Health Education & Behavior
38(5) 521–529

DOI: 10.1177/1090198110385774
http://heb.sagepub.com
SAGE

Effects of Goal Setting on Dietary and Physical Activity Changes in the Boy Scout Badge Projects

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Abstract

Background: This study evaluates the relationship of goal setting to low-fat vegetable (LV) and fruit/100% juice (FJ) consumption and physical activity (PA) change. **Methods:** A total of 473 10- to 14-year-old Boy Scouts from Houston took part in a 9-week intervention. A two-group (LV and FJ or PA) intervention design was used with each group serving as the control for the other. Internet-based activities included goal setting at home. Food frequencies measured dietary intake. **Results:** Goals attained were not related to LV intake or PA. Immediate posttest FJ consumption increased about 0.7 servings as home FJ availability increased, but social desirability of response appeared to confound reports of FJ intake at posttest 6 months assessment. **Conclusions:** Goals attained were not related to LV intake or PA but was related to FJ intake, but only when home FJ availability was high and the relationship was confounded by social desirability of response. Further research is needed with higher quality measures of dietary intake to clarify these relationships.

Keywords

goal setting, diet, physical activity, children

Background

According to the *Dietary Guidelines for Americans 2005*, children and adolescents should consume at least nine servings of fruit and vegetables (FV) a day and engage in at least 60 minutes of physical activity (PA) on most, preferably all, days of the week (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2008). However, most youth have not met these guidelines (Guenther, Dodd, Reedy, & Krebs-Smith, 2006; Troiano et al., 2008).

Goal setting has been part of successful interventions for education (Bandura & Schunk, 1981) and behavior change (Robinson, 1999). A goal is an intention and provides focus to the behavior change process (D. Thompson et al., 2007). Goal setting has been defined as a four-step process starting with acknowledging the need of a goal, formulating the goal, involvement in goal-directed activities, and self-reward on goal achievement (Cullen, Baranowski, & Smith, 2001). Goal characteristics are also important. For example, specific, short-term goals are more likely to be achieved than vague, long-term goals (Locke & Latham, 2002). This is important because success at achieving goals predisposes one to setting additional goals, which has been called the psychological success cycle (Hall & Foster, 1977). Successful goal attainment increases one's ability to successfully perform the behavior (i.e., self-efficacy; Bandura & Schunk, 1981).

Goal setting as a behavior change intervention procedure was originally developed for business situations (Latham & Locke, 2007). While quite successful in those settings (Latham & Locke, 2007), a number of limitations have also been identified (Ordóñez, Schweitzer, Galinsky, & Bazerman, 2009). Although "short-term attainable goal setting" has been encouraged for pediatric obesity treatment (Barlow, 2007), the literature on the effects of goal setting among children and adolescents is limited (Shilts, Horowitz, & Townsend, 2004). Goal setting was effective in increasing fruit and vegetables (FV) consumption (Baranowski et al., 2003; Beckman, Hawley, & Bishop, 2006; Cullen et al., 2001; Cullen, Watson, Zakeri, Baranowski, & Baranowski, 2007; Robinson, 1999), but the

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effects were moderated by home availability (Cullen et al., 2003) and food preferences (Cullen, Zakeri, et al., 2004). Only recently have reports appeared on goal setting in promoting PA among children (Shilts, Horowitz, & Townsend, 2009), and these effects were moderated by "goal effort" and "spontaneous goal setting." Therefore, the aims of this study were (a) to evaluate the relationship between goal setting and diet and PA behavior change among Boy Scouts participating in intervention programs to increase either fruit juice (FJ) and low-fat vegetable (LV) intake or PA and (b) to examine whether baseline home FJ and LV availability or FJ, LV, or PA preferences moderated the effects of goal setting.

