Guided goal setting: Effectiveness in a dietary and physical activity intervention with low-income adolescents

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Abstract: *Objective*: Determining the effectiveness of the guided goal setting strategy on changing adolescents' dietary and physical activity self-efficacy and behaviors. *Design*: Adolescents were individually assigned to treatment (intervention with guided goal setting) or control conditions (intervention without guided goal setting) with data collected before and after the education intervention. *Setting*: Urban middle school in a low-income community in Central California. *Participants*: Ethnically diverse middle school students (n = 94, 55% male) who were participants of a USDA nutrition education program. *Intervention*: Driven by the Social Cognitive Theory, the intervention targeted dietary and physical activity behaviors of adolescents. *Main Outcome Measures*: Dietary self-efficacy and behavior; physical activity self-efficacy and behavior; goal effort and spontaneous goal setting. *Analysis*: ANCOVA and path analysis were performed using the full sample and a sub-sample informed by Locke's recommendations (accounting for goal effort and spontaneous goal setting). *Results*: No significant differences were found between groups using the full sample. Using the sub-sample, greater gains in dietary behavior ($p < .05$), physical activity behavior ($p < .05$), and physical activity self-efficacy ($p < .05$) were made by treatment participants compared to control participants. Change in physical activity behaviors was mediated by self-efficacy. *Conclusions and Implications*: Accounting for goal effort and spontaneous goal setting, this study provides some evidence that the use of guided goal setting with adolescents may be a viable strategy to promote dietary and physical activity behavior change.

Keywords: Guided goal setting, adolescents, nutrition, physical activity

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INTRODUCTION

In the United States (US), pediatric overweight has tripled in the past 30 years, and an estimated 17.1% of children and adolescents 12-19 years of age are overweight (1). Obesity during adolescence is the best single predictor of adult obesity (2). Cardiovascular risk factors are evident in young people (3) tracked throughout childhood and adolescence (4). Dietary behaviors are learned, reinforced by repeat exposure, and solidified during childhood (5). Because behaviors

track over time, examining strategies that teach, model and reinforce appropriate behaviors in childhood are important (6).

As a strategy for changing behaviors, goal setting has been studied extensively among adults in workplace settings (7,8). Research is limited, however, for goal setting studies focusing on dietary and physical activity behavior change. A recent literature review identified only 13 studies assessing the effectiveness of goal setting on dietary and/or physical activity behaviors and these studies were of adults (9). Among these, only five assigned groups randomly and fully implemented the goal-setting procedure (10-14). Surprisingly, no studies were reported targeting children or adolescents (9, 15).

Three types of goal setting are reported in the literature with adults: (1) self-set, (2) participatory, and (3) assigned (9,16). Research has not provided evidence to suggest one type produces better outcomes (9,17). The authors believe that many factors, such as the age of the participant, the intervention setting, and the readiness to change influence the preferred type. Of the three types of goal setting, none was appropriate for our adolescent audience or for a school setting based on our focus group and individual interviews (18,19).

Setting a goal requires abstract reasoning (20), a process noted by Piaget (21) to begin during adolescence. Some adolescents may not yet have the cognitive ability to 'self-set' an appropriate goal, as was our finding from two focus group interviews with middle school adolescents (n = 9) (19). The focus group participants could identify when goal setting was being used and could explain its purpose, but they did not have the ability to formulate specific goals for themselves (19). 'Participatory' goal setting is not an option for most school settings because of the time commitment needed from the teacher with each individual adolescent (19). Our focus group participants identified the need for independence, particularly from adults, as a motivator to change their behavior (19). To desire autonomy i.e., a separation from adults, is a well-known developmental stage for adolescents (22). Thus, 'assigned' goal setting may limit adolescent autonomy and ignore the adolescent's quest for independence, thereby decreasing goal commitment. Consequently, we developed another goal setting type, 'guided' goal setting specifically for the adolescent audience, informed by focus group interviews, individual interviews, previous goal setting research, and cognitive development theory (18). Guided goal setting gives students choices from a collection of practitioner-developed major and minor goals. The adolescent made an independent decision in selecting a goal, a key element in this strategy (18). This type of goal setting eliminated the possibility of inappropriate goal development and ensured that the goal choices contain the attributes necessary for optimal goal effectiveness: specificity, proximity, difficulty, and attainability (17,19). Additional details can be found elsewhere (18).

