Goal Setting: An Integral Component of Effective Diabetes Care

*Carla K. Miller, Ph.D., R.D.
Associate Professor
Ohio State University
1787 Neil Ave., 325 Campbell Hall
Columbus, OH  43210
T: 614-292-1391
F: 614-292-8880
miller.4453@osu.edu

Jennifer Bauman, B.A., R.N.
Ohio State University
College of Nursing
1585 Neil Ave.
Columbus, OH  43210
bauman.123@osu.edu

*Corresponding author

Keywords: goal; goal setting; goal setting theory; patient goal setting; diabetes mellitus; health behavior change; patient education; lifestyle intervention; glycemic control; review article

Word count of text: 4,025 words
Abstract

Goal setting is a widely used behavior change tool in diabetes education and training. Prior research found specific relatively difficult but attainable goals set within a specific timeframe improved performance in sports and at the workplace. However, the impact of goal setting in diabetes self-care has not received extensive attention. This review examined the mechanisms underlying behavioral change according to goal setting theory and evaluated the impact of goal setting in diabetes intervention studies. Eight studies were identified which incorporated goal setting as the primary strategy to promote behavioral change in individual, group-based, and primary care settings among patients with type 2 diabetes. Improvements in diabetes-related self-efficacy, dietary intake, physical activity, and A1c were observed in some but not all studies. More systematic research is needed to determine the conditions and behaviors for which goal setting is most effective. Initial recommendations for using goal setting in diabetes patient encounters are offered.
Introduction

Conscious human behavior is purposeful and guided by an individual’s goals. Thus, goal setting is one of the most widely used techniques to promote behavioral change [1], one of the most evidence-based practices [2], and regularly implemented by clinicians and diabetes educators [3,4] during patient encounters. Goal setting is recognized as an evidence-based strategy for promoting behavioral change in the National Standards for Diabetes Self-Management Education and Support through the setting of SMART goals (i.e., specific, measurable, achievable, reasonable, and timely goals) [5]. Furthermore, collaborative goal setting between the physician and patient was associated with greater trust in the physician and improved glycemic control among patients with diabetes [6].

Despite the widespread use of goal setting during diabetes encounters, most of the evidence base regarding goal setting has examined an individual’s motivation in the workplace and sports performance [7]. Specific difficult goals have been shown to increase performance across a variety of tasks, timespans, individuals, groups, cultures, and organizations [8]. Yet, little research has examined whether and how the findings from workplace motivation and sports performance translate into health behavioral change and maintenance. Effective diabetes management requires extensive self-regulation to achieve and sustain optimal glycemia and engagement in a healthy lifestyle to reduce disease risk and comorbidities. The motivation to maintain quality of life while minimizing risk for chronic disease poses unique challenges that differ from the motivation for goal attainment at the workplace. Although prior workplace studies have not focused on outcomes considered relevant to health behavior, many of the
outcomes evaluated included cognitive and motivational elements similar in principle to those in health-related behaviors. In addition, the goal setting procedures used in these studies are applicable to health behavioral change and diabetes education efforts [9].

Therefore, the purposes of this review are to: (a) examine the mechanisms underlying behavioral change according to goal setting theory; (b) review how goal setting has been applied in studies encompassing diabetes education and counseling; (c) provide initial recommendations for using goal setting effectively in patient encounters; and (d) offer recommendations for future research regarding goal setting to promote behavioral change and maintenance. While goal setting is not the only technique that can be used in successful behavioral change programs and some health behavior theories do not endorse the goal setting process [10], goal setting is often one component of a larger, orchestrated group of behavioral change strategies [9].