Method

Design

This is a secondary analysis of a cluster randomized controlled trial to change either diet or PA among Boy Scouts (Jago et al., 2006; D. Thompson et al., 2009). The study was a two-group design: one group participated in a PA intervention (Fit for Life [FFL] Badge program; Jago et al., 2006) and the other received a "mirror image" FV intervention (Five a Day [5ADay] Badge program; D. Thompson et al., 2009). Troops were randomly assigned to badge programs after baseline assessment. Both groups provided diet and PA data; thus, each intervention group served as the control for the other. The Baylor College of Medicine Institutional Review Board approved this study (November 5, 2001), and written informed consent was obtained from all participants.

Participants/Setting

A total of 473 10- to 14-year-old Scouts were recruited from 42 troops in the greater Houston area. This cluster randomized control trial was conducted in two waves in spring 2003 (March-baseline; 16 troops) and fall 2003 (August-baseline; 26 troops). It included three data collection periods (baseline, immediate posttest, and 6 month posttest).

Intervention

Both interventions lasted 9 weeks. Each included approximately 55 minutes of weekly programming (approximately 30 minutes of in-troop activities, plus 20-25 minutes of Internet activities). Both troop programs included skill-building activities at troop meetings. Internet-based activities included behavior change activities such as goal setting, goal review, role modeling, and problem solving (Jago et al., 2006; D. Thompson et al., 2009).

In-troop components. Trained dieticians led weekly in-troop 5ADay Badge activities. Participants were taught functional knowledge (e.g., portion size) and skills (e.g., recipe preparation). Recipe preparation was designed to enhance preparation skills, thereby increasing FV self-control behaviors and self-efficacy. Tasting of prepared recipes was conducted to increase FV preference. These Scouts were provided a Boy Scout "recipe" booklet to facilitate home preparation of youth-friendly FV recipes (D. Thompson et al., 2009). For the FFL Badge, troop leaders were trained in PA and led 20- to 30-minute PA sessions during the troop meetings, focusing on building PA skills in sports activities attractive to young males. These Scouts were provided a Boy Scout "drills" booklet to facilitate their performing these activities at home (Jago et al., 2006). Troop leaders made outcome-expectancy comments related to the desired behaviors in each group.

Online components. For the Internet-mediated intervention, both groups logged onto the study website at least twice a week from home. The first log-on was to participate in the behavior change program and set behavior change goals that gradually increased the number of FV servings to consume or the number of minutes of PA every week. The goals identified specific foods, meals and days or specific PAs, times and days on which the goal would be attained, barriers that were likely to occur (selected from a menu), and ways to overcome that barrier (selected from a menu). The second log-on was to report goal attainment (or not) just before the weekly troop meeting. Weekly, a Boy Scout character in a cartoon-type story faced and overcame barriers to PA, or FV, goal attainment, depending on condition. The weekly story ended with a story "cliffhanger" designed to entice the viewing Scout to return to the website the following week to learn the resolution of the cliffhanger. Scouts who reported not meeting their weekly goal(s) were transitioned to a computerized problem-solving component that asked the child to identify the barrier that occurred, how this might be overcome in the future, and given the option to repeat attempting that goal in the coming week, in addition to attaining the new goal. There was a different FV or PA knowledge game on the website each week (Jago et al., 2006; D. Thompson et al., 2009). Points were awarded for attending troop sessions and setting and achieving activity goals. At the end of the program, a FFL or 5ADay Badge was awarded to participants who earned at least 70% of the possible points.

Measures

Scout's ethnicity and the highest household educational attainment (measure of socioeconomic status) were obtained by parental report. Stature was measured according to a standard protocol (Lohman, Roche, & Martorell, 1988) to the nearest 0.1 cm using a stadiometer (Shorr Height Measuring Board; Olney, MD). Body weight was measured according to a standard protocol (Lohman et al., 1988) to the nearest 0.1 kg using a calibrated scale (Seca 770 Model Scale; Vogel and Halke, Hamburg, Germany). Body mass index (BMI) and BMI percentile (BMI%tile) were computed using Centers for Disease Control age- and gender-specific percentiles.

