Title:

Behavior Change in Diabetes Practitioners: An intervention Using Motivation, Action Planning and Prompts

Objectives; Methods; Results; Conclusions; Practice implications

Running Title: Behavior Change Diabetes Practitioners

ABSTRACT

Objectives

It is important for health professionals to have behavior change skills to empower people to manage long-term-conditions. Theoretically derived, competency-based training can be particularly effective where it considers reflective and automatic routes to behavior change.

The aim of this study was to develop, deliver and evaluate a motivational, action and prompting behavior change skills intervention for diabetes health practitioners in Scotland, UK.

Methods

This was a longitudinal intervention study. A 2-day intervention was delivered to 99 health professionals. Participants set behavioral goals to change practice, completing action and coping plans post-training. Motivation and plan quality were evaluated in relation to goal achievement at 6-week follow-up.

Results

Post-training, practitioners could develop high quality work-related action and coping plans, which they were motivated to enact. Although under half responded at follow-up, most reported successful goal achievement. There was no difference in plan quality for goal achievers, non-achievers and non-responders. Barriers and facilitators of behavior change included institutional, service-user and individual factors.

Conclusions

The intervention successfully used planning to implement participants' behaviour change goals.

Practice Implications

Planning interventions are helpful to support clinicians to change their practice to help people self-manage diabetes care but may not fit demands of day-to-day clinical practice.

1. **Introduction**

Increasing incidence of diabetes is a challenge for health services internationally. In Scotland, over 5% of the population has a diagnosis of diabetes [1]. The impact on mental and physical health is considerable but can be mitigated by effective self-management [2]. This often requires lifestyle change, which can be challenging. Clinicians can assist individuals to self-manage by incorporating behavior change techniques (BCTs) within consultations [3].

In many consultations, health care professionals adopt an 'expert' role, providing information and advice to manage disease or symptoms. The patient's role may be largely passive. However, persuasive practitioner communication [4] or diabetes education on its own rarely leads to behavior change [5]. Conversely, using a person-centred approach, including respecting patient preference and autonomy, individualised treatment, and shared, collaborative decision making, can lead to improved individual health outcomes [6,7]. The American Diabetes Association (ADA) advocates these approaches together with incorporating behavioral strategies in standards of diabetes care [8], which corresponds with diabetes self-management guidelines issued by the Scottish Intercollegiate Network Guideline, 116, Management of Diabetes[9].

Behavioral approaches which draw on theory coupled with the use of BCTs where clearly specified, can produce effective health outcomes and are suited to use in diabetes care practice [10] . BCTs have clear functions [11] and can be applied to change individual and/or health professional practice [12]. BCTs can be directed towards increasing motivation, volition or managing prompts for behavioral change [13].

 A theoretically informed training intervention for people newly diagnosed with type 2 diabetes found goal setting, goal review and social support BCTs were associated with

reductions in BMI [11]. Similarly, prompts, barrier identification/resolution, and review of goals were associated with an increase in physical activity and HbA1c improvement in a systematic review of randomized controlled trials (RCTs) to increase physical activity in people diagnosed with type 2 diabetes [3].

1.1 Dual Process Theory

'Dual process' theories suggest two distinct processes operate during intentional and volitional phases of behaviour [14]. The reflective process includes motivational processes and deliberative planning actions which require cognitive effort and vigilance to achieve the intended behavior. Automatic, environmentally cued responses [15] demonstrate non-conscious influences on behavior, whereby events cue a programmed behavioral response. The automatic route can occlude the reflective route because of parsimony of cognitive effort required [14] and strength of accompanying immediate reward. Techniques which can assist individuals to put positive intentions into action include action and coping planning techniques [16]. Action plans specify the behavioral goal, and how and when action is implemented [17]. Coping plans specify anticipated barriers and their potential solutions[15]. Interventions using both action and coping planning engender positive behavioral outcomes across populations and behaviors [18].

1.2 Changing Health Professional Behavior: The role of planning and prompts

For BCTs to be effective, health professionals need to be competent in their use in consultations, allowing them to enhance motivation or to activate volitional efforts to change behavior. However, in order to use these techniques, clinicians need to change consultation behaviour. Clinician behavior change can be challenging [19]. Barriers are similar to those experienced by patients, including habitual ways of working, limited time,

and confidence [20,21]. In pressured work-related contexts, practitioners find habitual work-related behaviors easier, quicker and less cognitively effortful. This makes it difficult to apply novel approaches, including collaborative working incorporating BCTs, which require new 'reflective' skills and more short-term time and effort. Health practitioners also use both automatic and reflective routes [15]. Behavior change interventions targeting health practitioners should therefore address both routes to be effective [16]. This can be achieved through creating plans and identifying prompts thus addressing both processes of change. Applied to diabetes healthcare professionals' adherence to clinical guidelines, use of action and coping plans correlate positively with behavioral enactment[15].

1.3 Plan Quality

Higher quality behavioral plans have better impact and larger outcome-based effect sizes, enhanced perceptions of usefulness and stronger commitment to the plans [22]. Quality can be measured by degree of plan component specification[23]. Highly specific plans detail the action to take, including how, when, where, with whom and the context in which that action will take place [22] and identify the behavior needed to cope with anticipated barriers [18]. More specific plans are ranked as higher quality and are more likely to result in plan enactment [17]. A study of GPs' use of planning to offer smoking cessation advice [17] investigated links between plan specificity and subsequent enactment. Highly specific plans were more likely be enacted, particularly where intentions were high.

