Diabetes Prevention Programme

for The Health Service Executive Ireland

Evaluation Report 2023

Pilot Phase June 2021 – Sept 2022

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This project has received funding from Sláintecare Integrated Care Fund, 2019.

Clinical Design & Innovation
Person-centred, co-ordinated care

Sláintecare.

Integrated Care Programme for the Prevention and Management of Chronic Disease

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Executive Summary

Worldwide 537 million people are living with diabetes (over 90% of these have type 2 diabetes), 541 million adults or 10.6% of the population have impaired glucose tolerance and an estimated 319 million or 6.2% of the adult population have impaired fasting glucose (IDF, 2021).

'Prediabetes' is a term used increasingly to describe people with impaired glucose tolerance and/or impaired fasting glucose. It indicates conditions of raised blood glucose levels above the normal range and below the diabetes diagnostic threshold, indicating a higher risk of developing type 2 diabetes and diabetes-related complications. The terms 'prediabetes', 'non-diabetic hyperglycaemia' and 'intermediate hyperglycaemia' are all used in the literature and there is no worldwide consensus on one definitive clinical definition.

For this project prediabetes is defined in line with the definition outlined in the Chronic Disease Management Programme for General Practice (CDM, 2019) which defines prediabetes as:
• HbA1c 42-47mmol/mol and Fasting Plasma Glucose 6.1 – 6.9mmol/l.

In Ireland, the prevalence rates for prediabetes are estimated to be anywhere between 5.5% (Leahy et al, 2015) to 19.5% (Balanda et al, 2014) of the adult population. Using the conservative figure from the Irish Longitudinal Study on Ageing, (TILDA) report of 5.5%, this would suggest that for every 150,000 of the adult population (the population served by the chronic disease hubs), 8,370 will have prediabetes.
In 2020, Sláintecare funded this project to design, pilot and evaluate a National Diabetes Prevention programme for the Health Service Executive (HSE). This report describes that process, presents key findings from the evaluation of the pilot and makes recommendations for the future implementation and roll out of a National Diabetes Prevention Programme (DPP) by the HSE.

International evidence consistently shows that the best approach to preventing type 2 diabetes is to target high-risk individuals with interventions that focus on lifestyle modification, behaviour change and self-management supports over a long duration (Tuomilehto et al, 2023). The Diabetes Prevention Programme (DPP) for Ireland was designed to offer an evidence based lifestyle and clinical intervention to those with pre-diabetes and therefore, at highest risk of type 2 diabetes. It was designed to align with international best practice and was modelled on other international DPP that have successfully demonstrated effectiveness. The DPP was designed for the HSE and specifically for delivery by dietitians in the community specialist teams in Tier 2 services within the Model of Care for the Prevention and Management of Chronic Disease (ICPCD, 2019). While originally it was intended to design a programme for face-to-face delivery, due to the COVID-19 pandemic the pilot programme was designed for online delivery. The online programme will be adapted for in person /face-to-face delivery and will commence in 2024.

The pilot programme was offered to any adult referred by their GP to the community dietitian with a diagnosis of pre-diabetes as defined above. There was no exclusion on the basis of age and both private/GMS and GPVC holders were included. Participants were supported to gain the knowledge, skills and confidence to understand their risk and make appropriate lifestyle changes to reduce that risk.

The evaluation will inform the future scale up of the DPP and outcomes have demonstrated that early intervention may reduce risk and delay the progression to type 2 diabetes in high risk cohorts. In this pilot 50% of participants achieved normoglycaemia at 1 year. There were high levels of participation, positive clinical improvements and high levels of satisfaction from service users of the programme.

The Intervention

- Delivered in six CHO areas, (CHO 2, 3, 4, 5, 8 and 9)
- Online 1:1 Dietitian Led Initial Assessment
- Synchronous Online Group Programme for 12 months – 14 sessions x 1.5hrs

The Participants

- 73 people with pre-diabetes engaged in pilot.
- 53 % were male and 47% were female.
- Mean age = 60yrs, Range 35-82 years with 57% ≤ 65yrs

The Results

High Levels of Participation

- 92% attended at least 1 session
- 73% attendance at the first 6 sessions
- 72% retention for at least 50% of sessions
- 66% completion rate

Positive Clinical Improvements

- **50% returned to normoglycaemia at 1 year**
- BMIs in the healthy range increased from 3% to 12%
- Rate of Obesity Class II decreased from 28% to 15%
- 73% of completers had lost weight at 1 year
- Mean reduction HbA1c of 5.1% (2.3mmol/mol) at 1 year

Positive Service User Experience

At 1 year participants reported;

- Increased **knowledge** of diabetes risk (increased from 39% to 59%)
- Imporved **skills** at shopping and planning for healthy food (up from 6% to 35%)
- Improved **confidence** for engaging online, making healthy food choices, achieving goals for physical activity and weight
- High levels of **satisfaction** with the overall programme. 95% described course as ‘Excellent’ or ‘Very Good’

Background

1.1 Introduction

Diabetes Prevention Programmes are not new and have been successfully scaled up in Finland, UK, USA, Canada and Australia. Outcomes from these intervention trials demonstrate the efficacy of these programmes with interventions resulting in 5% weight loss and risk reduction for diabetes of 58% (Tuomilehto et al, 2001, Knowler et al, 2002 and Lindstrom et al, 2003). Participants remained 33% less likely to progress to type 2 diabetes 10 years later. Those who did develop type 2 diabetes delayed the onset of disease by up to 4 years (Knowler, 2009). A systematic review by Public Health England 2015 and recommendations by International Diabetes Federation 2016 stated that a structured intensive lifestyle intervention programme is a clinically effective and a cost effective way to prevent type 2 diabetes (Ashra e al, 2015 & IDF, 2016).

The National Clinical Programme for Diabetes –prevention subgroup 2018 provided the rationale and evidence base for the need for a National DPP in Ireland. It highlighted that those with a diagnosis of prediabetes are at high risk of developing type 2 diabetes, with up to half of this cohort progressing to type 2 diabetes within 10 years. Given the high burden of disease associated with type 2 diabetes and the associated cardiovascular risk in this cohort (IDF, 2016) the need for a diabetes prevention programme for Ireland was evident.

Lifestyle intervention programmes internationally show that the best approach to preventing type 2 diabetes is to target high-risk individuals with interventions that focus on lifestyle modification, behaviour change and self-management education and support over at least a 12 month period. The intervention should focus on supporting participants with eating well, being active and losing weight. International studies show that risk reduction is associated with behavioural change and weight loss of between 5-7%. (Lindstrom et al, 2010). In addition, the DE-PLAN study showed that a community based DPP was shown to improve overall health-related quality of life to a clinically meaningful degree (Karamanakos et al, 2019). Findings from the DIPLOMA study in the NHS, England indicated that the introduction of the NHS DPP is leading to a reduction in population incidence of type 2 diabetes (McManus et al, 2022).

A summary of the main results from the recognised proof of concept trials (Tuomilehto & Gregg, 2023) to prevent type 2 diabetes in high risk populations with lifestyle intervention have shown:

- A significant and consistent relative risk reduction from these randomised control trials
- The prevention effect of the intervention was rapid
- Lifestyle intervention postponed the onset of type 2 diabetes by at least 5 years
- Weight reduction is an essential component of risk reduction in those who are overweight or obese.

It is against this background and overwhelming evidence for the efficacy of lifestyle behavioural interventions in the prevention of type 2 diabetes that funding was secured to undertake the development of a National DPP for Ireland. (Sláintecare Fund, 2019)

Due to COVID 19, the programme was designed for online delivery. It was offered as a synchronous online group programme delivered by dietitians to those identified by their GP as having HbA1c within the prediabetes range.

Aim & Objectives

2.1 Aim

To design, pilot and evaluate a National Diabetes Prevention Programme for the Republic of Ireland in those at high risk of developing type 2 diabetes.

2.2 Objectives

To design a programme unique to the Irish health care setting, aligned with the Sláintecare programme to deliver care in the Enhanced Community Care setting.
To design a programme for delivery online by dietitians working in the community specialist teams.
To pilot the programme with a group of HSE service users diagnosed with pre-diabetes.
To evaluate the programme and use the lessons learnt from the pilot to scale up for national implementation.

Methods

3.1 Programme Design

The National Diabetes Prevention Programme (DPP) for Ireland has been designed with some unique features that differentiate it from other international programmes.

- The educators of the programme are all CORU registered dietitians who are equipped with the knowledge, skills and competence to deliver both medical nutrition therapy and self-management education and support to the highest standard for people living with prediabetes.

- Participants receive an individualised clinical consultation with a dietitian prior to joining the group sessions. This 1:1 clinical assessment offers medical nutritional therapy and allows for the development of a personal behaviour change care plan.

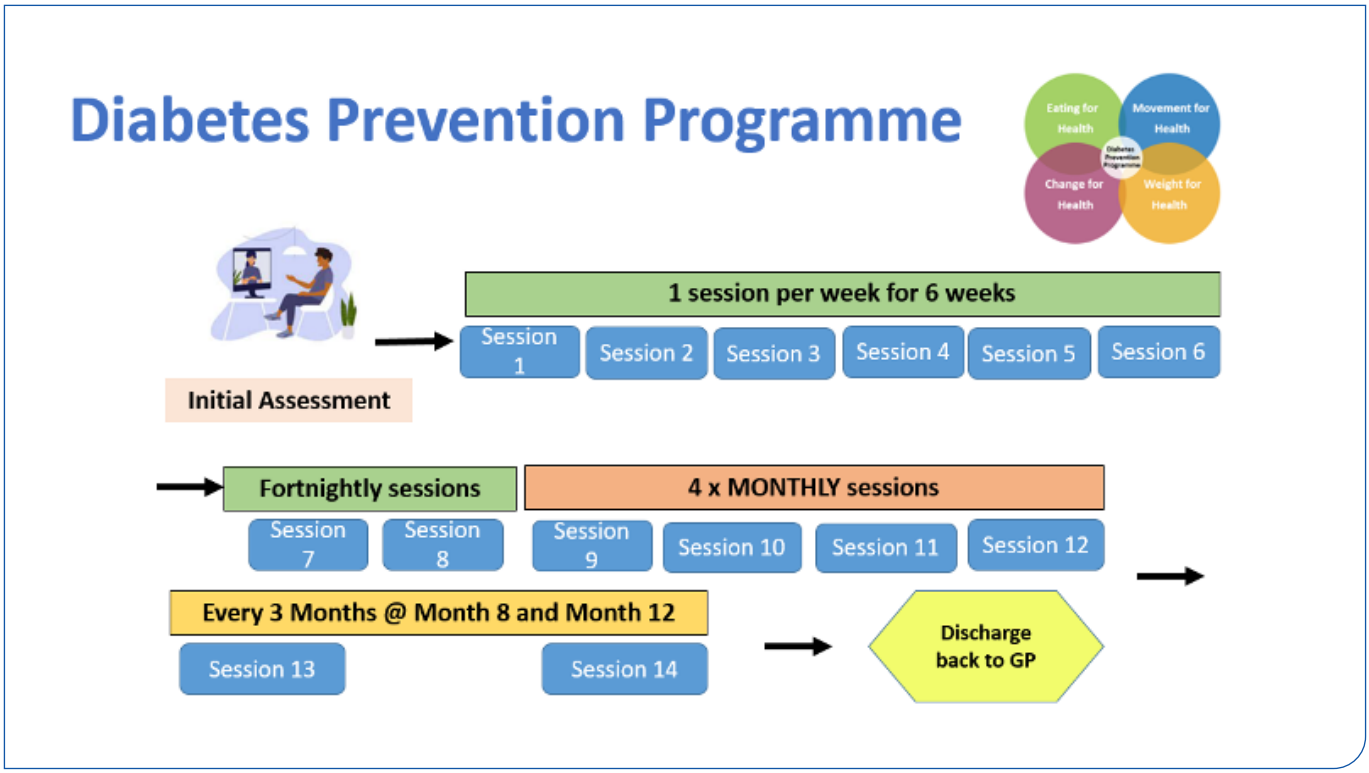
- Developing the programme during the COVID-19 pandemic meant that online design was prioritised. In person, face-to-face group programmes are currently in development.

- Participants are encouraged where appropriate to actively engage in 10 minutes of physical movement during each session. Bespoke, evidence based physiotherapy led video tools were designed to facilitate this component of the curriculum. Collaboration with physiotherapy colleagues on the curriculum content and on educator training also ensured appropriate delivery of this component of the curriculum.

The curriculum was designed based on best available evidence and offers a 12 month block of care to those with prediabetes. Those eligible for the programme had prediabetes defined as per the Chronic Disease Management programme for general practice (CDM, 2019).

HbA1c between 42 – 47 mmol/mol (6.0 – 6.4%) and fasting plasma glucose (FPG) level between 6.1 – 6.9 mmol/litre.

