Abstract: Objectives: To measure the number of people who have identified a behaviour change goal and completed an action-plan to meet their goal on completion of **a diabetes self-management education programme (DSME) and level of success in sustaining their action-plan. The DSME people attended was DESMOND (Diabetes Education and Self-Management for Ongoing and Newly Diagnosed).**
Methods: Copies of action-plans were collected from participants. Postal questionnaires were sent to participants one week and three months following DESMOND to assess factors associated with setting and sustaining action-plans.
Results: 92% (253/275) of participants completed an action-plan. Reducing weight was the area most targeted. **P**hysical activity was the most common goal. Sixty-eight percent (187/275) of participants returned a three month questionnaire. Ninety-six percent indicated they were still working on their action plan, with 87% reporting they were always/usually meeting their action-plan. Twenty-two percent said they had discussed their goal with a health care professional (HCP) following DESMOND.
Conclusions: Goal-setting as part of a DSME can lead to behaviour change.
Practice implications: Goal setting as part of a DSME enables participants to set and attain behaviour change goals. **Raising HCPs' awareness** of a person's action-plan following a DSME may further support a person undertaking behaviour change.

*Highlights (for review)

Highlights
- Goal-setting as part of a DMSE helps people identify behaviour change goals.
- Goal-setting as part of a DSME can lead to behaviour change.
- ~~Social support, patient activation and health associated with goal attainment~~.
- **Being married/living with a partner was significantly associated with attainment of action plans.**
- Making HCPs aware of people's action plans could further support behaviour change.

Title: Assessing the effectiveness of a goal-setting session as part of a structured group self-management education programme for people with type 2 diabetes

Abstract

Objectives: To measure the number of people who have identified a behaviour change goal and completed an action-plan to meet their goal on completion of DESMOND, a diabetes self-management education programme (DSME) and level of success in sustaining their action-plan. **The DSME people attended was DESMOND (Diabetes Education and Self-Management for Ongoing and Newly Diagnosed).**

Methods: Copies of action-plans were collected from participants. Postal questionnaires were sent to participants at one week and at three months following DESMOND to assess factors associated with setting and sustaining action-plans.

Results: 92% (253/275) of participants completed an action-plan. Reducing weight was the area most targeted. Physical activity was the most common goal. Sixty-eight percent (187/275) of participants returned a three month questionnaire. Ninety-six percent indicated they were still working on their action plan, with 87% reporting they were always/usually meeting their action-plan. Twenty-two percent said they had discussed their goal with a health care professional (HCP) following DESMOND.

Conclusions: Goal-setting as part of a DSME can lead to behaviour change**.**

Practice implications: Goal setting/action-planning as part of a DSME enables participants to set and attain behaviour change goals. Making HCPs involved in diabetes care aware **Informing HCPs** of a person's action-plan following a DSME may further support a person undertaking behaviour change.

1.0   Introduction

Diabetes self-management education (DSME) aims to help people achieve effective self-management skills and behaviour change [1] and has been shown to be effective in improving patients' clinical and psycho-social outcomes [2, 3].

Goal-setting has been incorporated into many DSME programme**s** to increase people's self-efficacy in managing their diabetes, change their behaviour and improve their health outcomes [4, 5]. Most studies of DSME measure the effect of self-management programmes as a whole [6, 7] with little information about the self-management goal-setting activities of participants [8] and factors that influence goal attainment.

Goal-setting has been identified as a priority research area in diabetes self-management [9] and requires greater exploration[10, 11]. Although research has been conducted where goal- setting was the principal or only intervention [12, 13] or involved one or more individual sessions [10, 14, 15], research on goal-setting delivered in a group DSME setting as part of a DSME remains understudied.

Self-efficacy is considered an important factor in behaviour change with attainment of goals leading to increased self-efficacy which can lead to the setting of further goals[16]. People with higher patient activation levels (a person's knowledge, skills and confidence in self-managing their condition) are more likely to engage in healthy behaviours [17] whereas diabetes distress has been associated with poor self-management. [18]

DESMOND is an evidence-based widely implemented DSME programme for people newly diagnosed with type 2 diabetes (T2DM).[7] It involves a 6 hour group session delivered by two trained educators to a maximum of 10 people either on one day or over two half-days. Like many DSME programmes, it incorporates a goal-setting component where attendees are encouraged to choose self-management behaviour change goals and write down a structured action-plan to reach these goals.

The overall aim of this study was to explore people's level of engagement in goal-setting and action-planning, level of attainment of action-plans, and people's experiences of the process, using both quantitative and qualitative methodologies. In this paper we report our findings on the quantitative component of the research which measured (1) the number of people who had identified goals and completed action-plans to reach these goals on completion of DESMOND, (2) to measure goal-attainment three months following DESMOND (3) individual characteristics associated with goal-setting and attainment including levels of patient

activation and diabetes distress (4) whether goal attainment is associated with increased diabetes-related psycho-social self-efficacy. Results of the qualitative component of the research exploring participants' experiences of the process will be reported separately.

2.0 Methods

This was a **descriptive correlational study** conducted in the West of Ireland and in Leicester in England. DESMOND attendees were recruited and followed up **three months** after completion of DESMOND to assess if they had identified a behaviour-change goal, completed an action- plan to meet their goal and level of success in attaining their action-plan. Data collection was carried out between June 2015 and September 2016.