It can be difficult for those delivering behavioral interventions to decide which BCTs should be used for which patient in a particular context. Guidance is offered by theories and models of intervention development [12,14] and behavior change. Lists or taxonomies of

techniques can be helpful but are often complex, and do not explain format of delivery [24] or skills needed to implement them successfully. The Health Behavior Change Competency Framework, (HBCCF) developed by health psychologists in Scotland [25] categorises behavior change techniques with the acronym 'MAP', according to those that build motivation, support the translation of intention into action and those that prompt behavior through triggers and cues, simplifying the selection and deployment of BCTs [26]. Similarly, the HBCCF specifies levels of intensity (low, medium, high) and competencies required to use individual BCTs, leading to more reliable delivery of training programmes for health professionals, and more effective outcomes. Using 'MAP' and the dual process approach to inform health professional behavior change may assist practitioners to change consultation behavior to include BCT use.

1.4 The Current Study

The HBCCF was used to develop a 'MAP' training programme. The programme adopted a person-centred approach to develop health professionals' knowledge and competence in use of motivational (M), action-based (A) and prompted and cued (P) behavior change techniques. This paper reports on competency development in planning, including goal setting, action planning, and prompts and cues, in relation to self-reported behavioral outcomes. Health professionals developed a plan to change their own consultation behavior, which provided mastery experience [27] and a model for future work on behavior change with patients. The training adopted a dual-process approach, including both making plans and managing environmental prompts and cues to behavior. Participants were encouraged to draw parallels between influences on their own behaviors, including 'intention-behavior' gaps, and self-management challenges for people with diabetes. Immediately post-training, participants identified a behavioral goal to implement a BCT from

the training into their practice using planning. This paper investigates how plan quality at end of training is related to participants' reported behavioral goal achievement at follow-up.

2. **Methods**

2.1 Design

This was a longitudinal intervention study. Quality of health professionals' practice-based action and coping plans was assessed immediately following training in behavior change skills (Time 1). The relationship between plan quality and practitioners' self-reported behavioral goal attainment at 6-week follow-up (Time 2) is assessed.

2.2 Ethics

The study was reviewed and approved by the University XXXXXXX General Research Ethics Committee on 8 September, 2016. Participants consented to follow-up providing their email addresses to do so. All data was stored securely, and participants were invited to create passwords to protect their anonymity. All training participants consented to participate in the study.

2.3 Participants and Recruitment

MAP training was offered face-to-face via local Diabetes Managed Clinical Networks to health professionals working in diabetes in Scottish NHS Area Health Boards. Twelve courses (10 multidisciplinary, 2 profession specific, for physiotherapists and podiatrists) were delivered to 135 health professionals in 7 (of 14) NHS boards. Most (99, 73%) participants completed two days of training and final action/coping plans (Time 1), 90 (91%) were female. Groups ranged from 5 to 17 participants.

2.4 Procedure

Training was delivered over 2 days, 2 weeks apart. After session 2 (Time 1), participants identified a behavioral goal to use one of the taught BCTs in practice, and constructed a detailed plan using BCTs including action planning, coping planning and prompts. Copies were retained by trainers.

Six weeks later (Time 2), participants were sent a workplace email reminding them of their behavioral goal and requesting free text information about goal achievement, facilitators, barriers and prompts.

2.5 Training programme intervention

Content was developed using the HBCCF and literature review. BCTS were selected representing motivation (M), action (A) and prompted and cued (P) techniques, on the basis of intensity level (low/medium) appropriate for health professionals relatively inexperienced in BCT delivery, and evidence of efficacy in changing self-management behavior in diabetes [3,11,13,26,27]. For example, 'low' intensity interventions are often delivered per protocol in shorter appointments and by front line staff [25], 'medium' intensity interventions have more flexibility and may be delivered in longer sessions and require more experience and competence in their use. Techniques included in training focusing on goal setting, planning and prompting, and their level of intensity are shown in Table 1.

TABLE 1 HERE

2.6 Delivery style and format

'Form of delivery' is an important intervention mechanism [24]. This intervention was delivered face-to-face by health psychologists with significant experience in behavior change interventions, and included didactic and activity-based learning, practice-based simulations, role plays, and visual prompts, drawing on reflective adult learning principles:

6

Do, review and apply [28]. A manual (available on request) outlined relevant theories and BCTs. Handouts and templates were provided to check learning and provide prompts for use in practice settings.

2.7 Measurement

2.7.1. Participant characteristics

Participants provided information about their job role, years in service and NHS area location.

2.7.2. Behavioral Goal:

Plans completed post-training included identification of a behavioral goal to implement the training (ie using a specific BCT from the training): 'What specific behavior would you like to change?'

Motivation:

Although the training included motivational BCTs, this paper focuses on participants' own planning rather than use of self-motivational behaviors. The measurement of motivation was assessed using two items of goal confidence and goal importance as a proxy measure of motivation [29,30].

Importance and Confidence: 'On a scale of 0 – 10, (0= very low, 10= very high), how important is this behavioral goal for you'; and 'how confident are you that you will be able to achieve this goal?

2.7.3. Action and Coping Plans

Plans were developed using BCTs shown in Table 2: assessed with the following questions:

When will I start? ;

Who will support me?;

What challenges (barriers) may get in my way;

How will I cope with them (solutions)? ;

How will I self-monitor to know how I am doing?

2.7.4. **Prompts and Cues**

Prompts were considered using the following questions:

What prompts can I use to act as a trigger?