Two hypothesized mediators of PA change, self-efficacy and preferences, were measured at each time period using validated questionnaires (Sherwood, Taylor, et al., 2004). The self-efficacy scale had 17 items and a three-point response scale (1 = *Not at all hard*; 2 = *A little hard*; 3 = *Very hard*), with α reliability coefficients of .54 to .71 (Saunders et al., 1997) and .67 (Sherwood, Beech, et al., 2004). Preference measures the number of physical activities in which a child enjoys playing. The preferences scale included 31 items (different physical activities) and a three-point response scale (1 = *Don't like it*; 2 = *Like it a little*; 3 = *Like it a lot*), with a reliability coefficient of .85 (Sherwood, Beech, et al., 2004).

FV self-efficacy was measured with a modified version of a questionnaire with acceptable internal consistency (.72-.87) and 2-week test-retest reliability (.52-.67; Domel et al., 1996). The modified scale contained 6 F/100% J and 7 V items, measured on a five-point scale (*Disagree a lot* to *Agree a lot*). Items were summed, with higher scores indicating higher self-efficacy. FV preferences were measured with a modified version of a scale demonstrating acceptable internal consistency (Cronbach's α = .67-.78) and test-retest reliability (.67-.72; Domel et al., 1993). It assessed 4 J, 17 F, and 18 V using a three-point scale (*I do not like this* to *I like this a lot*). Items were summed, with higher scores indicating higher preference. Home FV availability identifies the number of different FV items in the child's home and was assessed using a scale having acceptable internal consistency (Cronbach's α = .77) and 12-week test-retest reliability (intraclass correlation coefficient = .50; Cullen, Klesges, et al., 2004). The scale assessed 4 J, 17 F, and 17 V on a two-point yes/no response scale. Scores for each subscale were summed, with higher scores indicating greater availability.

Social desirability of response was assessed using the nine-item "Lie Scale" from the Revised Children's Manifest Anxiety Scale (Reynolds & Paget, 1983). The scale has a five-item response format (*never* to *always*). "Lie" score was determined by summing the responses. The instrument has shown good reliability and validity in children across a variety of ethnic groups (Dadds, Perrin, & Yule, 1998).

Fruit and vegetable consumption was measured using a modified version of a validated Food Frequency Questionnaire containing 4 juices (i.e., 100% fruit juices—orange, apple, grape, "other"), 17 fruit, and 17 vegetables (Cullen, Baranowski, Baranowski, Hebert, & de Moor, 1999). The response scale represented the nonaveraged number of servings consumed in the past week (previous 7 days). Separate analyses were conducted for FJ and LV consumption, as youth view FJ and LV differently. FJ consumption was computed by summing weekly servings of the 21 items and dividing by 7 days to reflect daily servings. LV consumption was determined by removing three high-fat vegetables (i.e., French fries, potato salad, other potatoes) and adding the weekly servings of the remaining 14 low-fat items. Similarly, the LV weekly servings were divided by 7 days to reflect servings per day. Due to skewness, both FJ and LV were log transformed (ln[consumption + 1]) for analyses. FJ servings were summed while ignoring full fruit juice servings that exceed the number of nonjuice fruit servings, unless the Scout reported only one serving of fruit per day. Outliers were treated as missing data and were determined as servings exceeding the recommended 9 servings per day. There were 8, 23, and 7 Scouts with outlying FJ values for baseline, immediate posttest, and 3 months posttest, respectively. No LV Scout values exceeded recommendations.

PA was monitored for 3 consecutive days at each assessment using the MTI® accelerometer (Manufacturing Technologies Inc., Fort Walton Beach, FL). The MTI has been validated as a measure of PA in adolescents (Puyau, Adolph, Vohra, & Butte, 2002). Each monitor was programmed to begin recording at midnight after the measurement meeting. Monitors were removed on the fourth morning after data collection. Criteria for use were at least 800 minutes of recording between 6 a.m. and midnight for at least 2 days, using published cutpoints (Puyau et al., 2002). Hypothesized mediators, F, LV, and PA self-efficacy and preferences, and home F and LV availability, were measured at each time period using validated questionnaires (Sherwood, Taylor, et al., 2004).