2.1 Ethical approval

Ethical approval was given by the National University of Ireland Galway Research Ethics Committee and by the East of Scotland Research Ethics Service.

2.2 The goal setting component of DESMOND

The DESMOND curriculum includes a 30 minute goal-setting session as the culmination of the programme where the educator discusses the benefits of making an action-plan, potential barriers and the impact of confidence on successful behaviour change. The educator highlights that personal clinical risk factors (e.g HbA1c, BP, lipids) could guide attendees to identify areas to target. The educator, with involvement from the group, then demonstrates the completion of a personal action-plan (Figure 1).

Space and time are provided for participants to identify their own personal goal and to complete a written action-plan by the end of the session. Participants are encouraged to set "SMART" (i.e., specific, measurable, attainable, realistic, and timely) goals and to focus preferably on one goal. As part of the process, participants are asked to identify potential barriers to their action-plans and potential solutions and to rate their confidence in attaining their chosen goal on a scale of 1-10. Those with a self-assessed confidence level of less than 7 are encouraged to re-visit their goal or think of ways to increase their confidence.

2.3 Participants

A convenience sample of all people with type 2 diabetes attending a DESMOND course were approached to participate in the study. Participants in the HSE West region were recruited from 30 DESMOND programmes delivered in community settings over a period of 10 months. Participants in the Leicester region were recruited from 27 DESMOND programmes delivered in community settings over a period of five months.

2.4 Sample size
Sample size calculations were based on the number of DESMOND attendees who would

identify goals at the end of DESMOND. In line with previous research, it was anticipated that this could be as high as 80%[13]. Based on this assumption, a sample size of 246 individuals was required to produce a two-sided 95% confidence interval with an absolute margin of error of 5%, i.e. an interval with a width equal to 10%. Assuming that 70% of DESMOND attendees would consent to participate, 351 DESMOND attendees would have to be invited to participate to meet the sample size of 246.

2.5 Recruitment

In Leicester, DESMOND is delivered on one day (**one six hour session**) whereas in Ireland DESMOND is usually delivered over two days (two three-hour sessions) with at least a week between the first and second session, so slightly different recruitment approaches were used.

Leicester participants were mailed the research project information sheet at least a week before attending DESMOND whereas Irish participants received it during the first DESMOND session. In Leicester, the recruiter attended DESMOND, gave a short overview of the research project, allowed attendees to ask questions about the research and informed them that their participation was voluntary. Those willing to participate were asked to sign a consent form. The same procedure took place in the Irish setting apart from the recruiter attending the second DESMOND session to recruit participants.

2.6 Data collection phases

i)   Baseline clinical data

Participants' most recent clinical data (HbA1c, lipids, blood pressure) were collected from clinical information systems.

ii)   Goal setting sheet

Participants were asked to complete a duplicate form of their goal-setting/action-plan sheet and return it to the educator at the end of the session or return it by post to the researcher in a pre-paid envelope within seven days of completing DESMOND. Each goal-setting sheet was given a unique identifier so that goal-setting sheets could be linked to patient questionnaires.

iii)   One week questionnaire

The one week questionnaire collected participants' socio-demographic and clinical data on diabetes duration and current medication. Participants were also asked if they had identified a goal, decided on an action-plan and if they had started it. Patient activation and diabetes distress levels were also measured to see if they were associated with goal-setting and goal attainment. Patient psycho-social self-efficacy was measured to see if goal attainment was associated with increased self-efficacy.

Patient activation was measured using the validated Patient Activation measure (PAM) which measures participants' knowledge, skills, beliefs and behaviours [19]. All items have five possible responses with scores ranging from 1(disagree strongly) to 4 (agree strongly) and 0 (not applicable). The mean score was transformed into a standardised activation score based on a conversion table provided by the license holders, Insignia (http://www.insigniahealth.com/products/pam-survey). A high score suggests respondents are involved in preventive actions related to their own care. The PAM score is converted into one of four levels of patient activation ranging from level 1 where people are seen as passive and lacking knowledge and skills in dealing with their health to level 4 where people are perceived as active, generally well-informed and competent.

Diabetes-related emotional distress was measured using the validated PAID-5 questionnaire [20]. Each item is rated on a 5-point Likert scale ranging from 0 ("not a problem") to 4 ("a serious problem"). For the PAID-5, a total score of ≥ 8 indicates possible diabetes-related emotional distress.

Diabetes-related psychosocial self-efficacy was measured using the validated 8 item Diabetes Empowerment Scale- Short form [21] which measures individual's perceived ability in their management of the psycho-social aspects of diabetes (e.g goal setting, coping with emotions, social support). Interviewees are asked to rate associated statements on a scale ranging from 1 (strongly disagree) to 5 (strongly agree).

For ease of interpretation raw scores on the patient activation scale and self-efficacy scale were converted to a 100 point scale. Higher scores on the three scales indicated better activation, self-efficacy and greater diabetes distress.

2.7 Three month follow-up questionnaire
A follow up questionnaire was posted to participants **three months** after completion of DESMOND. Participants were asked if they had decided on an action-plan on completion of DESMOND, what their action-plan was, if they were still working on their action-plan, if they had discussed their goals with others, and perceived success in achieving their action-plan. Perceived success was assessed using the following four response items: "*Always/Usually/ Rarely/ Never meeting my action-plan*". Respondents were also asked if they had set any new action-plans following completion of DESMOND, what these action-plans were and perceived success at meeting any new action-plan. Diabetes-related psycho-social self-efficacy was also measured again.