What prompts will I need to deal with that might trigger my old (previous) behavior?

2.7.5. **Follow-up**

Participants were contacted 6 weeks post-training and asked the following open questions:

You had set your goal as: (reminder of goal); How have you done?

What has helped you to achieve your plan?

What barriers did you encounter? What did you do to resolve your barriers?

How did you use prompts, environmental restructuring to help you achieve your plan?

2.8 Coding and Analysis

2.8.1. **Behavioral Goal Achievement coding**

Goal achievement was coded 0-3 following Verbiest et al.[17]: 0= no response or stated goal not achieved; 1 = future intention/time specified; 2= partially achieved; 3= fully achieved; and dichotomised (0,1) not achieved, (2,3) achieved, for analysis.

2.8.2. **Plan Quality**

Plan specificity was evaluated by scoring each component [17], 0=Not specified, unable to code; 1=poorly specified; 2= fully specified (Table 2).

TABLE 2 HERE

Examples of fully specified plan components (score 2) are: " *I will collaboratively set a goal with diabetes patients who I see at the diabetes clinic I have on Tuesdays*" (Behavioral goal); '.. with the other DSN (Diabetes Specialist Nurse) in my workplace' (Social support); "placing 'post-its' on the computer screen", (Prompts).

2.8.3. Coding reliability

Both authors initially coded a sample of 10% of plans. The framework was reviewed with an independent researcher with experience of plan coding and revised to clarify category descriptors. First author coded the remainder, with 10% of plans co-rated by the second author. Agreement was moderate, $\kappa = .51$, $p < .001$. Consensus was reached through discussion.

2.8.4. Analysis

Main outcomes were plan quality at Time 1 and goal achievement at Time 2. Analysis compared goal achievers, non-achievers and non-responders at follow-up in relation to motivation (importance and confidence) and plan quality using ANOVA. Non-parametric comparisons were also carried out as a validity check given the unequal group sizes. Free-text follow-up responses were categorized as barriers and facilitators of achievement and presented for explanatory detail.

3. Results

3.1 Participant Characteristics

9

Several professional groups participated. Table 3 presents participant characteristics including profession and time in post. Most were nurses and (allied health professionals (AHPs)).   135 participants commenced the training and 99 (73%) completed. Attrition to latter parts of the programme was due to ill health, shift patterns and lack of workplace cover. Analysis of plans relates to the 99 who completed the full training and the plans.

TABLE 3 HERE

3.2 Behavioral Goals

These included 'use of coping planning in practice' (n=30), 'setting goals with patients' (n=28), 'assess importance and confidence (n= 4) use collaborative communication skills including listening, summarising, reflecting (n=12) develop patients' social support (n=1), discuss pros and cons for behaviour change (n=4) self-monitoring (n=1) using 'prompts and cues' (n=7). Some participants opted for personal goals related to increasing physical activity, improving diet or time management (n=12).

3.3 Time 1: Goal Motivation

High levels of motivation, including confidence (mean 7.1, SD1.4) and importance (mean 8.3, SD 1.3) were reported.

3.4 Time 1: Plan Specificity

Specificity ratings for each section (Action plan, Coping plan, Prompts) and overall ratings are shown in Table 4. All participants completed all sections. There was no difference in ratings between professional groups, and no relationship between participants' years in role and plan quality, (n=73, r=-.06, p=.6).

[TABLE 4 HERE]

Most participants were able to develop clearly specified action plans, coping plans, prompts and self-monitoring strategies, and achieved high overall plan scores. Fewer participants clearly specified social support than 'what' and 'when' plan components. More identified (coping plan) barriers, and prompts than solutions. All participants specified self-monitoring methods and most defined specific prompts.

3.5 Time 2: Behavioral Goal Achievement

There were 45 (45.5% of training completers) responders at Time 2. Of these 37 (90%) reported goal achievement and 8 (10%) non-achievement. Proportionately fewer dietitians (n=4, 21%) responded at follow up than nurses (13, 39 %), podiatrists (7, 50%), physiotherapists (7, 64%) GPs/consultants (5, 63%) and others(7,50%), (39 -64% (χ2(5)=7.6, p=.18). There was no difference in overall plan specificity at Time 1 for goal achievers (mean, 10.7, SD1.9), non-achievers (mean, 11.3, SD 2.3) and non-responders (mean, 10.9, SD1.9) at Time 2; $F(2,96)$= .41, p=.66), suggesting specificity was not related to goal achievement. Similarly, there was no difference in any individual Time 1 plan component quality rating (motivation, action plan, coping plan, prompts, self-monitoring,) for these three groups. Table 5 illustrates plan composite quality mean scores according to professional group, email response and achievement of goal.

TABLE 5 HERE

3.6 Time 2: Self-reported progress

Free text email responses were provided by 45, 100% of email responders, and were content analysed to identify barriers and facilitators, solutions and prompts in goal attempts (Table 5.) Barriers included structural institutional factors, service-user characteristics, and cognitive factors, including memory and motivation. Several useful prompts were identified.

TABLE 5 HERE

4. Discussion and conclusion

4.1 Discussion

This evaluation focuses on quality of action and coping plans constructed at the end of a behavior change intervention for health professionals and asks whether plan quality is related to goal achievement at follow-up. Nearly all responders reported achieving their behavioral goal. Most also developed high-quality action and coping plans, including how to self-monitor and identify prompts to support 'automatic' aspects of behaviour. It is important to consider each of these aspects. Setting goals without considering 'coping planning' is likely to be much less effective [31].

