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GO GIRLS!: Results From a Nutrition and Physical Activity Program for Low-Income, Overweight African American Adolescent Females

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Abstract

This article describes the development, implementation, and results of an intervention designed for inner-city, overweight African American adolescent women. Fifty-seven participants were recruited from four public housing developments. Participants were administered physiologic, dietary, and cognitive assessments at baseline and immediately postintervention. Each session comprised three elements: (1) an educational/behavioral activity, (2) 30 to 60 minutes of physical

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activity, and (3) preparation and tasting of low-fat meals. In the absence of a control group, results were compared for high and low attenders, the former defined as attending at least 50% of the sessions. High attenders (n = 26) showed more favorable 6-month posttest values for most outcomes compared with low attenders (n = 31). These effects achieved statistical significance for nutrition knowledge, low-fat practices, perceived changes in low-fat practices, and social support.

Approximately one-half of all African American adult women are overweight (body mass index greater than 27.3) compared with 34% of European Americans.[1] This striking ethnic difference is also evident among children (African American, 17.9%; European American, 11.9%) and adolescents (African American, 16.3%; European American, 9.6%).[1,2] The higher prevalence of obesity among African Americans likely contributes to their higher total mortality, as well as their excess rates of coronary heart disease, diabetes mellitus, and hypertension.[3–5] While genetic and metabolic factors contribute to excess obesity in African Americans,[6–8] improper diet and inadequate physical activity are also involved.[9–12] Adiposity, and the two primary etiologic behaviors, diet and exercise, appear to track from childhood through adulthood,[11,13–15] thereby providing a rationale for early intervention.[11]

Health promotion programs should be matched to the social, cultural, and environmental characteristics of the target population.[11,16,17] For inner-city, low-income African Americans, these factors include culturally specific attitudes with regard to ideal body type, greater tolerance of being overweight,[18–20] unique dietary patterns,[21–24] lower exercise rates,[9] and environments that may impede healthy eating and physical activity.[11]

While the need for culturally sensitive obesity prevention and treatment programs for African Americans is evident,[11] only a handful of outcome studies involving such interventions have been published. Most have targeted adults,[25–28] although a few programs for families have been developed.[29,30] Additionally, there have been several nutrition and physical activity interventions developed for African Americans that do not specifically target overweight participants or weight loss.[31–34] To date, there has been little research examining obesity prevention and treatment programs for African American adolescents.[11,30] This article describes the development, implementation, and results of a nutrition and physical activity intervention called GO GIRLS! designed for inner-city, overweight African American adolescent women.

METHOD

Formative Research

The developmental phase began with a review of the literature, as well as discussions with researchers and practitioners conducting related interventions, yet unpublished. Two focus groups were then conducted with low-income, overweight African American adolescent women (7 to 10 per group) recruited through mall intercepts and at public housing developments not targeted by the intervention. Funding limitations precluded more extensive formative research. Key findings from the focus groups included generally low nutrition knowledge (particularly with regard to fat and calorie content of foods), infrequent consumption of fruit and vegetables, and a perception that despite being “big” or “thick”

(expressed as desirable traits), participants did not feel they were “nasty fat” (defined by some girls as “having fat that rolls over your waist”). Specific activities were subsequently designed to address these issues. An expert advisory panel comprising several leading nutrition and physical activity researchers was convened. One key recommendation of the advisory panel was that initial efforts focus on pilot testing an array of strategies and constructing a salient intervention, since little was known about the feasibility and efficacy of interventions for this population.

Recruitment

The public housing developments selected were serving as control sites for a substance use prevention program being conducted by our group. Participants were recruited at each public housing development through several methods. First, at each development, at least one presentation was made at a residents association meeting, during which names, phone numbers, and addresses of potential participants were obtained. The program was presented as a “nutrition and physical activity program for overweight girls.” Overweight was not further defined. Posters and flyers were placed around each development, and when possible distributed door to door. In each development, a community liaison/recruiter was hired (generally, this person was a residents association member) to identify and recruit potential participants, as well as secure space for the program. Names were also obtained from other health and social programs being conducted in each development. In two sites, guidance counselors at local schools were asked to refer possible participants.

Program staff screened all potential participants by telephone to determine eligibility (gender, weight status, and age) and interest in attending the program. Eligible adolescents were visited in their homes, where consent was obtained from parents or guardians, and baseline questionnaires were completed by participants. Names of peers who might be interested in participating were also sought.

