DAFNE*plus*: Group Course Logic Model

The DAFNE*plus* intervention (Coates et al., 2021) includes a group component, comprising a 5-day course delivered by two trained facilitators using a standardised curriculumas five full-day sessions, delivered once a week over five consecutive weeks. The objective of the group course is to enable adults with type 1 diabetes (T1D) to acquire the foundational knowledge and cognitive and behavioural skills required to manage blood glucose levels in ways that enable sustained long-term glycaemic management to prevent or delay the long-term complications associated with prolonged hyperglycaemia.

The group course includes content and activities to enable participants to:

1. gain sufficient understanding of the physiology of type 1 diabetes and its management.
2. understand the principles of, and develop the skills to manage T1D using Flexible Intensive Insulin Therapy (FIIT).
3. apply behavioural self-management* to implement FIIT within the context of their own lives over the long term.
4. prevent diabetes-related ketoacidosis (DKA) and severe hypoglycaemia and/or improve management of such episodes.

* using the principles of Cognitive-Behavioural Long-Term Condition Self-Management (CBLTC-SM)

The **Group Course Logic Model (Table 1**) describes the:

- features of the course:
    - processes (patterns of interaction between facilitator and participant, or sequence of processing information within the participant),
    - resources (objects or forms of technology),
    - content (information provided as part of the intervention), or
    - structure (a feature of the way the intervention is constructed or delivered).
- influencers of glycaemic management that each feature addresses
- expected outputs (changes in capability, opportunity, motivation) that the course is designed to bring about to improve engagement in the behaviours associated with optimal behavioural self-management using FIIT principles.

Table 2 summarises the Outputs column of the DAFNE*plus* Programme Theory. Outputs are the desired and hypothesised changes that the DAFNE*plus* intervention will bring about to deliver the programme's Outcomes (i.e., sustained enactment of behaviours involved in FIIT; see Hamilton et al (2021) for a description of the desired outcomes). Outputs are described using the COM-B model of behaviour change, which outlines the necessary conditions for the performance of three behavioural cycles identified as leading to long-term maintenance of glycaemic outcomes and quality of life. These include:

- capability (the knowledge and skills to perform the behaviours),
- opportunity (the ways in which the physical and social environment enable performance of the behaviours) and

- motivation (the learned and hardwired emotional, belief and attitudinal enablers of the behaviours).

Table 3 summarises the Influencers column of the DAFNE*plus* Programme Theory. Influencers are those features of the internal and external environment identified as contributing to the sustained enactment of FIIT principles. They may be specific behavioural patterns (e.g., overtreatment of hypoglycaemia), or influences on enactment of behaviours involved in FIIT (e.g. perception of burdens of FIIT behaviours).

Table 1: Group Course Logic Model

Feature	Description	Influencer on Glycaemic Management Targeted	Type	Revision Status	Outputs delivered
Training in FIIT principles	A series of group sessions and resources that provide participants with opportunities to acquire the knowledge and skills required to use FIIT principles to self-manage their blood glucose levels.	I1, I6, I7, I12	Content	Minor revision	C1, C2, C3, C5, C6, C7, 04, M1, M4
Behaviour Change Toolkit *Metaphors and other Figures of Speech* **cross-cutting	Group session providing information on six principles of cognitive and behavioural self-management used in chronic-disease self-management programmes (knowledge and skills, problem solving, goals and planning, emotions and mindset, routines and habits, social support), along with figures of speech (metaphors, phrases – see below)) that summarise the benefit of each principle, and tools to apply that principle to type 1 diabetes self-management. Metaphors and figures of speech were constructed to help participants make sense of the process of change and to frame the behavioural requirements of FIIT in ways that support enactment and minimise unhelpful thinking patterns and emotional reactions. For example, to help reduce perfectionistic and all-or-nothing responses to out of target blood glucose readings, participants are advised that up to three out of ten readings can be above range and still achieve HbA1c target.	I5, 12, I4, 13, 15, 18	Content, Resource	New	C4, C5, O2, M1, M3, M4, M5, M7, M8