**Goal Setting Theory**

Goals motivate action! This is the central premise of goal setting theory [11]. A goal is defined as the object or aim of an action [8] or a mental representation of desired outcomes or states [12]. Goal setting theory states that goals are the immediate regulators of human behavior and the standard used to appraise performance [8,13]. If people exceed their goal, they experience success; if they fail to attain the goal, they experience discontent. The greater an individual’s success in achieving high goals, the greater the individual’s satisfaction and happiness. Thus, goals embody a key aspect of overall well-being.
Goals encompass two core components: goal specificity and level of difficulty (Figure 1). A specific high goal leads to higher performance than an easy goal, no goal, or a vague goal such as “do your best” [14]. A “do your best” goal (e.g., lose weight) allows people to set their own performance standard, while a specific goal reduces variation in behavior by eliminating ambiguity; the target behavior is clearly defined (e.g., achieve 30 minutes of physical activity 5 days/week). Given adequate ability and commitment to the goal, the higher the goal the higher the performance or the greater the behavioral change. Goal difficulty, measured as the probability of success, is related to performance in a positive linear relation [8]. That is, the highest level of effort occurs when the task is difficult, assuming the goal is within a person’s ability and commitment to the goal is high. Performance levels off when the limits of ability are reached, and initial goal attempts may be needed to establish levels of ability. However, people may abandon a goal perceived to be impossible to attain.

Four mechanisms explain the effect of a specific goal on behavior according to goal setting theory (Figure 1). These include goal choice, effort, persistence, and strategy. Goal choice, or the goal one sets or is assigned, focuses attention toward goal-relevant and away from goal irrelevant activity. Furthermore, self-efficacy influences the goal that is set. When goals are self-set, people with higher self-efficacy set higher goals; they are more committed to assigned goals, find and use better strategies for reaching the goal, respond more positively to negative feedback, and are dissatisfied with lower levels of performance than do people with lower self-efficacy [8]. The higher the goal, the greater the effort and persistence (i.e., self-efficacy) needed to attain it. Setting proximal goals in which a difficult goal is divided into more manageable
subgoals enhances self-efficacy as people realize progress can be made [8]. One or more strategies are needed to discover new knowledge or develop new skills to achieve the proximal goal. If the target behavior is new, people will engage in deliberate planning to develop strategies that will enable them to attain the goal. Furthermore, training in appropriate strategies to achieve the target behavior improves discovery or learning to use those strategies for goal attainment.

Goal setting theory also includes the five moderating variables of ability, commitment, feedback, resources, and task complexity. Each moderator is briefly described below. Ability includes possession of the requisite knowledge and skills to accomplish the goal. For example, individuals need sufficient knowledge regarding sources of dietary fiber, how to read a food label to identify fiber content, and skills to prepare fiber-rich foods, if they establish a dietary fiber goal. A learning goal differs from a performance goal, however. A learning goal (e.g., identify foods high in fiber) is necessary prior to setting a performance goal (e.g., increase fiber intake to 30 grams/day), if an individual lacks strategies, processes, or procedures for a new, complex task. Once the necessary knowledge or skill has been acquired, a learning goal is no longer useful [15]. A specific, high goal regarding behavior should then be set.

Commitment refers to the degree to which a person is attached to the goal, considers it important, and is determined to reach it [16]. A high level of commitment is needed to achieve a high goal. People who exhibit lower levels of commitment abandon high goals in favor of easier ones. A high goal is more likely to garner
commitment when the rationale for the goal is provided and people believe they can attain the goal. Thus, self-efficacy enhances goal commitment.

Feedback reveals progress in relation to the goal. Feedback is a moderator of goal outcomes in that the combination of goals plus feedback promotes greater success than goals alone, especially for complex behaviors [17].

Resources also are a goal moderator in that goal attainment is possible only when people have the necessary social, financial or environmental resources needed. Resources should be garnered or provided before initiating any goal attempts.

Finally, task or behavioral complexity affects goal attainment. Goals do not always lead people to choose the best strategies, especially when the goal involves a new, complex behavior for which there is no training. If goal attainment is not a matter of using subconscious skills, people draw from a repertoire of skills they used in previous related contexts and apply them to the present situation. As noted above, training improves the use of effective goal strategies for novel, complex behaviors.