The date and time the participant logged onto the website and reported they attained their weekly goal was internally recorded via the website. Weekly goal attainment was coded as "1" to indicate a goal had been attained (as shown by a date/time) or "0" to indicate that a goal had not been attained. An overall measure representing the percentage of goals attained provided an overall measure of dose.

Statistical Analysis

Distributions were examined with descriptive statistics, histograms, and box plots to identify implausible values for categorical data and problematic departures from normality for continuous data. Chi-square tests of independence and analyses of variance were used to determine differences in participant characteristics between participants with and without missing data. The baseline characteristics and goal attainment of the study participants were described using frequencies, percentages, means, and standard deviations.

A linear mixed models design with repeated measures (immediate posttest, posttest 6 months) and Scouts nested within troops was used to test the relationship between goal attainment and the behavior outcome after the intervention. Specifically, goal attainment during the intervention, baseline behavior, self-efficacy, preferences, and availability (diet only) were used to predict behavior outcome immediately following the intervention (immediate posttest) and 6 months following the intervention (posttest 6 months). Because goals pertained only to the intervention group, dietary behavior outcomes (daily servings of F, LV) were only analyzed using the 5ADay group, and the PA outcome (moderate-vigorous minutes/day) was analyzed using only the FFL group. Cases with missing PA data at posttest were deleted. A stepwise modeling strategy

Table 1. Participant Characteristics by Intervention Group

Characteristic	Five a Day		Fit for Life	
	n	*M* (*SD*)	*n*	*M* (*SD*)
Age (years)	225	12.8 (1.1)	229	12.8 (1.1)
BMI percentile	218	64.4 (29.7)	220	66.7 (29.6)
Social desirability	219	31.2 (6.8)	218	30.7 (6.7)

	Low-Fat Vegetable		Fruit/Juice		Physical Activity	
	n	*M* (*SD*)	*n*	*M* (*SD*)	*n*	*M* (*SD*)
Baseline						
Preferences	228	32.4 (7.2)	228	46.0 (8.3)	218	41.4 (8.4)
Home availability	221	8.3 (3.8)	221	9.2 (4.4)	n/a	n/a
Self-efficacy	228	23.3 (5.2)	228	27.6 (5.6)	217	72.4 (15.1)
Goals attained	227	3.7 (1.7) out of 6	227	3.8 (1.7) out of 5	226	5.0 (2.2) out of 8
Intake (servings/day)/physical activity (min/day)						
Baseline	218	0.35 (0.32)	214	2.88 (1.85)	145	25.7 (17.6)
Assessment period (Post 1)	205	0.44 (0.36)	183	3.19 (1.86)	99	27.0 (18.3)
Assessment period (Post 2)	187	0.38 (0.36)	179	3.00 (1.92)	83	30.7 (18.0)

Note: BMI = body mass index.

was employed. Participant (BMI%tile, age) and study (assessment period, wave) characteristics were employed as predictors for Model 1. Baseline behavior and psychosocial variables (self-efficacy, preferences, and home availability) were added as predictors in Model 2. Goal attainment and baseline behavior by psychosocial characteristic interactions were added as predictors in Model 3. Significant nested main effects and two-way interactions were not interpreted in the presence of significant three-way interactions. Standardized regression coefficients were estimated to examine the changes in LV, F intake, and PA at the follow-up times. Although there is no directly comparable R^2 from the mixed models to the R^2 derived from ordinary least squares regression, the likelihood ratio R^2_{LR} from the mixed models, a pseudo R^2, was calculated to indicate a measure of goodness of fit of the model to the data (Kramer, 2005). All the statistical analyses were performed using SAS (Version 9.1). Graphical displays were used to visually assess significant interactions.