2.8 Data Analysis

2.8.1 Coding of action-plan sheets

Ten per cent of action-plan sheets (n = 25) were coded independently by three researchers (MOD, MC, RH). The three researchers then discussed the coding to finalise a coding frame for the action-plans. The remaining action-plans were coded by one researcher (MOD) with any coding issues being discussed and resolved by consensus with the other two researchers (MC, RH).

2.8.2 Statistical analysis

Data were analysed using the statistical package SPSS (Statistics version, 22.0, 2013, IBM Corp, Armonk, NY). Descriptive baseline statistics were generated for the demographic and health-related characteristics of the sample. **Independent t-tests were used to determine if patient activation, self-efficacy and diabetes distress were associated with goal-attainment. A paired t-test was used to assess whether there was a significant improvement in diabetes-related psycho-social self efficacy scores from baseline to three months after completion of DESMOND. C**hi-square tests were conducted to determine whether socio-demographic variables **were** associated with goal-setting and goal attainment. Statistical significance was set at the 5% level.

3.0 Results

3.1 Recruitment and completion of the four data collection phases

A total of 279 DESMOND attendees consented to participate (151 in the West of Ireland, 128 in Leicester). Figure 2 shows the flow of recruitment, withdrawals from the study, and loss to follow-up of participants through the study.

3.2 Differences in response rates to questionnaires

Those who returned the one-week questionnaire were older on average (59.6 v 55.4 years, $p < 0.05$) than those who did not return it. The same was true for the three month questionnaire (60 v 55 years, $p < 0.005$). Those who were not working were significantly more likely to return the three month questionnaire than those who were working (91% V 67%, $p < 0.005$) as were those of white European ethnicity compared to other ethnicities (84% V 57%, $p < 0.005$). West of Ireland participants compared to Leicester participants were significantly more likely to return a goal-setting sheet (99% V 83%, $p < 0.005$), a one-week questionnaire (91% v 72%, $p < 0.005$) and a three month follow-up questionnaire (83% V 51%, $p < 0.005$).

3.3 Baseline data

Baseline data from the two geographical locations are shown in Table 1. Sixty-six percent had a HbA1c above target at baseline with 83% of participants having two or more clinical markers above target at baseline. Twenty-four percent of participants were classified as having low levels of patient activation (level 1 and level 2 of patient activation measure) and 34% of participants had a total PAID-5 score of ≥ 8 indicating possible diabetes-related emotional distress.

3.4 Identification of goal/action-plan within one week of completing DESMOND (n = 253)

Of the 275 participants included in the analysis, 253 participants (92%) identified a goal and action-plan within one week of completing DESMOND (95% CI of 88% to 95%).

3.5 Areas targeted (n=220)

Eighty-seven percent (220/253) selected an area on their goal-setting sheet (e.g blood glucose, cholesterol, shape) they wanted to target. The most common area selected was shape/weight (48%, 106/220), followed by blood glucose (34%, 75/220) with 74% (163/220) selecting one area only (Table 2).

3.6 Behaviour change goals and action-plans to achieve goals (n = 253)

Two hundred and fifty three participants identified behaviour change goals with 80% (n = 202) focusing on one goal alone. The most common goals were increasing physical activity alone (48%, 121/253), making changes to diet alone (29%, 73/253) or a combination of both (18%, 46/253). Taking medication was chosen by two participants in combination with exercise/diet.

Of the 121 participants focusing on physical activity alone, walking was the most common action-plan to meet their goal with 51% (62/121) focusing on walking alone and a further 26% (31/121) including walking and another type of physical activity (e.g cycling, swimming) in their action-plan. Ninety-six percent (116/121) indicated the number of days and 39% (47/121) indicated the length of time they would dedicate to their physical activity goal.

Of the 73 participants focusing on dietary changes alone, 70 gave further details of their action-plans. The most common action-plans were portion control (39%, 27/70), reducing fat intake (33%, 23/70) and reducing sugar intake (20%, 14/70). Forty-four percent (31/70) selected more than one dietary change in their action-plan.

3.7 Potential barriers and problem-solving around potential barriers

Two hundred and thirty participants (91%, 230/253) completed a section on potential barriers to their proposed action-plan. Of these, 30 (13%, 30/230) stated they perceived no barriers. One hundred and ninety-two participants (97%, 192/200) who identified barriers also completed a section on problem-solving around potential barriers.

Potential barriers to physical activity action-plans alone (n = 101) and dietary change action-plans alone (n = 57) are shown in Figure 3. Participants were allowed to identify more than one barrier.

The main perceived barriers to physical activity action-plans were weather (41%, 41/101) and lack of time due to other commitments, including work and family (31%, 31/101). Ninety-seven participants identified potential solutions to physical activity barriers (96%, 97/101). The main solutions included fitting the activity into one's daily routine (24%, 23/97) and doing alternative physical activities (22%, 21/97).

The main perceived barriers to dietary change action-plans focused on lack of willpower, (47%,27/57), and eating with others(19%, 11/57). Fifty-four (95%, 54/57) identified one or more potential solutions to dietary change barriers. The main solutions included finding alternative food substitutes for foods they had eliminated or reduced in their diet (37%, 20/54) and staying motivated (33%, 18/54).