To be eligible, participants had to be female, living in or near the public housing development, age 11 to 17, and overweight based on either a body mass index ≥85th percentile for age and sex[35] or percentage body fat greater than 35% based on dual-energy X-ray absorptiometry (DXA) measurement. In the event that neither measurement was available, staff determined eligibility was based on visual inspection.

Program Delivery

The program was delivered to groups of 8 to 14 adolescents in community space or apartments at the four public housing developments. Program staff included a PhD candidate in nutrition science, a master’s-level exercise physiologist, and several public health master’s students who assisted in the assessment and intervention. The program was conducted in four 6-month cycles over 2 years. For the first 4 months, sessions were conducted twice per week, generally after school from 4:00 p.m. until 6:00 p.m. Some field trips were conducted on weekends and school holidays. For the final 2 months of each cycle, sessions were conducted weekly.

Research Design

The project was conducted as a developmental study, focusing more on feasibility and salience of the intervention than efficacy testing. Significant effort was placed on designing and refining intervention strategies. To determine program impact, participants completed physiologic, dietary, behavioral, and cognitive assessments at baseline and immediately postintervention (6 months). Given the developmental nature of the program, no control group was used. In the absence of a control group, we compared results from high and low attenders. The former was defined as attending at least 50% of the sessions.

Intervention

The intervention was based on the premise that both dietary and physical activity patterns contribute to obesity in this population.[12] Primary target behaviors of the intervention included (1) increased fruit and vegetable intake,[36] (2) decreased fat intake, (3) decreased fast food intake, (4) decreased television viewing,[37,38] and (5) increased physical activity.[12] Additionally, participants learned communication skills to enhance their ability to request that parents shop for and prepare healthier foods. Conceptually, the intervention was based on social cognitive theory.[39,40] Specifically, the intervention was designed to increase positive health and social outcome expectations for losing weight, negative outcome expectations for remaining overweight, and participants' confidence in their ability to modify diet (including preparing food and making positive food choices) and physical activity patterns.

Experiential activities were designed to enhance skills, efficacy, and outcome expectations. For example, by providing participants with opportunities to consume healthy foods, outcome expectations with regard to healthy eating were enhanced (i.e., increasing perceptions that healthy foods are pleasurable).[41] Hands-on cooking and exercise activities were designed to provide performance mastery experiences, a source of efficacy.[39] Given the preferred larger body type evident in this community (confirmed in our focus groups) and greater concern with regard to the health effects of obesity,[20] messages emphasized the physical and health effects more so than the esthetic effects of losing weight; "trimming down" and "firming up" more than attaining thinness.

Each session generally comprised three elements: (1) an interactive educational/behavioral activity, (2) 30 to 60 minutes of physical activity, and (3) preparation and tasting of low-fat, portion-controlled meals. Some key concepts were taught and reinforced across several behavioral modules. For example, in several sessions, participants learned to apply three options for behavior change: substitution, moderation, and abstinence. Emphasis was placed on substituting either healthier versions of similar foods (e.g., baked chicken for fried chicken) or noneating behaviors. Moderation focused on reducing (although not eliminating) frequency of consumption and size of portion. Abstinence was reserved as a "fail-safe" strategy, to be used sparingly, since abstaining can result in a behavioral void; feelings of deprivation and frustration. Based on food frequency questionnaire (FFQ) and 24-hour dietary recall data, each participant developed a list of target foods on which they focused their behavior change efforts. Common target foods included fried chicken, chocolate candy bars, salty snacks, and sugared soda. Girls also received satiety training, referred to

elsewhere as "conditioned satiation."[42] The rationale for satiety training is based on the finding that overweight children may be less sensitive to satiety cues than normal weight children; that they eat faster and do not decelerate their eating toward the end of a meal.[43] Our participants were particularly prone to eating second portions and large servings. The satiety training addressed awareness of satiety cues, portion control (redefining adequate portion size while minimizing feelings of deprivation), and avoiding second helpings. As part of the training, participants consumed single servings of main courses and snacks, and rated satiety prior to and 15 minutes after consumption.

Other activities addressed understanding fat and calorie content of foods, distinguishing emotional and physical hunger, and reading food labels.[44] Some lessons involved field trips (e.g., visit to a local farmer's market or grocery store), where participants were asked to shop for a list of ingredients, which were prepared back at the community site. For many lessons, a take-home sheet summarizing the key points was distributed. Thirty to 35 activities were implemented at each site.