Feature	Description	Influencer on Glycaemic Management Targeted	Type	Revision Status	Outputs delivered
	7 out of 10 (70%) within range. To reinforce this in a memorable and relatable way, a metaphor was created that compared the goal of achieving good enough diabetes self-management with flying a plane wherein a plane can deviate from its plotted course for up to 30% of the time but still reach its original destination.				
Individual Review **cross-cutting	Group session held at the start of every day of the group programme from week 2. Participants are invited to review progress made towards the goals outlined in their 'plan for action' constructed the previous week and consider blood glucose, insulin and carbohydrate data on the Glucollector platform. They share experiences with peers and reflect on what they have learned about their use of FIIT principles and what they would do differently next time to identify actionable goals for improving their self-management.	I2, I5, I6, I7, I9, I12, I13, I14, I16, I17,	Content	Major revision	C2, C6, C7, 05, M1, M2, M4
Action Planning **cross-cutting	The process of reflecting on previous self-management efforts (and review of data using Glucollector) to create an actionable self-management plan. All action plans contain the elements of: SMART goal setting, reasons for change, perceived barriers to enacting the goal and potential solutions to overcoming these. Specific action plans were also designed to support enactment of condition-specific behaviours such as those needed for hyper and hypoglycaemia management.	I2, I5, I6, I7, I9, I12, I13, I14, I16, I17, I18	Content	Major revision	C3, C4, M1, M4
Social Support	Group session that provides information about the role of social support, the three types of social support (emotional, practical, informational) and invites participants to reflect on how to identify their social support needs and elicit this from the relevant people in their network, including healthcare professionals.	I11, I18	Content	New	C4, O1, O2, M5

Feature	Description	Influencer on Glycaemic Management Targeted	Type	Revision Status	Outputs delivered
Emotional Influences and Wellbeing in Type 1 Diabetes	Group session that provides information about the four areas model of human experience (thoughts, feelings, physical response, behaviours) and how this can be used to address barriers such as unhelpful thinking patterns and emotional states when using FIIT principles. This included helping participants develop positive self-talk strategies ('cheerleading statements') to challenge unhelpful thinking patterns that might limit enactment of self-management behaviours.	I13, I14, I15, I16, I17, I18	Content	New	C3, C4, M3, M5, M7, M8
Lapse/relapse management and maintenance plans	Group session providing information on how to maintain behaviour change over the long-term, including information to normalise the experience of setbacks as part of the process of change, the three different stages of relapse (lapse, relapse, collapse) plus a specific action plan ('Rainy Day Plan') to help participants commit to minimum behavioural standards of self-management when their context or motivation is challenging.	I13, I16, I17, I18	Content	New	C4, C5, M1, M3, M5, M6, M8
Monitoring Long-Term Health	Group session addressing long-term health reviews. It challenges catastrophic thinking around complications and aims to support pro-active screening and early intervention.	I14, I15, I18	Content	Major revision	C1, C2, M2, M5, M6,
Layered curriculum	Key concepts in the FIIT approach are broken down into simpler component steps and introduced over subsequent days in the group programme, enabling participants to learn and achieve mastery over one step before moving onto the next.	I1, I2, I12, I17, I18	Structure	Major revision	C2, C3, M1, M3, M4,

Feature	Description	Influencer on Glycaemic Management Targeted	Type	Revision Status	Outputs delivered
Session plans and scripting	Detailed session plans were created to facilitate fidelity of delivery, particularly for aspects of the behaviour change parts of the curriculum that may be less familiar to facilitators. This included example scripts for each session that faciltitators could deliver verbatim or adapt if needed. Scripting also helped facilitators communicate in person-centred and solution-focussed ways.	I8, I9, I16, I13	Structure	Major revision	O3
Solution-focussed facilitation **cross-cutting	Using language that elicits constructive solutions to challenging problems, models non-judgemental curiosity and facilitates actionable strategies. This communication style supports personalisation of goals and adapting to evolving life circumstances.	I9, I12, I16, I18	Process	Major revision	C3, C5, O3, M1, M4
Person-centred communication **cross-cutting	Using language that emphasises the primacy of the person (over the condition), invites shared decision-making and fosters compassionate and empowering interactions. This communication style supports personalisation of goals and adapting to evolving life circumstances.	I1, I2, I9, I12, I16, I18	Process	Minor revision	C3, C5, O3, M1, M4
Coaching in use of the Glucollector diabetes management platform **cross-cutting	Participant and facilitator collaboratively reviewing glucose and other data data on Glucollector and discussing how to use this information and the platform to enhance self-management using FIIT.	I1, I2, I3, I5, I12, I14,	Process	New	C3, O5, M1, M4