Our purpose was to investigate the effectiveness of this new strategy, guided goal setting. We hypothesized that the middle-school adolescents implementing guided goal setting would see greater gains in dietary and physical activity self-efficacy and behavior scores compared with adolescents who do not set goals.

METHODS

Design

Using the random number table and having names of all students in the five class periods of the home economics course, each student was assigned randomly to one of two conditions:

1. the intervention with guided goal

setting [treatment group], or
2. the same intervention stripped of the goal setting component [control group].

Students, but not the intervention educators, were blinded to the assignment. Each student received a colorful magazine-style workbook that included all handouts for the intervention, along with supplemental nutrition and fitness information. The intervention for the treatment condition was designed with the goal-setting component integral to each lesson. This goal-setting component included choosing a goal, signing a goal contract, tracking goal progress twice weekly, and rewarding goal achievements (18). For the control condition, the intervention and workbook were redesigned and printed without any reference to goal setting. The first two authors co-taught the intervention. Each instructor was assigned to teach the same five lessons to both groups to control for a possible teacher effect. The students participated in the one-hour sessions, twice a week, for five weeks. Data collection occurred one week before and after the intervention. The study protocol was approved by the Institutional Review Board at the University of California, Davis.

Sample

The participants (n = 136) were 8th grade students enrolled in the home economics course taught at a low-income, urban middle school in central California. The middle school had 65% enrollment in free/ reduced price meals and met the criteria for participation in the US Department of Agriculture nutrition education programs for low-income youth, including the Expanded Food and Nutrition Education Program (EFNEP) and Food Stamp Nutrition Education (FSNE).

Measures

A self-administered instrument assessed the participants' dietary behaviors (19 items), physical activity behaviors (4 items), dietary self-efficacy (19 items), physical activity

Table 1: *Sample items and response range for variables on the six -part evaluation instrument*

Outcome variable	Sample question	Response range	Total
1. Dietary behavior	How many days last week did you eat breakfast (morning meal)?	0-7 days	19
2. Dietary self-efficacy	How confident are you that you can eat low-fat toppings on your pizza?	1) not at all confident, 2) somewhat confident, 3) confident, 4) totally confident	19
3. Physical activity behavior	How many days last week did you do flexibility/ stretching exercises, such as toe touching, knee bending, leg stretching, or yoga?	0-7 days	4
4. Physical activity self-efficacy	How confident are you that you can do flexibility/ stretching exercises, such as toe touching, knee bending, leg stretching, or yoga?	1) not at all confident, 2) somewhat confident, 3) confident, 4) totally confident	4
Stratification variable	**Question**	**Response range**	
5. Spontaneous goal setting	During the past two months, did you set a goal to improve your eating/physical activity levels?	1) yes, 2) no	2
6. Goal commitment	Did you make an effort to reach your eating/ physical activity goal?	1) yes, 2) no	2

self-efficacy (4 items), and goal commitment (2 items) or spontaneous goal setting (2 items) (see table 1). Behavior and self-efficacy items addressed the specific targeted behaviors of the intervention and corresponded to the pre-established goal options. The items in the dietary and physical activity behavior sections were adapted from the Centers for Disease Control Youth Risk Behavior Survey (YRBS) (23). The YRBS dietary and physical activity items were modified slightly to include specific targeted behaviors of the intervention. Self-efficacy was defined as the confidence to perform a targeted behavior and was determined by asking participants to self-report their confidence to perform targeted behaviors (20). The response range for the behavior-related items was an 8-point scale signifying the number of days per week the participant engaged in the targeted behavior, i.e., 0-7 days per week. The response range for the self-efficacy items was a 4-point scale, i.e., 1 equaling not at all confident to 4 being totally confident.

