversity, but others (across all stakeholder groups) were less aware, suggesting this
223 information was not utilised within their day-to-day roles.

224

225 *Off the top of my head, I absolutely can't (describe characteristics of the population).*

226 *(Locality lead, one-to-one)*

227

228 Characteristics of the eligible population did not often appear to be considered within
229 strategies to engage individuals with the programme. A common referral strategy included
230 'searches' undertaken by personnel in GP practices to identify all eligible people within the
231 locality to invite them to take part.

232

233 *We sent a hundred SMS messages out from a practice two weeks ago to eligible*
234 *patients, and so far only eight have come forward (Locality lead, one-to-one)*

235

236 Two locality leads (group and one-to-one) did describe a more targeted approach to ensure
237 that particular target groups were represented, including populations living in areas of high
238 deprivation.

239

240 *What we're trying to encourage is that the programme lead tries to actively engage*
241 *with deep-end practices, the ones in really deprived areas. (Locality lead, group)*

242

243 But there was agreement across all locality leads and referrers that their recruitment strategy
244 was to engage the highest number of people as possible, as opposed to a targeted
245 approach to fill the programmes. For example, one locality lead, (one-to-one) described how
246 they tried to instil some urgency in GP practices, by suggesting there was a cap on the
247 number of spaces available.

248

249 *We opened up the gates right at the beginning and said, "We've got 600 places;*
250 *first come first served" (Locality lead, one-to-one)*

251

252 **3.1.2 Stakeholder perceptions of service user's attitudes towards the intervention:**

253

254 *Acceptability of programme delivery models*

255 All interviewees perceived that acceptability of the programme's delivery model was
256 influenced by a person's individual circumstances One locality lead (group) explained that
257 digital access was a problem in rural areas and within the older population, and two
258 programme deliverers (delivering a range of delivery models) felt that digital delivery was
259 more suitable for people in full-time employment. All stakeholders described the pros and
260 cons of each delivery model and said that personal preferences of the participants was also
261 likely to influence acceptability.

262

263 *I think in my opinion I would like a bit of a choice for people. Some people are shy;*
264 *they don't want to go in groups. They would rather be maybe one-to-one or even a*
265 *Teams, something over Teams. Some of these people have chaotic lifestyles*
266 *anyway and trying to get to the church hall on a Wednesday night at six o'clock might*
267 *not be possible (Locality lead, group).*

268

269 *Acceptability of TDR products*

270 Views of the TDR products were positive amongst all stakeholder groups, although some
271 locality leads and referrers acknowledged a limited choice of products, unfavourable taste or
272 lack of a vegan option. One referrer explained that people know what to expect from a liquid
273 diet:

274

275 *It's just a liquid diet really which doesn't sound appealing, even if you're engaged. It*
276 *looked pretty good to me, and most people are aware of meal replacement kind of*
277 *regimes, for better or for worse (referrer, one-to-one).*

278

279 The majority of locality leads, referrers and programme deliverers perceived that once
280 people were signed up to the LCD programme, compliance with TDR was high, as it negated
281 the need to plan and prepare cooked meals. One locality lead (group) and two referrers
282 (one-to-one and group) remarked on the perceived cost savings to patients as the TDR
283 products were provided free of charge.

284

285 *I think the fact that the soups and shakes are provided free of charge is definitely*
286 *a bonus (Locality lead, group)*

287

288 *Barriers to sustaining motivation*

289 Interviewees across all stakeholder groups raised concerns about sustaining motivation on
290 the programme beyond the TDR phase. Programme deliverers (one-to-one) expressed that
291 they felt unable to meet the needs of individuals who requested more support around meal
292 planning due to a lack of time. Many referrers and programme deliverers described how
293 service users could feel disheartened after gaining weight, or felt anxious about
294 reintroducing food, leading them to drop out.

295

296 *There is an extra anxiety about [re-]introducing food, because people have seen*
297 *the results from the TDR shakes, and even if they were to introduce 900*
298 *calories of actual food, they still feel quite anxious (Programme deliverer, one-*
299 *to-one)*

300

301 A person's personal circumstances was also perceived by referrers and programme
302 deliverers to be influential on sustaining motivation, for example, some described that
303 maintained engagement was more likely if service users had family support and high
304 psychological wellbeing.