3.8 Confidence in achieving the action-plan (n = 247)

Out of a maximum score of 10, the mean score for participants' confidence in achieving their action-plan was 7.8 (SD 1.3, range 3-10) with 87% (n =215) having a score of 7 or over.

3.9 One-week questionnaire (n = 227)

Of the 227 participants who returned a one-week questionnaire, 94%, (213/227) responded to the question on whether they had started their action-plan with 91%, (193/213) saying they had started their action-plan.

*3.10 **Three month** follow-up questionnaire (n = 187)*

Of the 187 (68%, 187/275) who returned a three month questionnaire, 185 (99%) responded to the question if they had identified a goal since attending DESMOND with 74 (94%, 174/185) indicating they had identified a goal. **The response rate to the three month follow-up questionnaire was 68% (187/275). Ninety-nine percent (185/187) answered the question "*Since attending DESMOND have you picked a goal that you want to work on?*". Ninety-four percent (174/185) indicating they had identified a goal.**

3.11 Discussed action-plan with others (n = 173)

Of the 187 who returned a 3 month questionnaire, 122 (71%, 122/173) reported discussing their action-plan with someone. **One hundred and seventy- three respondents answered the question "*Since attending DESMOND have you discussed your action plan with anyone else?*" Seventy-one percent (122/173) indicated they had discussed it with someone, with 96% (117/122) giving further details of who they discussed it with.** Of these, 117 (96%, 117/122) specified who they had discussed their plan with. **The most common responses were discussing it with family members only (49%), with family members and their doctor/nurse (22%) or with family members and their friends (18%).** Forty-nine (42%, 49/117) had discussed their action-plan only with family members, 26 (22%, 26/117) had spoken to their family and their doctor/nurse and 21 (18%, 21/117) had spoken to family members and friends.

3.12 Attainment of action-plan (n = 172)

Of the 172 who responded to the question "*Are you still working on your action-plan?*" 165 (96%, 165/172) said they were still working on their action-plan. Of these 143 (87%, 143/165) indicated they were always/usually meeting their action-plan. Of the 7 who were no longer working on their action-plan only one indicated that they had usually met their action-plan.

Individual characteristics associated with goal attainment are shown in Table 3. Marital status was significantly associated with self-reported goal attainment with those who were married or living with a partner significantly more likely to report goal attainment than those who were single/separated or widowed (p = 0.014). Education was also significantly associated with self-reported goal attainment with those with tertiary level education less likely to report goal attainment than those with secondary level education (p = 0.038).

There were no significant differences between geographical locations or number of goals chosen and level of attainment of action-plans. **Psycho-social self-efficacy scores did not change on average between baseline and three month follow-up measurements (p value = 0.850) and there were no significant differences in change-scores between those reporting always/usually achieving their action plan and those who did not (p-value 0.238).** There were no significant differences in psycho-social self-efficacy mean scores at baseline and three months later in those who reported always/usually achieving their action-plan. There was no significant improvement either when the change in psycho-social self-efficacy from baseline to three months was compared in the same group.

3.13 Chosen a second goal and action-plan to meet this goal (n = 169)

Of the 169 participants who responded to the question "*Have you chosen a second goal*?", 72 (43%, 72/169) said they had. Of the 72 who had chosen a second goal, 61 (85%, 61/72 said they were always/usually meeting their action-plan to meet their second goal.

3.14 Changes in action-plan domains over the three months

One hundred and fifty four participants (61%, 154/253) provided details of their action-plan within one week of completing DESMOND and again in the three month questionnaire. Action-plans had changed for 76 participants (49%, 76/154) over the three month time period. Thirty-two participants described their action-plan as now combining both diet and physical activity whereas their original action-plan focused on physical activity alone or diet alone. Fourteen participants whose original action-plan was a combination of both physical activity and diet now described their action-plan as either focusing on diet alone or physical activity alone.

3.15 Differences across the two geographical sites

Leicester participants were significantly more likely to be married/living with a partner, to be working and of a non-European white ethnicity, less likely to report taking diabetes medications and to have a lower psycho-social self-efficacy score (Table 1).

Irish participants were significantly more likely to have completed their action-plan at the DESMOND course (93% V 78%, p = .000), more likely to choose two or more areas to focus on (33% V 17%, p value 0.009) and more likely to choose shape/weight as the area they wanted to focus on (57% V 38%, p value = 0.006) compared to Leicester participants. Leicester participants were significantly more likely to report a higher mean confidence score in achieving their action-plan than Irish participants (8.1 V 7.6, p = 0.003).

4.0   Discussion

The aim of this study was to measure people's level of engagement in goal-setting and action-planning as part of a group DSME programme, DESMOND. Our results suggest that goal setting in a group setting is feasible and effective and can lead to behaviour change. The behavioural changes reported in our study are comparable with other more intensive goal-setting interventions involving one or more individual goal-setting sessions [10, 13, 22] suggesting a group approach to goal-setting as part of a DSME may be an effective option to achieve behaviour change.