Fig 1. Pilot Programme Structure



3.1.1 The Initial Assessment

An initial assessment was carried out with all those deemed eligible. Due to COVID-19 most of this initial assessment was conducted online, with participants attending face-to-face only for anthropometric measurements. This 1:1 dietitian led clinical assessment was required to:

- Confirm eligibility to the programme
- Confirm suitability for a group online setting
- Offer a dietitian led clinical assessment which examined diabetes risk and all cardiometabolic risk factors.
- Offer a clinical intervention which took a whole person holistic approach to care.
- Provide participants with individualised medical nutrition therapy and an individualised care plan before joining the group setting.
- Following the initial assessment, if appropriate the service user was then offered a place on the group online programme. Where the group setting was deemed not appropriate the service user was offered 1:1 care.

3.1.2 Curriculum

Principles and Philosophy

- Evidence based, structured curriculum designed and delivered to best practice standards
- Person-centred care, offering individualised care plan
- Used culturally appropriate and non-stigmatising language
- Focused on empowering participants towards self-management and self-efficacy to achieve their health goals.
- Focused on building knowledge, skills and confidence to enable participants to understand and reduce their risk of developing type 2 diabetes.
- Facilitated family members or other support person to engage in the programme.
- Signposted participants to other members of the multidisciplinary team and to other supports in the community as appropriate.
- Provided progress report and referral back to GP at end of programme.

Content

The curriculum has four core pillars, with each one being addressed during each session of the programme. These include eating for health, movement for health, change for health, weight for health and other health related topics including sleep, stress, smoking and alcohol. Behaviour change skills including goal setting, self-management, empowerment, problem solving and overcoming barriers are core parts of every session.

Fig 2. Pillars of the Curriculum

Fig. 3 Core Messages

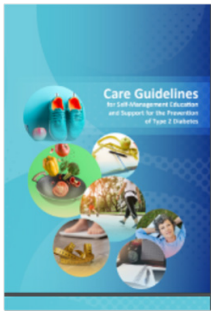
Pillar of the Curriculum	Core Message
Eating for Health	Focus is on a balanced varied diet which is tailored to address HbA1c, lipids and weight goals and considers individual preferences, needs, lifestyles and circumstances. Focuses on skills such as shopping, cooking and provides an opportunity to make informed decisions about food choices.
Movement for Health	Focus is on 'Sit Less Move More'. Participants explore the benefits of all types of activity, engaging in activity at the level that is safe and appropriate for the individual. Focus is on safety, consistency with movement and progression as able. Participants are supported to engage in a 10 minute movement activity during each session. Programme messages align with national physical activity guidelines and include both aerobic and strength based messages tailored to meet the clinical and personal needs of this cohort.
Change for Health	Develops the participants' skills in self-management, self-monitoring, planning, goal setting, problem-solving and habit formation. An empowerment, person-centred approach to care is at the core of the curriculum. Raising awareness of risk and sign-posting to other supports for smoking, alcohol, sleep and stress management are also part of the programme. The benefit of socially engaging and sharing with a group with similar needs is central to the behaviour change curriculum.
Weight for Health	Where appropriate participants are supported with a weight loss goal of 5-7% in the context of risk reduction. While weight reduction remains a corner stone to risk reduction in those who are overweight or obese (Tuomilehto & Gregg, 2023), the programme supports participants to do this and also recognises that not all participants will have a weight loss goal. There is a specific focus on health gain independent of weight loss goals.

Further detail for the evidence base on curriculum content can be found in the care guidelines for the delivery of the programme (DPP, 2021).

3.1.3 Programme Materials

A comprehensive suite of materials were developed to support the programme. These include evidence based care guidelines, resources for online delivery of the curriculum, a participant handbook and an educator manual.

Evidence based care guidelines

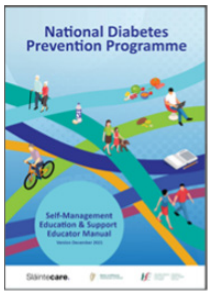


Care guidelines were written to support dietitians in the delivery of care to those engaging in the DPP. These provide educators with the clinical guidance to support them with identifying eligible participants, carrying out an initial assessment and in the delivery of the curriculum content. The guidelines set out the philosophy of person-centred and person-driven care. They describe an empowerment approach to care and reflect the theories of behaviour change, self-management education and support and the principles of adult learning theory. They include the evidence base for the role of medical nutrition therapy and dietitian led assessment in the programme. Integrated within this core philosophy is the attention to health literacy and the language used and ensures that the person is supported by their family and is signposted to other multidisciplinary individualised care when needed.

Participant Handbook

A comprehensive participant handbook was designed and developed. It is provided to participants when they joined the programme. It includes information on topics covered during the sessions as well as work sheets, tools for self-reflection, self-monitoring, goal setting and personal planning. It also includes case studies and scenarios to aid discussion during the programme delivery. The 1st draft was completed in June 2021 for the first phase of the pilot. Consultation with educators and a subset of participants during the pilot led to some changes being made before the final version for wider implementation was completed. This final version is now being used in the roll out of the National DPP.

Educator manual



An educator manual was designed to support dietitians with the curriculum content, learning objectives, key outcomes and practical aspects of delivery. The curriculum is also supported by a suite of resources to enable delivery of the programme online, including Microsoft PowerPoint slides, speaker notes and guides to supporting educators and participants with technology.
The educator manual supports educators with programme delivery and ensures that they are enabled to deliver the curriculum with consistency and with fidelity.

The educator manual is divided into six parts and includes:

- A detailed description of the principles and philosophy of the programme
- The practical application of these principles
- The skills, competencies and training requirements of educators
- The curriculum lesson plans
- The data collection and evaluation requirements
- The steps to getting started with delivery

3.2 Pilot Design

The pilot was delivered during the period June 2021 – September 2022. It was delivered at 6 pilot sites in CHO's 2, 3, 4, 5, 8 and 9. Participants took part in a group online programme with an average of 8 participants per group.

3.2.1 Identifying and training educators for the pilot DPP

The pilot was delivered by trained senior community dietitians with previous experience of delivering type 2 diabetes Self-Management Education and Support (SMES). They worked in the community/ primary care setting and included dietitians working as Integrated Care Programme (ICP) Dietitians or in a Health Promotion role. They had the necessary core skills and competencies to deliver the programme and an understanding of the principles and philosophies that underpin the curriculum. Some educators also had the benefit of having previous experience of delivering SMES for type 2 diabetes online in 2020 and were able to bring this experience to the DPP pilot. An educator training package was developed and is summarised below. This outlines the training educators received in advance of delivering the pilot.

Fig. 4 Pilot educator training package

Material to support programme delivery	Programme promotional material	Technology support	Training course
Educator Manual Suite of slides and speaker notes to deliver the curriculum Suite of material to support the delivery of the programme online.	A patient information leaflet. A GP practice information leaflet. Information leaflets to support educators with recruitment.	Guidance documents for using MS Teams/Cisco WebEx were provided to support educators with online delivery Linking to local telehealth leads and HSE virtual health teams was advised.	Training provided to support educators with all aspects of the curriculum content, in addition to training on recruitment, initial assessment and pilot data collection. Q&A sessions to support educators were also provided.

The pilot DPP incorporated behavioural strategies within the programme which are outlined in Appendix 10. Educator training on the use of these strategies is included in the comprehensive educator training package.

3.2.2 Identify pilot sites

Pilot sites were chosen to reflect an urban/rural spread and on the availability of experienced dietitian educators.

CHO 2 – Galway city and county
CHO 3 – Limerick city
CHO 4 – Kerry county and Cork city
CHO 5 – Waterford city
CHO 8 – Louth, Meath
CHO 9 – North Dublin city and county

3.2.3 Recruitment of participants

Eligible participants

Those with prediabetes as defined by the Chronic Disease Management programme for general practice (CDM, 2019) which defines prediabetes as:

HbA1c between 42 – 47 mmol/mol (6.0 – 6.4%) and when fasting plasma glucose (FPG) lies between 6.1 – 6.9 mmol/litre. In the absence of symptoms the FPG result should be confirmed by repeat testing on a different day.

It was also agreed that eligibility would be based on a diagnosis within 3 months of joining the programme, this was to ensure that participants were still within the prediabetes range on entry to the programme.

Not Eligible

Those with
- Type 2 diabetes
- Malnutrition / Sarcopenia
- Complex physical and/or intellectual disabilities
- Eating disorders
- Moderate to severe psychological problems
- Pregnant women

Participants for the pilot were recruited from the following sources:

- Existing waiting lists for an appointment with the community nutrition and dietetic service
- Waiting lists for a diabetes prevention course (in CHO 8 where one had been available in the past)
- Direct engagement with general practices or specialist nurses in the community to promote the programme and encourage direct referral to the pilot programme.

Potential participants were contacted by the relevant educator either by phone or by letter.

Some challenges arose to confirm eligibility on the basis of blood tests being within the prediabetes range. Due to the cyber-attack in May 2021 and the ongoing demands in general practice due to COVID-19 capacity for blood testing and access to results was at times difficult. While every effort was made to obtain confirmatory blood tests within 3 months of joining the programme in some instances this was not possible and participants joined on the basis of their most recent blood tests being within the eligible range.

3.2.4 Pilot design

Eligible Cohort – Those patients on a dietitians wait list or newly referred by their GP with HbA1c within eligible range. Eligibility for entry into the programme was based on HbA1c of 42-47mmol/mol and/or fasting plasma glucose of 6.1-6.9 ml/l.

Uptake – those that attended the Initial Assessment

Attender – those that attended the Initial Assessment and at least one group session

Decliner – those who were invited to attend but did not attend the Initial Assessment

Completer - those who attended 50% of the programme and at least one core session (sessions 1-6) and one of the 6,9 or 12 month sessions

HbA1c and lipids were provided by the participants' GP at the time of referral and were recorded by the dietitian in the software package for data analysis. Lipid results were included if available but were not essential. HbA1c was required in advance of the initial assessment as this determined eligibility to the programme.

Weight, Height and BMI were measured by the dietitian in a face-to-face clinic setting. Where appropriate waist circumference was also measured. Where the initial assessment was conducted online participants were invited to a follow up in-person clinic appointment to enable the dietitian to complete the anthropometry measurements.

Not all participants had a weight loss goal. Weight goals were decided in collaboration between the dietitian and the participant at their initial assessment. There are multiple reasons why a participant might not have a weight loss goal including currently being within a healthy weight range, weight maintenance being agreed as a more appropriate goal or other health behaviour goals and health gains identified as the priority goal for that individual.

3.3 Evaluation design

A multi-method formative evaluation was undertaken.

Guidance was sought on elements of the data collection and evaluation from the School of Public Health, University College Cork (UCC) and the Central Research Facility, UCC. The Central Research Facility supported the project with identifying suitable software for data collection and data analysis. A software tool, 'Castor' was identified and used to collect and manage the data. The CRF-C also provided expertise with statistical analysis of the results.

1. Data collection by educators included information on demographics, attendance at sessions and clinical measurements. Demographic (age, sex and ethnicity) data and clinical data (weight, BMI and lipids) were collected by educators at the initial assessment stage. HbA1c was collected prior to initial assessment as this was needed in advance to define eligibility to the programme. Educators also recorded attendance data for each session. The clinical data measures were collected at 3 time points, baseline (T1), 6 months from entry to the programme (T2) and at programme completion (T3).

2. Participant reported outcome measures (PROMS) and Participant Reported Experience Measures (PREMS) were collected via an anonymous, online self-administered survey. Consent was obtained from participants for the collection of anonymised data and for communication via email. Castor software was used to distribute the participant surveys electronically via email and to collate responses. PROMS were gathered using validated tools for physical activity (IPAQ-short), smoking and alcohol (Audit- C, risk tool), Quality of Life (WHO 5 tool) and an in-house designed questionnaire on dietary habits, knowledge and confidence. PREMS were gathered using an in house designed, bespoke questionnaire that asked participants about their overall satisfaction with the course content, course duration, course materials, the delivery online, support from the educator and overall satisfaction with the programme.
   Further detail of the evaluation dataset is described in Appendix 1.

3. Feedback was also sought by engaging informally with educators and participants. Progress and planning meetings took place with educators at regular intervals which allowed for feedback and reflection on the curriculum, the delivery of the programme and the educators experienced. A subset of participants engaged with the project team and gave feedback on the session content, the participant handbook and the programme structure.

4. Educators also collated information on those that declined the programme. A record was kept of any service user that was offered the programme and did not opt in. A telephone call was carried out to follow up on those that did not opt in and their reasons for declining the programme was recorded.