Physical activities included step aerobics, commercial aerobics videos, toning, walking, jumping rope, and outdoor games led by program staff. In addition, professional instructors were used to conduct hip hop/funk aerobics and "Afrobics" classes using African music or live drumming. A primary objective of the physical activity program was to expose participants to a wide range of options in the hope that they would be able to incorporate one or two activities into their lives. At least once during the 6-month intervention, participants visited a local health club where they swam, did aerobics, and sampled a variety of exercise equipment. For selected physical activities, participants wore a CALTRAC accelerometer[45] to record caloric expenditure before and after exercise sessions. This was done to demonstrate the benefits of physical activity in achieving energy balance.[45,46]

Food activities emphasized easy-to-prepare, moderately priced meals. Most recipes presented alternative low-fat versions of preferred foods (e.g., pasta with turkey meat-balls, oven "fried" chicken, low-fat macaroni and cheese, and baked hot wings). Portion size was controlled by program staff, and meals were generally served as the evening's dinner. Other food activities included tasting low-fat versions of packaged and fast foods such as chips, cookies, and ice cream, as well as "neophobia" tastings in which participants were blindfolded and given new foods to taste (e.g., star fruit, guava, kiwi, paella, chicken tandoori, Indian nan bread, California rolls, and Thai noodles). After tasting, they were asked to guess what they had eaten and then to classify the food using the food guide pyramid. Copies of the day's recipe were distributed, and the recipes for all meals served were bound into a cookbook and given to participants. In addition to the three core elements of each session, approximately once per week participants were asked to complete a take-home assignment, generally linked to the day's nutrition or exercise activity. Assignments included a food diary (discontinued due to low adherence) and exercise or nutrition goals, which were set during the session and fulfilled prior to the subsequent session.

Incentives were used to encourage participation in the assessment protocol, attendance, and participation at sessions. At baseline, participants received a T-shirt for completing the psychosocial questionnaire and $10 for completing the FFQ. At posttest only, participants

received $10 for completing the FFQ and psychosocial questionnaires, $10 for the physiologic assessment, and $10 for the three 24-hour recalls.

A GO GIRLS! point system was used to reinforce attendance, participation within sessions, calling staff to cancel when they could not attend, and completion of take-home assignments. Points were exchanged to purchase items at the GO GIRLS! store, some of which were imprinted with the project logo (e.g., water bottles, pens, coffee mugs, hats, frisbees), or low-fat snacks. Finally, three of the four groups were taken on a 1- to 2-day retreat to a state park. The retreat included intensive group discussion of weight and food issues, outdoor physical activities (e.g., hiking and swimming), and group meals. A primary objective of the retreat was to enhance bonding with staff members and the other participants and thereby decrease program attrition. Additional information about the intervention activities can be found elsewhere.[44]

MEASURES

Nutrient Intake and Dietary Practices

Diet was assessed pre- and postintervention with both quantitative and qualitative measures. A modified version of the National Cancer Institute Health Habits and History Questionnaire Food Frequency Questionnaire (HHHQ FFQ) was used.[47,48] For the first site, participants entered their frequency of consumption for the past week using an open-ended format, whereas for the latter three sites, closed-ended frequency categories were used to assess consumption in the past 2 weeks. In the last site, the FFQ was administered using a modification of the picture sort method developed by Kumanyika.[49,50] Six FFQs totaling fewer than 500 kilocalories per day ($n = 3$) or more than 7,500 kilocalories per day ($n = 3$) were excluded, as these records were assumed to be invalid.

Participants in three of the sites (not done in the first housing development) were also administered three 24-hour telephone recalls (typically 2 weekdays and 1 weekend day) before and after the intervention, conducted by trained staff using the Minnesota Nutrition Data System (NDS) multipass protocol. Participants were provided with a two-dimensional chart (Nutrition Consulting Enterprises, Framingham, Massachusetts) to assist in portion size estimation. Individuals without telephones were administered recalls in their homes. The intraclass correlation for the 3 days of recalls was .87 for total kilocalories.

