

Nutrition; Fitness

Goal Setting as a Strategy for Dietary and Physical Activity Behavior Change: A Review of the Literature

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Abstract

Objective. Estimate effectiveness of goal setting for nutrition and physical activity behavior change, review the effect of goal-setting characteristics on behavior change, and investigate effectiveness of interventions containing goal setting.

Data source. For this review, a literature search was conducted for the period January 1977 through December 2003 that included a Current Contents, Biosis Previews, Medline, PubMed, PsycINFO, and ERIC search of databases and a reference list search. Key words were goal, goal setting, nutrition, diet, dietary, physical activity, exercise, behavior change, interventions, and fitness.

Study inclusion and exclusion criteria. The search identified 144 studies, of which 28 met inclusion criteria for being published in a peer reviewed journal and using goal setting in an intervention to modify dietary or physical activity behaviors. Excluded from this review were those studies that (1) evaluated goal setting cross-sectionally without an intervention; (2) used goal setting for behavioral disorders, to improve academic achievement, or in sports performance; (3) were reviews.

Data extraction and synthesis. The articles were categorized by target audience and secondary by research focus. Data extracted included outcome measure, research rating, purpose, sample, sample description, assignment, findings, and goal-setting support.

Results. Thirteen of the 23 adult studies used a goal-setting effectiveness study design and eight produced positive results supporting goal setting. No adolescent or child studies used this design. The results were inconclusive for the studies investigating goal-setting characteristics ($n = 7$). Four adult and four child intervention evaluation studies showed positive outcomes. No studies reported power calculations, and only 32% of the studies were rated as fully supporting goal setting.

Conclusions. Goal setting has shown some promise in promoting dietary and physical activity behavior change among adults, but methodological issues still need to be resolved. The literature with adolescents and children is limited, and the authors are not aware of any published studies with this audience investigating the independent effect of goal setting on dietary or physical activity behavior. Although, goal setting is widely used with children and adolescents in nutrition interventions, its effectiveness has yet to be reported. (*Am J Health Promot* 2004; 19[2]:81-93.)

Key Words: Goal Setting, Review, Nutrition, Physical Activity, Prevention Research

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INTRODUCTION

The rate of obesity is increasing, and a substantial body of research links poor diet and physical activity habits to obesity and many chronic diseases.^{1,2} Producing sustainable dietary and physical activity behavior change to influence this rate of obesity has proven to be a challenge.^{3,4}

Research has shown that the most effective behavior change from nutrition education interventions occurs when the interventions are behaviorally focused and theory driven.³ The Social Cognitive Theory, widely used for understanding and researching behavior change, specifies goal setting as an important strategy.⁵ Lee, Locke, and Lantham⁶ define a goal as, "that which one wants to accomplish; it concerns a valued, future end state." Although goal-setting research in workplace settings has been proliferating over the past 30 years, it is only during the past decade that nutrition educators have begun to systematically test its effects in community health promotion interventions. Recently, Cullen et al.⁷ developed a four-step goal-setting process, based on Locke's work, to help dietitians use goal-setting strategies in nutrition counseling by (1) recognizing a need for change, (2) establishing a goal, (3) adopting a goal-directed activity and self-monitoring it, and (4) self-rewarding goal attainment.

Goal Characteristics

The extensive research conducted in the field of industrial and organizational psychology on the effects of

Table 1
Goal Properties and Components From the Industrial Psychology Literature

	Description	Practical Application
Goal properties		
Difficulty	To induce effort, a goal should be difficult yet attainable. Difficult goals require more effort to achieve than easy goals. As goal difficulty increases, so does the required effort and consequently performance, assuming the goal is reasonable to achieve. ¹¹	Eating four servings of dairy a day could constitute a difficult but appropriate goal if the individual is currently consuming two servings daily.
Specificity	A specific goal provides a clear and narrow target and designates the type and amount of effort necessary to accomplish the goal; general goals provide little basis for regulating one's effort. ¹²	A specific goal would be, "Walk 1 mile during lunch three times this week with Anne," compared with the general goal, "Exercise more often."
Proximity	Goals can be set at a proximal (short-term) or distal (long-term) level. Proximal goals mobilize effort now. In contrast, distal goals make it easy to postpone efforts. ¹²	A proximal goal would be, "Eat five servings of fruit and vegetables today: one at breakfast, one at lunch, two at dinner and one for snack," compared with the distal goal, "Eat more fruits and vegetables this month."
Goal components		
Feedback	Feedback can be described as knowledge of personal status about one's selected goal. Feedback enhances goal achievement and should be provided regularly. ^{11,13}	Having participants track their goal progress can function as feedback. An educator can review participant's goal progress and provide individual feedback.
Rewards	Rewards function as a motivator to continue goal progress. They can be <i>internal</i> (i.e., pride in accomplishment) or <i>external</i> (i.e., recognition). ¹¹	For goal progress, provide participants with raffle tickets to be drawn for prizes. For goal achievement, present the participant with a certificate of achievement.

goal setting on work task performance provides important background for this review. The literature has examined three goal characteristics: properties, components, and type. In 99 of 110 workplace studies reviewed by Locke et al.,⁸ *proximal, specific, difficult yet attainable* goals resulted in higher task performance compared with "no goal" or "easy goals." In addition, adding feedback and rewards to the goal-setting process increased motivation and task performance.^{9,10} These goal properties (*proximity, specificity, difficulty*) and components (*feedback, rewards*) (Table 1) are vital to making goal-setting effective in promoting motivation, self-efficacy, and, ultimately, behavior change in adults.¹¹⁻¹⁴ Goal type, another important characteristic of goal setting, clarifies the role of the user. Three types of goal setting have been investigated extensively with adults: self-set, assigned/prescribed, and participatory/collaborative (Table 2).^{11,24} The research results did not provide clear evidence to suggest one goal type is preferred, although it seems logical that certain types might be more appropriate than others for particular audiences and situations.