Findings

4.1 Summary

- **73 participants from six CHO areas engaged in pilot (CHO 2,3,4,5,8 and 9)**
- **53 % male, 47% female**
- **Mean age = 60yrs, Range 35-82 years with 57% ≤ 65yrs**
- **High levels of attendance to the programme with 92%** attended at least 1 session **73%** attendance at the first six sessions, **70%** attendance maintained for nine sessions, **72%** retention for at least 50% of sessions and a **66%** completion rate

Clinical Outcomes for completers *

- **Almost 50%** of the those with HbA1c recorded at 12 months had returned to **normoglycaemia**
- **A mean HbA1c reduction of 5.1% (2.3mmol/mol)** at 1 year
- **A mean weight loss of 3.7%** was demonstrated at 1 year
- **A mean weight loss of 5.5%** was seen amongst those that lost weight at 1 year
- **BMIs in the healthy range increased from 3% to 12%**
- **Rate of Obesity Class II decreased from 28% to 15%**
- **Rate of Obesity Class III decreased from 16% to 12 % Fig1.1**
- **73% had lost weight at 1 year**
- **An improvement in fruit and vegetable intake** was reported at 1 year.
- At end of the programme, participants reported an **improved understanding of diabetes risk** and an **increased knowledge** of the behaviour change needed to reduce that risk.
- Participants also indicated an **increased confidence** in putting that knowledge into action, **improved skills** at shopping and cooking and confidence in **achieving their goals**.
- Participants reported **high levels of satisfaction** with the programme, 95% described course as 'Excellent' or 'Very Good' , 90% described the course as 'Very helpful', 90% felt supported with engaging online, 70% were satisfied with course and session duration

** Described in detail in section 4.1.4*

4.1.1 Recruitment

Pilot sites identified 158 people who were eligible and were invited to attend. Of those invited to attend, 73 attended the initial assessment (46% uptake).

67 progressed to joining the group programme and were deemed to be an 'attender' i.e those that attended the initial assessment and at least 1 group session.

A 'completer' was defined as anyone who attended 50% of the programme and at least one core session (sessions 1-6) and one of the 6,9 or 12 month sessions with a total of 7 sessions or more attended. This was a group of 44 individuals. Based on this definition there was a completion rate of 66% (44/67) for the programme.

Appendix 2.1 and 2.2 describes the participation definitions and flow chart of recruitment to the pilot DPP.

The pilot phase ended in September 2022 when the full 12 month programme of care (14 sessions) had been delivered to the pilot cohort.

4.1.2 Baseline Characteristics

Characteristics at baseline are summarised here and described further in Appendix 3.
Of those that engaged with the programme initial assessment, 52% were male and 48% were female (Fig. 5).

The age range was from 35 to 82 years, with mean age = 60yrs and range of 35-82 years with 57% ≤ 65yrs (Fig. 6).

Participants described their ethnicity as white Irish (85%) or other (15%). (Fig. 7)

A small cohort (6%) had a previous history of gestational diabetes.

Fig 5. Gender at initial assessment (n= 73)

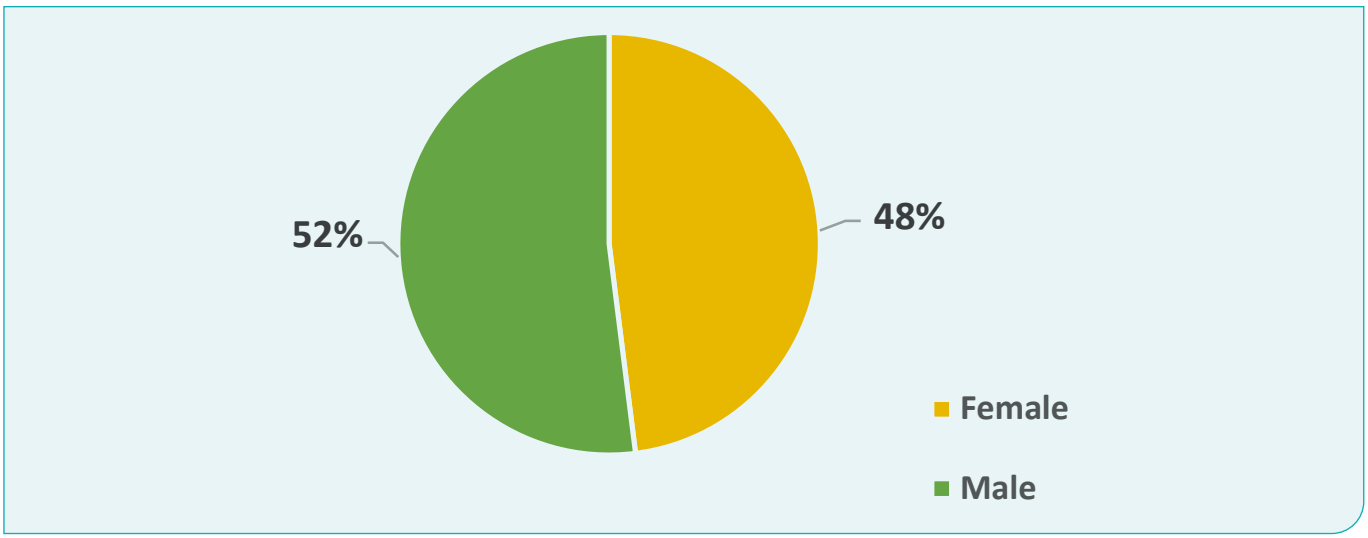


Fig 6. Age at initial assessment (n=73)

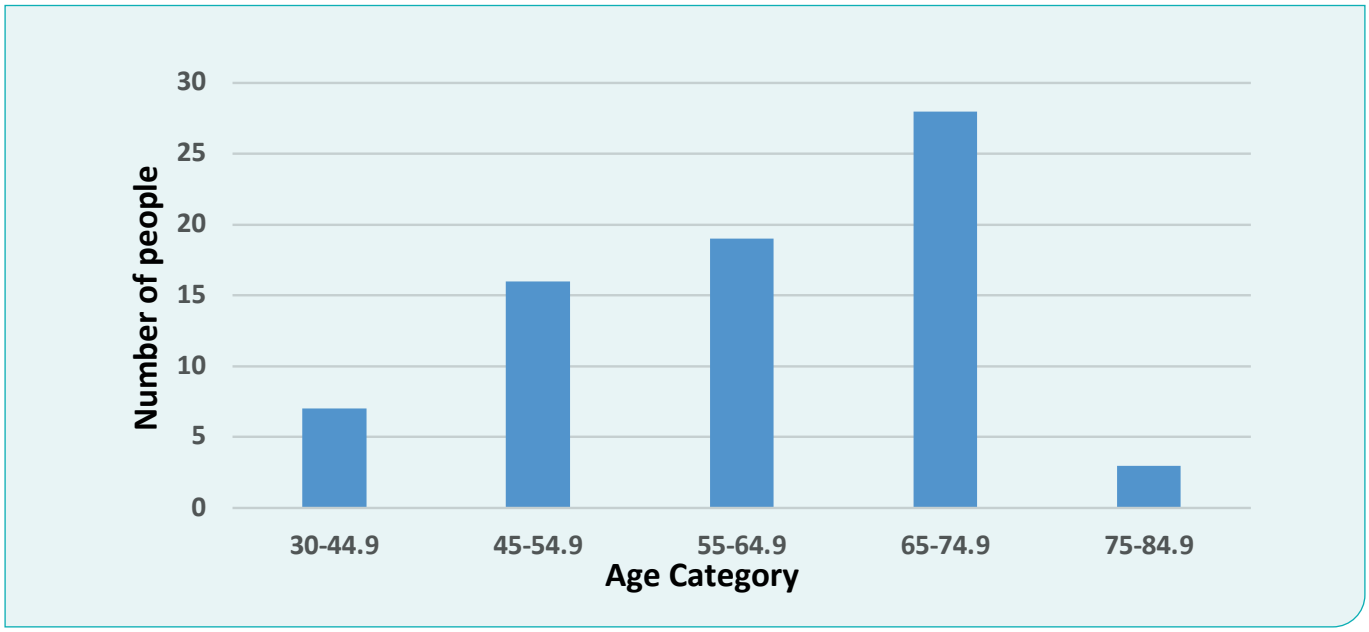
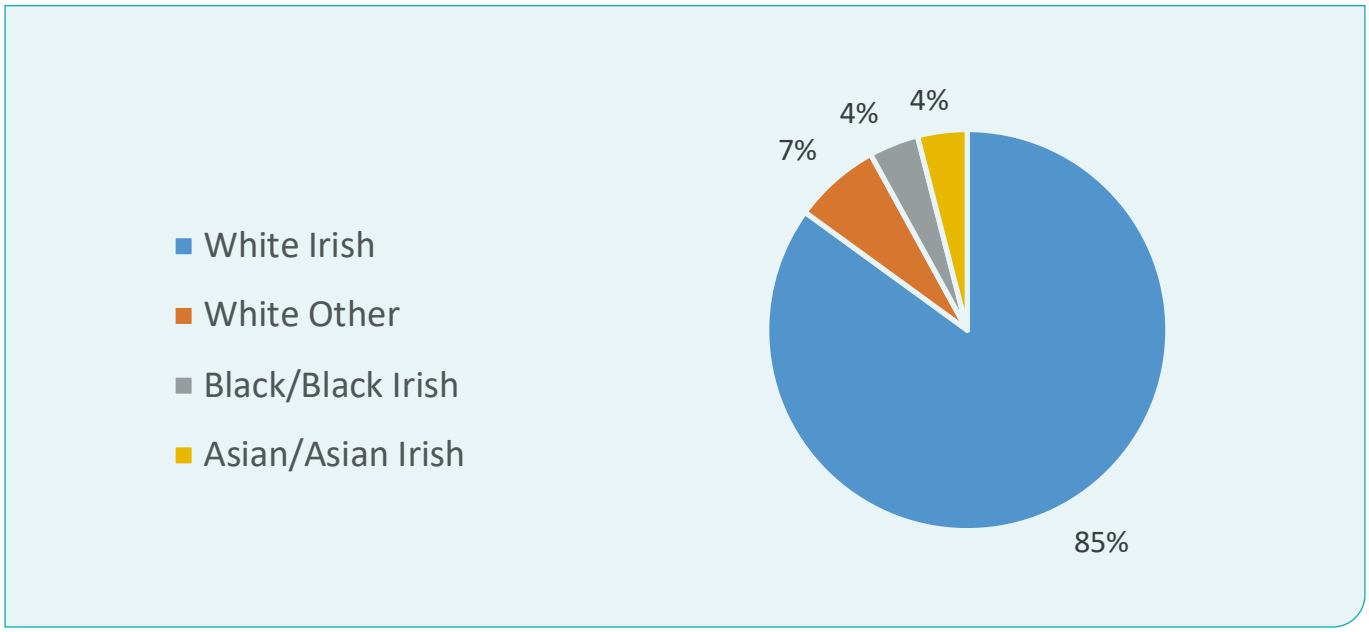


Fig. 7 Ethnicity at Initial Assessment (n=73)



4.1.3 Attendance

The pilot demonstrated high levels of participation with the online programme.

67 participants were defined as an attender i.e. they attended the initial assessment and at least one group session. The overall attendance at each session demonstrated high attendance.

The programme had **73%** attendance at the first 6 sessions and **70%** attendance for 9 sessions with **63%** attendance overall for the full cohort. The mean number of sessions attended was 9 sessions.

In particular there was a very high level of participation from those that remained throughout the programme with those defined as 'completers' attending for **79%** of the sessions.

Table 1.1 outlines the high level of attendance at the session's right through to session 14 of the programme.

Table 1.1

Group	N	Mean number of sessions attended	Range of sessions attended	% sessions attended
All	67	9	1-14	63%
All	67	Mean attendance at first 6 sessions Mean attendance at first 9 sessions		73% 70%
Completers	44	11	7-14	79%

Profile of decliners

Of the 158 eligible service users that were offered the programme 85 (54%) declined. The mean age of decliners was 61 years (range 40-84 years). Those declining the programme (n=85) did so primarily due to a "technology barrier" (31%) and being "unable attend due to the timing of the programme or lack of time to attend" (28%). Other reasons for declining are described in Appendix 4.

The age profile of participants and decliners was similar, thus suggesting that age was not a barrier to participation in the programme.

The impact of COVID-19 on recruitment and the methodology used for recruitment is explored later in the discussion.

4.1.4 Clinical Findings

Clinical characteristics of participants

The baseline clinical characteristics of participants showed a wide variation in weight, BMI, waist circumference and lipid levels. Baseline characteristics for HbA1c and FPG fell within the eligibility range for inclusion in the programme.

Weight of participants ranged from 62- 162kg and BMI ranged from 23 – 60 kg/m2.