The recruitment rate was 55% which compares favourably with similar studies [10]. West of Ireland participants were more likely to return a goal-setting sheet and both questionnaires than Leicester participants. Differences in response rates could be related to differences in ethnicity or **self-efficacy** across the two sites, **differences in the delivery of DESMOND across the two sites (6 hour session delivered over one day in Leicester and over two half-days in Ireland)** or differences in healthcare systems. In Ireland most people pay to visit their GP and welcome the fact that DESMOND is provided for free which may have

influenced their willingness to participate. In the UK patients are used to receiving all of their diabetes care for free and may be less motivated to engage in the research process.

Shape/weight was the most common area chosen by participants. Participants may have chosen shape/weight because of their raised awareness through DESMOND that losing weight could impact favourably on several of their clinical markers with four-fifths having two or more clinical markers above target when attending DESMOND.

Similar to other studies, participants were more likely to focus on dietary change or physical activity goals [5, 13, 23] with few focusing on taking medication. Participants may perceive taking medication as pretty straightforward and see changes to diet or physical activity levels as predominately their responsibility. Whereas the main perceived barriers to physical activity were external (weather and time), the main barrier to dietary change related to the individual and their perceived lack of willpower.

Research with regards to whether individuals should set one goal at a time and whether such an approach is more successful is inconclusive.[15] Although DESMOND educators encourage participants to focus on one goal (e.g. diet or physical activity) a fifth of participants chose two or more goals initially. We found no association between number of goals set initially and attainment of goals at three months.

Educators encourage participants to set SMART goals. Although the majority of participants completed all sections of their action-plan sheet, the level of detail provided varied amongst participants. For example only 40% of those with physical activity goals specifying the length of time they would engage in physical activity. Lack of detail may partly be due to the difficulty of grasping the concept of setting SMART goals in a thirty minute session and/or lack of time to complete the task.

Attainment of goals has been associated with setting of further goals [16]. Our findings support this with over a third of those attaining their goals at three months saying they had chosen a second goal. Changes in action-plan descriptions at the three month stage also suggest that people were adding to their original goal with many describing their goal as now including a combination of both diet and physical activity whereas initially it was either one or the other.

Being married/living with a partner having a higher patient activation score and self-reported good health was significantly associated with level of success in attaining an action-plan at three months. Other studies have highlighted the association between social support (especially family), high levels of patient activation, and perceived good health and successful diabetes self-management [24]. **Although the effect of education was weaker than marital status, it is interesting that people with higher levels of education were**

less likely to report success in attaining an action-plan. It may be the case that they are overly ambitious in their goals making them harder to achieve.

Although a previous study reported an improvement in psycho-social self-efficacy [15] following participation in a goal setting intervention, we found no improvement in self-efficacy in participants who reported sustaining their goal three months following DESMOND. This may be due to a ceiling effect, as the mean value for psycho-social self-efficacy reported by participants within one week of completing DESMOND was already high or that **a three month follow up measurement might not have been enough time to shown an effect on self-efficacy.**

Just over a fifth of participants reported discussing their goal with a health care professional (HCP). **It is unclear why this is the case. It may be because** DSME programmes are usually delivered separately to a person's medical diabetes care **and** people may not **do not** consider it as something they could**/should** discuss with diabetes HCPs or it may be the case that participants had not yet seen a diabetes HCP since completing DESMOND. Making HCPs aware of a person's goal/action-plan following a DSME may be one approach to further support a person when undertaking behaviour change.

4.1 Limitations

Although the recruitment rate of 55% compares favourably with similar studies [10] it may limit the potential generalizability of the findings, particularly if those participating were also more likely to be activated to self-manage their diabetes.

Those who agreed to participate may have been more likely to complete an action-plan as this was part of the study than would have been the case in a standard DESMOND programme.

Successful behaviour change was based on self-report of goal attainment and action-plan completion, which may have resulted in over-reporting of successful behaviour change due to social desirability bias. Future studies should consider if self-reported behaviour change is a good proxy measure for actual behavioural change.

The percentage of successful behaviour change may have been overestimated as it was only evaluated in those who returned a three month questionnaire. Those lost to follow-up may have been less likely to have sustained their action-plan.

As the purpose of the study was to measure people's level of engagement in goal-setting and goal attainment at three months following DESMOND, we did not measure objective measures of change in clinical outcomes. Future studies should include such measures to see if self-reported behaviour change results in important clinical changes.

4.2 Conclusions

Goal-setting as part of a DSME is acceptable to participants with our study reporting high levels of engagement in the goal-setting component of the programme and high levels of self-reported attainment of action-plans three months following DESMOND.

4.3 Practice implications

A brief goal-setting session as part of a DSME can help people with type 2 diabetes to identify goals and lead to behaviour change. Lack of social support, low patient activation levels and poor health are factors that may hinder goal attainment. Raising HCPs awarenss of the the goals people set during a DSME **Making HCPs aware of a person's goal/action-plan following a DSME may be one approach to further support a person undertaking behaviour change as HCPs could continue to encourage and support people with their goals.** Informing HCPs involved in a person's diabetes care of goals set by individuals during a DSME programme could further support behaviour change. HCPs could follow-up with DSME attendees and encourage and support them to continue with their behaviour change goals. with HCPs following up on the process and encouraging people to continue with their behaviour change goals.