Researchers have reported on segments of a continuum for a goal-setting theoretical framework.^{5,6,11,25-28} With the use of those segments, we have generated one continuum (Figure 1). Self assessment precedes goal setting and is followed by a commitment to the goal. If a person is not committed to (i.e., trying for) the goal, there will be no goal effect and, consequently, no behavior change.¹¹ According to this framework, goal feedback and tracking focuses on accomplishments, resulting in enhanced self-efficacy for the goal.¹⁴ Finally, goal persistence is likely to result in goal attainment. In the case of nutrition and physical activity, goal attainment is synonymous with behavior change.

Objective

Goal setting has the potential to be an important facilitator of behavior change. Setting specific goals provides a potential strategy for organizing nutrition and physical activity information and skills into practical and manageable steps.^{7,14,17} However, the majority of goal-setting research on task performance has been in the workplace. Therefore, the main pur-

pose of this review was to examine goal-setting research specific to diet and physical activity among adults, adolescents, and children. The primary objective was to determine the effectiveness of goal setting as a strategy for changing nutrition and physical activity behaviors. The secondary objective was to review the effect of goal-setting characteristics (types, components, and properties) on behavior change. The tertiary objective was to summarize the effectiveness of interventions containing a goal-setting component.

METHODS

Data Sources

For this review, a literature search was conducted for the period January 1977 through December 2003 that included a Current Contents, Biosis Previews, Medline, PubMed, PsycINFO, and ERIC search of databases and a reference list search. Keywords used were *goal, goal setting, nutrition, diet, dietary, physical activity, exercise, behavior change, interventions, and fitness*. The search produced 1912 titles of papers and abstracts from electronic databases and refer-

Table 2

Five Proposed Goal-Setting Types, Description, Target Audience, and Examples in the Nutrition and Physical Activity Behavior Change Literature

Type	Description	Target Audience	Examples in References
Self-set	Goals are designed and chosen by the participant.	Adults	Annesi ¹⁵ Mazzeo-Caputo et al. ¹⁶
Assigned/prescribed	Goals are designed and chosen by the practitioner without input from participant	Adults	Schnoll and Zimmerman ¹⁷ Duncan and Pozehl ¹⁸ Alexy ¹⁹ Lutz et al. ²⁰
Participatory/collaborative	Goals are designed and chosen jointly by practitioner and participant.	Adults	Baron and Watters ²¹ Alexy ¹⁹ Schultz ²² Stenstrom ²³
Guided*	The practitioner designs multiple goal choices and the participant chooses one goal.	Adolescents	No studies found
Group-set*	Goals are designed and chosen either by practitioner or group and goal attainment is contingent on the performance of the group.	Adults Children	No studies found No studies found

* Proposed by authors.

ence list searches, producing 144 papers for full review. These articles were reviewed by each author, and 28 were selected by using inclusion/exclusion criteria described below.

Inclusion and Exclusion Criteria

For this review, peer reviewed studies of goal setting in an intervention to modify dietary or physical activity behaviors were included. Studies that were experimental, quasi-experimental, or pre-experimental were included. Those studies that evaluated goal setting cross-sectionally, without an intervention or a cell size of less than five, were excluded. Articles were excluded that used goal setting (1) as a form of treatment for behavioral disorders (i.e., eating or personality disorders), (2) to improve academic achievement, or (3) in competitive athletics or sports performance. Program descriptions that used goal-setting strategy, but included no evaluation component, were excluded. In addition, one article was excluded because the goal-setting methodology was not defined for the treatment group.²⁹

Data Extraction and Synthesis

Goal setting is an abstract concept. Adolescence is the period when

abstract thought is developing³⁰; thus, it is the authors' opinion that goal setting might have different effects at different stages of development. Therefore, the articles were categorized by age of target audience (adult ≥ 20 years, adolescent 12–19 years, children < 12 years).

Each article was evaluated for methodological quality with a four-letter rating system. One letter was assigned for each of the research qualities: experimental design with random assignment to groups (*E*), sample size calculations reported (*S*), cell size of 30 or greater (*C*), and goal setting fully supported by the education intervention (*G*).

RESULTS

Data Synthesis

The 28 articles meeting inclusion criteria fell into three distinct categories of research foci: (1) goal-setting effectiveness, 2) goal-setting characteristic effectiveness, and 3) goal-setting intervention evaluation (Table 3).