** Features that cut-across the DAFNE*plus* programme

Table 2: Expected Outputs of DAFNE*plus*, i.e. Changes in Elements of Capability, Opportunity or Motivation to Enact Behaviours Associated with Flexible Intensive Insulin Therapy

Output Identifier	Output (Changes in Elements of Capability, Opportunity or Motivation to Enact Behaviours Associated with Flexible Intensive Insulin Therapy)
C1_KnowT1D	Increased knowledge of type 1 diabetes
C2_KnowFIIT	Increased knowledge of Flexible Intensive Insulin Therapy (FIIT)
C3_SkillFIIT	Increased skills in applying FIIT
C4_SkillCBSM	Increased knowledge and skills in applying principles of cognitive and behavioural self-management skills for type 1 diabetes
C5_SkillCong	Increased ability to achieve congruence between FIIT principles and life demands
C6_AttHyper	Reduction in over-reliance on corrective insulin dosing to manage hyperglycaemia
C7_AttHypo	Reduction in over-treatment of hypoglycaemia using carbohydrate
O1_TimeHCP	Increased access to timely and appropriate health professional support over a year
O2_PracEmSupp	Increased access to practical and emotional non-professional social support for self-management
O3_HCPAuton	Exposure to health professional interactions that support autonomy in self-management and avoid stigma
O4_T1DModel	Exposure to other models of people with type 1 diabetes learning how to implement FIIT and self-management strategies
O5_TechAccess	Access to technology that supports capability and motivation to enact FIIT and other diabetes self-management strategies
M1_ConfAdjust	Increases in confidence to independently adjust insulin and ratios to accommodate changes in the condition, life events and transitions
M2_ValueFIIT	Increased perception of the value of enacting FIIT principles
M3_Burden	Reduction in perception of burdens associated with enacting FIIT principles and other diabetes self-management behaviours
M4_EmpwrFIIT	Increases in feelings of success and empowerment in relation to enacting FIIT principles
M5_RedNegEmo	Reduction in negative emotional states associated with enacting FIIT principles
M6_Hope	Reduced feelings of hopelessness and increased optimism about positive long-term health consequences of type 1 diabetes
M7_SelfCompass	Increases in self-compassion in situations where self-management feels difficult or does not result in expected outcomes
M8_Think	Decrease in thinking patterns associated with procrastination or avoidance in relation to self-management behaviours (e.g. perfectionism, all-or-nothing, catastrophising)

Att=Attitudes, Know=Knowledge, Intent=Intention, Norm=Normative Behaviours, Skill=Behavioural Skills

Table 3: Behavioural Influencers

Behavoural Influencer	Influencer
I1_HealthLit	Low health literacy
I2_SkillFIIT	Lack of knowledge and skills to enact Flexible Insulin Intensive Therapy (FIIT)
I3_ForgetTarget	Forgetting blood glucose targets
I4_AdjTarget	Intentional upward adjustment of blood glucose targets
I5_AdaptFIIT	Inability to adapt FIIT principles in response to life events or transitions
I6_OverTxHypo	Over-treatment of hypoglycaemia using carbohydrate
I7_ShortInsHyper	Over-reliance on short acting insulin doses to manage hyperglycaemia
I8_AccHcpFIIT	Lack of access to Health Professionals trained in FIIT principles
I9_NonAutonHCP	Health Professional interactions that do not support autonomous motivation
I10_LackInfoFIIT	Lack of access to reliable information about type 1 diabetes and its management using FIIT principles
I11_LackSupport	Lack of support from friends and family on diabetes-related issues
I12_LowConfFIIT	Low confidence in decision making about use of FIIT principles
I13_ProcAvoid	Thinking patterns associated with procrastination or avoidance in relation to self-management
I14_EffortReward	Low effort/reward trade-off for engaging in FIIT
I15_Hopelessness	Hopelessness about long-term consequences of type 1 diabetes
I16_LackSelfCompass	Lack of self-compassion in situations where self-management feels difficult or does not result in expected outcomes
I17_HighBurden	Perceived burden associated with enacting FIIT principles and other diabetes self-management behaviours
I18_NegEmoState	Negative emotional states associated with enacting FIIT principles

References

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