Plan quality, assessed via specificity, was not related to achieving goals at follow-up, with no difference between the quality (specificity) of plans for those who reported goal achievement at follow-up, those who said they had not achieved their goal, and those who did not respond to the follow-up email requesting this information. High levels of motivation, assessed through proxy measures of confidence and importance, were also reported, indicating that individuals were 'ready' to put plans into action. Overall there may have been a 'ceiling' effect whereby more experienced, successful or enthusiastic participants were more likely to participate initially and respond at follow-up. In this sense we may have been 'preaching to the converted' and failed to capture the full range of responses to the intervention.

Examining plan content revealed that most participants specified a BCT to use in their practice, noted when and where they would implement it, but were less likely to specify who would offer support. Future research may wish to examine how to encourage use of

BCTs focusing on explicit support more clearly, including making plans in tandem, or in the context of their multidisciplinary team. Joint or supported planning can be particularly important for goal achievement in healthcare contexts [19]. Social support has been revealed as a critical feature of health behaviour change interventions in reviews [32–34], and participants noted that social support from colleagues was an important facilitating factor for goal enactment. Explicitly supporting intervention implementation with workplace coaching, mentoring or supervision may be an important route to achieve this [35].

Previous studies assessing the relationship between plan quality and behavioral outcomes have similarly found mixed results. In one study, high quality plans predicted weight-loss achievement only for people with initial high weight-loss goals, and were more likely to predict diet-related than exercise-related goals [23]. In a study of planning and physical activity created in pairs or individually,   plan enactment was more likely when the behavioral response was part of an established routine and the plans were made in pairs but less likely when plans had highly specified when-cues [36]. By contrast plan enactment has been associated with greater specificity around when-cues but less precision about the behavior to be pursued [37]. Ultimately, there seems to be some value in having a degree of flexibility in plans.

Also, these studies do not focus on health professionals, who may be limited in their flexibility and ability to implement plans by workplace contexts that are stressful and unpredictable. In studies using planning to increase clinical guideline adherence [16,17], the behavior and cue are much more tightly specified.   In the current study, practitioners indicated that they experienced challenges to identifying an appropriate person with whom to use a BCT given the unpredictable nature of their work. Perceived resistance on the part

of patients is reflected in barriers to use of BCTS in this study. It is not uncommon for health practitioners to be concerned that the introduction of a health behavior change conversation may be uncomfortable for both patient and practitioner [20,38]. To address this, the current programme provided simulated sessions to develop competency in how to have this conversation, nevertheless clinical experience of their use is required to continue to build expertise in more complex cases.

Including non-reflective prompts to support planning is a relatively novel approach which is useful to support more deliberative goal setting and planning activities. Most participants could specify relevant prompts in their plans, and follow-up responders were able to identify their own helpful prompts which acted as reminders. Several introduced prompts for specific BCT use in their consultations. This builds on existing, familiar ways of working by adding explicit cues into their normal work environment (for example, patient generated cues) to incorporate novel behaviors into practice. This environmental approach is a relatively simple, helpful innovation to support future interventions to change practitioner behavior.

To implement environmental change frequently requires whole system approaches, particularly where consultations take place in spaces which are rotated with other members of clinical staff. Changing the setting needs agreement from all who share that space. Institutional or managerial support often lies at the heart of successful changes in clinical practice [39]. This training was established with the support of a Scotland wide clinical diabetes group. Attendance was spread across all clinical areas but did not generally include whole teams or service leaders. Whole team training may be the most effective route for health behavior change training. Ensuring organisational 'buy-in' leads to more peer-

support, consistency of approach and sustainability across the entire team, leading to improved health care and health outcomes [40].

There were several study limitations.   Attenders may have been already predisposed towards behavioral ways of working. Sample size was relatively low, and response at follow-up may reflect positive bias towards goal achievers. We were tempted to conclude that non-responders were less likely to have achieved their behavioural goal, but have no evidence to support this conclusion. There are many individual and organisational factors which might influence whether or not plans are implemented with fidelity, and whether or not people will respond to requests for follow-up information and we were not able to investigate these, although responders did indicate barriers to goal achievement and plan implementation. Participant attrition is not unusual in health professional training programmes, where priority is immediate patient care, nevertheless, this was a limitation of the study.

4.2 Conclusion

This study contributes to our understanding of how a BCT training delivery incorporating the construction of plans to implement a BCT into consultation practice can operate pragmatically for different health professionals in different contexts related to diabetes care, by implementing simple goal setting and planning techniques and utilising 'reflective' and 'automatic' routes to behavior change. Supporting self-management behaviors is an increasingly key role for health professionals in the context of health services challenged by long term conditions, such as diabetes. The intervention was acceptable to practitioners,

who were able to successfully identify goals, develop plans and support with prompts at the end of the training.

4.3 Practice Implications

This study suggested specific deliberative planning may not be the most useful approach to behavior change in unpredictable health care delivery contexts. In the UK all health and social care professionals are encouraged to 'make every contact count' [41] as an opportunity to discuss ways of improving health and well-being with service users, and this type of training develops important and relevant skills for delivery. Training could focus on more flexible applications of learning, either development of skills that can be applied in different contexts, or how to specifically tailor intervention techniques to context. The focus on prompting and cueing techniques is also adopted in the field of organisational ergonomics, for example in 'human factors' research [42]. It may be helpful to consider how this approach could be combined with psychological theories around behavior change to enhance interventions with health professionals in future research.