These studies used goal setting to varying degrees. This lack of consistency of goal-setting support had the potential to confound the outcome of our review. Consequently, each

study was rated for level of goal-setting support. Three levels were identified and defined as follows.

Minimal Support. Goal was set and no further support was provided regarding goal feedback or goal attainment. No goal-setting theory was mentioned as a guide to the goal-setting process.

Moderate Support. Goal was set and some but not all aspects of goal setting were supported (i.e., feedback, barriers, and goal attainment). Goal-setting theory was used to formulate the goal.

Full Support. A majority of the intervention was focused on goal setting and attainment, with extensive and appropriate support provided (i.e., feedback, contracting, barriers counseling, goal attainment, and skills development). Goal-setting theory was used to formulate the goal and plan and develop the lessons.

Of the 28 studies, 23 targeted adults, 1 targeted adolescents, and 4 targeted children. Table 4 presents the 28 studies grouped by target audience and secondarily by research focus. Authors, outcome measure, publication year, research rating, pur-

Figure 1
Proposed Theoretical Framework for the Goal-Setting Process



pose, participant description, group assignment, findings, and goal-setting support are identified.

Adults

Goal-Setting Effectiveness. This focus compared an intervention with goal setting to the same intervention in the absence of goal-setting strategies and was appropriate for determining the effect of goal setting on dietary or physical activity behavior change. Thirteen studies were in this category.^{15,17–23,31–34,35}

The first eight studies support the effectiveness of goal setting among adults (Table 4).^{15,17–19,22,23,31,32} Six studies focused on physical activity,^{15,18,22,23,31,32} and two on nutrition.^{17,19} Seven of the eight studies randomly assigned participants to condition (i.e., treatment and control or multiple treatments).^{15,17–19,22,23,32} Sample sizes of groups varied from 6 participants¹⁸ to 93 participants.³¹ We rated four of the eight studies as “fully” supporting goal setting.^{15,17,18,22}

The remaining five studies with this focus did not produce results that supported the use of goal setting.^{20,21,33–35} Three focused on nutrition^{20,21,33} and two on physical activity.^{34,35} The five studies randomized participants to condition. Sample sizes varied from 15 participants²¹ to 151 participants.²⁰ We described one study as “fully” supporting goal setting.³³

Goal-Setting Characteristic Effectiveness. The second category included six

studies that examined the effectiveness of goal-setting characteristics (i.e., types [*self-set, assigned, participatory/collaborative*],¹⁶ components [*rewards or feedback*],³⁶ or properties [*proximity, specificity, difficulty*])^{9,12,37,38} on dietary activity, physical activity, or both behavior changes. Of the six studies, one focused on physical activity.³⁷ All six studies randomized participants to groups, and sample size of groups ranged from 7 participants³⁷ to 22 participants.³⁶ Two studies were rated as “fully” supporting goal setting.^{16,36}

“Assigned” goal setting was found to be more effective than “self-set” goals at maintaining the measured outcomes.¹⁶ The addition of goal attainment strategies (knowledge and skills) to a nutrition intervention did not enhance the goal-setting outcome.³⁶ Four studies compared the use of proximal vs. distal goals. One study found that distal goals facilitated greater weight loss compared with proximal goals but had a higher attrition rate.⁹ The remaining three studies found no difference on measured outcomes from proximal or distal goals.^{12,37,38} However, the results of one study might have been confounded because half of the subjects in the distal goal group self-set proximal goals.¹²

Goal-Setting Intervention Evaluation. The third category included four studies that examined the effect of an education intervention focused on goal setting compared to a “usual care or no intervention” control.^{39–42}

Studies that used this focus cannot determine whether behavior changes are due to goal setting. Instead, they can determine whether interventions with goal setting are effective at facilitating a desired behavior change.

These interventions produced positive outcomes. Two studies evaluated nutrition interventions,^{39,42} and two evaluated nutrition and physical activity interventions.^{40,41} Three studies randomized participants to condition.^{39–41} Sample size of groups ranged from 94 participants³⁹ to 901 participants.⁴⁰ We rated no interventions as “fully” supporting goal setting.

Adolescents and Children

Adolescents 12–19 Years. One study investigated the effect of a goal characteristic with an adolescent audience (Table 4).⁴³ The study randomized six high schools to condition. Sample size of groups ranged from 50 to 58 participants. Incorporation of a general knowledge component to nutrition education intervention with goal setting did not generate additional behavior gains. Participants who set goals improved nutrient intake; however, the nutrient data for treatment participants were not compared with the data for the “no intervention” control group.⁴³

Children Younger Than 12 Years. Four studies that used goal setting with children have been reported (Table 4).^{44–47} The four studies evaluated the effectiveness of an intervention with goal setting but did not investi-

Table 3

Three Research Foci Used in Goal-Setting Studies in the Nutrition and Physical Activity Behavior Change Literature