305

306 *I've sometimes got clients that live on their own or they maybe are on*
307 *antidepressant tablets, things like this, they find it a bit more difficult.*
308 *(Programme deliverer, one to one)*

309

310 **3.2 Intervention content**

311

312 **3.2.1 Stakeholder perceptions of supporting evidence base**

313

314 Interviewees across all stakeholder groups and delivery models perceived there to be a
315 strong supporting evidence base for the LCD programme. During interviews, locality leads,
316 referrers and programme deliverers described the randomised controlled trials that had

317 taken place to measure effectiveness. However, it was expressed by locality leads (one-to-
318 one), referrers (one-to-one, group) and a programme deliverer (one-to-one) that long term
319 outcome data was currently lacking.

320

321 *I thought the DiRECT trial was astonishing [...] but we can't 100% hand on heart*
322 *say we know that it's going to actually save your life because we haven't got the*
323 *data yet (Referrer, one-to-one)*

324

325 Locality leads and referrers also described how they needed to rely on anecdotal evidence
326 to understand programme impact, as participant level outcome data (and data on who
327 attended and completed the programme) was not consistently reported back to them.

328

329 *It would be nice to get more collated feedback from [service provider] about the*
330 *people we've referred because it's been sporadic (Referrer, one-to-one)*

331

332 **3.2.2 Character of intervention**

333

334 *Complexity of the referral process*

335

336 The referral process was described as complex by almost all interviewees, involving the
337 completion of a multiple-page form and, in some cases, undertaking a de-prescribing
338 process for patients (if on medication) before they could start. This complexity was perceived
339 to cause 'bottlenecks' in the process, resulting in delays to programme start dates and
340 disengagement of some referrers.

341

342 *It has been a challenge, getting referrals in, you know, a referral takes at least*
343 *20 minutes for a GP. (Programme deliverer, delivering range of delivery*
344 *models)*

345

346 *Core elements and key functions*

347

348 All interviewees agreed that the core element of the LCD Programme was the 12-week TDR
349 phase. Locality leads, programme deliverers and referrers described that as service users
350 tended to be compliant with this phase, weight loss and the possibility for remission of T2D
351 usually followed. Some programme deliverers (one-to-one and digital) mentioned other
352 elements of the programme, such as behavioural elements that were proposed to support
353 long term behaviour change (e.g., goal setting). But one referrer believed the programme
354 offered only a short-term fix.

355

356 *It is a short-term fix, it's a tool to get you somewhere. It's not a long-term*
357 *lifestyle view (Referrer, one-to-one)*

358

359 Programme deliverers implementing the one-to-one model described flexibility in its
360 structure, which was mostly led by the service user who would attend the session with
361 issues or questions that formed the basis of the session. This was in contrast to group
362 sessions which was described by one locality lead (group) as being more prescriptive.

363

364 **3.3 Environment**

365

366 **3.3.1 Characteristics of local and organisational setting**

367

368 Locality leads and referrers involved in implementing all delivery models expressed
369 frustrations around T2D care. For example, one described a fragmented way of working, and
370 a lack of joined up thinking. Wider issues were also described including being overworked, a
371 large turnover of staff and underfunding.

372

373 *Certain surgeries have their own problems with staffing or engagement,*
374 *particularly with diabetes and things like that. But it is just a national issue*
375 *when it comes to primary care. (Referrer, one-to-one)*

376

377 However, these issues were not universally voiced and, in general, locality leads and
378 referrers felt optimistic about the programme and described successful ways of working to
379 reduce pressures on GPs, including the involvement of clinical pharmacists and specialist
380 nurses in the referral process.

381

382 *I suggested we get the pharmacists on board because the pharmacists*
383 *probably had a bit more time available [...] and usually that worked well*
384 *(Referrer, one-to-one)*

385

386 **3.3.2 Stakeholder's perception of accessibility**

387

388 The upper age restriction within the eligibility criteria was described by one referrer as
389 limiting access which they felt was disappointing.

390

391 *I referred one person who I was really keen on referring, and they were outside*
392 *the age band and that was a bit of a disappointment because they were 66 or*
393 *67. (Referrer, one-to-one)*

394

395 Locality leads, referrers and programme deliverers across all delivery models gave
396 examples of population groups that were perceived as being unable to access the
397 programme including individuals who did not speak English or with learning disabilities:

398

399 *We have asked if the materials for the course are suitable for people with*
400 *learning disabilities [...] and what they have said is they don't have any*

401 *videos. People can come along and join the programme, however, there is a*
402 *level needed as to whether they retain, understand all of the information*
403 *(Locality lead, group)*

404

405 Some programme deliverers (group) described how they had attempted to make the
406 programme more accessible for their local population by scheduling programme start dates
407 to fit around religious holidays and adding spices to products. One also described how they
408 had been able to run a group in Urdu and developed culturally appropriate resources.