Reliability testing of the YRBS items with a nationally representative sample of adolescents indicated Kappas ranging from 91.1% to 64.2% (23). Using the concurrent method of Willis, all items adapted from the YRBS for this study were cognitively tested with individual 8th grade students (n = 16), revised and retested (24). The items were evaluated for content validity by three experts in behavioral nutrition (19). The instrument was pilot tested with 6th to 8th graders (n = 34) (25). A reliability assessment of the revised instrument was conducted to establish that the items were measuring phenomena in a reproducible and consistent way (26,27). Seventh and eighth grade students (n = 46) completed the instrument on two occasions, three weeks apart, with no intervention. The reliability coefficients were .73 for the dietary behavior items, .55 for the physical activity behavior items, .59 for the dietary self-efficacy items, and .48 for the physical activity self-efficacy items. Scales and instruments used with adults are thought to have acceptable test retest reliability with coefficients of .7 or greater (26). The coefficients for the dietary behavior items met this criterion. The other coefficients were lower than .7, indicating more random error associated with the items (28). Because the reliability assessments were conducted with 12-14 year olds, we are considering them marginally acceptable for our purposes.

In his goal setting review, Locke (29) found that participants in the treatment group (goal setting) who were not committed to their goal (e.g., making goal effort) confounded the results of goal-setting effectiveness studies. In addition, the participants in the control group (no goal setting) who spontaneously set goals also confounded the results (29). Goal commitment questions were included in the instrument to ascertain treatment group dedication to the goal set. Spontaneous goal-setting items with a yes/no response determined if participants in the control group individually set a goal during the course of the study (29). To further support the inclusion of questions to determine adherence to the designated protocol, Gross and Fogg (30) suggested in prevention trials, such as this one, that non-adherence is often not associated with the dependent variables and there is value in finding out how much benefit could be expected with full adherence. This is in contrast to the intent-to-treat (ITT) principle that included all participants in the analysis regardless of adherence (30).

Intervention

The intervention was designed to improve

the dietary and physical activity behaviors of middle school students living in low-income communities (18,31). Called EatFit, the intervention was driven by the Social Cognitive Theory (SCT), where variables known to influence behavior were specifically used throughout the curriculum (i.e., self-assessment, goal setting, contracting, self-monitoring, barriers counseling, skills mastery, cue management, modeling, social support, reinforcement, cognitive restructuring, and relapse prevention). Web-based assessment (www.eatfit.net) assisted the participants in dietary analysis and goal setting (32). Before intervention development, three focus groups and ten in-depth individual interviews with middle school students revealed that the adolescents' motivators for adopting healthy behaviors included attaining more energy, improving appearance, and establishing independence (25,31). These motivators were incorporated into activities throughout the curriculum. More information about EatFit can be found elsewhere (18,31,32).

Analysis

Statistical analyses were conducted using SAS PC version 8.1 (33). Double data entry in two separate files was performed, and each file was compared for differences using the compare procedure. Analyses were performed on the full sample (i.e., all participants who returned both consent and assent forms and completed each evaluation instrument), and a sub-sample based on Locke's (29) recommendations (i.e., treatment participants who made goal effort and control participants who did not spontaneously set goals). Participants' responses were totaled by variable (dietary behavior, dietary self-efficacy, physical activity behavior, and physical activity self-efficacy) for pre and posttest. Differences were compared between groups using a χ^2 test. For analyses using analysis of covariance (ANCOVA), the explanatory variable was group (goal setting or no goal setting) as the main effect, with covariates being pre-intervention score, gender, class period, and ethnicity. The response variables were dietary self-efficacy, physical activity self-efficacy, dietary behavior, and physical activity behavior. To understand the role of adherence in predicting guided goal setting effectiveness, effect size differences between the full sample and the sub-sample were compared using ANCOVA, including group, compliance variable and group by compliance interaction statement in the model (30).