Eating style was assessed with a six-item index (e.g., “consuming second helpings and eating until ‘stuffed’”), with higher scores indicating more desirable habits. Low-fat eating practices were assessed with an 18-item index based on the work of Kristal et al.[51] For each of the 18 items, participants were also asked whether in the past 6 months that behavior had increased, decreased, or stayed the same. The number of times low-fat practices increased and high-fat practices decreased were summed to form a perceived change index. Based on the criteria suggested by Bollen and Lennox,[52] coefficient alpha is not provided for this or any of the measures listed as indexes, since they are not assumed to tap an underlying psychological trait.

Other dietary variables included preferences for 7 high-fat/high-sugar items (e.g., ice cream, chips, candy) and 32 low-fat/high-fiber items (e.g., fruits, low-fat ice cream, vegetables, and low-fat chips), with higher scores indicating stronger preferences; a three-item meat preference scale (e.g., "I think most meals should include some meat"; $\alpha = .73$), with lower scores indicating weaker preferences; a seven-item neophobia scale ("I enjoy trying new foods"; $\alpha = .72$), with higher scores indicating less neophobia; and a 13-item emotional eating index developed by the investigators (e.g., "How often do you eat when you feel worried?"), with higher scores indicating more emotional eating.

Physiologic Measures

Anthropometrics/adiposity were assessed by body mass index, two-site skin folds, and DXA.[53] Body mass index cut points were based on National Health and Nutrition Examination Survey (NHANES I) reference data.[35] Skin fold measures were converted to percentage body fat using the two-site equation (subscapular and triceps) of Slaughter and Lohman.[54] Other physiologic measures included nonfasting total and High Density Lipoprotein (HDL) cholesterol based on a nonfasting capillary sample (Johnson & Johnson/Kodak DT 60, New Brunswick, New Jersey), blood pressure, and aerobic capacity determined by a submax treadmill test.[55] One of two treadmill protocols was used: one at 3 miles per hour increasing grade 2% to 2.5% every 2 minutes and the second at 3.5 miles per hour with the same grade increases. The former was used for severely obese girls ($n = 11$), since there was concern that they would be unable to tolerate a speed of 3.5 miles per hour long enough to reach 85% heart rate reserve. Stage achieved was converted to VO_2 submax using standard metabolic equations, and predicted VO_2 maximum was computed by regression.[56]

Psychosocial Measures

Outcome expectations for eating healthier and losing weight were assessed with a nine-item scale ($\alpha = .73$). Self-esteem was measured with the 10-item scale ($\alpha = .71$) developed by Rosenberg.[57] Preoccupation with weight and food was assessed with a 20-item scale developed by the investigators ($\alpha = .87$), with higher values indicating less preoccupation with food and body image. Social support from family and friends to eat healthier and exercise was assessed with a 12-item scale ($\alpha = .77$) adapted from Sallis et al.[58] Self-efficacy related to losing weight and modifying dietary, exercise, and cooking patterns was assessed with a 25-item scale ($\alpha = .90$) developed by the investigators, with higher scores indicating greater perceived efficacy. Health knowledge related to nutrient content of foods, understanding food labels, and the health effects of fat and fiber were assessed with a 15-item index, based on the instrument developed by Resnicow et al.[59] Perceived weight was rated as *very underweight* (1) to *very overweight* (5).

Physical activity was assessed with a 1-week recall based on the instrument developed by Sallis et al.[46] Scores were Metabolic Equivalent (MET) weighted using published values.[60] Physical activity preferences were assessed by inquiring for each of six activities (e.g., walking, aerobics, jogging) whether the respondent would "usually prefer" doing that activity or "watching television or hanging around." Scores were summed to form an index with a range of 0 to 6. Participants were also asked to indicate how many times in the past

week they engaged in each of seven sedentary behaviors (e.g., watching television, talking on the phone, napping, and reading), which yielded a sedentary behaviors index.

Data Analysis

Six-month outcomes were compared for high and low attenders by analysis of variance, adjusting for baseline values and age. All analyses were conducted in SPSS (version 7.5). Given the relatively small sample size, results are addressed in terms of both absolute differences between high and low attenders and statistical significance. Nutrient values from 24-hour recalls and FFQs were log transformed prior to conducting analyses of variance. To facilitate interpretation, the tables present untransformed values whereas *p* values are based on transformed values.

