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Goal setting frequency and the use of behavioral strategies related to diet and physical activity

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Abstract

Goal setting is an effective way to focus attention on behavior change. Theoretically, frequency of goal setting may indicate the level of commitment to diet and physical activity behavior change. Yet, little is known about the association between goal setting frequency and use of specific diet or physical activity-related strategies. This study examines whether changes in goal setting frequency predict changes in use of behavioral strategies over time, controlling for baseline strategy use, demographics and whether a person was trying to lose weight. Data are from a baseline and 1-year follow-up survey of adults in rural Iowa (n = 385). Overall, goal setting frequency was positively associated with use of the strategies measured, at baseline and overtime. Frequent goal setting that is focused specifically on diet or physical activity was more predictive of using dietary or physical activity strategies, respectively, than goal setting focused on weight loss overall. The study provides empirical support for what has been assumed theoretically, that is, frequent goal setting for weight management is an indicator of use of specific behavioral strategies. Significant challenges remain in regard to maintenance of this activity and attainment of weight loss goals.

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Introduction

The obesity epidemic in the United States has led to considerable interest in the processes of diet and physical activity-related behavior change [1, 2]. Social cognitive theory and self-regulation constructs in particular have been used to guide many weight management intervention programs. Goal setting is a key component of such programs and has been shown to be effective in focusing the attention of a participant toward behavior change [3].

Studies have examined characteristics of goals in the context of weight management, including their specificity or difficulty, and their associations with behavioral performance [4, 5]. Other studies have examined whether it is more advantageous for goals to be set by individuals themselves, a health professional or in a partnership of the two [6]. Self-directed goal setting, whether in the context of an intervention or not, has been found to be generally appropriate, and people who set goals tend to use positive behavioral strategies over negative ones to reach their goals [5, 7]. Strategy use in such studies is typically indicated by fairly broad measures of behavior such as reports of decreased fat intake, reduced caloric intake or increased physical activity. Little is known about the use of more specific diet or physical activity-related strategies following goal setting, especially outside the context of a formal intervention.

Self-regulation theory suggests that goal setting should be an iterative process whereby the person evaluates his/her performance, and subsequently revises his/her goals or sets entirely new ones [3]. Thus, frequent goal setting activity might be

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an indicator of a stronger commitment toward behavior change, especially in the context of complex behavioral management that occurs over a period of time, such as weight loss attempts. More pessimistically, frequent goal setting could also reflect a tendency to set unrealistic goals that are not acted upon and/or require constant modification.

This study presents an examination of goal setting frequency and its association with the use of specific behavioral strategies related to diet and physical activity, outside the context of a behavioral intervention. An initial baseline analysis is presented, followed by an assessment of whether changes in goal setting frequency predict changes in use of behavioral strategies over 1 year's time. The primary hypotheses were that frequent goal setting would be strongly and positively associated with use of specific behavioral strategies at baseline, and that changes in goal setting frequency would be positively associated with changes in strategy use. A secondary hypothesis was that frequent goal setting that is focused specifically on diet or physical activity would be more predictive of using dietary or physical activity strategies, respectively, than goal setting focused on weight loss overall.

Methods

Design and sample

Data for this study are from a larger study conducted in 2003 and 2004 in two towns of rural Iowa, USA, each with a population of ~2300 persons and similar demographic characteristics. The original purpose of the study was to provide a baseline and 1-year follow-up assessment of a variety of health behavior issues and serve as a resource for community-based participatory research projects. The present study is focused only on persons who participated in both the baseline and follow-up assessments.

Details of the larger study design and sampling procedures are described elsewhere [8] and only briefly reviewed here. A sampling frame was constructed to include adults aged 18 years and older living within a 3-mile radius of each town. From this list, individuals were randomly selected to receive introductory letters describing the study and informing them that they would be contacted soon via telephone. The letters were followed by telephone calls inviting eligible persons to participate. A total of 407 persons (201 from one town and 206 from the other) were enrolled in the study at baseline and completed the assessments which took place in local churches. Using eligible persons reached by telephone as the denominator, this represents a response rate of 25%. Of the baseline participants, 354 (87%) returned for the follow-up assessment 1 year later. Persons lost to follow-up were slightly younger on average than those who returned, but no gender, education or income differences were noted. Using census data from the region as a comparison, participants were more likely than the general population to be over the age of 45 years, have a higher income and to have more than a high school degree. The population in this region is nearly all non-Hispanic white.