The content analysis of responses identifying barriers and facilitators of implementation provided clues useful in addressing these barriers, suggesting that institutional factors, characteristics of specific patients, and environmental cues to support change are important. These types of factors are often flagged in models of intervention implementation as important facilitators of successful delivery [43,44]. Workplace managers should be involved in 'making space' to implement new ways of working when training is offered. Although this is difficult in the context of current health service pressures, approaches which focus on developing team-based skills in psychosocial ways of working are likely to produce lasting and cost-effective benefits.

References

[1]   N.H.S., Scottish Diabetes Survey Monitoring Group. Scottish Diabetes Survey., 2016.

[2]   S.R. Shrivastava, P.S. Shrivastava, J. Ramasamy, Role of self-care in management of diabetes mellitus, J. Diabetes Metab. Disord. 12 (2013) 14. https://doi.org/10.1186/2251-6581-12-14.

[3]   L. Avery, D. Flynn, S.U. Dombrowski, A. van Wersch, F.F. Sniehotta, M.I. Trenell, Successful behavioural strategies to increase physical activity and improve glucose control in adults with Type 2 diabetes., Diabet. Med. 32 (2015) 1058–1062. https://doi.org/10.1111/dme.12738.

[4]   M. Franklin, S. Lewis, K. Willis, H. Bourke-Taylor, L. Smith, Patients' and healthcare professionals' perceptions of self-management support interactions: Systematic review and qualitative synthesis., Chronic Illn. 14 (2018) 79–103. https://doi.org/10.1177/1742395317710082.

[5]   K.M. Knight, T. Dornan, C. Bundy, The diabetes educator: trying hard, but must concentrate more on behaviour., Diabet. Med. 23 (2006) 485–501. https://doi.org/10.1111/j.1464-5491.2005.01802.x.

[6]   J. Noordman, T. van der Weijden, S. van Dulmen, Communication-related behavior change techniques used in face-to-face lifestyle interventions in primary care: a systematic review of the literature., Patient Educ. Couns. 89 (2012) 227–244. https://doi.org/10.1016/j.pec.2012.07.006.

[7]   S.E. Inzucchi, R.M. Bergenstal, J.B. Buse, M. Diamant, E. Ferrannini, M. Nauck, A.L. Peters, A. Tsapas, R. Wender, D.R. Matthews, Management of Hyperglycemia in Type 2 Diabetes: A Patient-Centered Approach, Diabetes Care. 35 (2012) 1364 LP – 1379. https://doi.org/10.2337/dc12-0413.

[8]   AMERICAN DIABETES ASSOCIATION, Standards of Medical Care in Diabetes—2014, Diabetes Care. 37 (2014) S14 LP-S80. https://doi.org/10.2337/dc14-S014.

[9]   SCOTTISH INTERCOLLEGIATE NETWORK (SIGN), MANAGEMENT OF DIABETES, A NATIONAL CLINICAL GUIDELINE; 116, n.d.

[10]   J. McSharry, M. Byrne, B. Casey, S.F. Dinneen, M. Fredrix, L. Hynes, A. Lake, E. Morrissey, Behaviour change in diabetes: behavioural science advancements to support the use of theory, Diabet. Med. (2019) 455–463. https://doi.org/10.1111/dme.14198.

[11]   N. Hankonen, S. Sutton, A.T. Prevost, R.K. Simmons, S.J. Griffin, A.L. Kinmonth, W. Hardeman, Which behavior change techniques are associated with changes in physical activity, diet and body mass index in people with recently diagnosed diabetes?, Ann. Behav. Med. 49 (2015) 7–17. https://doi.org/10.1007/s12160-014-9624-9.

[12] S.U. Dombrowski, F.F. Sniehotta, A. Avenell, M. Johnston, G. MacLennan, V. Araújo-Soares, Identifying active ingredients in complex behavioural interventions for obese adults with obesity-related co-morbidities or additional risk factors for co-morbidities: a systematic review, Health Psychol. Rev. 6 (2012) 7–32. https://doi.org/10.1080/17437199.2010.513298.

[13] J. Presseau, N.M. Ivers, J.J. Newham, K. Knittle, K.J. Danko, J.M. Grimshaw, Using a behaviour change techniques taxonomy to identify active ingredients within trials of implementation interventions for diabetes care, Implement. Sci. 10 (2015) 1–10. https://doi.org/10.1186/s13012-015-0248-7.

[14] D. Kwasnicka, S.U. Dombrowski, M. White, F. Sniehotta, Theoretical explanations for maintenance of behaviour change: a systematic review of behaviour theories., Health Psychol. Rev. 10 (2016) 277–296. https://doi.org/10.1080/17437199.2016.1151372.

[15] J. Presseau, M. Johnston, T. Heponiemi, M. Elovainio, J.J. Francis, M.P. Eccles, N. Steen, S. Hrisos, E. Stamp, J.M. Grimshaw, G. Hawthorne, F.F. Sniehotta, Reflective and automatic processes in health care professional behaviour: a dual process model tested across multiple behaviours., Ann. Behav. Med. 48 (2014) 347–358. https://doi.org/10.1007/s12160-014-9609-8.

[16] S. Potthoff, J. Presseau, F.F. Sniehotta, M. Johnston, M. Elovainio, L. Avery, Planning to be routine: Habit as a mediator of the planning-behaviour relationship in healthcare professionals, Implement. Sci. 12 (2017) 1–10. https://doi.org/10.1186/s13012-017-0551-6.