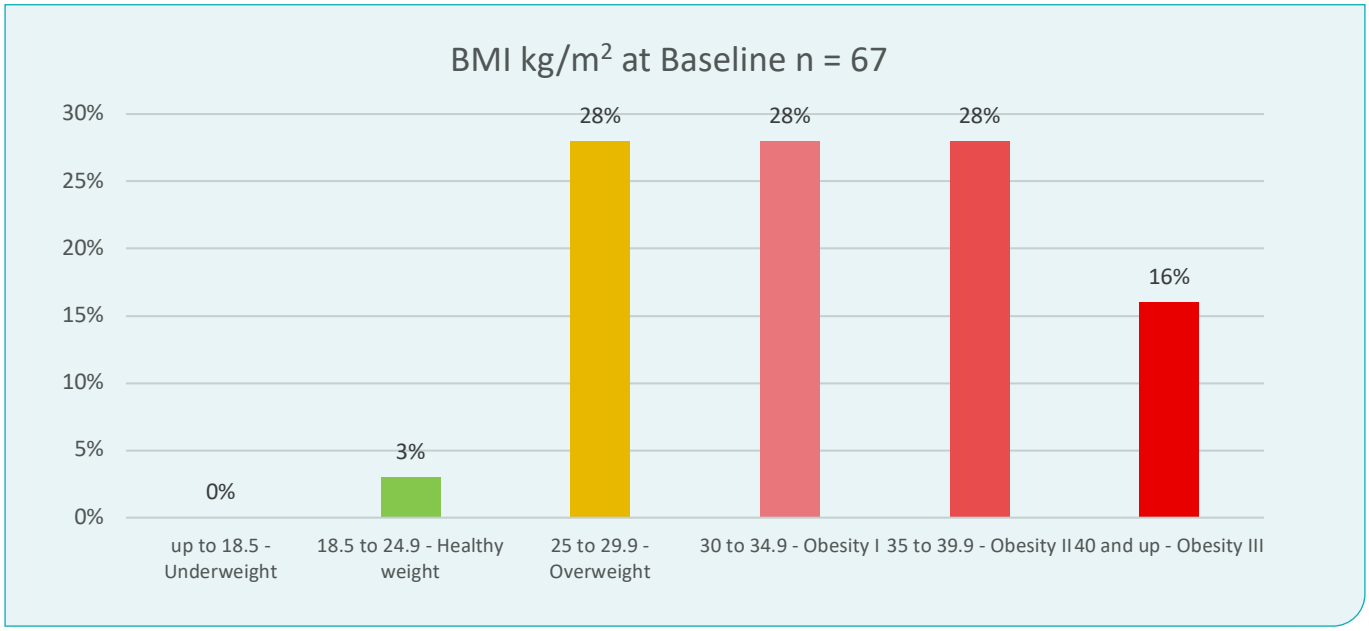
Individualised weight goals were discussed at the initial assessment and 88% of participants indicated that weight loss was a personal goal for them.

Table 1.2. Baseline clinical characteristics

N*	Characteristic	Mean	Range
64	Weight (kg)	97 kg	62 -162 kg
64	BMI (kg/m2)	34 kg/m2	23 – 62 kg/m2
61	HbA1c (mmol/mol)	44.4 mmol/mol	42-47 mmol/mol
11	Fasting plasma glucose (mmol/l)	6.3 mmol/l	6.1 – 6.7 mmol/l
53	Total cholesterol (mmol/l)	4.93 mmol/l	2.8 – 9.1 mmol/l
51	LDL (mmol/l)	2.86 mmol/l	1.2 – 5.7 mmol/l
49	HDL (mmol/l)	1.34 mmol/l	0.8 – 2.6 mmol/l
50	Triglycerides (mmol/l)	1.63 mmol/l	0.59 – 4.14 mmol/l
12	Waist circumference (cm)	114 cm	87 – 141 cm
65	Was weight loss a goal for you?	57 (88%) answered YES	
N number of individuals data was recorded for*			

Weight loss and weight loss goals are described further in the discussion section.

Table 1.3. BMI profile at baseline



Weight outcomes

Table 1.4 describes the weight outcomes for completers of the programme.

Weight was recorded for 29 participants at completion of the programme. The remaining completers did not have a weight recorded at the end of the programme. Of those that had a weight recorded 21 had lost weight, 6 had gained weight and 3 had no change to their weight.

- A mean weight loss of 3.7% was demonstrated in those that had weight measured at 1 year
- A mean weight loss of 5.5% was demonstrated amongst those that lost weight in this cohort
- Seventy three percent of completers had lost weight at 1 year (n=21)
- For individuals that did have weight gain (n=6) this gain was no more than 2.2kg (Table 1.4).

Table 1.4 Weight change during the pilot DPP

For n=44 completers of the programme

N*	Characteristic	Mean	Range
44	Basic Weight (kg)	97 kg	62 -162 kg
29	1 year weight (kg)	92kg	60 – 141kg
29	Weight change (kg)	-3.8kg	-24.5 to +2.2kg
29	Weight change (%)	-3.7%	-17.7% to +2.7%
21	Weight change for weight loss group (kg)	-5.56kg	-20.4kg to -1kg
21	Weight change for weight loss group (%)	-5.46%	-14.1% to -1%
6	Weight change for weight gain group (kg)	+1.4kg	+1.1 to + 2.2kg
N number of individuals data was recorded for*			

See Appendix 5 and 6 for the profile of weight changes for individual participants which describes further details on weight changes during the pilot programme.

BMI Outcomes

Results showed that among completers positive changes in BMI were demonstrated at 1 year.

There is an overall increase in those in the healthy weight range and decrease in those with obesity Class II and III at 1 year.

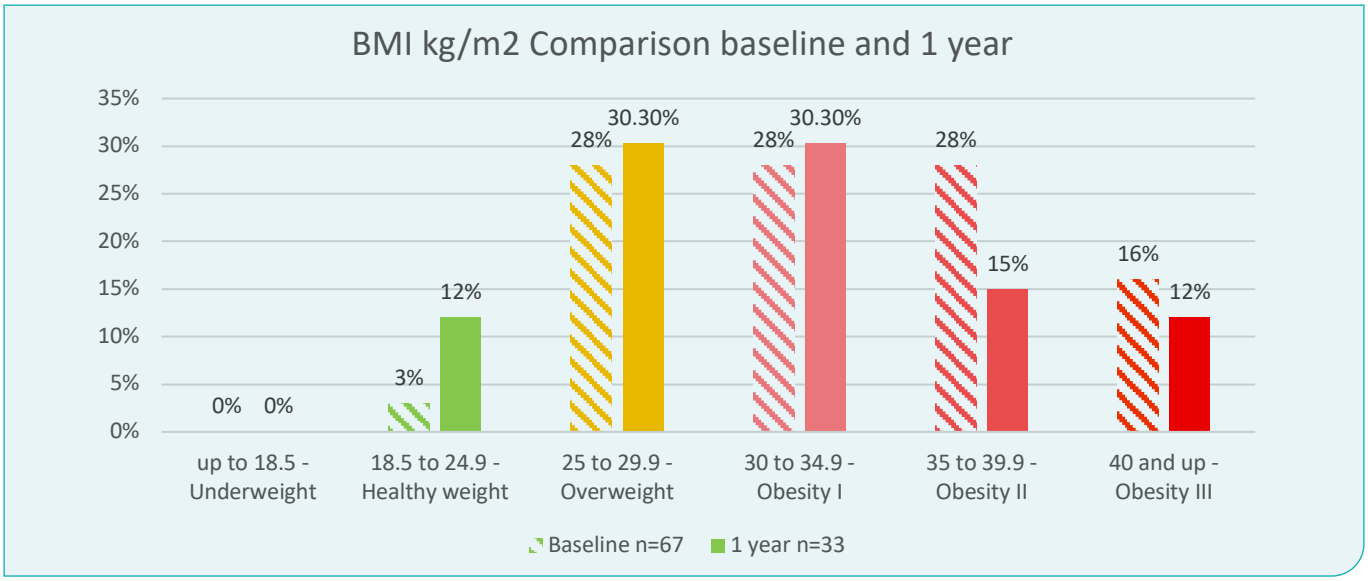
BMI in the healthy range increased from 3% at baseline to 12%

Obesity Class II decreased from 28% to 15%

Obesity Class III decreased from 16% to 12%

Obesity Class II and III combined, decreased from 44% at baseline to 27% . Table 1.5

Table 1.5. BMI kg/m2 comparison between baseline and 1 year



HbA1c

HbA1c was recorded for 29 of the 44 participants who completed the programme.
HbA1c was also available for others not defined as completers but for whom data was available at 12 months. HbA1c for the total sample is recorded in Table 1.6

Results showed a mean decrease of 4.3% in HbA1c for 29 completers [range -23.4 to +23.9%] and a 5.1% decrease in HbA1c (range -23.4% to +23.9%) for the full cohort this was equivalent to a mean change of 2.29mmol/mol.

Almost **50% of the group returned to normoglycaemia at 1 year.** (n=17/35 or 48.6%)

Table 1.6 HbA1c changes between baseline and 1 year

COMPLETERS

Characteristic	N	N = 44[1]
Change in HBA1C, baseline to 1 yr	29	-1.90 (3.59); -2.00 [-11.00 to 11.00]
% change in HBA1C, baseline to 1 yr	29	-4.3 (7.8); -4.3 [-23.4 to 23.9]

THOSE WHO ATTENDED ANY SESSIONS

Characteristic	N	N = 67[1]
Change in HBA1C, baseline to 1 yr	35	-2.29 (3.53); -2.00 [-11.00 to 11.00]
% change in HBA1C, baseline to 1 yr	35	-5.1 (7.7); -4.3 [-23.4 to 23.9]

[1]Mean (SD); Median [Range]
See Appendix 7 for HbA1c profile at each time point for completers
See Appendix 8 for HbA1c changes for all attenders.

4.1.5 Participant reported outcomes

Participant reported outcome data were collected via a self-administered, anonymised online survey.

There was a response rate of 42/67 (62.7%) to the online survey at baseline (although not all parts of the survey were completed by all responders)

There was a response rate of n= 25/34 (73 %) to the 6 month survey and a response rate of n=17/32 (53 % to the 12 month survey.

Table 1.7 reports on the high level observations on lifestyle and behavioural characteristics of participants in the pilot programme.

Of note, there is a different n number and response rate for each variable as not all responders answered all parts of the survey.

Table 1.7 Lifestyle and behavioural characteristics of participants

Qualitative Variable	Baseline Observations	1 Year Observations
Smoking	No Smokers	No Smokers
Alcohol *(MECC)	32 % never drank alcohol N=8 engaging in binge/high risk drinking	N= 5 engaging in high binge/ high risk drinking.
Dietary Habits	10% reported rarely eating fruit 3% reported eating 5 or more servings of fruit	0% reported rarely eating fruit Fruit consumption of 5 or more servings increased to 12% No significant reported change in the consumption of sugar sweetened beverages or high fat meals and snacks
Quality of Life **(WHO-5)	Mean Score 63	Mean Score 66

* Binge drinking (more correctly known as single occasion risky drinking is calculated as six or more standard drinks in 1 drinking occasion on 1 or more times per week, and is defined as 'harmful drinking'. Source: HSE 2023 & HRB National Drugs Library.

** A higher score on this measure indicates better mental wellbeing. In Ireland the average score was 61 (59 for women, 63 for men) in 2018 as per the Mental Health Ireland: MH Insights Survey, Dublin: IPSOS MRBI (2018).

Physical Activity

IPAQ – short version was the tool used to assess sitting time, MET scores and degrees of light/ moderate and vigorous physical activity undertaken by participants. Errors and inconsistencies were found in reporting by participants and no meaningful comparisons could be made between baseline and end of year findings for any of these variables. Therefore the results are not included in this report.

Knowledge, skills and confidence

At the end of the pilot programme (12 months) participants there were 17 responses received to this part of the survey with demonstrated improvements across all variables. Participants demonstrated improvements in their knowledge, skills and confidence in understanding diabetes risk, knowledge of the lifestyle factors that influence that risk and confidence to engage in behaviour change and achieve their goals.

At end of programme more responders indicated 'strongly agreeing' with all of the knowledge related questions.

Responders understanding of diabetes risk increased from 39% to 59% at 1 year.
Participant's understanding of how to reduce that risk also increased from 23% to 35% in those indicating that they strongly agreed with that statement.

In particular participants' knowledge of eating in a healthy way, planning and shopping for healthy food improved. There was also some increase in the number of participants knowing how physically active they needed to be. Table 1.8

Table 1.8. Knowledge

Knowledge rating for the following questions	Those indicating 'Strongly Agree'		Those indicating 'Agree'	
	Baseline	1 Year	Baseline	1 Year
I understand my risk of developing type 2 diabetes.	39%	59%	48%	35%
I know how to reduce my risk of type 2 diabetes.	23%	35%	65%	65%
I know how to eat in a healthy way	10%	29%	74%	71%
I know how to plan and shop for healthy food	6%	35%	65%	53%
I know how physically active I need to be for health	26%	35%	65%	53%

Confidence

Participants reported increased confidence in
- Engaging with an online programme
- Making healthy food choices
- Achieving their goals of physical activity
- Achieving their weight goals

A higher percentage reported 'very confident' across all variables between base line and 12 months.

Table 1.9 Confidence

Confidence rating for the following questions:	Those indicating 'Very Confident'		Those indicating 'Confident'	
	Baseline	1 Year	Baseline	1 Year
How confident do you feel about taking part in the diabetes prevention programme online?	13%	29%	61%	18%
How confident do you feel about making healthy food choices that are right for you?	9.7%	24%	65%	59%
How confident do you feel about achieving your physical activity goals?	9.7%	18%	58%	53%
How confident do you feel about reaching your personal weight goal?	3%	6%	48%	59%

Participant Reported Experience Measures (PREMS)

At the end of the 12 months programme evaluation 27 responses were received to this part of the survey. The experience of those responders was extremely positive.

95% of the group described the topics covered and the participant handbook as 'Excellent' or 'Very Good'

90% of participants reported that they found the course 'Very helpful'

90% of people described the support with getting started online as 'Excellent' or 'Very Good'.