Results

A total of 233 Scouts participated in the dietary intervention (5ADay) and 240 in the PA intervention (FFL). The majority of the sample was Anglo American (73%) from homes where the parent/guardian had a college degree (71%). The average age of the Scouts was 12.8 (±1.1) years; the average BMI%tile was 67.2 (±28.0) (Table 1). All available data were used in the analyses. Fifteen (6.4%) of the scouts in the 5ADay group were missing dietary-related data, and 100 (41.8%) of the Scouts were missing PA data in the FFL group. Most of the missing PA data were due to logistic problems (inadequate number of accelerometers for scouts). Little's (1988) chi-square test indicated that the data were missing completely at random ($\chi^2 = 831.66$, $df = 777$, $p = .064$) in the 5Aday group and in the FFL group ($\chi^2 = 748.54$, $df = 730$, $p = .309$). Extensive analyses conducted during the outcome evaluation revealed no group by characteristic by reporting status interaction. Participants with and without missing data significantly differed ($t_{454} = 2.56$, $p = .011$) for BMI%tile only. Excluded participants had higher baseline BMI%tile (73.4 ± 25.4) than participants included (65.4 ± 28.5). Both intervention groups were roughly the same age and had similar mean BMI%tiles and social desirability scores.

Dietary Intervention Group

The 5ADay group reported attaining an average of 3.7 out of 6 LV and 3.8 out of 5 F goals. The group consumed approximately one third (0.4) of a serving of LV and 2.9 servings of F at baseline (Table 1). Results from the mixed models analyses of the posttest 6 month assessment of LV intake are shown in Table 2. Model 1 yielded a significant posttest assessment period main effect, indicating that consumption decreased at posttest 6 months. In Model 2, baseline LV intake and LV self-efficacy were significantly and positively associated with posttest 6 month consumption. In Model 3, there were no additional significant two- and three-way interactions with the number of goals and assessment period.

Mixed models analyses of FJ intake are shown in Table 2. Model 2 showed significant posttest assessment, baseline

Table 2. Results From Hierarchical Mixed Models Analyses of Posttest Assessment Servings of Low-Fat Vegetables and Fruit/Juice Regressed Onto Goal Attainment and Other Potential Covariates

	Low-Fat Vegetables						Fruit/Juice					
	M1		M2		M3		M1		M2		M3	
	$R^2_{LR} = .20$		$R^2_{LR} = .26$		$R^2_{LR} = .26$		$R^2_{LR} = .01$		$R^2_{LR} = .21$		$R^2_{LR} = .22$	
Independent Variables	Std	*p*	Std	*p*	Std	*p*	Std	*p*	Std	*p*	Std	*p*
Assessment (Posttest 2 = 1)	−0.08	.010	−0.09	.011	0.32	.571	−0.09	.017	−0.09	.015	−0.59	.408
Wave (Spring = 1)	0.05	.357	0.04	.356	0.04	.363	0.13	.038	0.04	.433	0.03	.503
Baseline												
Age	0.08	.191	0.00	.981	0.01	.789	−0.07	.234	−0.05	.324	−0.04	.352
BMI percentile	0.06	.336	0.06	.225	0.08	.082	−0.01	.862	0.04	.400	0.03	.492
Intake[a]			0.42	.000	0.35	.024			0.48	.000	0.59	.003
Preferences[a]			0.06	.290	0.29	.100			0.09	.081	0.25	.148
Home availability[a]			0.10	.082	−0.16	.355			0.08	.184	−0.31	.078
Self-efficacy[a]			0.14	.017	0.23	.124			−0.01	.891	0.07	.626
Social desirability			−0.01	.811	0.02	.900			0.01	.836	0.07	.375
# Goals Attained			0.04	.470	0.47	.211			0.15	.004	0.31	.448
Interactions with # Goals Attained												
Assessment					−0.44	.466					1.14	.139
Intake					0.09	.614					−0.20	.449
Preferences					−0.49	.197					−0.35	.421
Home availability					0.35	.113					0.49	.030
Self-efficacy					−0.25	.462					−0.08	.820
Social desirability					−0.12	.700					0.00	.991
Interactions with Assessment												
Intake					−0.28	.142					0.01	.979
Preferences					−0.90	.090					−0.15	.830
Home availability					0.06	.831					0.27	.408
Self-efficacy					−0.03	.949					−0.19	.685
Social desirability					0.66	.093					0.58	.145
Interactions with Goals and Assessment												
Intake					0.28	.163					0.04	.911
Preferences					0.94	.099					0.07	.923
Home availability					−0.04	.888					−0.22	.495
Self-efficacy					0.05	.928					0.06	.916
Social desirability					−0.71	.110					−1.12	.009