Goal Setting in Diabetes Self-Care

Given the potential for goal setting to be effective in promoting behavioral change, a review of the application of goal setting in diabetes self-care was performed. We searched MEDLINE, Ovid, and CINAHL for relevant studies using the following keyword and combination of keyword search terms: goal setting, goal setting theory, diabetes, diabetes mellitus, behavior change, and patient education. Also, we systematically searched the reference lists of included studies. The inclusion criteria included randomized controlled trials or controlled studies that evaluated goal setting as
the primary intervention strategy among patients with diabetes. Only studies published in English were included. The abstracts of identified citations were reviewed to determine whether they met the inclusion criteria and eight studies were identified. The data from each eligible article were summarized (see Table 1).

The studies can be organized into one of three intervention delivery channels, including in person primary care clinic visits, individual computer-based interventions, and interventions with community samples. Each of the studies focused on helping patients set specific goals regarding diabetes self-care. Two of the primary care studies employed group-based cluster visits or shared medical appointments to implement the intervention. These studies included an assessment of disease risk markers (e.g., A1c, blood pressure, cholesterol), the delivery of patient education during a group visit, followed by the formation of personalized diabetes goal(s) [18,19]. Goals focused mainly on changes in diet and physical activity, self-monitoring of blood glucose, and medication adherence.

In the first primary care study, a shared decision making framework was used during a routine clinical visit for the establishment of diabetes goals that were realistic for each patient and suited to their personal values, fears and expectations using a 28-page decision support workbook [18]. Patients were encouraged to discuss their goals with their health care provider during their next clinical visit. A significant improvement in the number of patient goals documented in the medical record occurred (the mean number of goals increased from 0.67 to 1.09 goals; P<0.001); however, there was no significant change in A1c or body weight at 4-month follow-up.
In the second primary care study, patients were randomly assigned to either a group that received two shared medical appointments plus routine primary care or to a group that received four shared medical appointments with emphasis on collaborative goal setting and action plans [19]. Patients in the treatment group received information about principles of goal setting theory such as goal specificity, difficulty and importance. Discussion of effective patient-physician communication about goals and goal progress were included during the group sessions. A1c was significantly improved in the goal setting treatment group following the intervention (see Table 1) with sustained improvement at 1-year. Self-efficacy also improved in this study and mediated the relationship between the goal-setting intervention and improvement in A1c at the post-intervention assessment.

A third study conducted in primary care included use of a written guide with educational information followed by the setting of a small achievable goal (or action plan) during a brief counseling session with individual patients [20]. The action plan specified what, when, how much, and how often patients would engage in a behavior and then patients rated their level of confidence for achieving this behavior on a scale from 0 to 10 [21]. Those who rated their confidence < 7 were encouraged to modify the action plan to be more achievable followed by a second rating of confidence. Two and four weeks after the counseling session, patients were contacted by telephone to determine progress in implementing the action plan. At least one behavioral goal was achieved by 93% of patients and 73% achieved two behavioral goals [20]. Significant improvement in diabetes-related knowledge, self-efficacy, self-reported behavior, and diabetes distress was observed [21].
A series of studies have been conducted using computer-based interventions to establish behavioral goals among patients with diabetes. Overall, the interventions were effective in helping participants achieve self-set behavioral goals. In the first study, patients completed computerized baseline assessments via a touchscreen monitor, were weighed, and had blood drawn to assess A1c and serum cholesterol [22]. Patients then received feedback on dietary fat intake (the focus of the intervention) and barriers to self-care, established goals based on dietary assessment results, identified specific strategies for achieving goals, and rated their level of confidence for achieving the goal. Those with a high self-efficacy score (> 85 on a 100-point scale) received a take-home video on the area that presented the most frequent barrier to eating a lowfat diet (e.g., dining out), while those with a low self-efficacy score returned to the office to view an interactive video operated via a touchscreen system. The findings revealed a significant reduction in dietary fat intake and serum cholesterol were obtained following the intervention.