70% indicated that the duration of the programme and the number of sessions was 'just right'

Free text at the end of the online survey allowed participants to give feedback in their own words. The testimonials from participants were overwhelmingly positive and have been captured under key themes including:

- Understanding risk
- Motivation to change
- Overall feedback on the programme
- Engaging online
- The physical activity component
- Support received (See Appendix 9)

Discussion

This pilot Diabetes Prevention Programme (DPP) was the first of its kind to be delivered in the Health Service Executive, Ireland. Numerous important and insightful findings can be taken from this pilot programme and the lessons learned from the pilot phase will guide the implementation phase and scale up of the National DPP. The DPP will be rolled out for delivery within the Enhanced Community Care Specialist Teams as part of the overarching goals of the HSE for the prevention and treatment of Chronic Disease.

Participation and attendance at this pilot exceeded the participation and attendance levels at large scale DPP's internationally. While direct comparisons are difficult due to variation in terminology and modes of delivery of other programme an participation rate of 92% and completion rate of 66% is very high. The in person 'Healthier You' in the UK reported 53% attendance at the initial assessment and 34% attendance at least 1 group-based session and 22 % completed the intervention (Howarth, 2021). In the US a review of DPP lifestyle change programmes showed 55% of those enrolled in an online program had remained after 1 year, compared to 28% of those enrolled in-person programmes. (Golovaty et al, 2021)

This programme saw a 46% uptake to the programme and attendance at initial assessment. There was 92% attendance to at least one group session and 66% completed the programme.

It is likely that uptake would have been even higher if participants had been referred specifically to a DPP programme, however eligible participants were identified from generic waiting lists and had not been specifically informed of or referred to a DPP. For the implementation phase to ensure higher uptake it is recommended that the programme is promoted to referrers and service users and informed referral takes place. It is also recommended that there is timely access to initial assessment and to a group programme to optimise participation, retention and patient outcomes.

Age was not a barrier to engagement with the age range being 35 – 82 years old. This is a slightly older age cohort compared to other international programmes with the 'Healthier You' DPP in the UK reporting an age range of up to 79 years and the DPP in the USA reporting an upper age of 75 years. The increasing age profile seen in the Irish pilot DPP may reflect the aging demographic in general worldwide and the increased acceptance of online engagement since COVID 19. Positive engagement with the programme indicates a potentially high level of acceptability of synchronous online self-management education interventions.

While attendance and completion rates were high for this pilot DPP, further research could be done to follow up those that didn't engage, declined or dropped out of the pilot programme. This would identify barriers to engagement and retention which could then be addressed for scale up and wider implementation and provide valuable information on engaging with hard to reach groups. Research suggests that expanding accessibility of online delivery of lifestyle change programmes is an attractive strategy to bring DPP to scale. (Golovaty et al, 2021)

International studies show that the longer people stay engaged in a DPP the better the outcomes (Knowlder, 2009, Tuomilihito & Gregg, 2023). Therefore, to enable people to get the best possible outcomes they need to stay with the programme for as long as possible. The high participation and retention to this programme is likely to have contributed to the positive clinical and behavioural outcomes.

Discussion

Participant information collection by the educators provided accurate and comprehensive data on attendance and clinical measurements. The findings for weight change in this pilot programme was 3.8kg (range -24.5 to +2.2kg) weight loss at 1 year for full cohort and -5.56kg in the weight loss cohort (range of -20.4kg to -1kg). These results are comparable to international randomised control trials which demonstrate between 3.3-5.5kg weight loss at 1 year (Tuomelihto, 2001, Knowler, 2002, Valabhji et al, 2020).

The wide variation in weight (62 -162 kg) and BMI (23 – 62 kg/m2) observed at baseline for this cohort highlights that those with prediabetes are not a homogenous group and may have multiple and varied co-morbidities. This highlights the need for a personalised approach to care before individuals join the group setting. Having an individual initial assessment before commencing the group sessions has enabled the provision of a personalised approach to care. This approach aligns with the American Dietetic Association guidance on the role of the dietitian in providing medical nutrition therapy and self-management education and support (ADA, 2022). The benefits of 5-7 % weight loss, where appropriate remains a key component to the successful prevention of progression to type 2 diabetes. (Tuomilehto and Gregg, 2023)

HbA1c reduction of 2.29mmol/mol was demonstrated at year 1 in this pilot DPP, which again is comparable to the large scale outcomes study in the UK which demonstrated a change in HbA1c of 2.04 mmol/mol (Valabhji et al, 2020). An important outcome of this pilot DPP was that almost 50% of the pilot group had returned to normoglycaemia at 1 year, therefore no longer having prediabetes.

Participant reported outcome and experience measures were collected via a self-administered, anonymised online survey with a 62.7% response rate at baseline (although not all parts of the survey were completed by all responders). This is higher than the average response to online surveys which is more typically around 45% (Myer et al, 2022). The response rate did decrease at follow up but this was linked to reduced numbers of attenders at 6 and 9 months. This qualitative survey offered information about the lifestyle and behavioural characteristics of participants.

There were no smokers in the pilot cohort and 32% reported never drinking alcohol. A small cohort reported engaging in high risk/binge drinking at base line and this number dropped slightly at year 1. There was no significant change in the consumption of sugar sweetened beverages or high fat meals and snacks between base line and end of programme. The baseline consumption of sugar sweetened beverages was low with 80% reporting never consuming these drinks. The instrument used to capture eating habits was an in house designed questionnaire with eight questions asking about frequency of consumption of fruit, vegetables, high fat and high sugar foods. The tool may have been too complex for use in a self-administered survey and it is recommended that an alternative instrument might be used in future studies.

Similarly the validated International Physical Activity Questionnaire – IPAQ short form (Lee et al, 2011) was used to measure and assess types and intensity of physical activity and sitting time in this cohort. This also proved too complex a tool for a self-administered survey with inconsistencies in responses and patterns of responses not matching earlier answers, therefore no meaningful conclusions could be drawn on the activity levels of this pilot group.

Discussion

The WHO-5 mental wellbeing index (Topp et al, 2015) was used to capture information on the quality of life score for this cohort. Participants scored an average of 63 at baseline and slightly increased to 66 at end of programme. This score is broadly similar to the mean score for the Irish population where the average score is 61 (59 for women, 63 for men) and where a higher score indicates better mental wellbeing (MH Insights, 2018). Participants in the DPP pilot have demonstrated similar mental wellbeing status to the rest of the population.

This pilot DPP was designed to be delivered online due to the COVID-19 pandemic Participation online was acceptable to participants and furthermore, research suggests that telehealth and online group counselling may facilitate improved access to nutrition care and reduce costs for the service user and service provider (Morgan-Bathke et al, 2022). The delivery of diabetes prevention programmes online are shown to be as effective, if not more effective than face to face delivery as demonstrated by the UK's 'Healthier You' DPP which saw greater weight loss results for those who completed group programmes online (2.4 kg compared with 2 kg for those who completed face-to-face groups) (Baron et al, 2023).

This project has demonstrated clinical and behavioural effectiveness and has been extremely well attended and positively received by participants. Scaling up this online DPP and adapting it for face to face delivery will offer the at risk population a programme that is designed for the Irish health care setting that offers high standard quality evidence based care within the new ECC structures of the reforming HSE.

Lessons Learned

Lessons Learned for Participant Recruitment

Recruiting from historical waiting lists was challenging and time-consuming. Those on a waiting list had not originally been referred to a Diabetes Prevention Programme but were referred to routine dietetic care, this meant that recruitment calls were essential to inform participants of the programme and reduce barriers to online engagement. Recruitment from historical waiting lists also meant that HbA1c may not have been current and accessing repeat bloods was a challenge for practices as the pilot began shortly after the HSE cyber-attack. For longer term implementation the opportunistic screen and high risk prevention programme as part of the GP contract for chronic disease will ensure that patients will receive annual review and bloods and timely referral to a diabetes prevention programme

Learning Point:

Clear Referral Pathway: Engagement with and retention to the programme will be increased if there is a clear pathway of referral at the time of diagnosis.

Recent HbA1c: The presence of recent HbA1c within range is critical to ensure that those most at risk receive care and that those who have progressed to type 2 diabetes are referred to the most appropriate programme for them.

Timely Referral: Those referred directly to the programme by their GP practice at the time of the pilot were much more likely to engage. Timely referral and access to a programme with recent HbA1c results is best.

Informed Referral: At point of referral participants should be informed of their diagnosis and risk. They should be provided with details of the programme and of the benefits of taking part.

Educators choose to use phone calls to contact potential participants as they knew from previous experience when recruiting for online courses that it was a more successful way of recruiting than letters. Phone contact gave potential participants the opportunity to ask questions and address any concerns particularly in relation to joining an online programme. For large scale roll out telephone contact may not be always possible but those referred should be provided with information and an opportunity to opt in via letter or phone.

Recruitment was particularly successful where educators had established working relationships with GPs, practice nurses and diabetes specialist nurses. This helped the process of identifying eligible participants. Evidence also suggests that a recommendation from a trusted health professional increases participation in lifestyle intervention programmes (Aveyard et al, 2016).

Learning Point:

Engaging with Participants: As telehealth and online programmes are a relatively new way of delivering health care it is recommended that recruitment should include a phone contact to support potential participants with engaging with programmes online.

Engaging with Referrers: GPs and Practice Nurses are key stakeholders in promoting and encouraging uptake to the programmes. Early engagement with general practice sites and relevant health professionals is essential to ensure appropriate and adequate referrals. Promotion of the DPP and awareness-raising campaigns amongst health professionals will be important for the successful long term implementation and national scale-up of the Diabetes Prevention Programme.

Lessons Learned for Educator Training

Engaging trained experienced educators ensured that educators had the necessary core skills, competence and confidence for recruiting, assessing and delivering the programme.

Engaging educators with prior experience of delivering SMES both in person and online meant they could use this experience to successfully recruit to the programme, support participants with engaging online and maximise retention to the programme.

Engaging dietitians with the clinical expertise, behaviour change skills and group facilitation skills ensured that they had a unique skill set to offer both medical nutrition therapy and behaviour change support to participants, thereby optimising both behavioural and clinical outcomes

Providing training and opportunities for feedback and reflection was critical in supporting educators to effectively deliver the programme. Clear, consistent and regular communication with educators has been essential to building confidence in those delivering the programme.

The feedback from educators at all stages of the process ensured that lesson plans and materials for online delivery could be adapted and improved, the role and purpose of the initial assessment was more clearly defined and lessons learned in one pilot site could be shared with others.

Learning Point:

Training: New educators for implementation phase should be supported to develop the knowledge, skills and confidence they need to deliver the programme. Educator training should support educators with engaging referrers to identify those within the eligible range and at highest risk to enhance recruitment and retention..

Training should focus on steps for recruitment, principles and philosophy which underpins the programme, the curriculum content, behaviour skills training, facilitation skills training, engaging groups online, social supports and signposting participants to other healthcare professionals and additional supports when needed.

Programme Fidelity: Staff engaging in the delivery of the programme at implementation stage will need training, shadowing, peer support and opportunities for reflection and feedback to ensure the programme is delivered to the highest quality standards. This will ensure that courses are delivered to the highest possible standard and are delivered as they were originally intended.

Support: Opportunities for shared learning will be important as the programme is scaled up to reach all CHO areas. Structures to enable shared learning and shared expertise should be created to support national implementation and roll out.

Lessons Learned for Programme Design

Eligibility criteria

HbA1c range of 42-47moml/mol was the criteria used for the pilot phase of the DPP as this is the criteria by which general practices identify patients at highest risk and are deemed eligible for the chronic disease programme. Internationally eligibility for access to DPPs varies from eligibility based on HbA1c, fasting plasma glucose, impaired glucose tolerance or by using risk tools to assess risk. Risk tools used internationally include FINDRISC (Lindström J., Tuomilehto J. 2003) or and adapted version of it such as AUSRISK, (Chen et al., 2010) or the Leicester risk assessment tool (Gray et al., 2010).

Learning Point:

In the future, the use of a risk tools may be considered to identify those at highest risk. Further examination of risk tools is needed to determine the tool most appropriate to the Irish health care setting.

Initial Assessment

The initial assessment was a valuable component of the programme to provide participants with medical nutrition therapy, a personalised care plan and support with engaging with the programme in the online setting. It also allowed for the identification of those who may not be suitable for the online or group setting. The Initial Assessment also optimised engagement with participants having built rapport and identified initial steps towards change before joining the group setting. The initial Assessment proved an essential component of the programme and should be retained.

Learning Point:

The initial assessment will remain a key component of the programme. Guidance for the initial assessment will include recommendations for 1:1 care for those deemed not suitable for group care. Educators will be supported to use clinical judgement and person centred skills to identify those suitable for the group setting and those best suited to a 1:1 care package

Programme Structure

Feedback from participants as part of the evaluation process showed a preference for monthly follow up and not a gap of three months, this was reflected in attendance rates, with attendance dropping at the 6, 9 and 12 month sessions.