Path analysis examined the mediating effect of self-efficacy on behavioral outcomes (33). The total effect of the model was calculated by regressing behavior change on group, covariates, and the self-efficacy residual. The direct effect was determined by regressing behavior change on group, covariates, and self-efficacy change. To calculate indirect effect, the direct effect coefficient was subtracted from the total effect coefficient.

RESULTS

Before the intervention, participants (n = 136) were randomly assigned to treat-ment or control. Of the 136 potential participants, 28 did not return both consent and assent forms, 12 did not complete the post-evaluation instruments (e.g. some were members of families that relocated during the intervention, others had prolonged absences), and 2 were not included in the final analysis due to severe physical or mental disabilities. Efforts to retrieve these forms continued throughout the intervention period. The attrition rates were similar for treatment and control conditions. Therefore, 94 participants (45 treatment and 49 control), with an average age of 14.0 ± 0.4 years, were eligible for analyses. More

than half (55%) of the participants were male. Ethnicity of the participants was reported by the teacher as 34% Asian, 25% Hispanic, 21% non-Hispanic white, 13% non-Hispanic black, 3% Asian Indian, and 4% other. We used teacher-report because in our previous work, asking youth to report their ethnicity was difficult for them (34). No significant difference between treatment and control conditions was found for age or ethnicity using χ^2 tests. More males were in the treatment condition (30) than in the control condition (23), (p = .054).

Analyses for full sample

Each treatment condition participant selected one dietary and one physical activity major goal and then corresponding minor goals. Among the major dietary goals, 'increase fruit and vegetable intake' was the most frequently selected (29%), followed by 'reduce fat intake' (20%), 'reduce added sugar intake' (16%), 'increase calcium intake' (13%), 'increase iron intake' (9%), and 'improve eating habits' (7%). Among the major physical activity goals, 'increase flexibility' was the most frequently selected (47%), followed by 'increase strength' (22%), 'increase aerobic activities' (20%) and 'improve lifestyle activities' (4%). Students then chose one of three minor goals. A complete list of minor goal options for each major goal can be requested from the first author.

The χ^2 test revealed statistically significant differences between conditions for the dietary behavior variable (p = .04), where 73% of treatment condition participants showed improvement compared with 53% of control participants. More treatment participants (44%) also showed improvement compared to the control participants (29%) on the physical activity self-efficacy variable (p = .01). No statistically significant differences were found between conditions for dietary self-efficacy and physical activity behaviors (p = .86, p = .51). No differences were found between treatment and control conditions using all youth in the analyses using ANCOVA (see table 2).

Table 2: *Total difference scores for sub-sample and full sample**

Independent Variable	*Sub-Sample*†			*Full Sample*†		
	Treatment	Control		Treatment	Control	
	(n = 39-40)	(n = 18-19)	*p*	(n = 45)	(n = 49)	*p*
Dietary Behavior‡§	5.46±2.50	-1.16±3.22	.02	5.51±1.49	2.55±1.40	.15
Dietary Self-Efficacy#	0.14±2.08	-1.24±2.69	.56	2.33±1.36	0.45±1.28	.32
Physical Activity and Behavior‡§	0.42±1.6	-3.61±1.97	.04	0.76±0.86	0.33±0.80	.71
Physical Activity Self- Efficacy#	0.38±0.48	-0.82±0.60	.04	0.72±0.29	-0.02±0.27	.06

*Model controlled for pretest score, gender, ethnicity, and class period.

†Least squares means and standard errors reported.

‡Dietary and physical activity behaviors units are measured in days.

§ Significant difference in effect size between sub-sample and full sample, *p* = .01.

Dietary and physical activity self-efficacy units are measured in points.

Analyses for the sub-sample

Most treatment participants reported that they made goal effort for their eating goals (87%) and their physical activity goals (89%). Control participants receiving the intervention without goal setting reported they spontaneously set a dietary goal (62%) and a physical activity goal (60%). Therefore, 40 of the original 45 treatment participants and 19 of the original 49 control participants were included in the sub-sample analyses. This sub-group was similar to the full sample for age and ethnicity but had fewer total females (41 versus 19, p = .004).