RESULTS

Across the four sites, 57 adolescents enrolled and completed the baseline evaluation protocol. Posttest data (at least one physiologic or one dietary variable) were collected from 56 participants. Sample size at posttest ranged from 38 to 47 depending on the outcome, since some participants completed only parts of the assessment and some instruments were not used in the first site. As shown in Table 1, mean age of the sample was 13.5 years. Participants averaged 87.7 kg (193 lbs) and 45% body fat. Eight percent of the sample reported being “a little underweight,” 5% “just about right,” 48% “a little overweight,” and 38% “very overweight.” Perceived weight was significantly correlated ($r = .35$, $p = .01$) with baseline body mass index.

Girls attended on average 43% of the sessions. Thirty-one (54%) were classified as low attenders (<50% of sessions attended), and 26 (46%) were classified as high attenders (>50% of sessions attended). At baseline, low and high attenders differed significantly with regard to HDL and diastolic blood pressure. Otherwise, the two groups were similar.

Psychosocial Outcomes

As shown in Table 2, at 6-month follow-up, high attenders exhibited significantly greater nutrition knowledge scores. They reported significantly more low-fat practices and were significantly more likely to perceive positive dietary changes at posttest compared with low attenders. They also reported more social support from friends and family for making diet and exercise changes. None of the other psychosocial variables differed significantly between the two groups.

Dietary Outcomes

Adjusting for baseline values, the 24-hour recall and FFQ data indicated that high attenders reported substantially lower total kilocalories, slightly lower percentage of energy from fat, and lower cholesterol and sodium intake at posttest compared with low attenders. While in the favorable direction, none of these differences achieved statistical significance. The direction of change within and between groups for percentage calories from fat, fiber, and sodium were inconsistent across the two assessment methods.

Anthropometric and Physiologic Outcomes

No significant differences were observed between high and low attenders for any of the physical measures. Nonetheless, although the magnitude of the differences were small and should not be overinterpreted, there was a slight trend favoring high attenders for most measures. Based on raw change values, both groups showed an increase in body weight and body mass index. High attenders, however, showed a small decrease in body fat (both by skin fold estimation and DXA) and an increase in HDL, whereas low attenders showed a slight increase in these adiposity measures and a decrease in HDL. Both groups showed a decline in total cholesterol and systolic blood pressure. Degree of perceived overweight was correlated (−.43, $p = .01$) with change in body mass index from baseline to 6-month follow-up. In other words, participants who perceived themselves as heavier at baseline showed a greater decrease in body mass index between baseline and posttest.

DISCUSSION

The aim of the GO GIRLS! project was to develop and test the feasibility and potential effectiveness of an obesity intervention for low-income, African American adolescent women. With regard to engaging the community, the results of the project were largely encouraging. In general, little difficulty was encountered recruiting participants. However, attendance and retention were somewhat problematic. On average, participants attended 43% of the sessions, and the dropout rate (defined as missing the final six sessions) was approximately 45%. Our experience suggests there is substantial interest among low-income, overweight African American adolescent women in participating in a weight control program, and public housing represents a potentially useful site to conduct such interventions. However, additional strategies are needed to maximize participation and retention.

The project yielded considerable experience with regard to the types of activities that participants found engaging. Based on focus groups conducted with each cohort at the end of the intervention cycle and staff observations at each session, participants preferred experiential activities to more didactic lessons. Participants rated highly physically active field trips such as hiking, ice skating, and swimming at state parks. In many cases, they reported enjoying “getting away” as much as the activity itself. Overall, the benefits of these trips appeared to exceed the additional costs and logistical “headaches,” and including such activities in future programs for this population is recommended. The GO GIRLS! incentive plan was also rated highly, and the use of incentives for recruitment, attendance, participation, and assessment is recommended. Compliance with written homework assignments was generally poor, even with the use of incentives, and therefore cannot be recommended for future programs. Many participants were motivated to enroll and continue attending for the social benefits of the program (e.g., camaraderie) and for the meals provided at each session. Future programs should consider exploiting these “secondary” benefits to enhance recruitment and retention.

With regard to program effectiveness, the results were less encouraging. In the absence of a control group, program impact was examined by comparing low and high attenders. Overall, high attenders showed more favorable 6-month posttest values compared with low attenders.

However, these effects achieved statistical significance only for nutrition knowledge, low-fat practices, perceived changes in low-fat practices, and perceived social support. FFQ and 24-hour recall data showed some absolute changes favoring high attenders. Although not statistically significant, for total calories and sodium intake the magnitude of these differences could be considered clinically meaningful. Differences for most other psychosocial, behavioral, and physical activity variables, although favoring the high-attendance group, cannot be considered clinically meaningful. Prior prevention and treatment programs have shown changes in psychosocial and dietary outcomes without changes in physiologic measures.[29,61] We conclude that the program had a modest favorable impact on knowledge and some dietary behaviors, and served as a maintenance program, perhaps decelerating weight gain and the associated physiologic sequela.