Learning Point:

The programme structure has been revised for national roll out and is now 6 weekly sessions followed by 8 monthly sessions. This has additional advantages for scheduling and for communicating a simple message about programme structure. The revised programme outline is described in Appendix 11

Eating for Health Curriculum

The programme focuses on a supporting participants to understand the implications of diet and activity on their HbA1c, lipids and overall diabetes risk. It enabled them to achieve a balanced, varied diet for health which can be enjoyable and achievable for the long term. Dietitians have the knowledge skills and competence to tailor messages to meet the clinical needs of participants and to guide participants towards sustainable habits, they can also tailor messages to enable participants to make personal changes that can have a positive impact on their overall diabetes health risk. Dietitians can support participants to explore not just what they eat but their eating preferences, their eating behaviours and help participants navigate towards reliable trusted sources of information and understanding the many myths that exist around diet, food and health.

Learning Point:

Dietitians in the Community Specialist teams of the Chronic Disease services are ideally placed to offer timely access to this evidence based programme.

Movement for Health Curriculum

Inclusion of a 10 minute physical activity component which supported people with a chronic condition to engage in safe, evidence based, clinically appropriate physical activity was possible with the support of physiotherapy partners. Feedback from participants indicated that they valued this component as a key enabler for them to commence or progress with their physical activity goals. The pilot phase identified the need for bespoke video tools which would be physiotherapist led. The project team worked in collaboration with physiotherapy and Healthy Eating and Active Living (HEAL) colleagues to develop a suite of physiotherapy led videos designed to meet the needs of those with an underlying chronic condition and will be included in the implementation phase of the movement for health curriculum.

Learning Point:

As part of the educator training educators are encouraged to signpost participants onwards for additional support from physiotherapy services where needed or to further community activity programmes to continue to meet their goals for movement for health. Continued collaboration with physiotherapy partners and Healthy Eating and Active Living partners will ensure that the curriculum reflects best practice.

Weight for Health

The weight profile of participants in the DPP ranged from BMI of 22.7 – 60.2 kg/m2, with 61% of participants having a BMI of >30 kg/m2. The DPP has collaborated with the Clinical Programme for Obesity in further developing the curriculum to ensure that the care being delivered to those in the DPP and those in the Best Health Adult Weight Management Programme aligns where appropriate and meet the needs of those living with obesity.

Learning Point:

Continued collaboration with the Clinical Programme for Obesity will ensure that educators are supported to deliver the programme to align with new and emerging evidence for the treatment of obesity and that participants living with obesity, engaging with the DPP are supported to meet their needs.

Delivering Online

The experience of the pilot dietitian educators who had been engaged with delivering DISCOVER Diabetes Type 2 and DESMOND online in 2020 was invaluable. They shared their skills, knowledge and learning from their previous experience. This was a key enabler for this project to progress online and a key component for the overall success of the programme.

Learning Point:

Adequate resources and supports must be available to ensure that participants feel confident to engage in an online programme.

Adequate and appropriate technological infrastructure within the HSE is critical to the long term implementation of this programme online.

For scale up and national implementation the programme will need to be adapted for face-to-face delivery to improve reach, access and engagement with the programme.

Where possible a combination of in-person and online programmes should be offered to engage the widest possible audience (blended service).

Reflective Practice

Reflective practice for health care professionals enhances critical thinking, deepens self-awareness and improves communication skills. (Coru, 2023). This same reflective practice allows participants to think critically and make autonomous, informed decisions which is central to the empowerment approach to care (Anderson & Funnell, 2008)

Reflective practice has been an important component of the programme. Participants were encouraged to engage in reflective practice during each session. Time to reflect, stop, think and review was facilitated throughout the programme. Educators were encouraged to engage in self and peer reflection at the end of each session. This process enables both participants and educators alike to grow in their own learning and skill development.

Reflective practice is encouraged as part of ongoing continuing professional development of educators.

Learning Point:

Reflective practice should remain central to empowering and enabling both educators of and participants to the programme.

Feedback

Educators provided feedback during the regular planning and progress meetings. A subset of participants provided feedback on the curriculum and the handbook as part of an online discussion at the end of the programme. The reflective process and the feedback from educators and participants was really valuable to help inform the plan for longer term implementation. The lessons learned from what they shared has given valuable insight into the strengths of the programme and the areas for improvement.

A free-text box was also available to those participants completing the online survey and some samples of participant feedback are shared in the testimonials below.

Testimonials

“Motivated by course to stay on the right path. My goal is to reverse my prediabetes to a normal level.”

“This programme is very helpful, educational and informative. I would recommend it to anyone with concerns about their risk of developing type 2 diabetes or being g [sic] prediabetic.”

“Course is giving me useful information about healthy [sic].”

“I am really enjoying the course it is very relaxed and unstressed with lots of good information.”

Further detail of testimonials is found in Appendix 9.

Learning point:

Keeping participants at the centre of care means keeping them involved and including their needs at all stages and will ensure that the programme will provide the right care. Consideration needs to be given to have a platform for participants to continue to contribute to the programme development into the future. Collaborating with educators will need to be an essential component of all future programme review and development.

Recommendations

Access and Referral

- Promote the programme to GPs and practice nurses to ensure appropriate, timely and informed referral to the programme to optimise engagement, retention and patient outcomes.
- Use of suitable software to ensure General practice can easily and accurately identification of high risk groups i.e. those with HbA1c within the prediabetes range
- Use of healthlink to ensure easy and timely referral to Community Specialist Teams in the hubs.
- A Diabetes Register would greatly enhance the identification and ongoing support of those with and at risk of type 2 diabetes.

Educator Training

- Develop a comprehensive quality assured training package for educators to ensure they have the necessary knowledge, skills and competencies to deliver the programme both online and face-to-face.

Programme Design

- Adopt the curriculum to enable delivery in-person (face-to-face groups).
- Adopt the curriculum to meet the needs of high risk groups including those with a previous history of gestational diabetes, immigrant ethnic minority groups and hard to reach lower socio-economic groups.

Evaluation Design

- Focus groups combined with wearable devices may prove better instruments to capture physical activity of participants and should be considered for any future research.
- Similarly the use of an app to collect 'real time' data on food intake and physical activity would be more reliable than self-reported data and should be considered in any future research.
- Further research could be carried out to map the behavioural strategies used in the programme to establish which strategies work best for each desired outcome.

Considerations for the Future

- Raise awareness of risk and consider the use of an appropriate risk tools to identify asymptomatic high risk individuals.
- Ensure systematic ongoing review of the curriculum to align with new and emerging evidence and best practice.
- The programme will seek QISMET accreditation. (QISMET accreditation achieved at time of printing December 2023)
- Resources will be required to enable ongoing audit and evaluation when the programme is fully scaled up for national implementation.
- Consider the use of digital technologies to enhance the user experience and increase engagement with the core messages of the programme in their own time.
- Consider the Diabetes Prevention Programme in the context of wider health promotion, public health and population based initiatives to address the wider determinates of health in an effort to promote and encourage risk reducing behaviours in the wider population.

Conclusion

This pilot has demonstrated the successful design, delivery and evaluation of a Diabetes Prevention Programme for the Irish healthcare setting. The DPP online pilot has demonstrated that early intervention may reduce risk and delay the progression to type 2 diabetes in high risk cohorts with 50% of participants in this study having achieved normoglycaemia at 1 year. The programme has demonstrated high levels of engagement, positive clinical improvements and high levels of satisfaction from service users.

The results delivered in this pilot cohort are comparable to large scale international randomised control trials. The favourable results across weight and HbA1c outcomes in particular suggest that programmes such as this one will successfully lead to improved clinical outcomes and in doing so reduces risk of progression to type 2 diabetes.

The positive results from participant experience suggests that participants are willing to engage in online programmes and found it useful, supportive and informative and participation led to improvements in knowledge, skills and confidence to engage in behaviours that reduce risk of progression to type 2 diabetes.

The evidence from international programmes as summarised in the opening of this document suggests that such interventions are clinically and cost effective (Ashra e al, 2015 & IDF, 2016) and can lead to a reduction in population incidence of type 2 diabetes (McManus et al, 2022).

This programme offers a pathway to a diabetes prevention intervention for GP practices which compliments the structured Chronic Disease Management Programme within the HSE (CDM, 2019).

The Sláintecare values of Right Care, Right place, Right time aims to provide safe, timely access to care and promotes health and wellbeing. It aims to increase capacity and productivity across our services and reduce waiting lists. This pilot programme demonstrates that a diabetes prevention programme such as this one can provide care in a way that is accessible and acceptable to service users. The online component ensures that participants can receive care in their own homes. The outcomes show that early intervention can and does prevent progression to chronic disease.

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Margaret Humphreys, Dietitian Manager and Project Lead, Office of NCAGL, Integrated Care Programme for Chronic Disease

Liz Kirby, Project Manager & Clinical Specialist Dietitian

Project Team: Aoife Ward, Senior Project Dietitian, Dr. Karen Harrington, Clinical Specialist Dietitian, Dr.Ciara McGowan, Senior Dietitian, Orla Brady, Senior Dietitian, John Cowhig, Administrator

Working Group

Liz Kirby, Project Manager

Aoife Ward, Senior Project Dietitian

Dr Karen Harrington, National Clinical Specialist Dietitian, Diabetes

Olive Tully, Senior ICP Diabetes Dietitian, CHO 8- Louth

Katriona Kilkelly, Senior ICP Diabetes Dietitian, CHO 2- Galway

Pilot Dietitian Educators

Katriona Kilkelly, Senior ICP Diabetes Dietitian, CHO 2- Galway

Ciara Heverin, Senior Diabetes Dietitian, CHO 2- Galway

Maria Barrett, Senior Health Promotion Dietitian, CHO 3- Limerick

Sinead Cunneen, Senior Primary Care Dietitian, CHO 3- Limerick

Lisa Cronin, Community Dietitian, CHO 4- Cork

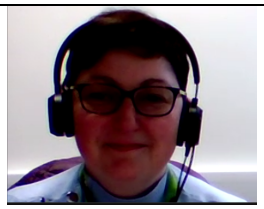
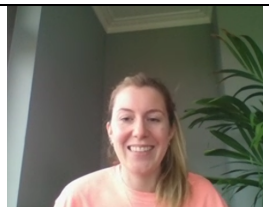
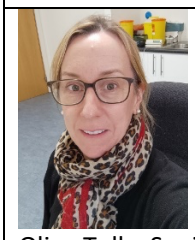
Nadine Drew, Senior Diabetes Dietitian, CHO 5- Waterford

Mary O'Sullivan, Senior Diabetes Dietitian, CHO 5 – Carlow/Kilkenny

Olive Tully, Senior ICP Diabetes Dietitian, CHO 8- Louth

SallyAnn McLaughlin, Senior Health Promotion Dietitian, CHO 8 –Louth

Pilot Dietitian Educators

Katriona Kilkelly, Senior Diabetes Dietitian, CHO2 and member of DPP working group	 Ciara Heverin, Senior Diabetes Dietitian, CHO2	 Maria Barrett, Senior Health Promotion Dietitian, CHO3	 Sinead Cunneen, Community Dietitian CHO3
Lisa Cronin, Community Dietitian, CHO4	 Mary O'Sullivan, Senior ICP Diabetes Dietitian, CHO5	 Nadine Drew, Senior ICP Diabetes Dietitian, CHO5	 Sally-Ann McLaughlin, Senior Community Dietitian, CHO8
 Olive Tully, Senior ICP Diabetes Dietitian, CHO 8 and member of DPP working group			

National Advisory Group

Professor Sean Dinneen (SD) Clinical Lead NCP Diabetes, Ms Cliodhna O'Mahony, Programme Manager NCP Diabetes, Dr Diarmuid Quinlan, GP Lead National Clinical Programme for Diabetes, Dr Annemarie Tully, Community Dietitian Manager CHO 5, Dr Maureen Mc Gowan, CH East, Freda Horan Community Dietitian Manager CHO 4, Ruth Sargent, Community Dietitian Manager CH East, Sheena Rafferty, Community Dietitian Manager CHO 9, Marie Courtney, Practice Nurse Professional Development Co-ordinator, Joanne Lowe, Integrated Care Diabetes Nurse, NCP, Dr Grainne O' Donoghue, Assistant Professor of Physiotherapy & Sport UCD, Ben Cloney, Acting Head of Digital Communications HSE, Sarah O'Brien National Lead, Healthy Eating & Active Living Policy Programme, Professor Donal O'Shea, Clinical lead NCP Obesity, Dr Helen Ryan Project Dietitian – NCP Obesity, Marie O'Grady, General Manager – Primary Care, Strategy and Planning, Dr Sheena McHugh, Public Health Researcher UCC, Liz Corr Change & Portfolio Management OoCIO, Lorna Hurley Change Manager, Slaintecare Project, Type 2 Diabetes E2E, Margaret Humphreys, Dietitian Manager & National Lead, Diabetes Self-Management Patient Education, Strategic Planning & Transformation, Dr Karen Harrington, Clinical Specialist Dietitian – Diabetes, Liz Kirby, Project Manager SIF Project 156 (Type 2

Diabetes Prevention), Cliona Twohig, Project Manager Type 2 Diabetes and IT System (SIF Project 154, 155), Siobhan O Farrell, Administrative lead – Office of the NCAGL Chronic disease

Community Dietitian Managers Nationally and specific guidance from a sub group of managers including Dr. Maureen McGowan, Ruth Sargent, Freda Horan, Dr. Anne Marie Tully & Sheena Rafferty

Collaborators

Dr. Grainne O'Donoghue, Lecturer/Assistant Professor, School of Public Health, Physiotherapy and Sport Science, University College Dublin, Health Sciences Centre, Dublin. For guidance on the physical activity curriculum.