Study Focus	Research Focus	Outcome Measure	Adult Studies	Adolescent Studies	Child Studies
Goal-setting effectiveness	Intervention with goal-setting vs. intervention without goal setting	Effectiveness of goal-setting on physical activity and/or dietary behavior change.	Annesi ^{15,31} Schnoll and Zimmerman ¹⁷ Duncan and Pozehl ¹⁸ Alexy ¹⁹ Lutz et al. ²⁰ Baron and Watters ²¹ Schultz ²² Stenstrom ²³ Bandura and Cervone ³² Mann and Sullivan ³³ McKay et al. ³⁴ Cobb et al. ³⁵	No studies found	No studies found
Goal-setting characteristic effectiveness	Intervention with goal-setting characteristic A vs. intervention with goal-setting characteristic B or no characteristic	Effectiveness of goal-setting characteristics such as (1) types (self-set, assigned, participatory), (2) components (feedback, rewards) or (3) properties (proximity, specificity, difficulty) on dietary and/or physical activity behavior change.	Zegman and Baker ⁹ Bandura and Simon ¹² Mazzeo-Caputo et al. ¹⁶ Berry et al. ³⁶ Martin et al. ³⁷ Dubbett and Wilson ³⁸	White and Skinner ⁴³	No studies found
Goal-setting intervention evaluation	Intervention with goal setting vs. usual care (no goal setting) or no intervention	Effectiveness of an intervention with goal setting on dietary and/or physical activity behavior change.	Glasgow et al. ³⁹ Mayer et al. ⁴⁰ Burke et al. ⁴¹ Boeckner et al. ⁴²	No studies found	Sallis et al. ⁴⁴ Howison et al. ⁴⁵ Coates et al. ⁴⁶ Ma and Contento ⁴⁷

gate the independent effect of goal setting. The four interventions were school-based and conducted with fourth and fifth graders. One study was conducted in Taiwan.⁴⁷ Two studies randomized classrooms or schools to condition,^{44,47} and the remaining two studies did not have a comparison group.^{45,46} Sample size of groups ranged from 161 participants nested in two schools⁴⁶ to 955 participants nested in seven schools.⁴⁴ Each study reported improved outcomes on the basis of the interventions. We rated two of the four studies as “fully” supporting goal setting.^{44,46}

Randomization and Sample Size Considerations. For the five adolescent and child goal-setting studies in this review, randomization was conducted at the school or classroom level, whereas unit of analysis was the participant. However, data were analyzed

with classroom nested within treatment. As a result, the denominator degrees of freedom were based on the number of classrooms, not the number of participants, and the actual denominator itself reflects the between-classroom variability, not the between-student variability.

Constraints of school-based intervention studies often necessitate randomization at the school or classroom level because of the difficulty of randomization by participant in a school setting. Randomization by classroom makes it difficult to account for differences between groups without the use of a large number of participating classrooms. If this type of design is used, we advise, first, that sample size calculations definitely take the design into account and should involve calculating the number of classrooms needed, as well as the number of students needed in

each classroom. Second, emphasis should be placed on additional classrooms instead of additional students to account for between-classroom variation.

DISCUSSION

The primary objective of this review was to determine the effectiveness of goal setting as a strategy for changing dietary and physical activity behaviors. Of the 28 studies meeting inclusion criteria, only 13 investigated the effectiveness of goal setting, and these 13 studies targeted adults. No goal-setting effectiveness studies have been reported with adolescent and child audiences.

Goal Setting Studies With Adults

Goal-Setting Effectiveness. Eight of 13 studies, with an appropriate research

Table 4
Dietary and Physical Activity Goal-Setting Studies With Adults, Adolescents, and Children, 1977 to 2003

Target Audience	Research Focus/ Outcome Measure	Study/ Research Rating*	Purpose	Number of Participants and Description	Group Assignment/ Sample Size	Findings	Goal-Setting Support
Adult	Effectiveness of goal setting (Intervention with goal setting vs. intervention without goal setting)	Schnoll and Zimmerman ¹⁷ E, G	Evaluate goal setting and self-monitoring to enhance dietary fiber self-efficacy and consumption.	113 Students in an introductory college nutrition course.	Random assignment: (1) goal setting (n = 29), (2) self-monitoring (n = 29), (3) goal setting and self-monitoring (n = 29), or (4) no goal setting or self-monitoring (n = 26)	Subjects who set goals consumed 91% more fiber and scored 15% higher on a dietary self-efficacy scale than subjects who did not.	Full
		Annesi ¹⁵ E, C, G	Evaluate effect of a goal-setting protocol on exercise maintenance.	100 Members of an Italian fitness club, age 20–60.	Random assignment: (1) goal setting (n = 50) or (2) no goal setting control (n = 50)	The goal-setting group had significantly less dropout and significantly better exercise attendance compared with the control group.	Full
		Duncan and Pozehl ¹⁸ E, G	Investigate a goal-setting intervention to support exercise adherence.	13 Patients with heart failure in a clinic setting.	Random assignment: (1) exercise with goal setting (n = 7) or (2) exercise only (n = 6)	The exercise intervention with goal-setting group demonstrated higher exercise adherence and greater confidence to continue exercising in the future.	Full
		Shultz ²² E, G	Determine the difference between an educational intervention and an educational intervention plus goal-setting strategies on knowledge of and participation in an exercise program.	54 Participants were recruited from a primarily outpatient diagnostic center showing no evidence of cardiovascular disease.	Random assignment: (1) exercise strategies intervention (n = 26) or (2) exercise strategies intervention plus goal-setting strategies (goal setting, self-monitoring, rewarding) (n = 28)	The exercise strategies plus goal setting was more effective than educational strategies alone in improving exercise frequency at 6 weeks, but no difference was found at 12 weeks. Both interventions significantly improved exercise knowledge, frequency, and duration.	Full
		Alexy ¹⁹ E, C	Determine the effect of goal setting and goal type in a health risk reduction intervention.	152 Participants recruited from three industrial or corporate settings.	Random assignment: (1) participatory goal setting (n = 54), (2) assigned goal setting (n = 52), or (3) no goal-setting control (n = 46)	Both types of goal setting were superior to the no-goal setting group, yet goal type did not influence goal achievement. In selected subsamples, assigned goals produced higher program success.	Minimal

