

THE FUN, FOOD, AND FITNESS PROJECT (FFFP): THE BAYLOR GEMS PILOT STUDY

Objective: The Girls health Enrichment Multi-site Studies (GEMS) Fun, Food, and Fitness Project (FFFP) was designed to prevent obesity among 8-year-old African-American girls.

Design: Twelve-week, two-arm parallel group randomized controlled pilot study.

Setting: Summer day camp and homes in Houston, Texas.

Participants: Thirty-five girls and their parents or caregivers were randomly assigned to treatment ($N=19$) or control groups ($N=16$).

Intervention: Girls in the intervention group attended a special 4-week summer day camp, followed by a special 8-week home Internet intervention for the girls and their parents. Control group girls attended a different 4-week summer day camp, followed by a monthly home Internet intervention, neither of which components included the GEMS-FFFP enhancements.

Main Outcome Measures: Body mass index (BMI), consumption of fruit, 100% fruit juice, and vegetables (FJV), physical activity.

Results: After adjusting for baseline BMI, there were no significant differences in BMI between treatment and control group girls, either at the end of the 4-week summer day camp, or after the full 12-week intervention. By the end of the summer camp, the subgroup of treatment group girls heavier at baseline exhibited a trend ($P<.08$) toward lower BMI, compared to their heavier counterparts in the control group. Overall results at the end of the 12-week program demonstrated substantial, although not significant, differences between treatment and control groups in the hypothesized directions. On average, less than half the treatment sample logged onto the Website, which limited intervention dose.

Conclusions: Summer day camp appears to offer promise for initiating health behavior change. Effective methods must be developed and tested to enhance log-on rates among healthy children and their parents before Internet programs can achieve their potential. (*Ethn Dis.* 2003;13[suppl1]:S1-30-S1-39)

Key Words: Obesity, Prevention, Female, African-American, Children, Parent, Diet, Physical Activity, BMI, Internet

From the Children's Nutrition Research Center, Department of Pediatrics, Baylor

Tom Baranowski, PhD; Janice C. Baranowski, MPH; Karen W. Cullen, DrPH; Deborah I. Thompson, PhD; Theresa Nicklas, DrPH; Issa F. Zakeri, PhD; James Rochon, PhD

BACKGROUND

Obesity has increased substantially in the last 20 years,¹ especially among children.² Obese children are likely to become obese adults.³ Once gained, excess weight is difficult to lose,⁴ thereby increasing the medical community's interest in obesity prevention.^{5,6} Behavior change may be easier to effect among children,⁷ thereby enhancing the possibility of preventing obesity. Prevalence of obesity has been particularly high among African-American girls, beginning as early as 9 years of age,^{8,9} thereby emphasizing the need for programs targeted toward young girls in this group.

School-based obesity prevention programs have not provided definitive guidance for the design of effective programs.¹⁰ While families influence children's diets¹¹ and physical activity (PA),¹² the best method for involving families in promoting change has yet to be discovered.¹³ One family-based intervention revealed that African-American families with children found it difficult to attend evening group sessions,¹⁴ suggesting that other mechanisms may be necessary to maintain contact over time. Summer camps have been shown to facilitate behavior change among children,¹⁵⁻¹⁷ but no studies have addressed

the use of computers in maintaining change. Among families with a computer and Internet access, Internet-based interventions could overcome the barrier of requiring participants to travel to a specific location at a specific time.

This paper reports on the Girls health Enrichment Multi-site Studies (GEMS) Fun, Food, and Fitness Project (FFFP), a pilot study which targeted obesity prevention among healthy 8-year-old African-American girls and their families. The 12-week intervention included a 4-week summer day camp experience (girls only), followed by separate 8-week Internet programs for girls and parents. The purpose of the pilot study was to test the 12-week intervention and associated measurements using a randomized clinical trial design that included a comparison group. Because of its low sample size and short duration, the pilot study did not have sufficient power to test for between-group differences in changes either in body mass index, which would be a primary outcome in a larger scale trial, or in other key outcome measurements. The evaluation of the pilot study was primarily based on intervention process measures and trends in key measurements, including body mass index, diet, physical activity, and psycho-social measures.

METHODS

Sample

The inclusionary criteria for the 8-year-old African-American girls were: to have a parent also willing to be involved; to be in the ≥ 50 th percentile for age and gender specific body mass index (BMI) based on CDC growth charts;¹⁸ to have a home computer with

College of Medicine, Houston, Texas (TB, JCB, KWC, DIT, TN, IFZ); and George Washington University Biostatistics Center, Washington, DC (JR).