References

1. Powers MA, Bardsley J, Cypress M, Duker P, Funnell MM, Hess Fischl A, et al. Diabetes Self-management Education and Support in Type 2 Diabetes: A Joint Position Statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics. Diabetes Care. 2015;38:1372-82.
2. Steinsbekk A, Rygg LO, Lisulo M, Rise MB, Fretheim A. Group based diabetes self-management education compared to routine treatment for people with type 2 diabetes mellitus. A systematic review with meta-analysis. BMC Health Serv Res. 2012;12:213.
3. Chrvala CA, Sherr D, Lipman RD. Diabetes self-management education for adults with type 2 diabetes mellitus: A systematic review of the effect on glycemic control. Patient Educ Couns. 2016;99:926-43.
4. Funnell MM, Brown TL, Childs BP, Haas LB, Hosey GM, Jensen B, et al. National standards for diabetes self-management education. Diabetes Care. 2012;35:S101-8.
5. Estabrooks PA, Nelson CC, Xu S, King D, Bayliss EA, Gaglio B, et al. The frequency and behavioral outcomes of goal choices in the self-management of diabetes. Diabetes Educ. 2005;31:391-400.
6. Deakin T, McShane CE, Cade JE, Williams RDRR. Group based training for self-management strategies in people with type 2 diabetes mellitus. Cochrane Database Syst Rev.

2005(2):CD003417.

7.   Khunti K, Gray LJ, Skinner T, Carey ME, Realf K, Dallosso H, et al. Effectiveness of a diabetes education and self management programme (DESMOND) for people with newly diagnosed type 2 diabetes mellitus: three year follow-up of a cluster randomised controlled trial in primary care. BMJ. 2012;344:e2333.

8.   Anderson DR, Christison-Lagay J, Villagra V, Liu H, Dziura J. Managing the space between visits: a randomized trial of disease management for diabetes in a community health center. J Gen Intern Med. 2010;25:1116-22.

9.   Mc Sharry J, Fredrix, Milou, Hynes, Lisa, & Byrne, Molly. . Prioritising target behaviours for research in diabetes: Using the nominal group technique to achieve consensus from key stakeholders. Res Involv Engagem. 2016;2:1-19.

10.   Anderson DR. Self-management goal-setting in a community health center: the impact of goal attainment on diabetes outcomes. Diabetes Spectrum. 2010;23:97-105.

11.   Malemute CL, Shultz JA, Ballejos M, Butkus S, Early KB. Goal setting education and counseling practices of diabetes educators. Diabetes Educator. 2011;37:549-63.

12.   Bodenheimer T, Handley MA. Goal-setting for behavior change in primary care: an exploration and status report. Patient Educ Couns. 2009;76:174-80.

13.   DeWalt DA, Davis TC, Wallace AS, Seligman HK, Bryant-Shilliday B, Arnold CL, et al. Goal setting in diabetes self-management: taking the baby steps to success. Patient Educ Couns. 2009;77:218-23.

14.   Naik AD, Palmer N, Petersen NJ, Street RL, Jr., Rao R, Suarez-Almazor M, et al. Comparative effectiveness of goal setting in diabetes mellitus group clinics: randomized clinical trial. Arch Intern Med . 2011;171:453-9.

15.   Swoboda CM, Miller CK, Wills CE. Impact of a goal setting and decision support telephone coaching intervention on diet, psychosocial, and decision outcomes among people with type 2 diabetes. Patient Educ Couns. 2017;100:1367-73.

16.   Bandura A. Self-efficacy: toward a unifying theory of behavioral change. Psychol Rev . 1977;84:191-215.

17.   Mosen DM, Schmittdiel J, Hibbard J, Sobel D, Remmers C, Bellows J. Is patient activation associated with outcomes of care for adults with chronic conditions? J Ambulatory Care Manage. 2007;30(1):21-9.

18.   Fisher L, Mullan JT, Skaff MM, Glasgow RE, Arean P, Hessler D. Predicting diabetes distress in patients with Type 2 diabetes: a longitudinal study. Diabet Med. 2009;26(6):622-7.

19. Hibbard JH, Mahoney ER, Stockard J, Tusler M. Development and testing of a short form of the patient activation measure. Health Serv Res. 2005;40:1918-30.

20. McGuire BE, Morrison TG, Hermanns N, Skovlund S, Eldrup E, Gagliardino J, et al. Short-form measures of diabetes-related emotional distress: the Problem Areas in Diabetes Scale (PAID)-5 and PAID-1. Diabetologia. 2010;53:66-9.

21. Anderson RM, Funnell MM, Fitzgerald JT, Marrero DG. The Diabetes Empowerment Scale: a measure of psychosocial self-efficacy. Diabetes Care. 2000;23:739-43.

22. Wolever RQ, Dreusicke M, Fikkan J, Hawkins TV, Yeung S, Wakefield J, et al. Integrative health coaching for patients with type 2 diabetes: a randomized clinical trial. The Diabetes educator. 2010;36:629-39.

23. Handley M, MacGregor K, Schillinger D, Sharifi C, Wong S, Bodenheimer T. Using action plans to help primary care patients adopt healthy behaviors: a descriptive study. J Am Board Fam Pract. 2006;19:224-31.

24. Strom JL, Egede LE. The impact of social support on outcomes in adult patients with type 2 diabetes: a systematic review. Current diabetes reports. 2012;12:769-81.