Table 4, continued

Target Audience	Research Focus/ Outcome Measure	Study/ Research Rating*	Purpose	Number of Participants and Description	Group Assignment/ Sample Size	Findings	Goal-Setting Support
Adult		Bandura and Cervone ³² E	Investigate the effect of goal setting and feedback on exercise performance motivation.	90 Subjects were drawn from an introductory psychology course.	Random assignment: (1) goals with feedback (n = 20), (2) goals alone (n = 20), (3) feedback alone (n = 20), (4) neither goals nor feedback control (n = 20), or (5) self-judgment control (n = 10)	The goal-setting and goal-setting with feedback groups had significant improvement in exercise self-efficacy and performance compared with the groups without goal setting.	Minimal
		Stenstrom ²³ E	Evaluate effect of adding a goal-setting component to home exercise program.	42 Rheumatoid arthritis patients from Swedish medical facility.	Random assignment: (1) goal setting (n = 22) or (2) pain attention (n = 20)	The goal-setting group had significantly larger decreases in pain rating and increases in exercise load.	Minimal
		Annesi ³¹ C	Test the effects of a computer feedback and goal-setting system on exercise behavior.	164 Participants were new members of a private fitness center.	Convenience assignment: (1) computer-based system with enhanced tracking, goal setting, and feedback (n = 93) or (2) standard exercise tracking and feedback (n = 71)	The computer feedback/goal-setting group had higher attendance, longer adherence, and lower dropout rates compared with the standard feedback group.	Moderate
		McKay et al. ³⁴ E, C	Evaluate the effect of an Internet-based intervention with goal-setting strategies on physical activity levels.	78 Sedentary adults with type-2 diabetes recruited via diabetes-specific Web sites.	Random assignment: (1) intervention (n = 38) or (2) information-only control (n = 40)	Increased physical activity levels were observed in both groups, but no significant differences were found between groups.	Moderate
		Cobb et al. ³⁵ E, S	Determine the effect of goal setting on exercise adherence.	104 Students in a community college fitness program.	Random assignment: (1) goal setting (n = 28), (2) health and fitness reading (n = 33), or (3) control (n = 43)	No significant differences among the three groups in exercise adherence.	Moderate
		Mann and Sullivan ³³ E, G	Determine the effect of goal setting on a hypertension reduction intervention.	66 Participants recruited at a teaching hospital clinic.	Random assignment: (1) task-centered intervention (n = 19), (2) task-centered intervention plus goal setting and self-monitoring (n = 19), or (3) no intervention control (n = 18)	Both intervention groups performed significantly better than the control group in achieving reduced dietary sodium intake; 83% of goals set was achieved, but no support was found for adding goal setting and self-monitoring.	Full

Table 4, continued

Target Audience	Research Focus/ Outcome Measure	Study/ Research Rating*	Purpose	Number of Participants and Description	Group Assignment/ Sample Size	Findings	Goal-Setting Support
Adult		Baron and Waters ²¹ E	Evaluate the effects of goal setting and goal level on weight loss with restraint monitoring (not carrying out an intention to eat).	60 Recruited through advertisement in college newspaper.	Random assignment: (1) no goal setting (n = 15), (2) low goal level (n = 15), (3) moderate goal level (n = 15), or (4) high goal level (n = 15)	Goal setting and goal level had no differential effect on weight loss. All groups lost about the same amount of weight.	Minimal
		Lutz et al. ²⁰ E, C	Evaluate the effects of computer-tailored nutrition newsletters to improve number and variety of fruits and vegetables.	Health maintenance organization members recruited via a mailed survey.	Random assignment: (1) computer-tailored newsletter with tailored goal setting (n = 146), (2) nontailored newsletter (n = 140), (3) computer-tailored newsletter (n = 136), or (4) control (n = 151)	All intervention groups had higher intake and variety scores compared with the control group. No significant differences were found among intervention groups, but a trend of improved intake and variety was found with the addition of each newsletter element (tailored or tailored + goal setting).	Moderate
		Effectiveness of a goal-setting characteristic (Intervention with goal-setting characteristic A vs. intervention with goal-setting characteristic B or no characteristic)	Bandura and Simon ¹² E	Investigate the effect of goal setting on weight loss and the effect of proximal vs. distal goal setting on weight loss.	66 Self-selected individuals were recruited through an advertisement in a community newspaper.	Random assignment: (1) distal self-monitoring (n = 13), (2) proximal self-monitoring (n = 13), (3) distal goal setting (n = 13), (4) proximal goal setting (n = 13), or (5) no intervention control (n = 13)	Goal setting enhanced reduction in weight loss. No differences between the distal and proximal goal-setting groups were detected.
		Dubbert and Wilson ³⁸ E	Evaluate proximal (daily) vs. distal (weekly) goal setting and levels of couple involvement in a weight loss program.	47 Overweight married couples were recruited through newspaper and radio advertisements.	Random assignment: (1) distal goals/couples (n = 12), (2) proximal goals/couples (n = 12), (3) distal goals/individual (n = 12), or (4) proximal goals/individual (n = 12)	All participants lost significant amounts of weight (17 lbs), but weight losses for the two goal-setting conditions and two spouse treatments did not differ.	Moderate
		Berry et al. ³⁶ E, G	Evaluate addition of goal attainment strategies (knowledge and skills) to a goal-setting intervention to improve nutrition-related behaviors.	60 Military personnel recruited at a teaching hospital.	Random assignment: (1) goal setting + knowledge and skills (n = 19), (2) goal setting only (n = 13), or (3) no intervention control (n = 22)	Goal setting + knowledge and skills group had significantly higher nutrition behavior scores than the control group. The goal setting-only group was not significantly different from the other groups.	Full