Address correspondence and reprint requests to Tom Baranowski, PhD; Professor of Pediatrics (Behavioral Nutrition); Children's Nutrition Research Center; Department of Pediatrics; Baylor College of Medicine; 1100 Bates Street, Room 2038; Houston, TX 77030-2600; 713-798-6762; 713-798-7098 (fax); tbaranow@bcm.tmc.edu

Internet access; and to provide informed assent and parental consent. Exclusionary criteria included having a medical condition or taking medications affecting growth; and having conditions that would limit the girl's ability to participate in the intervention or measurement assessments.

All participating girl-parent families were volunteers who responded to radio advertisements, a GEMS-FFFP recruitment Website, fliers, presentations made to various church or other social groups serving the African-American community, and postcards sent to lists of names and addresses obtained from selected schools in the Houston area. More details on recruitment can be found in Story et al¹⁹ in this special issue. The desired sample for this pilot test was 40, but only 35 were randomized. All girls provided assent, and parents provided signed informed consent at the time of baseline assessment.

Design

Girls were randomized to treatment or control groups. Random assignment was conducted in an urn randomization procedure,²⁰ through telephone contact to the Coordinating Center at George Washington University in Washington, DC. Baseline measurement of outcomes occurred from March 2001 through May 2001, at the Children's Nutrition Research Center. Outcomes included height, weight, waist circumference, diet, and PA. Camp occurred in June; the Internet program was delivered during July and August. The 12-week follow-up assessments began the last Saturday in August, and continued through September 2001. Only BMI was measured at 4 weeks (the end of summer camp). The mean time from baseline to follow-up assessment was 114.0 (± 15.1) days, or 16.3 (± 2.2) weeks.

Target Behaviors

The behavioral goals of GEMS-FFFP were: to increase the girls' fruit and vegetable consumption, with the intent of

displacing foods high in dietary fat and related calories, and enhancing the girls' sense of fullness from a diet higher in fiber and water;²¹ increase the girls' intake of water, with the intent of displacing the consumption of soft drinks and sweetened fruit flavored beverages common at this age;²² and to increase moderate to vigorous physical activity to 60 minutes per day.²³

Theoretical Framework

This intervention was based on Social Cognitive Theory.^{24,25} Our previous research suggested that reasons the children did not consume fruit, 100% fruit juice, and vegetables (FJV), were: disliking (preference—a personal characteristic) vegetables;^{26–28} lack of availability of FJV (an environmental characteristic) in their homes;²⁹ and lack of knowledge regarding the preparation of simple FJV recipes (a skill).²⁶ Findings from focus group discussions suggested that this triad of preference, availability, and skill also influences water intake and physical activity.³⁰

Formative Assessment

Focus group discussions were conducted with 73 girls and 82 parents. Formative results have been reported elsewhere.³⁰

Intervention Activities/ Procedures

To encourage the girls to consume more FJV, attempts were made to: 1) increase the girls' FJV preference by associating fun with, and increasing exposure to, FJV³¹ at camp and home; 2) increase their skills and self-efficacy in requesting parents to increase the availability of FJV at home;²⁹ 3) train them to prepare simple FJV recipes; 4) increase their self control for eating FJV. For self-control, the girls were trained to set goals (called "challenges") for eating more FJV;³² select FJV over alternatives (decision making); take action when they did not meet goals (problem solving); and provide them with rewards

(friendship beads) for meeting FJV goals. The intervention also provided many simple suggestions and incentives for eating more FJV snacks and simple dishes. Girls were trained to use a 5-a-day self-schema (eg, one FJV serving at breakfast, one at lunch, one for PM snack, and 2 for dinner) that simplified inclusion of five FJV servings a day, and identified self expectations for daily consumption. These skills were intended to be applied outside of camp. During camp, girls brought their own lunches. A "5-star lunch" campaign was initiated to educate children and parents on what foods and amounts were best for healthier camp lunches and snacks.

To enable the girls to drink more water, attempts were made to: 1) increase their preference for water by increasing exposure to water; 2) increase the availability and accessibility of water at home and camp; 3) train them in a schema for drinking 5 glasses (12 oz) of water each day; 4) increase the girls' self control for drinking more water by training them to select water over sweetened beverages, to set goals for drinking water each day, to take action when these goals were not met, and by providing the girls with incentives (friendship beads) for meeting water goals.