The second computer-based study focused on increasing levels of physical activity among patients with diabetes through an internet delivered intervention [23]. Patients completed online assessments and received feedback on their baseline activity level in relation to national guidelines for moderate intensity physical activity. Participants were then led through a “5 Steps to Action” planning process in which they selected a physical activity goal, selected two preferred activities from an activity checklist, scheduled days of the week and times of day they would perform those activities, and identified two barriers to physical activity from a barriers checklist. Participants could enter and track their total minutes of activity/day and generate graphs
of their progress on the intervention website. Overall, participants reported a moderate but significant increase in both walking and moderate-to-vigorous intensity physical activity.

In the third computer-based study, intervention participants completed a CD ROM-assisted diabetes care enhancement program focused on improving both clinical (e.g., blood pressure) and patient-centered (e.g., goal setting, patient satisfaction) aspects of care [24,25]. Patients arrived at their usual diabetes-related primary care visit 30 minutes early to complete the computerized touchscreen baseline assessment. Patients answered questions regarding their dietary, physical activity, and smoking behaviors and were given feedback on each of these behaviors. They were asked to select a behavior change goal in one of those areas and selected specific activities to support the goal, identified barriers to achieving the goal, and chose strategies to overcome these barriers. The computer generated a printout of the patient’s action plan, and patients met with a “care manager” who conducted a brief counseling session to review goals before departing. One follow-up phone call occurred 2 weeks later to review goal progress. Study results showed that participants set a goal in the area that needed the most improvement [26]. Those who selected physical activity or fruit and vegetable intake goals had the greatest changes in the targeted behaviors relative to baseline. However, patients in each of the other goal-setting conditions demonstrated behavioral changes that approached significance in the other conditions. The findings suggest that the process of providing recommended guidelines for multiple behaviors may have led patients to set multiple goals in addition to the self-selected “official” study goal specified during the goal-setting process.
Finally, two studies were conducted among patients with diabetes recruited from the community to evaluate the effect of goal setting on diabetes-related outcomes. The first study aimed to evaluate the relation between goal difficulty and the adoption of a low glycemic index (GI) diet. The GI classifies carbohydrate-containing foods according to their postprandial glucose response [27]. A meta-analysis found low GI diets reduced A1c by 0.43% more than high GI diets in people with diabetes [28]. Thus, study participants were randomly assigned to one of two goal conditions (consume either 6 or 8 servings/day of low GI foods) following a 5-week behavioral intervention about GI. Both treatment groups significantly increased consumption of low GI foods but there was no significant difference in the change in consumption between groups [29]. Based on dietary intake at baseline, the goal conditions were not difficult enough to adequately evaluate the effect of goal difficulty on behavioral change. Nevertheless, significant reduction in A1c occurred for all participants combined. In addition, participants with greater self-efficacy beliefs were more committed to their assigned goal, perceived the goal to be less difficult, and were more satisfied with the dietary change achieved [30]. This is one of the few studies reported to empirically evaluate the relation between goal difficulty and behavioral change in people with diabetes. The findings lend support to the role of self-efficacy and goal commitment to achieve change.

The second community-based study recruited adults with diabetes from community health centers caring for an ethnically and racially diverse population of medically underserved patients [31]. Study participants met individually with a certified diabetes educator in which the focus was the identification of a specific area in which patients believed they could change a behavior and they set highly specific goals with a
start date, duration, frequency, and a measurable quantity or outcome. Patients rated their level of confidence for achieving the goal and revised goals with a confidence rating < 7 on a 10-point scale. Follow-up sessions occurred every 2-3 weeks for a minimum of 6 sessions; the diabetes educator rated patient’s success at achieving each goal using a 4-point attainment scale (1 = no success; 4 = complete success).

Nutrition- and exercise-related goals were chosen most often compared to other self-management behaviors. Analyses revealed that the more goals patients attained, the more likely they were to improve or maintain their level of glycemic control as measured by A1c.