Note: R^2_{LR} = likelihood ratio R^2 for mixed models; Std = standardized regression coefficient; BMI = body mass index. Model 1 (M1) = Participant/study characteristics; Model 2 (M2) = + main effect of baseline measures and goals; Model 3 (M3) = +two- and three-way interactions with goals, visit.
a. Outcome specific (e.g., low-fat vegetables baseline intake for low-fat vegetables intake postoutcome).

intake, and number of goals attained main effects. Model 3 yielded a significant baseline FJ intake main effect, number of goals attained by availability (two-way) interaction, and number of goals attained by posttest assessment by social desirability (three-way) interaction ($R^2_{LR} = .22$). As shown in Figure 1, the relationship between baseline FJ home availability and FJ intake was positive and stronger as the number of goals attained increased. There was almost no relationship between the social desirability and FJ intake at immediate posttest assessment; however, more goals attained resulted in slightly higher predicted FJ intake (Figure 2A). At 6 months assessment (Posttest 2), for Scouts with few to no goals, social desirability was positively associated with predicted FJ intake, whereas Scouts attaining all or nearly all goals showed a negative association between social desirability and predicted FJ intake.

Physical Activity Intervention Group

Members of the FFL group attained an average of 5 of 8 goals and were engaged in 25.7 minutes of moderate-to-vigorous PA (MVPA). Model 1 (Table 3) indicated that posttest 6 month assessment of MVPA was significantly higher than immediate posttest assessment; Model 2 indicated baseline MVPA was significantly associated with posttest assessment MVPA. The number of goals attained was not related to MVPA in Model 2 or 3 as a main or an interaction term.

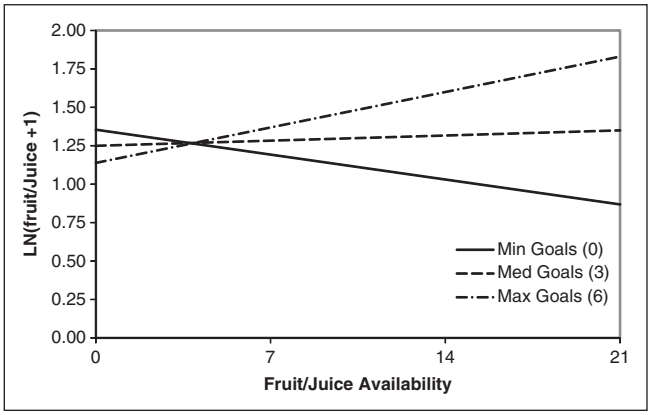

Figure 1. Graphical display of relationship between baseline availability and predicted fruit/juice servings intake at immediate posttest interacting with the number of goals attained