Data collection and measures

The study was approved by the Human Subjects Committee of the University of Iowa. Written informed consent was obtained prior to data collection, which was completed in a 90-min visit at a local church. The churches were chosen simply because they were well-known places in the community and had appropriate space available. Persons involved in data collection were extensively trained in standardized procedures.

Only the subset of measures used in this report is described below. Demographic measures were interviewer-administered and included age, gender and education level. The education measures were the same as those used in the Behavioral Risk Factor Surveillance System [9], with levels later collapsed into the three categories of less than high school degree, high school only and more than a high school degree. A single item asked 'Are you currently trying to lose weight?' with response options of yes or no.

Goal setting frequency was measured by individual items asking how often the person had set goals for weight management, dietary intake

and physical activity (i.e. How often did you set goals related to your weight? Your eating habits? How much you exercise?) using response options of almost never, sometimes, often or almost always (assigned values of 1 through 4, respectively). Change in goal setting frequency was calculated by subtracting the Time 2 value from the baseline value; thus, change could be positive or negative.

Measures of goal setting described above, as well as diet and physical activity-related strategy use, were included in a self-administered instrument called the diet and exercise self-management survey. The specific content of this instrument was guided in part by focus group results [10], the curriculum of major intervention studies such as the Diabetes Prevention Program [11] as well as standard recommendations for healthy weight management [12]. It was also guided by a conceptual framework of chronic disease self-management that is based on elements of social cognitive theory [13] and proposed by Clark [14, 15]. The framework is especially focused on the self-regulation process. This study is designed to examine only the behavioral strategies measured and their relationship to goal setting, not to test the validity of the entire conceptual framework.

The diet and exercise self-management survey instrument was pre-tested among 123 adults in the same community ~1 year earlier in a study called the Rural Iowa Diet and Exercise Study [16]. A test–retest procedure at that time demonstrated intra-class correlations for scales ranging from 0.62 to 0.85, indicating good to excellent reliability for the individual scales [17]. Cronbach alpha values ranged from 0.69 to 0.93, and factor analysis fit statistics showed a good to reasonable fit between the data and each of the scale models (0.91 to 1.0). Psychometric characteristics of the scales as demonstrated in the community study from which data for this report are drawn are described in detail elsewhere [8]. Alpha values for the scales ranged from 0.73 to 0.90.

Most items in the survey instrument offered a four-point response option (e.g. almost never, sometimes, often and almost always). For all these measures, participants were asked to reflect back on the past month in answering the questions. A list of all items in each scale is presented elsewhere [8]. The diet self-regulation process was represented by a scale measuring 'self-monitoring of diet' with items such as the following: 'How often do you keep track in your head of the amount of food you eat'. 'Self-monitoring of physical activity' behavior included items such as, 'How often do you keep a record in your head of how physically active you've been during a week'.

Additional scales represent other strategies believed useful in weight management. 'Planning' strategies are captured in a five-item scale which includes, for example, 'How often do you plan meals ahead of time?'. 'Preparation and buying' behaviors to reduce fat intake are in a six-item scale, while 'portion control' is assessed in a scale with five items, for example, 'how often do you refuse offers of food when you are not hungry?'. A diet-related 'social interaction' scale consists of three items regarding diet change: 'how often do you ... try to bring healthy foods to social events with family members or friends?' 'serve healthy foods when you have family or friends over?' and 'when you go out to eat with family members or friends, suggest restaurants that have at least some healthy choices on the menu?'. 'Social interaction regarding physical activity' was captured with items such as 'how often do you ... ask a friend or relative to do some physical activity with you?'. A five-item scale of 'diet-related cognitive strategies' was included which parallels one related to 'physical activity' developed by Saelens *et al.* [18] (e.g. 'how often do you reward yourself for eating healthy foods?').