Table 4, continued

Target Audience	Research Focus/ Outcome Measure	Study/ Research Rating*	Purpose	Number of Participants and Description	Group Assignment/ Sample Size	Findings	Goal-Setting Support
Adult		Mazzeo-Caputo et al. ¹⁶ E, G	Evaluate effects of two teaching strategies on dietary change, which included participants receiving assigned goals or self-set goals.	56 College women enrolled in an introductory nutrition course.	Random assignment: (1) assigned goal setting (n = 22), (2) self-set goal setting (n = 17), or (3) no intervention control (n = 17)	Both intervention groups significantly decreased their intake of calories and total grams of fat and polyunsaturated fats compared with control. Only the prescribed diet group maintained changes throughout the experiment.	Full
		Zegman and Baker ⁹ E	Evaluate proximal vs. distal goals on adherence to prescribed calorie intake.	34 Military personnel recruited through base newspaper.	Random assignment: (1) proximal goal setting (n = 19), or (2) distal goal setting (n = 15)	The distal goal group achieved greater weight losses at cost of more deprivation and higher attrition.	Minimal
		Martin et al. ³⁷ E	Evaluate effect of distal vs. proximal goal-setting strategies on exercise adherence.	34 Sedentary adults enrolled in a free exercise course at a community college.	Random assignment: (1) proximal goal setting, 1-week intervals or (2) distal goal setting, 5-week intervals	Proximal goal participants had mean class attendance of 71%, and distal goal participants had a mean class attendance of 83%. The difference was not statistically significant ($p = 0.07$).	Moderate
	Effectiveness of intervention with goal setting (Intervention with goal setting vs. usual care [no goal setting] or no intervention)	Mayer et al. ⁴⁰ E, C	Evaluate goal setting and counseling on health behaviors of older adults.	1800 Subjects who are members of health maintenance organizations were recruited.	Random assignment: (1) goal setting and counseling intervention (n = 899) or (2) usual care/control (n = 901)	Intervention participants had significant increases in activity level and selected nutrition behaviors relative to control subjects.	Moderate
		Burke et al. ⁴¹ E, C	Evaluate an intervention with a goal-setting component to encourage physical activity, a healthy diet, and weight control.	137 Couples living together less than 2 years.	Random assignment: (1) high level (half of the intervention was in person and half by mailings) (n = 47 couples), (2) low level (intervention primarily by mailings) (n = 47 couples), or (3) usual care (n = 43 couples)	Intervention participants decreased fat intake and increased physical activity and fitness compared with the usual care participants.	Moderate
		Boeckner et al. ⁴² C	Evaluate nutrition course to reduce risk of coronary heart disease, cancer, osteoporosis, and obesity.	142 Participants recruited via advertisement from seven counties in Nebraska.	None—intervention group only	Participants made significant positive changes in food practices (decreased selection of high-fat cheeses, regular red meats, sodium-rich products, etc.).	Moderate