Table

Table 1 Baseline characteristics of participants by location*

	West of Ireland	Leicester, England	Total	P value
Baseline clinical data from clinical information systems				
HbA1c (mean/SD) (n = 266, West of Ireland n = 140, Leicester, n = 126)	64.2 (18.1)	64.4 (19.7)	64.3 (18.9)	.95
Cholesterol (mean/SD) (n =243, West of Ireland n = 136, Leicester, n = 107)	4.8 (1.2)	4.9 (1.4)	4.8 (1.3)	.62
LDL (mean/SD) (n = 239, West of Ireland n = 131, Leicester, n = 108)	2.7 (.97)	2.8 (.92)	2.7 (.95)	.49
HDL (mean/SD) (n = 246, West of Ireland n = 133, Leicester, n = 113)	1.2 (.34)	1.2 (.39)	1.2 (.36)	.20
Systolic blood pressure(mean/SD) (n = 215, West of Ireland n = 93, Leicester, n = 122)	133 (16.0)	134 (14.8)	134 (15.3)	.77
Diastolic blood pressure (mean/SD) (n = 215, West of Ireland n = 93, Leicester, n = 122)	79 (9.9)	78 (8.8)	79 (9.9)	.59
% (n) with clinical data above national targets$				
HbA1c ≥53 mmol/mol (n/%)	96/140 (69)	78/126 (62)	174/266 (66)	.29
Cholesterol ≥4.5 mmol/L (%/n)	78/136 (57)	64/107 (60)	142/243 (58)	.70
LDL ≥ 2.5 mmol/L (%/n)	79/131 (60)	71/108 (66)	150/239 (63)	.39
HDL ≤ 1 mmol (male), ≤ 1.2 mmol/l (female)(n/%)	63/133 (47)	58/113 (51)	121/246 (49)	.54
Systolic blood pressure ≤ 140of (n/%)	29/93 (31)	40/122 (33)	69/215 (32)	.80
Diastolic blood pressure < 80 (n/%)	49/93 (53)	68/122 (56)	117/215 (54)	.66
% (n) with 2 or more clinical markers above target (n/%)	116/142 (82)	105/124 (85)	221/266 (83)	.81
Socio-demographic data				
Age (mean/SD) (n =275, (West of Ireland, n = 149, Leicester, n = 126)	60 (10.6)	58 (11.4)	59 (11.0)	.06
Male (n/%)	86/149 (58)	74/126 (59)	160/275(58)	.87
Married/Living with someone (n/%)	82/133 (62)	66/86 (77)	148/219 (68)	.02
Working full-time/part-time (n/%)	49/132 (37)	48/86 (56)	97/218(45)	.007
Tertiary education level (n/%)	69/134 (52)	57/86 (66)	126/220 (57)	.031
European white ethnicity	129/133 (97)	56/82 (68)	185/215 (86)	.00
General health Fair/poor (n/%)	25/129 (19)	18/78 (23)	43/207 (21)	.53
Diagnosed within the last 12 months (n/%)	86/134 (64)	55/85 (65)	141/219 (64)	.94
Taking diabetic medication/injections (n/%)	106/134 (79)	54/86 (63)	160/220 (73)	.008
Psychosocial measures				
Patient activation mean (0-100 scale) mean (SD) (n = 201, West of Ireland n = 123, Leicester, n = 78)	62.3 (11.9)	60.6 (12.4)	61.6 (12.1)	.329
PAM levels				
Level 1 (n/%)	9/123 (7)	11/78 (14)	20/201 (10)	
Level 2 (n/%)	18/123 (15)	11/78 (14)	29/201 (14)	.48
Level 3 (n/%)	77/123 (63)	45/78 (58)	122/201 (61)	
Level 4 (n/%)	19/123 (15)	11/78 (14)	30/201(15)	
Self efficacy Empowerment scale (0-100 scale) (mean/SD) (n =218, West of Ireland, n = 133, Leicester, n = 85)	80.9 (14.9)	75.4 (14.1)	78.8 (14.8)	.007
PAID-5 scale (0-20 scale) (median IQR)) n = 214, West of Ireland, 129, Leicester, 85)	5.0 (8)	5.0 (8)	5.00 (8)	.73
PAID-5 ≥ 8 (n/%)	45/129 (35)	27/85 (32)	72/214 (34)	.64

*Denominators vary depending on clinical data provided and responses to questions on questionnaire.
$Source: https://www.hse.ie/eng/services/Publications/topics/Diabetes/A_Practical_Guide_to_Integrated_Type_II_Diabetes_Care.pdf

Table

Table 2: Areas selected by location (n = 220)

	West of Ireland n = 122	Leicester n = 98	Total n = 220	P value
No of areas targeted				
1 area only (n/%)	82 (67)	81/98 (83)	163/220 (74)	
2 or more areas (n/%)	40 (33)	17/98 (17)	57/220 (26)	.009
Areas targeted				
Shape (n/%)	69 (57)	37 (33)	106 (48)	.006
Blood glucose (n/%)	43 (35)	32 (33)	75 (34)	.68
Cholesterol (n/%)	25 (21)	28 (29)	53 (24)	.16
Blood pressure (n/%)	18 (15)	12 (12)	30 (14)	.59
LDL/HDL (n/%)	16 (13)	8 (8)	24 (11)	.24
Smoking (n/%)	5 (4)	2 (2)	7 (3)	.39
Depression	5 (4)	2 (2)	7 (3)	.39
Other	2 (2)	1 (1)	3 (1)	.69