The treatment participants in the sub-sample scored significantly higher than sub-sample control participants on dietary behavior (p = .02), physical activity behavior (p = .04), and physical activity self-efficacy (p = .04). No difference was found between groups for dietary self-efficacy (p = .56) (see table 2).

Examining the effect size differences using both the full sample and the sub-sample (30), significant differences were found for the dietary (p = .01) and physical activity behavior (p = .01) variables, a marginal difference for the physical activity self-efficacy variable (p = .08), and no significant difference for the dietary self-efficacy variable (p = .87) (see table 2).

Conducting path analysis using the sub-sample, approximately half of the change in physical activity behaviors was mediated by the self-efficacy variable (β = 1.81) while the remaining half was a direct effect of the other intervention components (ß = 2.02). Conversely, change in dietary behaviors was primarily a direct effect of the intervention (ß = 6.09) with an insignificant indirect effect of changes in self-efficacy (β = 0.16).

DISCUSSION

This study demonstrates the effectiveness of the guided goal setting strategy for changing dietary and physical activity behaviors using the sub-sample of treatment participants who made goal effort and control participants who did not set goals spontaneously. Our primary purpose was to explore the effect of guided goal setting as part of an intervention compared to no goal setting; therefore, Locke's approach to ensure adherence to the study design was important to our research question. In the full sample, non-adherence may be the cause of no statistically significant differences as described by Gross and Fogg (30) in their commentary on intention to treat (ITT). Including all participants, regardless of adherence to the protocol, does not clarify whether guided goal setting was more effective than no goal setting. When adherence was accounted for, and the control participants who did not set goals spontaneously were compared with those implementing guided goal setting, significant differences in physical activity self-efficacy (p = .04) and dietary (p = .02) and physical activity (p = .04) behaviors were revealed. A possible explanation for the different results for the two samples could be that more participants in the treatment group proceeded with goal setting than those in the control group who were motivated enough to set their own goals. The guided goal setting procedure may capture more of the teachable students who would benefit from some guidance in the process.

Effect size differences

Ideally, participants randomly assigned to treatment and control conditions adhere to the designated protocol. Unfortunately, this does not always happen and is a particular concern in prevention research when students in a school setting are a captive audience (30). Students do not volunteer to attend school or participate in the study, as would be the case for adults in a

randomized clinical trial to test the efficacy of a new drug. Intent-to-treat analysis (ITT) includes all participants regardless of adherence; the ITT method may be better suited to clinical trials were participation is voluntary. Gross and Fogg (30) suggested limitations of ITT when applied to prevention research are reduced statistical power and increased the potential for Type II error. A major limitation to the alternative approach (i.e., analyzing those who adhered to the protocol) is selection bias. Also, those in the analysis may represent only the most successful cases which could increase the potential for Type I error (35). A suggested solution is to conduct analyses on both the full sample and the sub-sample and then examine the differences in effect size to better understand the role of adherence in predicting guided goal setting effectiveness (30). Our findings from this analysis indicate that there is a difference in outcomes between protocol adherers and non-adherers. Thus, adherence is a critical variable in capturing the value of guided goal setting. Future research should examine methods to improve adherence.

Self-efficacy as a mediator

In the sub-sample, the effect of self-efficacy on behavior was partially supported by the results of our study. The path analysis for physical activity suggests that the change in behavior occurred, in part, because of changes in self-efficacy, indicating that self-efficacy was acting as a mediator. About half of the behavior change occurred through self-efficacy while the remaining half was a direct effect of the other intervention components (not measured) on physical activity behavior. Although the difference between the two conditions was mostly due to the decline in the control condition's physical activity self-efficacy and behavior, this result supports the SCT premise that increasing self-efficacy increases the likelihood of behavior change (see table 2).