[17] M.E.A. Verbiest, J. Presseau, N.H. Chavannes, M. Scharloo, A.A. Kaptein, W.J.J. Assendelft, M.R. Crone, Use of action planning to increase provision of smoking cessation care by general practitioners: role of plan specificity and enactment, Implement. Sci. 9 (2014) 180. https://doi.org/10.1186/s13012-014-0180-2.

[18] D. Kwasnicka, J. Presseau, M. White, F.F. Sniehotta, Does planning how to cope with anticipated barriers facilitate health-related behaviour change? A systematic review, Health Psychol. Rev. 7 (2013) 129–145. https://doi.org/10.1080/17437199.2013.766832.

[19] M.J. Johnson, C.R. May, Promoting professional behaviour change in healthcare: what interventions work, and why? A theory-led overview of systematic reviews, BMJ Open. 5 (2015) e008592–e008592. https://doi.org/10.1136/bmjopen-2015-008592.

[20] C. Keyworth, T. Epton, J. Goldthorpe, R. Calam, C.J. Armitage, 'It's difficult, I think it's complicated': Health care professionals' barriers and enablers to providing opportunistic behaviour change interventions during routine medical consultations, Br. J. Health Psychol. 24 (2019) 571–592. https://doi.org/10.1111/bjhp.12368.

[21] S. Potthoff, J. Presseau, F.F. Sniehotta, M. Breckons, A. Rylance, L. Avery, Exploring the role of competing demands and routines during the implementation of a self-management tool for type 2 diabetes: a theory-based qualitative interview study, BMC Med. Inform. Decis. Mak. 19 (2019) 23. https://doi.org/10.1186/s12911-019-

0744-9.

[22] E. de Vet, A. Oenema, J. Brug, More or better: Do the number and specificity of implementation intentions matter in increasing physical activity?, Psychol. Sport Exerc. 12 (2011) 471–477. https://doi.org/10.1016/j.psychsport.2011.02.008.

[23] S.U. Dombrowski, R. Endevelt, D.M. Steinberg, Y. Benyamini, Do more specific plans help you lose weight? Examining the relationship between plan specificity, weight loss goals, and plan content in the context of a weight management programme, Br. J. Health Psychol. 21 (2016) 989–1005. https://doi.org/10.1111/bjhp.12212.

[24] S.U. Dombrowski, R.E. O'Carroll, B. Williams, Form of delivery as a key "active ingredient" in behaviour change interventions., Br. J. Health Psychol. 21 (2016) 733–740. https://doi.org/10.1111/bjhp.12203.

[25] M. Dixon, D; Johnston, Health Behaviour Change Competency Framework: Competences to deliver interventions to change lifestyle behaviours that affect health, Heal. Behav. Chang. (2010) 21.

[26] M. Dixon, Diane; Johnson, MAP: a mnemonic for mapping BCTs to three routes to behaviour change, Br. J. Health Psychol. (n.d.).

[27] A. Bandura, Perceived-Self-Efficacy-in-Cognitive-Development-and-Functioning.pdf, Educ. Psychol. 28 (1993) 117–148.

[28] D.A. Kolb, Experiential learning: Experience as the source of learning and development., Prentice-Hall, Englewood Cliffs, NJ, 1984.

[29] M. Robling, R. McNamara, K. Bennert, C.C. Butler, S. Channon, D. Cohen, E. Crowne, H. Hambly, K. Hawthorne, K. Hood, M. Longo, L. Lowes, T. Pickles, R. Playle, S. Rollnick, E. Thomas-Jones, J.W. Gregory, The effect of the Talking Diabetes consulting skills intervention on glycaemic control and quality of life in children with type 1 diabetes: Cluster randomised controlled trial (DEPICTED study), BMJ. 344 (2012) 1–17. https://doi.org/10.1136/bmj.e2359.

[30] W.R. Miller, W.R. Johnson, A natural language screening measure for motivation to change, Addict. Behav. 33 (2008) 1177–1182. https://doi.org/https://doi.org/10.1016/j.addbeh.2008.04.018.

[31] P.M. Gollwitzer, V. Brandstätter, Implementation intentions and effective goal pursuit., J. Pers. Soc. Psychol. 73 (1997) 186–199. https://doi.org/10.1037/0022-3514.73.1.186.

[32] N. Heron, F. Kee, M. Donnelly, C. Cardwell, M.A. Tully, M.E. Cupples, Behaviour change techniques in home-based cardiac rehabilitation: a systematic review., Br. J. Gen. Pract. 66 (2016) e747-57. https://doi.org/10.3399/bjgp16X686617.

[33] L.B. Meade, L.M. Bearne, L.H. Sweeney, S.H. Alageel, E.L. Godfrey, Behaviour change techniques associated with adherence to prescribed exercise in patients with

persistent musculoskeletal pain: Systematic review., Br. J. Health Psychol. 24 (2019) 10–30. https://doi.org/10.1111/bjhp.12324.

[34]   C.J. Greaves, K.E. Sheppard, C. Abraham, W. Hardeman, M. Roden, P.H. Evans, P. Schwarz, Systematic review of reviews of intervention components associated with increased effectiveness in dietary and physical activity interventions, BMC Public Health. 11 (2011) 119. https://doi.org/10.1186/1471-2458-11-119.

[35]   G.R. Wallen, S.A. Mitchell, B. Melnyk, E. Fineout-Overholt, C. Miller-Davis, J. Yates, C. Hastings, Implementing evidence-based practice: effectiveness of a structured multifaceted mentorship programme., J. Adv. Nurs. 66 (2010) 2761–2771. https://doi.org/10.1111/j.1365-2648.2010.05442.x.