Participants in postintervention focus groups were asked why they did not lose more weight. A common response was that they “just didn’t try hard enough” or “they didn’t want to give up their favorite foods.” Thus, participants appeared to express an awareness that they did not fully commit to making the requisite changes. Some noted that in the future they might apply what they learned and make a more serious attempt at diet and exercise change. Participants’ responses were consistent with staff perceptions. During the course of the intervention, it was evident that most participants were not losing weight. Staff members concluded that we were unable to assuage participants’ fears about the negative effects of giving up their favorite foods (i.e., tolerating delayed gratification). Despite attempts to reduce feelings of deprivation (e.g., by stressing moderation more than abstinence and providing enjoyable low-fat recipes at each session), the program was in many ways unable to persuade participants to apply the principles discussed in the sessions to their lives. In terms of social cognitive theory, it appears negative outcome expectancies for health effects and positive outcome expectancies for social effects were not sufficiently strong enough to merit behavior change. Perhaps the program did not adequately enhance the efficacy and skills required to make diet and exercise changes.[39,40] The most common obstacle reported by participants was lack of parental (usually the mother) assistance with shopping and cooking. Although parents were invited to at least two sessions at each development, only one to two parents generally attended. Involving parents in other nutrition and health promotion programs has proven to be difficult.[62] In future programs, more intensive and creative strategies for engaging parents may be needed. For example, perhaps parents could be asked to sign a contract at the beginning of the program pledging their willingness to attend program activities and to commit to making changes in their shopping and cooking practices. There may be a way to make participation of the child contingent on some level of parent involvement.

There were other limitations of the program that may have contributed to the outcomes. Although most of the staff were African American, we did not have sufficient representation from the community in our intervention team. Using lay health educators from the community may have proven fruitful. The program was almost exclusively an individual-based intervention. Changing the local environment (e.g., improving the availability of safe and attractive exercise facilities) and working with local vendors and possibly school food service personnel to improve the selection of low-fat foods and quality fruits and vegetables may have potentiated the effects of the individual-based components.

Possible program modifications include recruiting women younger or older than those targeted by our program. Early adolescence may be a particularly difficult stage to inculcate behavior change. GO GIRLS! did not provide a daily food plan but, rather, stressed reduction of high-fat foods, increasing fruit and vegetable consumption, and portion control. Perhaps a more structured dietary prescription would prove effective for this population.

The impact evaluation has several limitations. Comparing high and low attenders (as opposed to a randomized, controlled design), a post hoc distinction, suffers from numerous threats to validity.[63] The use of 50% attendance as the cut point for "high attendance" was somewhat arbitrary. Using a higher cut point, such as 75%, was not possible, since only seven participants met this criterion. Perhaps with the exception of nutrition knowledge, the psychosocial and behavioral measures were likely influenced by social desirability bias. Additionally, several of the outcome measures were developed anew for this study or had not been used previously among this population. Each of these factors threatens the validity of the findings. With the exception of total calories and cholesterol, the magnitude and direction of change for dietary variables varied across the two methods of dietary assessment, making interpretation of the findings difficult. Self-reported dietary assessment in youth remains a challenge. The relatively small sample size translates into low statistical power and the possibility of Type II error. Many of the absolute differences observed would likely have achieved significance with 10 or 20 more adolescents in the sample. From its inception, this project was not designed as a rigorous efficacy trial. Instead, we hoped to answer whether such a project could be conducted in a public housing setting and whether the intervention merits a more formal evaluation. Finally, obtaining information from parents with regard to family shopping and cooking patterns, as well as perceptions of their children's behaviors, would have been useful. Budget limitations, however, precluded data collection from parents. Despite the limitations in the study's design and its modest effects, additional research to improve the intervention and evaluate it with a formal field trial may be warranted.