409

410 **3.4 Transferability**

411

412 **3.4.1 Methods to promote GP engagement**

413

414 From a locality lead and referrer perspective, the main barrier to implementation of the
415 programme was securing engagement from GP practices. Some described how they
416 convened multidisciplinary groups to agree strategies on how to secure engagement. Some
417 locality leads described using a multitude of communication methods to promote interest and
418 knowledge, such as webinars, bulletins and training.

419

420 *We decided to do three group sessions for patients who were eligible [...] then*
421 *as part of the session we offered to refer anybody who then wanted to be*
422 *referred and almost everybody took it up, which is brilliant (Referrer, digital).*

423

424 **4. Discussion**

425

426 This study describes factors that could influence transferability of the LCD programme from
427 its pilot to the national roll-out Although many interviewees understood some characteristics
428 of their local populations, few described how this influenced their referral approach. Instead,

429 efforts often focused on filling referral places by using “cold”, non-targeted methods that
430 were less resource-heavy [14]. These referral approaches were also reported by localities
431 implementing the programme in stage one of the pilot [15], reflecting the widely
432 acknowledged challenge to balance quantity over quality of referrals [16] Prior research in
433 the wider Remission evaluation also found that some commercial providers preferred
434 referrals from those more likely to succeed to demonstrate the programme’s effect [17].
435 However, ensuring uptake from target populations or subgroups which are identified as
436 having the greatest need promotes effectiveness of the programme overall, precisely
437 because it promotes the equitability of the programme [18, 19]. Efforts to address equity
438 during the planning and organisation of programme mobilisation or transfer can be taken by
439 using tools, such as the equity impact assessment tool. Doing so ensures that an equity
440 perspective is adopted from the start, which can be subsequently managed throughout
441 programme delivery [20]. However, in order to refine a targeted referral approach, a precise
442 understanding of the local population is needed, along with agreement among stakeholders
443 on where inequities exist, through the provision of good quality and timely data. The need for
444 routine data to monitor referrals in real time was also highlighted in the national evaluation of
445 the NHS Diabetes Prevention Programme delivered in England [6].

446

447 Offering participants a choice of delivery model was perceived by interviewees in this study
448 as promoting acceptability and accessibility of the programme. Factors such as age,
449 employment status, and digital access were described as influencing whether service users
450 found the programme acceptable. Although this element of the study did not explore
451 experiences of service users directly, these findings are in line with previously reported
452 factors influencing participation in similar programmes [21-23]. Going forward, digital
453 methods are likely to be favoured in the delivery of health interventions, particularly in T2D
454 and obesity care [24]. It is planned that service users will be offered the choice of digital or
455 one-to one in the national roll-out of the LCD programme. One to one delivery of the LCD
456 programme was valued amongst programme deliverers in this study, due to the intensive

457 support they were able to provide to individuals. Previous research has also demonstrated
458 that service users value one-to-one delivery [25]. However, the benefits of group delivery of
459 TDR interventions are also accepted, including opportunities for peer support, greater
460 potential for scalability and reduced dropouts [26].

461

462 Our findings highlighted differences in the way the programme was delivered in respect to
463 the delivery model. The one-to-one model was reported to be service user led, and more
464 aligned to a person-centred approach which has been found to help service users address
465 specific barriers to weight management within their own life circumstances [27, 28]. In a
466 previous study exploring participant's experiences of a TDR intervention delivered one-to-
467 one, participants explained that the counsellor who delivered the programme was the most
468 important aspect of taking part, including their knowledge of dealing with common difficulties
469 and ways to improve the flavour of TDR products [29]. A study undertaken as part of the
470 wider ReMission evaluation reported that person-centred delivery was also more successful
471 in one-to-one sessions [30].