Previous analyses using the same dataset have provided support for the validity of the behavioral strategy measures described above. For example, greater use of strategies for portion control, diet self-monitoring, meal planning, food preparation, social interaction related to diet and cognitive strategies were all associated with a lower caloric intake and a lower proportion of intake from fat assessed via food frequency questionnaire [8]. Similarly, use of strategies for self-monitoring physical activity, social interactions around physical activity and cognitive strategies were associated

with greater scores for physical activity using a modified form of the Baecke Physical Activity Questionnaire [8, 19, 20]. Additional previous analyses demonstrated that compared with men who were trying to lose weight, women trying to lose weight reported more frequent use of all strategies measured [21]. These findings regarding gender are quite consistent with other gender comparison studies that used broader measures of these behaviors [22–25]. Another analysis has shown age group differences in diet-related strategy use that are consistent with age group differences in dietary intake and body weight [26]. That is, use of behavioral strategies increases across age groups as caloric intake and fat intake decline.

Data analysis

Analyses are based on data from the 354 persons who completed both the baseline and follow-up assessments. Since no systematic, significant differences in demographic or behavioral measures were noted between the two towns for either time point, data were combined for the purposes of this study.

Spearman correlation coefficients were calculated to examine the association between goal setting frequency and strategy use at baseline. Multiple regression analyses were used to assess whether changes in goal setting activity predicted changes in strategy use over 1 year's time while controlling for strategy use at baseline, as well as age, gender, education and whether the participant was currently trying to lose weight. In a series of separate models, strategies related to both diet and physical activity were examined in relationship to setting goals for body weight, while only strategies related to diet were examined in relationship to setting dietary goals, and only strategies related to physical activity were examined in relationship to setting physical activity goals. The analyses were conducted in SAS version 9.1 [27].

Results

Of the 354 participants who completed both the baseline and follow-up assessments, 59% were women, and the average age was 56 years with a range of 25–88 years. Approximately 5% had less than a high school education, 37% had only a high school education or equivalent and the remainder (58%) had more than a high school education. At baseline, ~45% (n = 159) of the study population stated they were currently trying to lose weight. Previous analyses have shown that 73% were overweight [body mass index (BMI) $\geqslant$ 27] if not obese (BMI $\geqslant$ 30), and the mean percent of total kilocalories from fat was 36.6 (standard error = 7.93), based on data from the modified block food frequency questionnaire [28].

The distribution of goal setting frequency is shown in Table I. For each type of goal (weight, diet, physical activity), the most commonly endorsed response was 'sometimes' and the least endorsed was 'almost always'.

Baseline correlations between goal setting frequency and strategy use

At baseline, frequency of goal setting related to body weight was significantly and positively correlated with use of all six diet-related strategies and

Table I. *Frequency of goal setting related to weight, diet and physical activity*

	n (%)
In the past month ... How often did you set goals related to your weight?	
Almost never	129 (32.3)
Sometimes	152 (38.1)
Often	84 (21.0)
Almost always	34 (8.5)
In the past month ... How often did you set goals related to your eating habits?	
Almost never	78 (19.5)
Sometimes	191 (47.8)
Often	99 (24.8)
Almost always	32 (8.0)
In the past month ... How often did you set goals related to how much you exercise?	
Almost never	111 (27.9)
Sometimes	152 (38.2)
Often	95 (23.9)
Almost always	40 (10.5)

all three physical activity-related strategies (all $P < 0.0001$), with the lowest correlation being in regard to portion control ($r = 0.28$) and the highest in regard to self-monitoring of diet ($r = 0.56$). Frequency of goal setting related to diet was significantly and positively correlated with use of all six diet-related strategies (all $P < 0.0001$), with the lowest correlation again in regard to portion control ($r = 0.32$) and the highest in regard to self-monitoring of diet ($r = 0.65$). A similar pattern was found with regard to physical activity. Goal setting related to physical activity was significantly and positively correlated with use of all three physical activity-related strategies (all $P < 0.0001$), with the lowest correlation in regard to use of cognitive strategies ($r = 0.61$) and the highest in regard to self-monitoring of physical activity ($r = 0.69$).