Figure

Table 3 Individual characteristics and self-reported attainment of behaviour change goals

	Usually/Always meeting goal % (number)	Rarely/never meeting goal % (number)	P value
Geographical Location			
West of Ireland	84 (93/111)	16 (18/111)	.118
Leicester, England	93 (50/54)	7 (4/54)	
Gender			
Male	88 (89/101)	12(12/101)	.491
Female	84 (54/64)	10 (16/64)	
Marital status			
Married/Partner	92 (100/109)	8 (9/109)	**.005**
Single/Separated/Widowed	76 (37/49)	25 (12/49)	
Occupation			
Working	90 (53/59)	10 (6/59)	.468
Not-working	86 (85/99)	14 (14/99)	
Education			
Secondary level	90 (56/63)	11 (7/63)	.527
Tertiary level (Technical/Vocational/University)	85 (82/96)	15 (14/96)	
Ethnicity			
European white ethnicity	86 (120/139)	19/139 (14)	.365
European other ethnicity	94 (16/17)	6 (1/17)	
Number of goals targeted following completion of DESMOND			
1 goal only	89 (109/123)	82 (31/38)	.260
2 or more goals	11 (14/123)	18 (7/38)	
Self-reported general health			
Excellent/very good/good	89 (110/123)	74 (20/27)	
Fair/poor	11 (13/123)	26 (7/26)	**.034**
Diabetes duration			
Diagnosed within last 12 months	85 (85/100)	15 (15/100)	
Diagnosed over 12 months ago	91 (52/57)	9 (5/57)	.260
Diabetes management			
Lifestyle only	93 (41/44)	7 (3/44)	
On diabetes medications	85 (97/114)	15 (17/114)	.170
Age (mean/SD)	60.91 (10.75)	60.55 (12.38)	.885
HbA1c at baseline (mean/SD)	61.34 (16.9)	64.4(17.7)	.434
Patient activation score at baseline (mean/SD)	62.85 (12.53)	56.87 (13.96)	**.046**
Self-efficacy score at baseline (mean/SD)	79.90 (15.33)	75.87 (13.96)	.268
PAID-5 mean score (mean/SD)	5.85 (5.08)	8.05 (5.2)	.074

Figure

Table 3 Individual characteristics associated with self-reported attainment of behaviour change goals

	Odds ratios*	95% CI	p-values
Geographical Location **West of Ireland VS Leicester, England**	0.41	0.08 to 2.10	0.287
Gender **Male VS Female**	1.52	0.42 to 5.44	0.52
Age	1.02	0.95 to 1.08	0.649
Marital status **Married/Partner VS Single/Separated/Widowed**	5.74	1.42 to 23.20	0.014
Occupation **Working VS Not working**	2.07	0.45 to 9.50	0.349
Education **Secondary level VS** **Tertiary level (Technical/Vocational/University)**	5.16	1.09 to 24.29	0.038
Ethnicity **European other ethnicities VS European white ethnicity**	1.74	0.13 to 22.68	0.674
Number of goals targeted following completion of DESMOND **2 or more goals VS 1 goal only**	0.83	0.22 to 3.17	0.791
Self-reported general health **Fair/poor VS Excellent/very good/good**	0.58	0.12 to 2.82	0.497
Diabetes duration **Under 12 months VS 12 months and over**	0.63	0.15 to 2.59	0.522
Diabetes management **On diabetes medications VS Lifestyle only**	1.24	0.22 to 7.09	0.813
HbA1c at baseline	0.99	0.95 to 1.02	0.440
Patient activation score at baseline	1.07	0.99 to 1.15	0.055
Self-efficacy score at baseline	0.98	0.94 to 1.04	0.556
PAID-5 mean score	1.05	0.91 to 1.20	0.524

* Adjusted by all variables in the table.

Figure

Figure 1 Goal setting sheet

Figure

Figure 2: Flow chart of subject recruitment and response rate to data collection phases
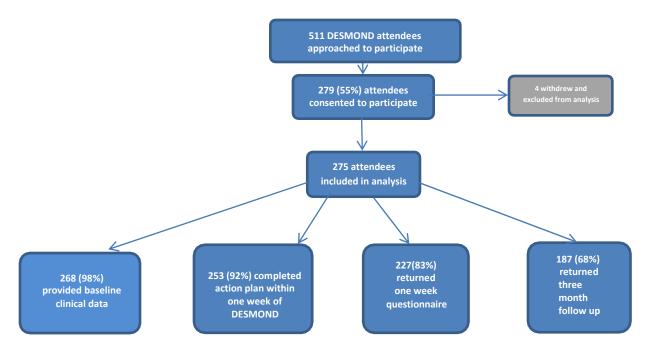
Figure

Figure 3. Physical activity and dietary change goals – perceived barriers

Physical activity goals - perceived barriers

(Bar chart with y-axis from 0 to 45. Categories and approximate values: Poor weather 41, Lack of time 31, Poor health 24, Laziness 16, Lack of motivation 14, Low mood 10, Tiredness 7, Lack of willpower 4)

Dietary change goals - perceived barriers

(Bar chart with y-axis from 0 to 50. Categories and approximate values: Lack of willpower 47, Eating with others 19, Lack of motivation 16, Lack of planning 11, Negative perceptions towards change 11, Low mood 2)