Dr Sheena McHugh, Senior Lecturer, School of Public Health, University College Cork for guidance on evaluation design

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Pilot Participants

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Appendices

Appendix 1: Evaluation Dataset

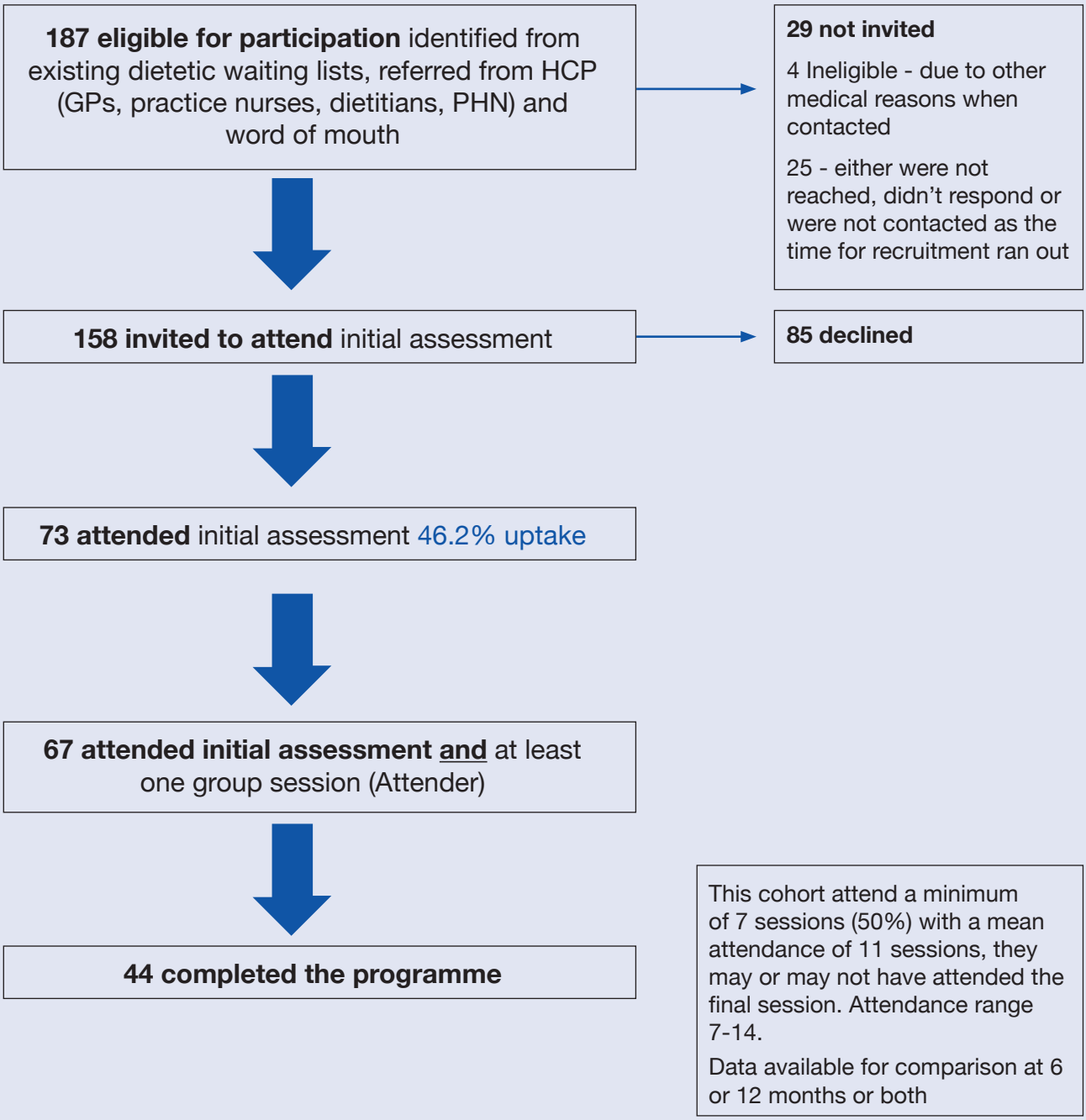
Data Collected by Educators	
Demographic details (T1, T2, T3)	Data on gender, age, ethnicity, CHO area
Attendance	Attendance was recorded at all sessions
Clinical details (T1, T2, T3)	Weight, Height, BMI, HbA1c, lipid profile, previous history of gestational diabetes
Participant Reported Outcome Measures	
Eating patterns (T1, T2, T3)	8 items asked on consumption and frequency of consumption of fruit, vegetables, snacks, sugar sweetened beverages and high fat meals
Smoking (T1,T2, T3)	2 items asked about smoking status
Alcohol (T1,T2, T3)	2 items asked about alcohol consumption. The Audit-C risk tool was used to determine risk with a score of ≤4 indicating low risk drinking and ≥5 indicating high risk drinking.
Knowledge (T1, T2, T3)	5 items asked about knowledge of diabetes risk, healthy eating and physical activity
Confidence/Self Efficacy (T1, T2, T3)	3 items asked about confidence in being able to engage with practices to reduce diabetes risk. 1 item asked about confidence in engaging with the programme in an online setting
Quality of Life (T1, T2, T3)	The WHO 5 mental wellbeing index was used. This tool comprises 5 positively worded items answered on a 6-point scale. Items included cheerfulness, calmness, activity, feeling rested and levels of interest. A higher score on this measure indicates better mental wellbeing. This score is best interpreted when compared to population norms. In Ireland the average score for the population is 61 (59 for women, 63 for men) Mental Health Ireland – MH Insights Survey 2018: Mental Health Ireland. (2018). Mental Health Insights. Dublin: IPSOS MRBI.
Physical activity levels (T1, T2, T3)	The International Physical Activity Questionnaire (IPAQ- short version) was used. This measure assesses the types and intensity of physical activity and sitting time that people do as part of their daily lives and is used to estimate total physical activity in MET-min/week and time spent sitting. There are two forms of output from scoring the IPAQ. Results can be reported in categories (low activity levels, moderate activity levels or high activity levels) or as a continuous variable (MET minutes a week). MET minutes represent the amount of energy expended carrying out physical activity.
Participant Reported Experience Measure	
Satisfaction with the programme (T3 only)	At the end of the programme 7 questions asked participants about overall satisfaction with the programme, programme materials, content, duration, online delivery and support from educator

Appendix 2: Recruitment and Participation in the Programme

2.1 Definitions of Participation

Outcome Measure	Definition	Analysis cohort	Outcome
Uptake	Attendance at initial assessment	All identified as eligible from waiting list at pilot site n= 158	N=73 attended initial assessment. 46% uptake
Attender	Went on to attend at least one group session	Of those that attended initial assessment n=73	N=67 (92%) attended at least one group session
Retention	Attended at least 50% of sessions	Of those that attended at least one group session n=67	N=48 (72%) reached the retention rate
Completion	Attendance at the final intervention session or the recording of some final health measure (HbA1c, weight or well-being), plus at least 50% attendance at least one session being from the 1st 6 sessions and one session being either the 6,9 or 12 month session. (DPP, Ireland)	Of those that attended at least one group session n=67	N=44 66% completion rate

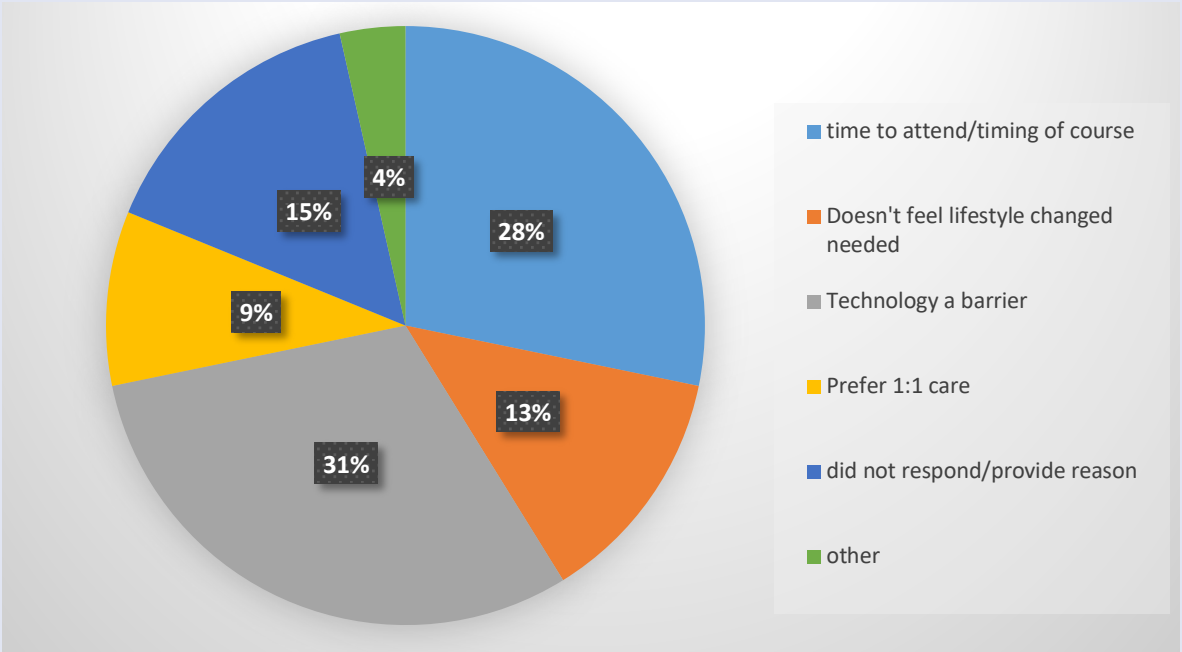
2.2 Flow Chart of Recruitment



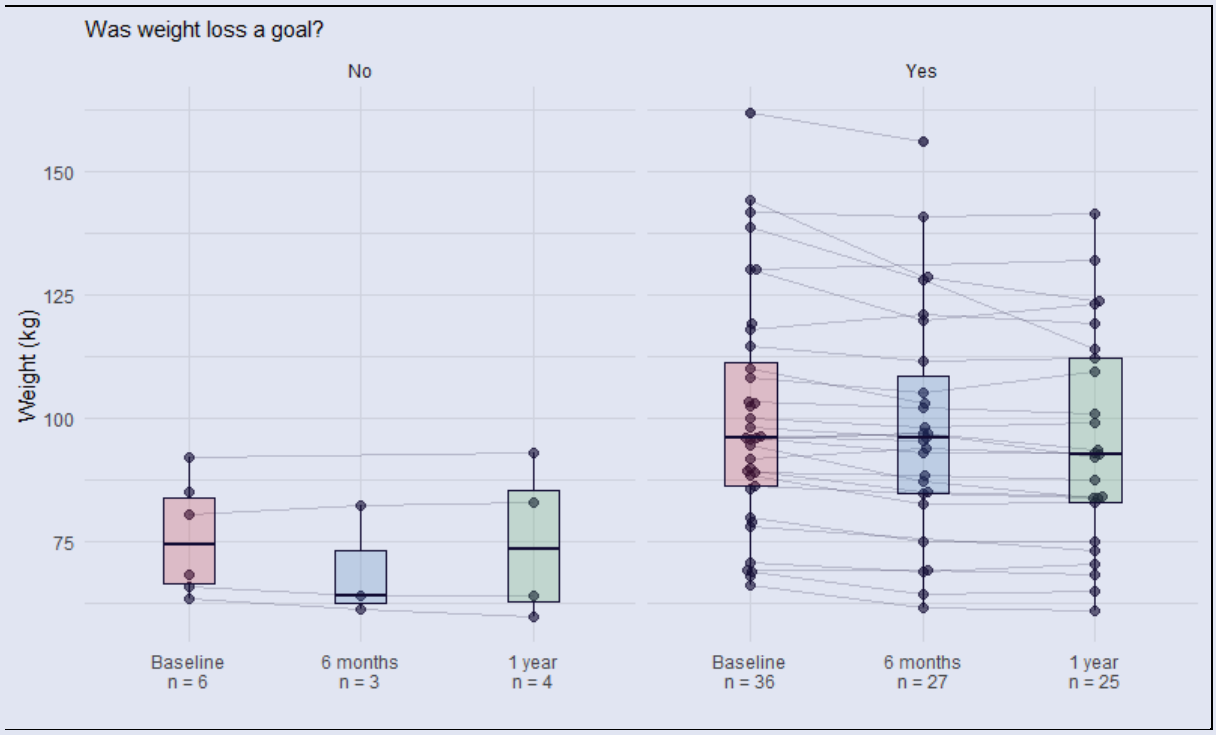
Appendix 3 : Baseline Characteristics - additional information