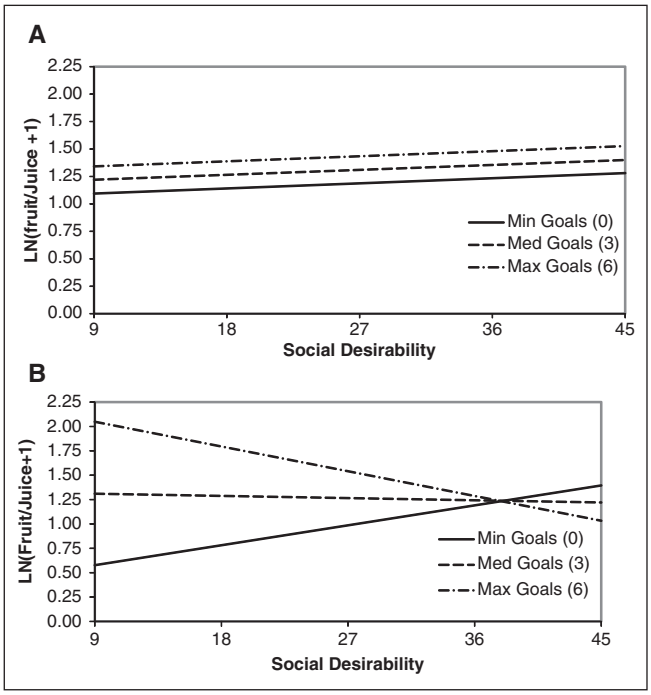

Figure 2. Graphical display of three-way interaction of assessment period by number of goals attained by social desirability predicting fruit intake: (A) immediate assessment (Posttest 1); (B) six-month assessment (Posttest 2)

Discussion

Goal setting was not related to LV intake or PA and complexly related to FJ intake. Goals were more likely to enhance FJ intake immediately after the program than 6 months later, but goals enhanced FJ intake only among those with high FJ availability at baseline and decreased intake among those with low availability at baseline. In another study assessing the impact of goal attainment on total V intake (Cullen, Zakeri, et al., 2004), attaining one goal was positively associated with intake among those with low baseline V intake, whereas attaining a second goal had no additional effect; for those with high baseline total V intake, posttest V consumption declined with attaining one goal and reverted to baseline after attaining two goals. The influences on FJ intake patterns also varied between studies (Cullen, Zakeri, et al., 2004). In the current study, the relation of goal attainment to FJ intake depended on level of home FJ availability and social desirability of response. Higher levels of goal attainment increased FJ consumption only among those with higher home FJ availability, and social desirability of response confounded the relationship at posttest 6 months but not earlier. In the other study the number of goals was positively associated with intake among those with low baseline FJ intake (Cullen, Zakeri, et al., 2004). The other study did not contain 6 month posttest data. The complex interaction term among number of goals attained, time of assessment, and social desirability of response on FJ intake suggests that social desirability may confound these findings and should be regularly assessed to control for their possible influence. The differences in patterns detected between these reports deserve more research in other studies with more precise measures of dietary intake (e.g., multiple 24-hour recalls) and of goal attainment. Given concerns about the limitations of food frequency questionnaires in general (F. Thompson & Subar, 2008) and among children in particular (Cullen, Watson, & Zakeri, 2008; McPherson, Hoelscher, Alexander, Scanlon, & Serdula, 2000), multiple 24-hour recalls offer promise of estimates of intake with less error to attenuate relationships.

Analyses controlled for several psychosocial and microenvironmental influences, which could otherwise confound the relationships of goals to intake. The relationship of self-efficacy to LV or FJ intake, which has been reported several times (Rasmussen et al., 2006), was not detected here. This study revealed a significant home availability by number of goals interaction on FJ intake, wherein more goals attained were associated with higher intakes among those with more home availability at immediate post, but not at 6 month posttest (also emphasizing the short-term effectiveness of goal setting). Further research should assess the generalizability of these interaction terms in other studies with more precise measures of dietary intake.