The findings from these goal setting studies conducted among people with type 2 diabetes reveal that goal setting is often used in primary care to help patients identify self-management behaviors to target for change. Goal setting has been associated with improvement in diabetes outcomes such as A1c, physical activity, dietary intake, and diabetes-related self-efficacy (see Table 1) [19,21,22,23,26,29]. However, objective measures of behavior were not assessed across all studies [18,19,21,31]. Research conducted among patients with type 1 diabetes was not identified during the literature search. This could be due to type 1 diabetes occurring primarily in children and adolescents where developmental issues and family communication and conflict play a more central role in self-management [32,33]. Few studies empirically evaluated the relation among core concepts in goal setting theory, such as goal specificity and difficulty, and more research is needed to determine if ability, goal commitment, and feedback moderate the change in diabetes outcomes following a behavioral intervention as postulated by goal setting theory.
Practice Implications

Many diabetes-related behaviors are highly complex and require planning to develop an appropriate goal setting strategy. Highly complex behaviors, such as consuming more dietary fiber or engaging in consistently high levels of physical activity, require effort, persistence, resources, and appropriate strategies. Despite the paucity of goal setting studies among patients with diabetes, enough is known from existing research in other fields to provide initial practice recommendations for the inclusion of goal setting during patient encounters [7,34]. To use goal setting effectively, the following steps are recommended:

1. Begin with an assessment of: the patient’s current behavior in relation to the behavioral goal or standard, situational constraints, resources available, and knowledge and skills for engaging in the behavior. Provide training in the target behavior if the individual lacks the necessary knowledge or skills. Begin with a learning goal, instead of a performance goal, when knowledge and skills are low.

2. Determine the level of commitment to addressing the problem. (See reference #35 for a 4-item instrument to assess goal commitment.) If commitment is low, address ambivalence about the goal or select another behavior on which to focus for which there is sufficient commitment [9]. Discuss and resolve conflicting or competing goals and try to align competing goals [12].

3. Analyze the tasks required to reach the goal. Establish proximal, subgoals for complex tasks and build a “goal ladder.” A criterion to decide whether a task is
complex is the degree to which strategic analysis of the behavior is required. Tasks requiring a great deal of strategic analysis can be considered complex [9].

4. Assess the patient’s self-efficacy for engaging in the behavior. Ask the individual to rate their level of confidence for achieving the behavior on a 10-point scale (1 = low; 10 = high). Identify the reasons for low self-efficacy, when present. Establish specific goals at an appropriate level of difficulty to increase efficacious beliefs. Be sure the goal is specific with a clear behavioral target.

5. Establish specific goals that are relatively difficult but within reach. The goal selected should require effort but be realistic, considered optimistic, and attainable in a restricted time frame. Goals considered too easy will not be taken seriously and goals considered too difficult will not be attempted. Adjust the level of difficulty based on prior experience and success and current resource levels.

6. Develop detailed plans (i.e., what, when, where, how, how often), called action plans, regarding goal attainment. Planning is a useful method for generating strategies and may increase goal commitment [36].

7. Provide feedback regularly and praise successful goal attainment. Frame failed goal attempts as skill development and learning opportunities. Reassure the individual that relapse is to be expected and does not represent failure.

8. When goal commitment and ability are high, continue to set incrementally difficult goals to enhance personal satisfaction and self-efficacy. Reformulate a goal in a more manageable way when a goal is unattainable in its present form. Modify successive goal attempts based on lessons learned.
Directions for Future Research

Too few controlled studies of goal setting in diabetes management exist to draw firm conclusions regarding its efficacy in this context. Research studying specific elements of goal setting to improve diabetes self-care is urgently needed. The results of this research would yield important knowledge for diabetes clinicians, especially given the burgeoning population of people with prediabetes and type 2 diabetes [37,38]. Specifically, research is needed to answer the following questions:

1. Does the linear goal difficulty-behavior relationship posited by goal setting theory exist for diabetes-related behaviors? Which behaviors are most amenable (e.g., physical activity) and which are least influenced (e.g., medication adherence) by goal difficulty? What is the upper level of difficulty individuals will pursue before they abandon the goal?

2. To what degree does goal commitment moderate the goal difficulty-behavior relationship? Is planning an effective technique for increasing goal commitment? How does the quality of the plan influence the commitment-behavior relationship? What are the characteristics of a high-quality goal plan? (See reference 39 for a tool to assess goal quality.)