Characteristic	N	N=67[1]
Age (years)	67	59 (11); 61 [35 to 82]; n = 67
Sex	67	
Female		34 (51%)
Male		33 (49%)
Ethnicity	67	
Asian or Asian Irish - Any other Asian background		2 (3.0%)
Asian or Asian Irish - Chinese		1 (1.5%)
Black or Black Irish - African		2 (3.0%)
Black or Black Irish - Any other black background		1 (1.5%)
White - Any other white background		4 (6.0%)
White - Irish		57 (85%)
History of gestational diabetes	34	
No		25 (74%)
Unknown		5 (15%)
Yes		4 (12%)

Appendix 4: Participant reasons for declining the programme (n =85)



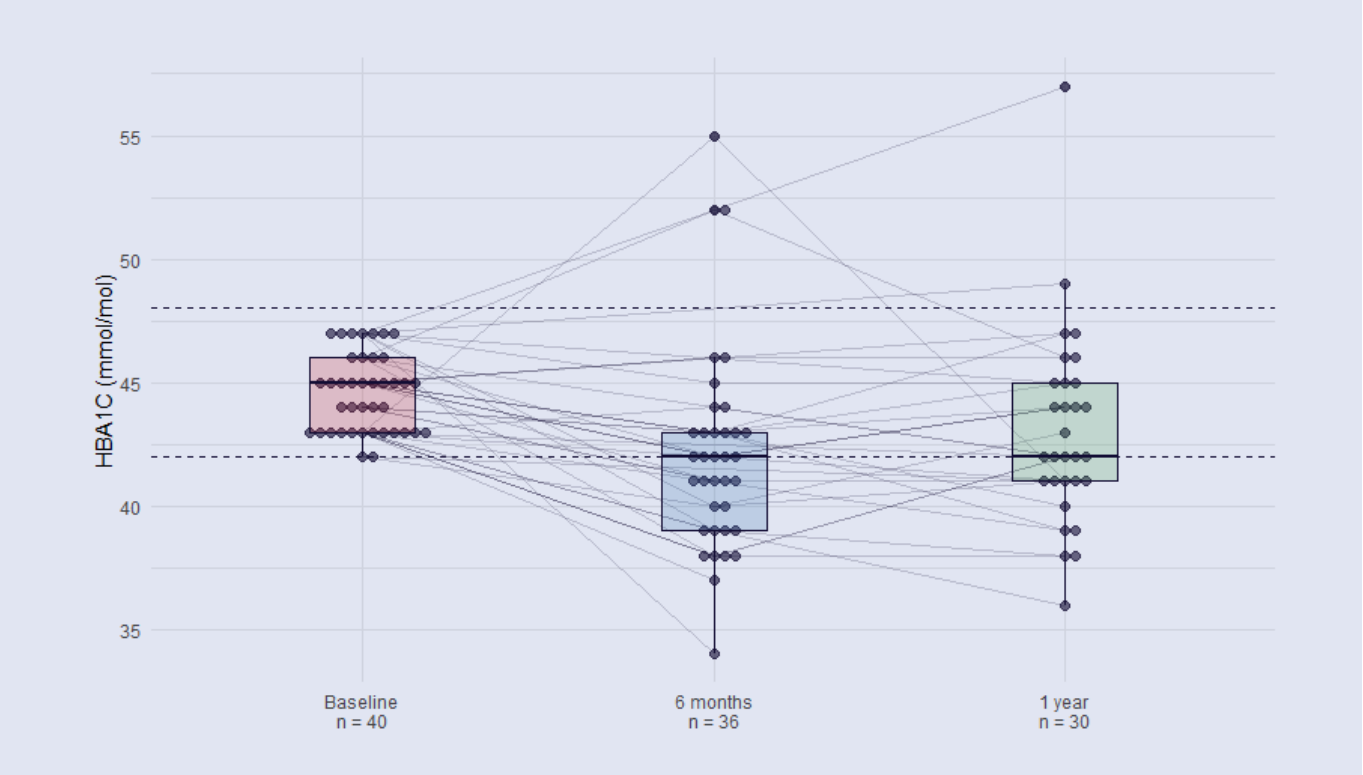
Appendix 5: Profile of Weight Changes for individual participants at each time point for 42/44 completers, by weight loss goals



Appendix 6: Weight outcomes for attenders

Enrolees who attended any sessions		
Characteristic	**N**	**N = 67[1]**
Weight (kg) at baseline	64	97 (23); 95 [62 to 162]
Weight (kg) at 1 year	29	92 (22); 92 [60 to 141]
Change in weight, baseline to 1 yr	29	-3.8 (6.0); -2.5 [-24.5 to 2.2]
% change in weight, baseline to 1 yr	29	-3.7 (4.7); -2.6 [-17.7 to 2.7]
This is based on 29 people with both a baseline and 1 year observed weight.		

Appendix 7: HBA1C profile at each time point for 40/44 completers



Appendix 8: HbA1c changes for attenders

Enrolees who attended any sessions		
Characteristic	**N**	**N = 67[1]**
HBA1C (mmol/mol) at baseline	61	44.44 (1.66); 44.00 [42.00 to 47.00]
HBA1C (mmol/mol) at 1 year	36	42.67 (3.88); 42.00 [36.00 to 57.00]
Change in HBA1C, baseline to 1 yr	35	-2.29 (3.53); -2.00 [-11.00 to 11.00]
% change in HBA1C, baseline to 1 yr	35	-5.1 (7.7); -4.3 [-23.4 to 23.9]
[1]Mean (SD); Median [Range]		

Appendix 9: Testimonials

Risk and Motivation

> Motivated by course to stay on the right path. My goal is to reverse my pre diabetes to a normal level.

> I have received great support towards making some lifestyle changes to prevent diabetes.

> I have been made very aware of the importance of diet and exercise in the prevention of type 2 Diabetes.

> thanks to doing the course....I am no longer in pre diabetes range and am back to normal.....all good

> The course gave me the motivation to eat healthier and achieve the goals I had set myself.

Support

> Having Support from the other attendees is vital

> The camaraderie has helped me

> Excellent help from the facilitator. New ideas from the other participants were very helpful & much appreciated also

> This programme was very helpful to me personally and I was sorry when it ended.

> Great support from the facilitators and the interaction with the other participants was always helpful.

Online

> It is convenient to do the course online

> Would like a combination of technology and meeting in person

> If it was face to face I can honestly say I probably wouldn't have been able to attend.

> brilliant able to do it from home - the way to go - all into technology

> Webex worked very well. I am reaching 70 years old so if I could manage the technology, anybody can do it.

Overall

> I found the inclusion of exercise in the programme really added to it.

> I really enjoyed the course it is very relaxed and unstressed with lots of good information.

> I would highly recommend this programme to anyone with concerns about prediabetes.

> Excellent course learned lots

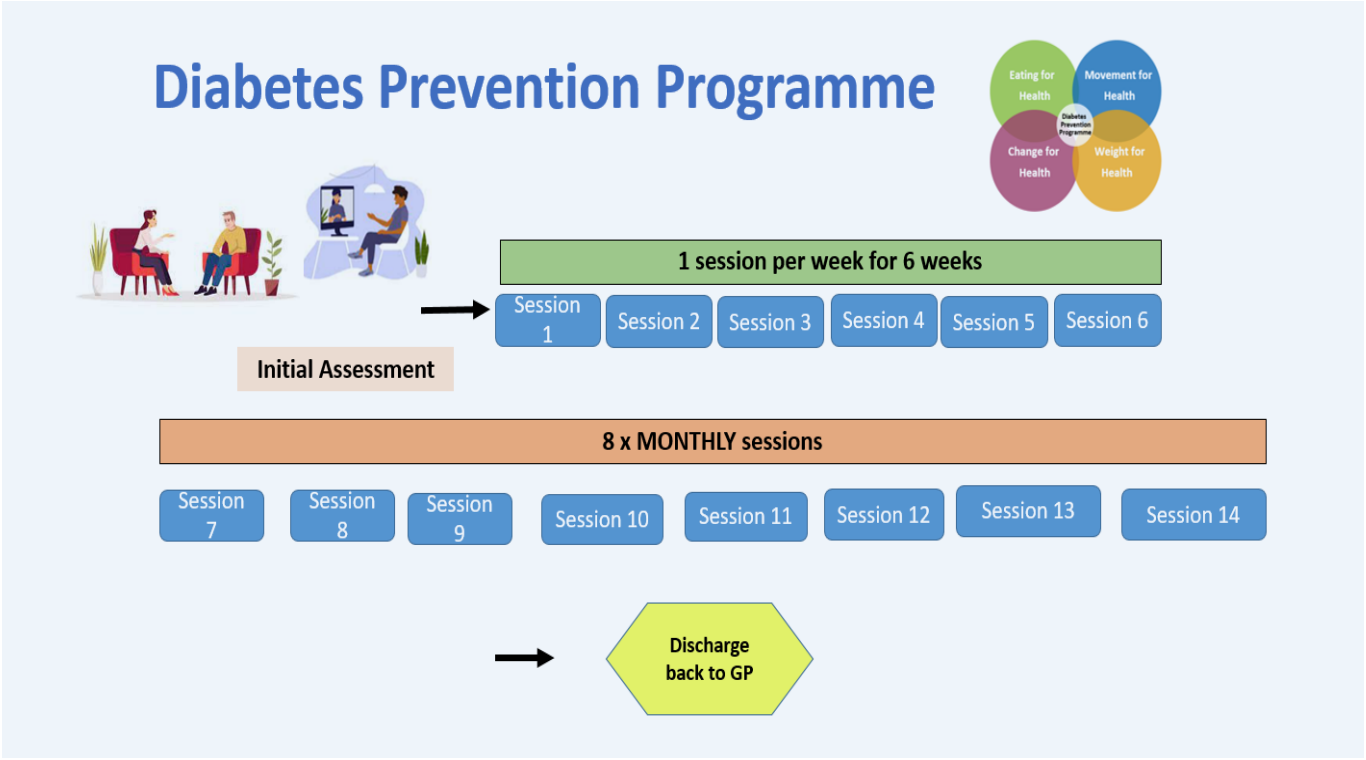
> At first, I thought that the 1.5 hours was long, however, because exercises are included, that much time was needed.

> I very much enjoyed both the exercises and the topics for each day.

Appendix 10– Behavioural Techniques in the curriculum

Behavioural technique/strategy	Description of technique
Self-monitoring	**Eating for Health:** Food diary. Food and mood diary. Helps to bring awareness to eating behaviours. Helps identify triggers for unhelpful eating practices. Allows participants to engage in awareness led goal setting. **Movement for Health:** Physical activity trackers: Step Counters, log for sitting time, minutes of movement or steps of activity or use of a weekly activity tracker, use of the FITT tool. Allows participants to monitor their base line and set realistic targets for increasing movement. Allows participants to engage in a variety of types and intensity of activity to meet their needs and enable progression **Other change for health:** Journaling: a general tool for self-awareness to bring attention to other possible behaviour changes such as smoking, alcohol, triggers and responses to stress. Sleep diary to notice sleep routine, duration and identify any disrupted sleep patterns **Weight for health:** Where appropriate participants are supported to monitor their weight to assess baseline and explore realistic weight loss or weight maintenance goals
Goal setting	Identify short term process goals related to diet, physical activity, sleep, stress-management as appropriate. Identify long term goals with a focus on wider health benefit Linking goals to participant health results to ensure personalised and relevant Adopting a SMART approach to goal setting. Use of behavioural change techniques to brainstorm, discuss and collaborate regarding goal-setting.
Stimulus control	Identification of external and internal triggers that impact on health behaviours Identify alterations to the food and physical environment to support healthier eating behaviours and reduce sedentary time.
Cognitive restructuring	Support participants to use positive self-talk and use of a journal or diary to aid this process. Encouraging participants to focus on successes and what is going well. Supporting participants to notice patterns of less helpful thinking e.g. black and white thinking or an 'all or nothing' mind-set and identify alternatives
Reward and support	Use of non-food-related rewards to aid motivation. Support participants to identify positive support networks amongst family, friends and colleagues. Support participants to identify negative support and how to deal with it.
Problem solving	The individual is prompted to think about possible barriers to planned behaviour-change goals and consider how to overcome these. Support participants to identify that relapse is normal and to be expected but they can build skills that recognise, manage and respond positively to relapse.

Appendix 11: Programme Outline for Implementation Phase



Glossary

Face-to-Face – programmes delivered to groups in person

Online – Synchronous online programmes that are delivered through videoconferencing with a group of participants and educators in real time, such platforms in the HSE include Cisco WebEx, MSTeams

Digital –supports offered to individuals using apps, digital platforms and social media, these are asynchronous, meaning they are accessed by users in their own time and not in real time

1:1 – care provided to an individual in either a face-to-face or online setting

Correspondence to: liz.kirby@hse.ie
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2023