472

473 Some programme deliverers described ways in which they had been sensitive to their
474 service user's cultural context during delivery of the programme, such as consideration of
475 religious holidays and ensuring meals were culturally appropriate. Previous research
476 explored the experiences of individuals from a South Asian ethnicity undertaking the LCD
477 programme which found that participants valued ethnically matched peer support, language
478 specific groups and cultural tailoring in the delivery of the programme, again highlighting the
479 importance of person centred, culturally appropriate delivery of the programme [31]

480

481 The core element of the LCD programme was mainly described as the 12-week TDR phase.
482 The theoretical basis of the wider programme was described less by interviewees. This
483 could be due to interviewees understanding less about the impact of behaviour change
484 components. An earlier study reported a lack of underpinning theory and fidelity to BCTs

485 within the pilot of the LCD programme [32]. But, unless programme theory is explicitly used
486 and understood, evaluation of a programme's impact is challenging, along with
487 understanding a programme's suitability to a new context during transfer.

488

489 The referral process for the LCD programme was perceived as being complex. Previous
490 studies have reported worries around the volume of work and disturbed workflow introduced
491 by new and existing programmes as influencing engagement from primary care practitioners
492 [33]. In this study, some described engaging a wider pool of health professionals to support
493 programme referrals, such as enlisting clinical pharmacists to undertake de-prescribing of
494 medications. Indeed, the potential role of pharmacists in the management of T2D is
495 increasingly being recognised [34].

496

497 **4.1 Strengths and limitations**

498 This study used a theoretical approach to understand transferability of the LCD programme
499 by understanding its implementation across 11 pilot sites. The PIET-T model, developed
500 using a rigorous approach and informed by the literature provided structure to the study and
501 prompted consideration of pertinent factors that could influence transferability:
502 characteristics of the population, intervention, environment and the transfer process. The
503 model itself suggests that these factors should be explored within individual contexts where
504 an intervention has been known to be effective, before considering the intervention's
505 suitability to a new 'target' context. Here, we have explored PIET-T constructs across 11
506 sites to draw broad conclusions about optimising its transfer. Our sampling strategy sought
507 to explore the perspectives of three stakeholder groups (locality leads, referrers and
508 programme deliverers) involved in delivering the programme, ensuring representation from
509 all delivery models. Our results did not highlight a contrast in experiences between
510 stakeholder groups or delivery models, suggesting the findings were consistent between
511 sites. We suggest commissioners and / or service leads from target contexts undertake their
512 own assessment of comparability to inform the development of strategies to mitigate

513 challenges or consider potential adaptations. Our transferability assessment did not capture
514 the perspectives of service users directly to consider transferability of the programme.
515 However, exploration of service user experiences was undertaken at length within the wider
516 ReMission study to explore what works for whom and why, and so interviews with this
517 population group were not repeated for this study. Emerging findings from these interviews
518 were considered when developing our topic guides (e.g. preferences for delivery models and
519 accessibility of the programme) and the full findings are reported separately [10-12]. We
520 suggest perspectives of service users should be considered by those within target contexts
521 to understand how their own population might interact with the programme.

522

523 **4.2 Recommendations**

524 Based on our transferability assessment we provide the following recommendations on how
525 to optimise transfer of the LCD or similar programmes.

- 526 • Ensure that all involved in programme planning and delivery are aware of local
527 characteristics of the population so that strategies to reach underserved groups can
528 be developed. Utilise population data as available to refine referral approach.
- 529 • Undertake local Equality Impact Assessments at the start of programme planning to
530 consider how to prevent issues of inequity, and ensure that these assessments are
531 actively reviewed on a regular basis.
- 532 • Ensure timely reporting and collation of good quality data on service user referrals
533 and outcomes, to enable local teams (including referrers) and patients to understand
534 who is enrolled on the programme locally and their progress/outcomes. Reviewing
535 national health audit data (e.g., National Diabetes Audit data) to highlight how
536 programmes supports service users after the programme has ended should also be
537 considered.
- 538 • Consider offering a range of delivery models to optimise both acceptability and
539 accessibility of the programme.

- 540 • Ensure referrers have a good understanding of cultural implications of the
541 programme across a wide range of communities.
- 542 • Ensure person-centred support is offered, including adequate support during food re-
543 introduction, signposting for anyone with ongoing mental health complications and
544 tailoring programmes to meet the needs of individuals, particularly those with learning
545 difficulties or who do not have English as their first language.
- 546 • Ensure programme deliverers receive appropriate training on behaviour change
547 delivery and underpinning theory of change.
- 548 • Work with health professionals to consider how referral processes can be
549 streamlined to ensure minimal burden on GPs.
- 550 • Ensure eligibility criteria are regularly reviewed to ensure people are not excluded
551 from programmes who could benefit.