To increase physical activity (PA), attempts were made to: 1) enhance social support for activity by establishing a girls' buddy system; 2) involve the parent by training the girls to ask their parents to participate with them in PA after camp, or in the evening; 3) increase the girls' preference for PA by increasing their exposure to it, and by associating fun with physical activity; 4) train them in PA skills, eg, having an instructor teach them to dance; and 5) provide them with a pedometer to self monitor PA.

Summer Camp Programs

A summer day camp was selected over a live-in camp because formative research revealed that the girls would not attend a live-in camp. A day camp

also provided the opportunity to assess whether the girls practiced at home what they learned at camp each day, whereas a live-in camp would have placed the girls in a learning, environment devoid of their usual social realities. The camps for both treatment and control children were largely subsidized by the project, in order to attract participants. The summer day camp was 4 weeks in duration and was conducted in conjunction with Kid Venture Camps of HoustonTM. One of the camps was used for the treatment camp and another for the control. The control camp experienced only the usual camp activities at that site, while the treatment camp blended usual camp activities with activities specially designed for GEMS-FFFP. The specially designed interactive multimedia GEMS-FFFP activities included buddy groups; camp cheers used as mnemonics for decision making, problem solving, and asking behaviors; training in dance; educational games targeted at increasing FJV intake and PA; snack recipe preparation; and goal (called "challenges") setting and review. Figure 1 presents usual daily activities for week 2 of the control camp (first column, labeled Kid Venture), and a day-to-day schedule of the treatment group camp.

Internet Programs

The Internet was selected as a program delivery channel for several reasons: virtually all children enjoy aspects of the Internet; this electronic medium allows the program to be delivered as designed; it can be delivered in the home, thereby minimizing the inconvenience of traveling to sites outside the home; and it has been demonstrated to promote dietary change.³³ Separate Internet programs were employed for each of the following audiences: control girls, control parents, treatment girls, and treatment parents. Control girls were asked to log-on once a month, and the information provided included links to other general health and homework

Websites that 8-year-old girls would find interesting. The control parent Website offered access to the girl's Website, and links to other Websites with information on general health issues interesting to parents of 8-year-old girls. New links were listed each month on each control Website.

The weekly behavioral/environmental foci for each of the treatment web programs were the same for the girls' and parents' Websites: 1) do a fun PA at home; 2) choose an FJV for snack; 3) increase home FJV availability and accessibility; 4) do PA with a parent in the evening; 5) drink water vs soft drink; 6) do PA after camp; 7) eat FJV after school; and 8) maintain 5 a day. The weekly Website for treatment girls included: a comic book with characters who attended GEMS summer camp and faced and overcame hurdles in making lifestyle changes consistent with the FFFP dietary and PA goals; problem solving for challenges identified in the comic strips; review of attainment of previous week's goal; opportunities to set goals of 5 FJV servings/day, 5 glasses water/day, and 12,000 pedometer counts per day; a photo album of girls from the camp (both individual and group pictures); an "ask the expert" feature; and links to various Websites of interest to girls (including diet and PA Websites not listed for the control girls). The organizing page for the girls' Website is found in Figure 2. Each item on the page could be clicked, thereby linking to the various activity pages. If the child did not click on an item within 10 seconds, items on the page began to flash, thereby inviting a click. A week-by-week schedule of girls' treatment group Website activities can be found in Figure 3. Girls received weekly email and telephone reminders to log-on.

The weekly Website for treatment parents included: a comic book in which a parent character commented on each frame of the child's comic, from an authoritative parenting perspective (in order to model desired parenting behav-

iors);¹¹ a poll of parents regarding the best ways to encourage lifestyle changes in their daughters, which, with feedback from all parents the following week, led to setting a goal of choosing methods to help their daughters make a lifestyle change each week; review of previous week's goal/challenge attainment; a review of the girls' goal/challenge attainment; new recipes; an "ask the expert" feature; links to other Websites of interest to parents of 8-year-old girls; and a link to their daughters' Websites (with a reassurance to parents that their daughters' Websites were "safe"). A week-by-week listing of activities on the Website for the parent treatment group can be found in Figure 4.