In the sub-sample, dietary behavior changed in the hypothesized direction while dietary self-efficacy did not. When further analyses were conducted to investigate the mediating effect of self-efficacy on dietary behavior, the intervention led to changed behavior, but not through the variable self-efficacy, or at least not as it was measured. The random error associated with the mediocre reliability coefficient of $r = .59$ for the dietary self-efficacy variable should be a consideration.

Another possible explanation for these unexpected results for dietary self-efficacy is that participants had unrealistically high expectations for their capabilities before the intervention as noted on the pre-test. Similar findings about self-efficacy have been reported in previous research for fruit, vegetable, and fat intake (36,37). After the intervention, participants may be more realistic about their capabilities, which masking actual changes in confidence when using a traditional pre/post measure (38,39). The result using a traditional pre/post format may contain "optimistic bias", also known as "response shift bias", a possible cause of internal invalidity of the assessment tool (40). Some evidence suggests that administering the self-efficacy measure retrospectively may provide a more accurate reflection of change in confidence (38,39,41).

Goal commitment and spontaneous goal setting

By removing treatment participants who did not make goal effort (n = 5-6) and control participants who spontaneously set goals (n = 18-19) in the sub-sample, adherence to the study design was maintained, and the

effect of the guided goal setting strategy was exhibited. We recognize that spontaneous goal setting contributed to some positive change among participants in the control condition, but our purpose was to investigate the guided goal setting procedure compared to no goal setting. Without incorporating Locke's recommendations, the intervention with any form of goal setting is being compared with the intervention with both spontaneous and no goal setting. The difference is subtle but nonetheless essential for assessing the value of guided goal setting. Locke's (29) method of accounting for goal commitment and spontaneous goal setting was used in the workplace goal setting literature. We recommend including the measures of goal commitment and spontaneous goal setting method in future health related goal-setting effectiveness studies.

To help alleviate spontaneous goal setting among control participants, Weinberg (42) recommended eliminating or reducing the amount of feedback given to the control participants. In our effort to keep the intervention similar for treatment and control groups, except for the goal setting component, we included dietary and physical activity self-assessment for all participants. Providing personal feedback to participants could have unintentionally motivated the control participants to set personal goals (29,42). This also could explain why there were fewer females in the sub-sample. Of the 26 girls originally in the control group, 19 reported spontaneously setting goals, resulting in more females being excluded than anticipated in the sub-sample. The self-assessment activity experienced by the control participants may have been sufficient motivation for females to spontaneously set their own goals. The self-assessment activity may not have been as motivating to the boys. Examining gender as a moderating variable is an area for future research.

The effectiveness of goal setting is contingent upon goal commitment; consequently, if the participant does not commit to the goal and make an effort to reach the goal, then the possibility of a goal setting effect is unlikely (17). Because 87% of treatment participants reported making an effort to reach their eating goals and 89% their physical activity goals, a case can be made that this adolescent audience accepted the guided goal setting procedure well. Written comments by participants following the intervention indicated a high level of enjoyment with the guided goal setting process (19).

Strengths and limitations

To strengthen our study and reduce the possibility of an educator effect, we used educator consistent/staggered lessons, where one instructor taught lessons 1, 3, 5, 7, and 9 and the other instructor taught lessons 2, 4, 6, 8, and a supplemental lesson (43).

A limitation is the small sample size. We expected to enroll 150 students (10% attrition rate) to yield 68 per group with power of 0.82 to detect change. Due to class size variations, we actually started the study with 136 students, and had higher attrition rates than expected. With the sample size for the full sample analyses (Treatment group, n = 45; Control group, n = 49), we could detect a difference between groups of .60 standard deviations with 80% power. With a sample size for the sub-sample (Treatment group, n = 40; Control group, n = 19), we could detect a difference only between groups of .80 standard deviations with 80% power. The self-assessment activity included in the curriculum for the control participants may have contributed to the spontaneous goal setting and should be removed for future studies. Developers of

the intervention who served as the intervention's instructors were not blinded to group assignment. In addition, improving the psychometric properties of the data collection tools would be valuable and increase the likelihood of capturing existing change. Lastly, generalization of study results is limited to the students who participated in the study (35).