Changes in goal setting frequency as a predictor of changes in strategy use

Table II presents results of multiple regression models with strategy use at Time 2 as the dependent variable, and change in frequency of goal setting over time as predictors. Models controlled for baseline strategy use, age, gender, education level and whether the participant was trying to lose weight. All findings were statistically significant ($P < 0.05$) with the exception of the association of diet-related goal setting change and use of social interaction strategies, and the association of weight-related goal setting change and use of preparation/buying strategies. Four of the six diet-related strategies were more strongly associated with changes in diet-related goal setting than with changes in weight-related goal setting. In addition, all three physical activity-related strategies were more strongly associated with changes in physical activity-related goal setting than with weight-related goal setting.

Discussion

Overall, the results support the hypotheses of the study. Goal setting frequency was found to be strongly and positively associated with use of the strategies measured, both at baseline and over-time, with a few exceptions. This is consistent with other studies showing goal setting activity to be associated with more successful weight management [4, 5]. In addition, goal setting specifically related to diet or physical activity was, in most cases, more strongly associated with the corresponding strategies than goal setting related to body weight. This finding is also supported by other studies where focused goal setting has been found to be more effective than general goal setting [6].

Self-monitoring appears to be quite strongly associated with goal setting frequency. This is

Table II. *Associations between goal setting frequency and strategy use, controlling for strategy use at Time 1, age, gender, education level and trying to lose weight* (n = *354*)

Strategy (Time 2)	Change in weight-related goal setting		Change in diet-related goal setting		Change in physical activity-related goal setting	
	β	*P* value	β	*P* value	β	*P* value
Self-monitoring of diet	0.69	0.0004	1.7	<0.0001		
Planning diet	0.42	0.0004	0.76	<0.0001		
Preparation/buying	0.22	0.18	0.42	0.03		
Portion control	0.44	0.003	0.47	0.01		
Social interactions, diet	0.26	0.01	0.17	0.12		
Cognitive/behavioral strategies, diet	0.46	0.002	0.80	<0.0001		
Self-monitoring physical activity	0.32	0.01			1.02	<0.0001
Social interactions, physical activity	0.31	0.006			0.68	<0.0001
Cognitive/behavioral strategies, physical activity	0.41	0.01			0.82	<0.0001

perhaps not surprising as both involve paying attention to one's behavior. On the other hand, use of positive strategies in social situations was less associated with goal setting. These strategies tend to be less commonly promoted in weight management information provided to the public than strategies such as portion control and meal planning, so they are perhaps not as likely to be part of the average person's repertoire of strategies. It is unclear why preparation and buying strategies were not as strongly associated with changes in weight-related goal setting as some other strategies. This may be due to measurement error or differences in stability over a year's time among these different categories of behaviors.

As expected, the results suggest that setting more specific goals, e.g. for diet or physical activity, is generally more strongly associated with strategy use than setting weight-related goals. Setting goals for weight only may reflect a less serious attempt to change one's lifestyle than setting goals more specifically for dietary intake and physical activity. Other research has shown that when persons report they are trying to lose weight, they are more likely to be changing their diet rather than their physical activity habits [23]. The findings of this study are consistent with this pattern in that goal setting related to weight and diet show more similar associations to strategy use than goal setting related to weight and physical activity.

There are a number of limitations to this study. Use of negative strategies was not measured, and participants may also have used additional positive strategies not captured in the survey instrument. In addition, neither the specific nature of the goals was determined nor is it known whether participant goal setting involved repeated revisions of only one or two goals or a variety of different goals. Alternate ways of determining goal setting frequency might yield different or more informative results, e.g. providing a different time frame, different wording of item stems or response options. Results might also vary in a more racially diverse population.

The study provides empirical support for what has been assumed theoretically, that is, self-set and frequent goal setting for weight management is an indicator of use of specific and positive self-management strategies. This is shown both cross-sectionally and overtime. Studies that are designed to more specifically characterize the iterative nature of goal setting activity over time would add depth to our understanding of this behavior and its association with long-term behavior change. Weight management intervention studies that emphasize goal setting may want to measure this activity, but also measure use of specific strategies in addition to dietary intake and physical activity. This will allow them to more clearly document, and subsequently analyze, the theorized pathway toward successful weight loss. Significant challenges remain in regard to maintenance of this activity and attainment of weight loss goals.

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Conflict of interest statement

None declared.

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