552

553 5. **Conclusions**

554

555 Stakeholders in this study had confidence in the LCD programme and were happy to refer
556 people, suggesting new localities may also view the LCD programme favourably. A greater
557 understanding of long-term outcomes could further increase confidence. Population demand
558 and accessibility of the programme is likely influenced by the delivery model on offer,
559 suggesting that a range of delivery methods could be offered to optimise transferability.
560 Referral strategies to reach underrepresented groups should be considered from the start of
561 programme planning to ensure equity in uptake and impact, based on a precise
562 understanding of the local population. Good quality and timely data is needed to inform
563 localities of who in their area is accessing and benefiting from the programme.

564

565 **Funding**

566 This work was supported by the National Institute for Health Research, Health Services and
 567 Delivery Research [NIHR 132075]. The NHS Low-Calorie Diet Pilot is funded by NHS
 568 England.

569 **Table 1** Interview participant characteristics

570

Stakeholder type	n	Delivery model	Population deprivation levels within the participant's locality	Gender (M/F)
Locality lead	7	3 Group 3 One-to-one 1 Digital	3 working in locality with lower than average deprivation 4 working in locality with higher than average deprivation*	7 Female
Referrer	9	3 Group 4 One-to-one 2 Digital	4 working in locality with lower than average deprivation 5 working in locality with higher than average deprivation*	7 Female 2 Male
Programme deliverer	9	1 Group 4 One-to-one 1 Digital 3 Deliver all three models	1 working in locality with lower than average deprivation 5 working in locality with higher than average deprivation* 3 work across multiple localities	8 Female 1 Male

571 * With the exception of some unique districts that have lower than average deprivation levels

572 **Table 2** Example questions within each PIET-T construct

573

Population	The population characteristics in the primary context	Can you explain how you consider the characteristics of your local population when making referrals?
Intervention	Characteristics of the evidence base in terms of utility / usefulness and quality	Can you explain what you understand to be the evidence base surrounding the programme?
Environment	Characteristics of the health care system and service provision	How has the roll out and delivery of the programme been influenced by wider system priorities?
Transfer	Characteristics of adoption and implementation	What has been important to facilitate rollout of the programme in your local area?

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Table 3 Summary of programme characteristics by each service provider

Service provider	How is programme delivered	Profession of programme deliverer	Product range available during TDR phase	What kind of dietary advice is issued during programme	Physical activity component	Tailoring
1	One to one in person appointments	Registered nutritionist x 2	Soups and shakes	Healthy eating principles, personalised meal plan, low carbohydrate diet	Included in weight maintenance phase (no further details provided)	No
2	In person group programme accessed by maximum of 15 individuals	Trained non-specialists (although mainly registered dietician and nutritionists)	Soups, shakes, bars, pre-prepared meals	Healthy eating principles	Physical activity advice, Signposting to local programmes and provided Physical activity app	Coaches available who can facilitate women only groups and Urdu-speaking groups. Workbooks enable individuals to follow-up after session if needed due to language difficulties or learning disabilities
3	Remote group programme accessed by maximum of 15	Health coaches - Dieticians and nutritionists	Soups and shakes	Healthy eating principles, personalised meal plan	Physical advice only, signposting to local services	No
4	Dependent on area - in person 1:1, digital (app)	Diabetes practitioners	Soups and shakes	Healthy eating principles	Physical activity explored with service users including how	Gender specific groups if required.

	based with live chats or app texts), remote group				to overcome barriers. Information on local leisure activities also provided.	Language specific groups Additional resources to meet differing learning styles Tailoring also available to meet other needs including, visually and hearing impaired and anthropophobia
5	Dependent on area - in person 1:1, digital (app based with live chats or telephone calls), remote group	Dietitians and health coaches with varying professional backgrounds (including nutritionist, dietetics assistants)	Soups and shakes	Healthy eating principles (5-a-day, Eatwell Guide), Personalised meal plan Intermittent fasting Low fat diet Low-carbohydrate diet Prescribed energy deficit	Physical activity advice only	The dietitian delivering the programme ensures tailoring to the individual patient need, e.g. of content or access requirements

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