[36]   J. Keller, L. Fleig, D.H. Hohl, A.U. Wiedemann, S. Burkert, A. Luszczynska, N. Knoll, Which characteristics of planning matter? Individual and dyadic physical activity plans and their effects on plan enactment, Soc. Sci. Med. 189 (2017) 53–62. https://doi.org/10.1016/j.socscimed.2017.07.025.

[37]   L. Fleig, B. Gardner, J. Keller, S. Lippke, S. Pomp, A.U. Wiedemann, What contributes to action plan enactment? Examining characteristics of physical activity plans, Br. J. Health Psychol. 22 (2017) 940–957. https://doi.org/10.1111/bjhp.12263.

[38]   C. Albury, A. Hall, A. Syed, S. Ziebland, E. Stokoe, N. Roberts, H. Webb, P. Aveyard, Communication practices for delivering health behaviour change conversations in primary care: a systematic review and thematic synthesis, BMC Fam. Pract. 20 (2019) 111. https://doi.org/10.1186/s12875-019-0992-x.

[39]   M. Bracher, K. Steward, K. Wallis, C.R. May, A. Aburrow, J. Murphy, Implementing professional behaviour change in teams under pressure: results from phase one of a prospective process evaluation (the Implementing Nutrition Screening in Community Care for Older People (INSCCOPe) project), BMJ Open. 9 (2019) e025966. https://doi.org/10.1136/bmjopen-2018-025966.

[40]   S.J. Weaver, S.M. Dy, M.A. Rosen, Team-training in healthcare: a narrative synthesis of the literature, BMJ Qual. Saf. 23 (2014) 359–372. https://doi.org/10.1136/bmjqs-2013-001848.

[41]   W. Lawrence, C. Black, T. Tinati, S. Cradock, R. Begum, M. Jarman, A. Pease, B. Margetts, J. Davies, H. Inskip, C. Cooper, J. Baird, M. Barker, "Making every contact count": Evaluation of the impact of an intervention to train health and social care practitioners in skills to support health behaviour change, J. Health Psychol. 21 (2016) 138–151. https://doi.org/10.1177/1359105314523304.

[42]   A.L. Russ, R.J. Fairbanks, B.-T. Karsh, L.G. Militello, J.J. Saleem, R.L. Wears, The science of human factors: separating fact from fiction, BMJ Qual. &Amp; Saf. 22 (2013) 802 LP – 808. https://doi.org/10.1136/bmjqs-2012-001450.

[43]   J.-L. McIsaac, G. Warner, L. Lawrence, R. Urquhart, S. Price, J. Gahagan, M. McNally, L.A. Jackson, The application of implementation science theories for population

health: A critical interpretive synthesis, AIMS Public Heal. 5 (2018) 13–30. https://doi.org/10.3934/publichealth.2018.1.13.

[44]   S. Michie, M.M. van Stralen, R. West, The behaviour change wheel: A new method for characterising and designing behaviour change interventions, Implement. Sci. 6 (2011) 42. https://doi.org/10.1186/1748-5908-6-42.

Table 1: Behaviour Change techniques delivered in training mapped to HBCCF competency framework

Training Technique: M Motivation A Action P Prompts/Cues	Competencies from HBCCF MAP health behavior change competency (Dixon & Johnston, 2010)	Competency category/level
M1. Explore importance and confidence	M15 Motivational interviewing: Elicit self-motivating statements & evaluation of own behavior to reduce resistance to change	Motivation/ medium intensity
M2. Decision Making	M13 Generate Alternative Courses of action, and pros and cons of each and weigh them up	Motivation/ medium intensity
M3. Contract	M5 (also A7 – Action Medium intensity) Generate a contract of agreed performance of target behavior with at least one other, written and signed or verbal	Motivation/ medium intensity
A1. Identifying goal	A1 Goal-setting: Identify and set a behavioral goal	Action/ low intensity
A2. Planning	A8 Action Planning: Make a detailed plan of what the client will do including, as a minimum, when, and where to act	Action / low intensity
A3. Coping Planning	A9 Coping planning: Identify and plan ways of overcoming barriers (note, this must include identification of specific barriers e.g. "problem solving how to fit into weekly schedule" would not count)	Action/ low intensity
A4. Self-monitoring	A3 Self Monitoring of behavior: Record the specified behavior (person has access to recorded data of behavioral performance, (e.g. from diary)	Action/ low intensity
A5[1]. Establish social support	A21 Social Support (nonspecific): Provide and/or identify sources of non-specific social support	Action/ low intensity
	M12 Social Support (emotional) Provide & or ID potential sources of empathy and give generalised positive feedback	Motivation/ low intensity
	P18 Social support (instrumental) Provide or arrange for others to perform component tasks of behavior or tasks that would compete with behavior (e.g. offering childcare)	Prompt/ low intensity
P1. Use of prompts and cues	P2 Prompt: Identify a stimulus that elicits behavior (e.g. telephone calls or postal reminders designed to prompt the behavior)	Prompt/ medium intensity

P2 Environmental change	P21 Environmental change: Change the environment in order to facilitate the target behavior (other than prompts, rewards and punishments, e.g. choice of food provided)	Prompt/ medium intensity

[1]Different types of social support can support Motivation, Action and Prompting components of planning in this context.