Implications for Practice

Practitioners are encouraged to apply the principles and procedures from the GO GIRLS! project to other community-based institutions, as well as clinical and school settings. This includes using formative research to tailor the intervention to the sociodemographic and cultural characteristics of the target audience.[16] Specifically, prior to initiating intervention activities, social marketing techniques such as focus groups should be used to delineate attitudes and practices related to nutrition and physical activity patterns, body image, and dieting, as well as the food preferences and eating, cooking, and shopping habits of the target audience. Pretesting of intervention messages, project names, artwork, and specific intervention activities is also recommended. Our experiences also suggest using experiential educational activities, including when possible field trips that facilitate healthy eating and physical activity; existing community resources that might donate meeting space, products, or services (e.g., a local gym or restaurant); incentives to encourage attendance and participation; and community members as paid staff. We also strongly recommend providing participants with an opportunity to eat at each session. Elements of our program that were less successful include significant written self-monitoring (e.g., food diaries) and

educational lectures that did not actively engage participants either verbally or physically. To the extent possible, behavior change strategies should be individualized to participants' unique dietary and physical activity patterns and preferences. Practitioners may also want to screen potential participants for their readiness to change, as this may allow for more judicious resource expenditure. Despite our expectations to the contrary, we observed considerable interest in our nutrition and physical activity program on the part of low-income, overweight African American adolescent women. Although creative and at times intensive recruitment strategies may be needed to accrue participants for such programs, it may be helpful to operate under the assumption that the community is concerned about this issue.

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Table 1

GO GIRLS! Mean Baseline Sample Description

	Full Sample (*n* = 57)	Low Attenders (*n* = 31)	High Attenders (*n* = 26)
Age	13.5 (range = 11–17)	13.8 (range = 11–16)	13.0 (range = 11–17)
Height (cm)	161.1 (*SD* = 6.7)	162.3 (*SD* = 7.2)	169.7 (*SD* = 5.9)
Weight (kg)	87.7 (*SD* = 21.1)	88.4 (*SD* = 19.8)	86.7 (*SD* = 22.9)
Body mass index	33.6 (*SD* = 7.2)	33.4 (*SD* = 6.7)	33.9 (*SD* = 8.0)
Dual-energy X-ray absorptiometry (% body fat)	45 (range = 36–60)	45 (range = 38–51)	45 (range = 36–60)
Skin fold (% body fat)	45 (range = 33–61)	45 (range = 33–60)	45 (range = 34–61)
Total cholesterol (mg/dl)	172 (*SD* = 29.9)	165 (*SD* = 27.9)	180 (*SD* = 30.8)
HDL (mg/dl)	51 (*SD* = 18.1)	57 (*SD* = 20.6)	44* (*SD* = 10.9)
Systolic blood pressure (mm Hg)	116 (*SD* = 11.7)	117 (*SD* = 12.4)	115 (*SD* = 11.1)
Diastolic blood pressure (mm Hg)	74 (*SD* = 8.6)	77.4 (*SD* = 8.3)	70.0* (*SD* = 6.9)
VO_2 maximum (ml/kg-min)	33.8 (*SD* = 6.2)	33.2 (*SD* = 7.1)	34.2 (*SD* = 5.9)
Total kilocalories (FFQ)	3,125 (range = 662–7,450)	2,974 (range = 973–7,450)	3,285 (range = 662–5,674)
Percentage kilocalories from fat (FFQ)	41.6 (range = 27–55)	40.9 (range = 31–52)	42.1 (range = 27–55)
Servings of fruits and vegetables (FFQ)	4.3 (*SD* = 4.5)	3.8 (*SD* = 4.5)	4.7 (*SD* = 4.4)
Total kilocalories (24-hour recalls)	2,217 (range = 921–4,070)	2,224 (range = 921–4,070)	2,244 (range = 1008–3,865)
Percentage kilocalories from fat (24-hour recalls)	36.7 (range = 26–48)	36.0 (range = 26–46)	37.8 (range = 27–48)

NOTE: FFQ = food frequency questionnaire.

* High and low attenders significantly different at $p < .05$.