3. Are self-set goals more effective in promoting behavioral change than assigning goals based on standards of care (e.g., achieve 10,000 steps/day; achieve consistent postprandial glucose levels < 180 mg/dL)? Are assigned goals more likely to be accepted when given by a credible source?
4. Can mobile technology be effectively used to create detailed plans for goal attainment or is mobile technology best suited for cueing (e.g., monitor blood glucose) or tracking lifestyle behaviors (e.g., calories consumed, step counts for physical activity) via mobile applications [40]?

5. Can social media be used to promote and increase the behavioral standard for which goals are set? Is social media a valued source of social support?

6. What kind of feedback should be provided, by whom, under what conditions, and how often? Can mobile technology be used to provide relevant feedback? Who should have access to the data obtained for feedback provision?

7. What conditions exist when an individual decides to disengage from a goal altogether? What situations should exist for re-engaging in the target behavior?

Conclusions

In summary, humans have the ability to conceptualize goals, modify goals based on prior experience, and engage in purposeful behavior. Goals provide people with a sense of purpose and goal attainment provides a sense of accomplishment. The SMART goal acronym (i.e., specific, measurable, achievable, reasonable, and timely) is a useful tool for helping people establish effective goals. The findings from the studies reviewed provide a foundation to predict, describe, and influence our own actions and the actions of the patients we serve. Although goal directedness is inherent in well-being, people are not necessarily effective self-regulators. Furthermore, personal, environmental, and social barriers often are encountered on the path to goal attainment, and competing goals can derail one’s efforts. Self-regulation skills require training,
effort, and experience [15]. With sufficient training, there is optimism about the benefits of goal setting and self-regulation. Goal setting is pervasive in diabetes patient encounters. As stated by Strecher et al. [9], the question is not whether goal setting should be used, the question is whether goals will be set systematically with regard to research findings. When used effectively, goal setting can increase satisfaction, self-efficacy, and commitment to even more ambitious life pursuits.
Compliance with Ethics Guidelines

Conflict of Interest: Carla Miller and Jennifer Bauman declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent: This article does not contain any studies with human or animal subjects performed by any of the authors.
References

Papers of particular interest, published recently, have been highlighted as:

- Of importance


Comment [CM4]: Goal setting and action planning during shared medical appointments were associated with greater improvement in A1c and diabetes-related self-efficacy than standard education.


Comment [CMS]: Those who were more committed to the dietary goal perceived the goal to be less difficult. Those with greater efficacy beliefs were more committed to the goal, perceived the goal to be less difficult, and were more satisfied with their change effort in this pilot study.