PA goals were not related to PA. In the another report assessing the effect of goals on PA among children (Shilts et al., 2009), goal setting did not relate to PA change in the sample as a whole but was related in the subsample that deleted treatment group participants who were not committed to their goal and deleted control group participants who spontaneously set goals. It is possible that stronger effects would have been detected in this study if more cases of measured PA were available at posttest, especially since missing data were more likely obtained from the overweight. Perhaps new goal setting procedures could enhance its effect. For example, among middle-aged women, those who engaged in PA to attain goals including sense of well-being or stress reduction engaged in more activity than

Table 3. Results From Hierarchical Mixed Models Analyses of Postassessment Physical Activity Regressed Onto Goal Attainment and Other Potential Covariates

	M1		M2		M3	
	$R^2_{LR} = -.03$		$R^2_{LR} = .04$		$R^2_{LR} = .04$	
Independent Variables	Std	*p*	Std	*p*	Std	*p*
Assessment (Posttest 2 = 1)	0.10	.040	0.11	.076	−0.93	.472
Wave (Spring = 1)	0.03	.610	−0.02	.801	−0.03	.747
Baseline						
Age	−0.07	.315	−0.03	.757	0.00	.988
BMI percentile	−0.11	.118	0.01	.926	0.00	.959
Physical activity (PA)			0.46	<.001	0.26	.517
PA Preferences			0.01	.912	0.39	.271
PA self-efficacy			0.00	.973	−0.05	.892
Social desirability			0.14	.112	−0.05	.888
# PA Goals Attained			0.16	.105	0.63	.433
Interactions with #PA Goals Attained						
Assessment					0.52	.712
PA					0.32	.465
PA preferences					−1.09	.147
PA self-efficacy					0.06	.943
Social desirability					0.43	.523
Interactions with Assessment						
PA					1.34	.148
PA preferences					0.15	.744
PA self-efficacy					−0.45	.691
Social desirability					0.19	.885
Interactions with Goals and Assessment						
PA					−0.34	.452
PA preferences					1.19	.309
PA self-efficacy					−0.13	.924
Social desirability					−1.52	.128

Note: BMI = body mass index; R^2_{LR} = likelihood ratio R^2 for mixed models; Std = standardized regression coefficient. Model 1 (M1) = participant/study characteristics; Model 2 (M2) = + main effect of baseline measures and goals; Model 3 (M3) = +two- and three-way interactions with goals, visit.

those whose goal was weight loss or health benefits (Segar, Eccles, & Richardson, 2008). Thus, future studies should include purposes to be attained from the PA goal set.

The strength of this research was the reasonably large sample. The limitations included the self-reported measures of goal attainment and diet (FFQ); the sample that was only male and predominantly White, from households with high educational attainment, which limit generalizability; and the high proportion (41%) of children without PA data at posttest. There was some missing data, but these were determined to be missing at random. An intervention that targeted diet and PA together might have achieved more change.

It is not clear why different relationships of goal setting would be detected by behavior. It is possible that other variables not accounted for in these analyses control these differences or that these are random results that are not clinically meaningful. Since goal setting has been accepted as an important intervention procedure (Fitch & Bock, 2009), practitioners should continue its use. Future research with larger samples, however, should test more detailed procedures and components of goal setting, for example, implementation intentions, and conduct within-study analyses.

Conclusions

Diverse, at times apparently contradictory, relationships were detected between goals and LV intake, FJ intake, and PA. The enhancing effects of goals were mostly short term, right after the end of the program. More research is needed to find ways to clearly determine the circumstances under which goals promote desired health behaviors. How short-term changes made in response to goals can be maintained must also be addressed.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research and/or authorship of this article:

This research was primarily funded by a grant from the American Cancer Society (TURSG-04). This work is also a publication of the U.S. Department of Agriculture (USDA/ARS) Children's Nutrition Research Center, Department of Pediatrics, Baylor College of Medicine, Houston, Texas, and had been funded in part with federal funds from the USDA/ARS under Cooperative Agreement No. 58-6250-6001. The contents of this publication do not necessarily reflect the views or policies of the USDA, nor does mention of trade names, commercial products, or organizations imply endorsement from the U.S. government.

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