Implications for research and practice

The guided goal-setting strategy promoted positive dietary and physical activity change among adolescent participants when accounting for goal effort and spontaneous goal setting, but not with the full sample. For practitioners, this goal setting methodology could be an option when designing health promotion interventions or in a clinical setting as a component of a counseling session. For researchers, the next steps to investigate guided goal setting's applicability further would include:

- Investigating appropriateness of this goal setting type with other audiences, such as high school adolescents, low literacy adults, and the elderly;
- Comparing guided goal setting with other goal setting types (self-set, assigned, or participatory) among adolescents and other groups;
- Conducting guided goal setting research with a large sample of adolescent volunteers to investigate the impact of specific goal options, such as the selection of the increase fruit and vegetable intake goal;
- Assessing guided goal setting's effect on adolescent self-efficacy using a retrospective assessment of this variable.

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REFERENCES

1. Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. JAMA 2006;295(13):1549-55.
2. Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. Predicting obesity in young adulthood from childhood and parental obesity. N Engl J Med 1997;337(13):869-73.
3. Berenson G, McMahan C, Voors A, Webber LS, Srinivasan SR, Frank GC, et al. Cardiovascular risk factors in children: The early natural progression of atherosclerosis and essential hypertension. New York: Oxford Univ Press, 1980.
4. Kelder SH, Perry CL, Klepp K, Lytle L. Longitudinal tracking of adolescent smoking, physical activity and food choice behaviors. Am J Pub Health 1994;84(7):1121-6.
5. Lytle L. Nutrition education for school aged children. Alexandria, VA: Food Nutr Serv, 1994.
6. Lytle LA. Nutritional issues for adolescents. J Am Diet Assoc 2002; 102(3):S8-S12.
7. Lee TW, Locke EA, Lantham GP. Goal setting theory and job performance. In: Pervin L, ed. Goal concepts

in personality and social psychology. Hillsdale, NJ: Lawrence Erlbaum, 1989.
8. Locke EA. Toward a theory of task motivation and incentives. Organ Behav Human Perform 1968;3:157-89.
9. Shilts MK, Horowitz M, Townsend MS. Goal setting as a strategy for dietary and physical activity behavior change: a review. Am J Health Promot 2004;19(2):81-93.
10. Annesi JJ. Effects of computer feedback on adherence to exercise. Percept Mot Skills 1998;87(2):723-30.
11. Duncan K, Pozehl B. Staying on course: the effects of an adherence facilitation intervention on home exercise participation. Progress Cardiovasc Nurs 2002; 17:59-65.
12. Schnoll R, Zimmerman BJ. Self-regulation training enhances dietary self-efficacy and dietary fiber consumption. J Am Diet Assoc 2001;101 (9):1006-11.
13. Schultz S. Educational and behavioral strategies related to knowledge of and participation in an exercise program after cardiac positron emission tomography. Patient Educ Couns 1993;22 (1):47-57.
14. Mann KV, Sullivan PL. Effect of task-centered instructional programs on hypertensives' ability to achieve and maintain reduced dietary sodium intake. Patient Educ Counsel 1987;19:53-72.
15. Baranowski T, Cullen KW, Nicklas T, Thompson D, Baranowski J. School-based obesity prevention: a blueprint for taming the epidemic. Am J Heatlh Behav 2002;26(6):486-93.
16. Locke EA, Lantham GP. New directions in goal-setting theory. Current Dir Psy Sci 2006;15(5):265-8.
17. Locke EA, Lantham GP. A theory of goal setting and performance. Englewood Cliffs, NJ: Prentice-Hall;,1990.
18. Shilts MK, Townsend MS, Horowitz M. An innovative approach to goal setting for adolescents: guided goal setting. J Nutr Educ Behav 2004; 36(3):155-6.
19. Shilts MK. The effectiveness of guided goal setting on dietary and physical activity self-efficacy and behaviors of middle school adolescents. Dissertation. Davis, CA: Univ Calif, 2003.
20. Bandura A. Foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall, 1986.
21. Piaget J. Intellectual evolution from adolescence to adulthood. Hum Dev 1972;15:1-12.
22. Berk LE. Development through the life span, 4th ed. Boston, MA: Allyn Bacon, 2006.
23. Brener ND, Collins JL, Kann L, Warren CW, Williams BI. Reliability of the youth risk behavior survey questionnaire. Am J Epidemiol 1995; 141(6):575-80.
24. Willis G. Cognitive interviewing and questionnaire design: A training manual. Hyattsville, MD: CDC, National Center of Health Statistics, Work Paper Series, 7, 1994.
25. Shilts MK, Townsend MS, Horowitz M. Pilot study of the EatFit intervention to determine sample size and protocol for a randomized controlled trial. In: Center for Advanced Studies in Nutrition and Social Marketing, University of California, Davis, 2002. Available at: http://socialmarketing-nutrition.ucdavis.edu/publications.htm #review6 Accessed 28 June 2006.
26. Litwin M. How to measure survey reliability and validity. Thousand Oaks, CA: Sage, 1995.
27. Carmines E, Zeller R. Reliability and validity assessment. Newbury Park, CA: Sage, 1979.
28. Nunnally J, Bernstein I. Psychometric