Table 2

GO GIRLS! 6-Month Outcomes: Mean Psychosocial and Qualitative Dietary and Exercise Variables

	High Attenders (*n* = 24)	Low Attenders (*n* = 23)	*p* Value
Nutrition knowledge	71 (0.14)	59 (0.12)	.001
High-fat/high-sugar preferences	18.6 (1.8)	17.5 (2.4)	.08
Low-fat/high-fiber preferences	76.6 (8.2)	73.9 (10.2)	.17
Meat preferences	2.6 (0.61)	2.3 (0.78)	.16
Perceived changes in low-fat practices	6.4 (5.3)	3.9 (4.1)	.04
Low-fat practices	40.5 (6.4)	36.9 (6.5)	.05
Neophobia	2.2 (0.40)	2.2 (0.36)	.70
Outcome expectations for healthy eating	2.1 (0.60)	2.0 (0.66)	.97
Preoccupation with food and body image	2.3 (0.57)	2.3 (0.52)	.95
Emotional eating	25.0 (8.5)	24.4 (7.7)	.72
Eating style	15.7 (2.7)	14.9 (3.2)	.45
Social support	2.3 (0.28)	2.1 (0.44)	.05
Self-esteem	1.8 (0.44)	1.8 (0.50)	.98
Self-efficacy	2.6 (0.30)	2.5 (0.30)	.14
Exercise preferences	3.5 (1.3)	3.7 (1.6)	.81
Self-reported exercise in past week	139 (67)	136 (80)	.90
Sedentary behaviors	22.0 (9.1)	25.1 (12.6)	.34

NOTE: Means are adjusted for age and baseline values. Standard deviations are in parentheses.

Table 3

GO GIRLS! 6-Month Outcomes: Dietary Intake

	High Attenders (*n* = 23)		Low Attenders (*n* = 22)		
	Adjusted Mean	**Raw Change**	**Adjusted Mean**	**Raw Change**	***p* Value[a]**
Twenty-four hour recall data[b]					
Total kilocalories	2,011 (883)	−178	2,357 (1,060)	+117	0.28
Percentage kilocalories from fat	34.6 (4.9)	−3.2	36.5 (3.9)	+0.22	.13
Fiber (g)	15.1 (6.2)	+1.4	14.8 (7.8)	+0.62	.71
Cholesterol (mg)	218 (74)	−52.0	265 (102)	+60	.20
Sodium (mg)	3,612 (1,767)	−14.2	3,690 (1,718)	−343	.83
Food frequency data					
Total kilocalories	2,187 (1,216)	−1,108	2,988 (1,899)	−242	.25
Percentage kilocalories from fat	42.3 (4.1)	+0.84	42.7 (5.4)	+1.2	.82
Fiber (g)	10.4 (5.3)	−8.5	13.4 (9.1)	−4.1	.63
Cholesterol (mg)	393 (291)	−155	466 (329)	−54	.60
Sodium (mg)	3,107 (1,814)	−2,230	4,069 (2,343)	−775	.31
Servings of fruits and vegetables	2.9 (1.7)	−1.7	3.2 (1.9)	−1.1	.89

NOTE: Means are adjusted for age and baseline values. Standard deviations are in parentheses. The raw change is the difference between posttest and baseline value, unadjusted.

[a]Based on adjusted log transformed posttest means.

[b]*n* is reduced for 24-hour recalls, 19 high attenders and 19 low attenders.

Table 4

GO GIRLS! 6-Month Outcomes: Physiologic Variables

	High Attenders (n = 20)		Low Attenders (n = 20)		
	Adjusted Mean	**Raw Change**	**Adjusted Mean**	**Raw Change**	***p* Value[a]**
Body mass index	35.3 (7.9)	+0.7	35.5 (6.8)	+0.9	.78
Weight (kg)	91.3 (21.8)	+2.6	92.3 (21.0)	+2.4	.60
Height (cm)	160.9 (5.9)	+1.1	160.6 (5.9)	0.0	.78
Percentage body fat from skin folds	44.7 (7.9)	−0.8	46.4 (10.3)	+0.4	.46
Dual-energy X-ray absorptiometry (% body fat)	44.4 (5.2)	−0.1	46.3 (4.2)	+1.5	.16
VO_2 maximum (ml/kg-min)	32.7 (4.9)	−1.2	35.3 (6.4)	+1.6	.34
Total cholesterol (mg/dl)	159 (18.9)	−12.5	162 (30.0)	−5.6	.65
HDL cholesterol (mg/dl)	44.4 (12.6)	+0.6	44.1 (6.8)	−5.9	.93
Systolic blood pressure (mm Hg)	108 (14.8)	−6.0	113 (11.8)	−2.8	.28
Diastolic blood pressure (mm Hg)	70 (10.3)	0.0	72 (7.8)	−5.1	.62

NOTE: Means are adjusted for age and baseline values. Standard deviations are in parentheses. The raw change is the difference between posttest and baseline value, unadjusted.

[a]Based on adjusted log transformed posttest means.