<table>
<thead>
<tr>
<th>Citation</th>
<th>Objective</th>
<th>Sample</th>
<th>Research Design</th>
<th>Intervention</th>
<th>Key Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference #16</td>
<td>Feasibility of SDM &amp; GS</td>
<td>T2DM ≥ 6 mo. (n=44)</td>
<td>Single group pre-/post-test</td>
<td>Decision-support workbook &amp; 1-2 hr. education session</td>
<td>↑DM understanding (+1.07, p=.001); ↑# goals in medical record (+0.42, p&lt;.001)</td>
</tr>
<tr>
<td>Reference #19</td>
<td>Evaluate GS through shared medical appt.</td>
<td>T2DM 50-90 years old; A1c ≥ 7.5% (n=87)</td>
<td>R; Parallel 2 group pre-/post-test w/3 &amp; 12 mo. FU; UC w/group education</td>
<td>4 group sessions on GS and action planning every 3 wks over 3 mo.</td>
<td>↓ A1c @ 3 mo. &amp; 1 yr. (between group diff = 0.67%, p=.03 and 0.59%, p=.05, respectively); ↑SE @ 3 mo. (between group difference = 0.84, p &lt; .02); SE mediated change in A1c</td>
</tr>
<tr>
<td>References #20, 21</td>
<td>Assess GS as part of Living with Diabetes Guide</td>
<td>T2DM &gt; 18 years old (n=229)</td>
<td>Single group pre-/post-test w/2, 4, 12-16 wk FU</td>
<td>1-15 min. counseling session → 2 phone counseling sessions @ 2 and 4 wks; GS &amp; action planning during individual clinic visit</td>
<td>↑ SE (+4.29); ↓ distress (-5.15); ↑ knowledge (+6.16); ↑ self-care (+5.82); all p&lt;.001</td>
</tr>
<tr>
<td>Reference #22</td>
<td>Evaluate office-based intervention on dietary intake</td>
<td>T2DM or T1DM, ≥ 40 years old (n=177)</td>
<td>R; 2 group cluster pre-/post-test w/3 mo. FU; UC</td>
<td>Computer assessment of diet → feedback → GS &amp; action planning w/ interventionist → video; FU phone call @ 1 and 3 wks</td>
<td>↓ kcal/day; ↓ % kcal from fat; ↓ % kcal from saturated fat; ↓ serum cholesterol (all p &lt;.01)</td>
</tr>
<tr>
<td>Reference #23</td>
<td>Evaluate internet intervention to ↑PA</td>
<td>T2DM ≥ 40 years old, PA levels less than recommended (n=78)</td>
<td>R; Parallel 2 group pre-/post-test w/8 wk FU; AC</td>
<td>Personalized 8-wk internet-based to ↑ PA w/online support; completed 5 Steps to Action planning process</td>
<td>↑ PA for both groups (p&lt;.001); between group difference was n.s.</td>
</tr>
<tr>
<td>References #24, 26</td>
<td>Evaluate diabetes care enhancement program</td>
<td>T2DM &gt; 25 years old (n=886)</td>
<td>R; 2 group cluster pre-/post-test w/6 mo. FU; UC</td>
<td>30-45 min. CD-ROM GS intervention w/feedback on baseline behaviors → 8-10 min. counseling session → phone call 2 wks later</td>
<td>↓ Fat intake (p&lt;.05); ↑ Fruit &amp; Vegetable intake (p=.075); change in PA, PHQ-9 &amp; PAID-2 were n.s.; greater change made in behavior targeted for change through GS</td>
</tr>
<tr>
<td>References #29, 30</td>
<td>Evaluate GS re: low glycemic index diet and goal difficulty</td>
<td>T2DM ≥ 1yr, 40-65 years old; A1c ≥ 7%, no insulin (n=35)</td>
<td>R; Parallel 2 group pre-/post-test w/6 wk FU</td>
<td>5 wk 1.5 hr. group intervention for all → R to goal of 6 or 8 servings of low glycemic index foods/day → 8 wk FU</td>
<td>Both groups achieved dietary goal; ↓ A1c (-0.58%, p=.01) &amp; weight (-2.3 kg, p=.01) for all participants combined; 8 serving/day group perceived greater goal difficulty</td>
</tr>
<tr>
<td>Reference #31</td>
<td>Evaluate GS through community health centers</td>
<td>T2DM adult, PHQ-9 &lt; 10 (n=488)</td>
<td>Single group pre-/post-test w/FU every 6 mo.</td>
<td>Minimum 6 individual GS &amp; action planning sessions w/CDE every 2-3 wks</td>
<td>Goal attainment at any FU visit ↓ risks category (39%) &amp; PA category (64%) vs. other goal categories</td>
</tr>
</tbody>
</table>

Abbreviations: 1 SDM = shared decision making; 2 GS = goal setting; 3 T2DM = type 2 diabetes mellitus; 4 R = randomization to treatment group; 5 FU = follow-up measures; 6 UC = control group received usual care; 7 SE = self-efficacy; 8 PA = physical activity; 9 AC = attention control group; 10 n.s. = non-significant; 11 PHQ-9 = Patient Health Questionnaire-9; 12 PAID-2 = Problem Areas in Diabetes -2 Scale; 13 CDE = certified diabetes educator
Figure 1. Central concepts in goal setting theory [8]. The *dashed line* indicates feedback channels.