theory, 3rd ed. New York: McGraw-Hill, 1994.
29. Locke EA. Problems with goal-setting research in sports and their solution. J Sport Exerc Psychol 1991;8:311-6.
30. Gross D, Fogg L. A critical analysis of intent-to-treat principle in prevention research. J Primary Prev 2004;25(4): 475-89.
31. Horowitz M, Shilts MK, Townsend MS. EatFit: A goal oriented intervention that challenges middle school adolescents to improve their eating and fitness choices. J Nutr Educ Behav 2004;36(1):43-4.
32. Horowitz M, Shilts MK, Townsend MS. Adapting a diet analysis program for an adolescent audience. J Nutr Educ Behav 2005;37:43-4.
33. SAS Institute Inc. In. 8.1 ed. Cary, NC.
34. Townsend MS, Johns M, Shilts MK, Farfan-Ramirez L. Evaluation of a USDA nutrition education program for low-income youth. J Nutr Educ Behav 2006;38(1):30-41.
35. Campbell DT, Stanley JC. Experimental and quasi-experimental designs for research. Chicago: Rand McNally, 1966.
36. Bogers RP, Brug J, van Assema P, Dagnelie PC. Explaining fruit and vegetable consumption: the theory of planned behavior and misconception of personal intake levels. Appetite 2004;42:157-66.
37. Brug J, Assema Pv, Kok G, Lenderink T, Glanz K. Self-rated dietary fat intake: associations with objective assessment of fat, psychosocial factors, and intention to change. J Nutr Educ 1994;26(5):218-23.
38. Howard GS, Ralph KM, Gulanich NA, Maxwell SE, Nance D, Gerber SL. Internal invalidity in pretest-posttest self-report evaluations and the re-evaluation of retrospective pretests. Appl Psychol Meas 1979;3:1623.
39. Shilts MK, Smith D, Ontai-Grzebik L, Townsend MS. Evidence to support the use of the retrospective pretest method to measure dietary and physical activity behavior and self-efficacy in adolescents. J Youth Dev 2008;3(1): article 080301RS002.
40. Rohs FR, Langone CA, Coleman RK. Response shift bias: a problem in evaluating nutrition training using self-report measures. J Nutr Educ 2001;33 (3):165-70.
41. Pratt C, McGuigan W, Katzeva A. Measuring program outcomes: using retrospective pretest methodology. Am J Eval 2001;21:341-9.
42. Weinberg RS. Goal setting and performance in sport and exercise settings: a synthesis and critique. Med Sci Sport Exerc 1994;26(4):469-77.
43. Cook TD, Campbell DT. Quasi-experimentation: Design and analysis for field settings. Chicago: Rand McNally, 1979.