Table 2: Coding of Plan Quality Post Intervention (Time 1)

Behavior Change Technique	0	1	2	Total Max. Score
ACTION PLAN				
Action planning – Behavioral goal (what)	Not codable or entry not specific to a behavior	Behavior to change is identified but not clearly specified	Specific behavioral goal identified	2
Action Planning (When)	Not codable or no time identified	Time mentioned is not clearly specified	Specific time identified	2
Action Planning – Social support (With whom)	Not codable or no social support identified	Social support identified but not clearly specified	Specific individual is identified	2
				6
COPING PLAN				
Coping plan (Barrier)	Not codable	Barrier was not clearly specified	Specific barrier identified	2
Coping Plan (solution)	Not codable	Solution provided but not clearly specified	Specific solution identified	2
				4
SELF-MONITORING	Not codable	Self-monitoring is not clearly specified	Specific self-monitoring is identified	**2**
PROMPTS AND CUES	Not codable	Prompt identified	Prompt identified with environmental restructuring	**2**
Total maximum score for planning quality				**14**

Table 3 Participant roles, role experience and previous training experience

	Roles n =	Mean years in role	Any previous training in behaviour change N=
nurse	33	7.1	11
dietician	19	6.3	11
podiatry	14	8.7	6
physio	11	7.6	10
Gps/consult	8	10.2	2
others	14	3.4	2
Total	99	7.5	

Table 4: Specificity ratings of individual plan components and total scores

BCTs in plan	Percentage Specificity ratings N = 99			Total Mean (SD)
	0	**1**	**2**	
Action plan WHAT	1	41.4	57.6	1.6
Action plan WHEN	2	29.3	68.7	1.6 (.5)
Action plan WHO (support)	3	59.6	37.4	1.3 (.5)
ACTION PLAN TOTAL	-	-	-	**4.6(1.1)**
Coping plan BARRIERS	1	31.3	67.7	1.7 (.5)
Coping plan SOLUTIONS	1	57.6	41.4	1.4 (.5)
COPING PLAN TOTAL	-	-	-	**4.7(1.1)**

Prompts (1 Item)	2	29.3	68.7	1.7 (.5)
Self-monitoring (1 item)	0	46.5	53.5	1.5 (.5)
OVERALL PLAN MEAN RATING	-	-	-	**10.9 (1.9)**

TABLE 5: Participant roles with mean plan quality, response to email follow up and goal achievement

	Mean (SD) aggregate of plan components	Range (maximum score is 14)	Responded N (%)	Achieved N (%)
nurse	10.21 (1.9)	6-13	13 (39.4)	10 (30.3)
Dietitian	11.79 (1.6)	9-14	4 (21.1)	3 (15.8)
podiatry	10.57 (2.3)	7-14	7 (50)	6 (42.9)
physio	11.27 (1.8)	8-14	7 (63.6)	7 (63.6)
Gp/consult	10.25 (1.9)	7-13	5 (62.5)	4 (50.0)
Others	11.36 (1.7)	8-13	7 (50)	6 (42.9)

Table 6: Barriers and Facilitators of Goal Achievement

Barriers			Examples Professional group/time in role
	Practice-based	• **Insufficient time** • **Not supported by others in the team** • **Clinical priorities, checks**	*'I struggled initially due to the volume of work we currently have on the go and the very limited time we actually spend with patients. '* OTHER (PHARMACIST) 1 *'I find my biggest barrier to HBC is the fact finding nature of my consultations.. what is your bp? Are you taking your meds? Very information gathering due to the nature of the job'* NURSE 4
	Service user	• **Perceived motivation, low mood** • **Resistant to change**	*'also having patients that have done it that way for a long time are a challenge'* CONSULTANT 1
	Individual	• **Current habits are easier** • **Feels awkward consulting style** • **Remembering**	*'my own mindset… a lot of what I do is habit or …. A script… so laziness, or being on autopilot'.* AHP 5
Facilitators			
	Practice-based	• **You can change the consultation format, more repeat appoinments** • **Shared plans with the wider team changes culture** • **Have set up a peer support group**	*'I tried to encompass it into my initial assessments prior to undertaking any treatments for all people with diabetes so it was quickly done without the additional distraction of the treatment'* AHP6
	Service-User	• **Diabetes patients need solutions to problems that they can manage themselves**	*'they feel in control of their diabetes and outcome rather than their diabetes being in control of them!'* NURSE 1

	Individual	• **Build confidence, keep focused and keep practising**	*'I can choose the right patient as some just want us to give them all the answers'* AHP (Dietitian)12
Prompts and Cues Utilised		• **Placing paperwork on desk** • **Highlight patient in records to act as reminder and prompt**	*'having the new paperwork has acted as a prompt for myself'* *'I changed our paperwork to include prompts'* *'using the action plan sheets which I find really useful, keeping the MAP goal sheet'* NURSE 3

Table # Roles and BCT goal in plan

		Roles (N=)							Total
		nurse	dietician	podiatry	physio	GPs & consultant	others	%	
goals	communication	5	2	5	0	0	0	12.1	12
	coping planning	6	5	4	8	1	6	30.3	30
	goal setting	9	7	4	1	4	3	28.3	28
	importance and confidence	1	0	0	1	2	0	4.0	4
	increase motivation	2	1	1	0	0	0	4.0	4
	Personal goal	8	2	0	0	0	2	11.1	12
	prompts and cues	1	2	0	1	0	3	1.0	7
	self-monitoring	1	0	0	0	0	0	7.1	1
	social support	0	0	0	0	1	0	1.0	1
Total		33	19	14	11	8	14	100	99