Table 4, continued

Target Audience	Research Focus/ Outcome Measure	Study/ Research Rating*	Purpose	Number of Participants and Description	Group Assignment/ Sample Size	Findings	Goal-Setting Support
Adolescent	Effectiveness of a goal-setting characteristic (Intervention with goal-setting characteristic A vs. intervention with goal-setting characteristic B or no characteristic)	White and Skinner ⁴³ E, C	Evaluate the addition of a knowledge component to a nutrition and goal-setting intervention for high school health classes.	159 Ninth- and tenth-grade students in 12 classrooms from six high schools.	Random assignment: (1) goal-setting intervention (n = 2 schools, 51 students), (2) goal setting + knowledge intervention (n = 2 schools, 58 students), or (3) no intervention control (n = 2 schools, 50 students)	The addition of the knowledge component to the nutrition and goal-setting intervention did not produce significant differences compared with the goal setting-only group; 67% of intervention participants reported improved intake of the nutrient they selected as a goal.	Moderate
Children	Effectiveness of intervention with goal setting (Intervention with goal setting vs. usual care [no goal setting] or no intervention)	Coates et al. ⁴⁶ C, G	Evaluate effectiveness of a school-based intervention with Social Learning Theory in changing eating and exercise habits.	161 Fourth- and fifth-grade students from two schools.	None—intervention group only	Compared with pretest, students made significant eating behavior and knowledge changes. Changes in exercise were minimal.	Full
		Howison et al. ⁴⁵ C	Develop and evaluate a nutrition education program focusing on food selection behavior and nutrition knowledge.	934 Fifth-grade students in 37 classrooms.	None—intervention group only	Students significantly increased nutrition knowledge scores and number of daily servings in each of the four food groups.	Moderate
		Sallis et al. ⁴⁴ E, C, G	Evaluate effect of physical education program on physical activity during school and outside of school.	955 Fourth- and fifth-grade students from seven schools.	Seven schools were stratified by ethnicity and randomly assigned to: (1) PE specialist-implemented intervention, (2) trained teacher intervention, or (3) usual care control	Students in both treatment groups spent more time being physically active in school compared with the control group. The behaviorally focused (goal setting) aspect of the intervention had no effect on outside activity.	Full
		Ma and Conento ⁴⁷ E, C	Develop and evaluate a nutrition education curriculum for Taiwanese children in an after-school setting.	262 Fifth-grade students in eight classrooms.	Two schools randomly selected from 78 schools in low-income districts. Four classes randomly selected from the two schools. Classes randomly assigned to: (1) intervention group (n = 4 classrooms) or (2) no intervention control group (n = 4 classrooms)	Intervention group scored higher for knowledge, attitudes and skills. No differences between groups were found for food choice intentions and intake of low-fat foods.	Moderate

* Methodological quality rating: E, experimental design with random assignment to groups; S, sample size calculations reported; C, cell size >30; and G, goal setting fully supported by study.

focus to investigate the effect of goal setting, showed goal setting had a statistically significant positive effect on either dietary or physical activity behaviors.^{15,17-19,22,23,31,32} A possible lack of statistical power might contribute to the inconsistent findings. No studies reported power calculations, limiting our interpretation of results. One author mentioned sample size without providing relevant details to determine power calculations.²² Lack of reported power calculations for identification of adequate sample size was a weakness of all 28 studies in this review.

Goal-Setting Characteristic Effectiveness. An examination of goal type found that assigned goal setting was the most common type of goal setting used among the adult studies.^{17,18,20,21,38} Participatory or collaborative goal setting was used in three studies,^{22,23,33} and self-set goal setting was used in four studies.^{15,16,34,35} Goal type could not be determined in one study.⁴¹ Only two studies compared the effect of different goal types on goal attainment.^{16,19} On the basis of the results of these studies, a single type of goal setting cannot be determined as superior. It is the authors' belief that many factors (age, readiness to change, type of behavior being targeted, respect for the educator) can influence appropriateness of goal type. Further research is warranted to determine which type is superior for a particular audience.

Compared with distal goals, proximal goals might be assumed to be more effective at promoting behavior change. They are considered to be more tangible and more difficult to postpone with more immediate rewards from goal accomplishment. However, the four studies in the dietary and physical activity fields produced inconclusive results.^{9,12,37,38}

Goal-Setting Intervention Evaluation. Of the four intervention evaluation studies with adults, all showed positive effects on dietary, physical, or both activity behaviors attributable to the intervention, although none were rated as fully supporting goal setting.³⁹⁻⁴² It appears that interventions with goal setting can facilitate dietary and

physical activity behavior change with adults.

Expanded Discussion of Sample Size. Of the 23 adult studies reviewed, none presented any information about sample size determination. Therefore, it is impossible to know whether the reason for no difference between groups was because of the lack of statistical power or whether there truly was no difference between groups. For example, Mann and Sullivan,³³ using a research design appropriate for testing goal-setting effectiveness, conducted a study that appeared to spend adequate time on goal-setting activities. No statistically significant results were found between the two groups, although results showed a positive trend. The lack of statistically significant findings was possibly a result of small cell size (<20). Three additional studies had small cell sizes (n = 13-26), and all had minimal detection of significant differences between groups.^{12,21,23} Attention should be given to the inclusion of sample size calculations and the use of appropriate sample sizes in goal-setting research.

Goal-Setting Support. We evaluated each study for level of goal-setting support. Looking specifically at the studies that used the goal-setting effectiveness focus (n = 13), five adult studies were rated as having full goal-setting support. Four of the five studies showed a significant goal-setting effect.^{15,17,18,22} The study that did not might have had a statistical power problem with a cell size of 19.³³ Three of the four studies with a moderate level of support did not show significant goal-setting effects,^{20,34,35} whereas one did.³¹

In one of the studies providing full goal-setting support, Schnoll and Zimmerman¹⁷ found a strong goal-setting effect on dietary behaviors. The goal-setting procedures used were (1) self assessment at the beginning of the goal-setting process, (2) the use of proximal goals, and (3) frequent goal progress tracking. In addition to providing full goal-setting support, this study had a robust sample size. Few studies, such as this example, support the effectiveness of

goal setting to promote dietary and physical activity behavior change in adults. Maximizing the ability to observe a positive goal-setting effect includes designing a study with the following components: goal-setting effectiveness research focus, fully supported goal setting, ample sample size supported by power calculation, and use of goal-setting theory to design goal-setting support.

Goal Setting Studies With Adolescents (12-19 Years)

We found only one study with high school adolescents meeting our criteria for this review.⁴³ We found no studies with middle school adolescents. The research focus did not allow for testing the differential effect of goal setting on behavior change. However, an important contribution of this study was the new knowledge that high school adolescents were able to set a dietary goal and make progress toward achieving it. The participating adolescents made desirable dietary changes on the basis of their personal goals.

O'Hearn and Gatz⁴⁸ investigated the effect of a primary prevention program promoting positive mental health with the use of goal setting among middle school adolescents. Although not exclusively investigating the effect of goal setting on nutrition and physical activity behaviors, this study found that middle school students could learn some goal-setting skills, set a goal, and make progress toward achieving this goal.⁴⁸ Although the students showed significant increases in goal-setting knowledge, O'Hearn and Gatz⁴⁸ expressed that the students did not master a substantial amount of the program content. We conclude that age-appropriate goal-setting methodological research is needed.

Youths 12 to 14 years old are beginning to understand abstract concepts, relate to nutrition concepts, and understand causality (e.g., what I eat affects my health, growth, weight, etc.).⁴⁹ They are moving from the concrete operational stage of cognitive development, thinking logically about concrete objects and places, to the formal operational stage with logical thought about abstractions.⁵⁰

Goal setting is an abstract concept. If youth 12 to 14 years of age have not developed the ability to think logically about abstractions, attempting to change dietary and physical activity behaviors through self-set goals would theoretically be futile.

The question of youth aged 12 to 14 years having the ability to understand and apply goals arises is important. Instead of expecting these youth to develop and set their own goals, the authors of this review have proposed “guided goal setting” as a new goal type (Table 2). Guided goal setting encourages youth to *choose* from a variety of structured goals developed by the practitioner, thus maintaining the adolescent’s autonomy.^{51,52} This menu approach to goal setting eliminates the possibility of inappropriate goals (i.e., goals that are unattainable, distal, or too general) yet ensures that the goal choices are attainable, proximal, specific, and difficult. We recommend that this type of goal setting be studied for appropriateness and effectiveness with youth aged 12 to 14 years.

Goal Setting Studies With Children (<12 Years)

No studies investigating the independent effect of goal setting with this age group were identified in our literature search. However, four interventions with goal setting have been evaluated. At the same time, we have noticed that many nutrition and physical activity programs targeting children have incorporated goal setting into their content as a behavior change strategy. If goal setting is to be used with children, we recommend that it be used with prudence until research is conducted to determine its effectiveness and appropriateness. We propose the use of an age-appropriate type of goal setting—classroom-level or group-level instead of individual-level goal setting (Table 2). With this method, children agree on one goal for the group as opposed to having each student set a personal goal. The educator guides the group in setting an appropriate goal, and the class works toward achieving the group goal. We recommend this group-set method of goal setting for children under 12 years of

age because formulating a goal requires complex skills these children possibly have yet to master. However, it is most important to reiterate that no evaluation on types of goal setting with children have been reported in the literature on dietary and physical activity behavior change.

Limitations of the Study

Although the authors used a systematic framework to evaluate each study, this review is both qualitative and quantitative, and findings must be interpreted with this in mind. Also, despite a thorough attempt to include every study meeting inclusion criteria, some studies might have been unintentionally overlooked. Finally, judgments were made on the basis of what was reported in the articles reviewed, not necessarily what actually occurred.

SO WHAT? Implications for Health Promotion Practitioners and Researchers

On the basis of these findings, moderate evidence indicates that implementing goal setting as a dietary or physical activity behavior change strategy is effective with adults, and those studies that fully supported goal setting were more likely to produce positive results. No studies investigated the effect of goal setting among adolescents and children. On the basis of these findings, practitioners should apply goal-setting strategies fully when promoting dietary and physical activity behavior change with adults. In addition, these findings suggest that researchers should conduct experimental studies with attention paid to power calculations, fully supported goal setting, and the appropriate research focus to establish efficacy with adolescents and children. Goal-setting methodologies, which might vary by age of target audience and the intervention setting, need to be studied for all age groups.

CONCLUSION

We conclude that goal setting has shown promise in promoting dietary

and physical activity behavior change among adults. The 13 adult studies investigating the effect of goal setting on dietary and physical activity behaviors provide a reference point from which to direct future studies. Researchers should consider the methodological issues raised here in planning future studies. The literature on goal setting with adolescents and children is limited, and to the authors’ knowledge, no research has been conducted investigating the independent effect of goal setting on dietary or physical activity behavior of youth. Because goal setting is used in many nutrition and physical activity programs in all age categories, we recommend that research employing the requisite methods be conducted to determine the effectiveness of goal setting in the nutrition and physical activity fields, particularly with adolescents and children.

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