Measures

The variables reported include demographics, body mass index, waist circumference, physical maturation, % body fat by DEXA, diet, physical activity, and preferences for physical activity and sweetened beverages. Race and ethnicity of each girl were reported by her parent(s) or legal guardian(s). Two readings of height and weight were taken, and the mean was used analytically. Two readings of waist circumference were taken, using the umbilicus as a landmark.³⁴ The mean of the 2 measures was used analytically. Percent body fat was estimated by DEXA at baseline, using the Hologic QDR 4500 instrument (Waltham, Mass). Sexual maturation was assessed by a professionally trained and certified nurse. The stages of breast and pubic hair maturation were recorded using the Tanner scale, which categorizes stages 1 (pre-pubertal) to 5 (fully developed), and an overall level of sexual development was determined. Diet was assessed using two 24-hour dietary recall reports (one determined during a clinic visit, and one by a follow-up telephone call within 2 weeks) conducted at baseline and after the 12-week intervention. Dietary intake was collected using the Nutrition Data System for Research (NDS-R) of the University of Minne-

		Monday	Tuesday	Wednesday	Thursday	Friday		
TIME	KIDVENTURE	6/11/2001	6/12/2001	6/13/2001	6/14/2001	6/15/2001		
7:30 AM	Pre-Camp	Mystery FJV: Nectarines/Cherry Tomato, Use senses to discover. Write on handout smell, taste, touch, sight.	Log in Pedometer Counts/Reset Ped.	Log in Pedometer Counts/Reset Ped.	Log in Pedometer Counts/Reset Ped.	Turn in Mom/Daughter Checklist. Log in Pedometer Counts/ Reset Ped.		
8:00 AM		Win FFF Spirit Sticks. Explain water goal for week. Do GIRL TALK CHEER.	Win FFF Spirit Sticks. Pedometer LP #2	Win FFF Spirit Sticks. Win HR monitors. Camp CHEER	Win FFF Spirit Sticks. Win HR monitors. Askin w/ Attitude Cheer.	Win FFF Spirit Sticks. Win HR monitors.		
8:10 AM		Circle Up-Buddy Groups. Solve Mystery FJV. Review weekend goals. Choose today's PA	Circle Up-Buddy Groups. Solve Mystery FJV. Choose today's PA. Review goal from last night.	Circle Up-Buddy Groups. Solve Mystery FJV. Choose today's PA. Review goal from last night.	Circle Up-Buddy Groups. Solve Mystery FJV. Choose today's PA. Review goal from last night.	Circle Up-Buddy Groups. Solve Mystery FJV. Choose today's PA. Review goal from last night.		
8:30 AM		Food Guide Pyramid Activity	Selection Activity	Begin Storage Experiment	Forecasting Game	Solve storage experiment		
8:45 AM		Pep Rally	Snack Preparation: Fruit Smoothie	Snack Preparation: Sticks 'n Stones for Friday field trip	Snack Preparation: Sunshine Salad	Snack Preparation: Veggie Wrapper	Snack Preparation: Celebration Sundae	
9:30 to 9:45 AM	Snack Time	Snack Time: Applesauce & raisins	Snack Time: Watermelon	Snack: Sticks 'n Stones	Snack Time: Celery & PNB	Snack Time: Del Monte Fruit to go		
10:00 AM	Kidventure Morning PA Rotations	Kidventure PA	Kidventure PA		Kidventure PA	Kidventure PA		
10:30 AM		GEMS PA: Jump Rope or Run/walk	GEMS PA: Basketball or Play Stations		GEMS PA: Basketball or Scooter	GEMS PA: Jump Rope, Run/Walk or Play stations		
11:00 AM		Kidventure PA	Kidventure PA		Kidventure PA	Kidventure PA		
11:30 AM	Lunch	Lunch: All-Star Lunch Checklist			Lunch	Lunch: All-Star Lunch Checklist		
12:00 PM	Quiet Time	CHEER TIME: Create new words and phrases for cheers.		FIELD TRIP: PARK	CHEER TIME: Create new words and phrases for cheers.			
12:30 -1:15 PM	Kidventure Crafts	Kidventure Crafts			Kidventure Crafts			
1:30 PM	Kidventure Afternoon PA Rotations	POOL DAY	Kidventure PA		GEMS PA: Dance	Kidventure PA		
2:00 PM			GEMS PA: Soccer or Tag			Kidventure PA	GEMS PA: Relay or Volleyball	
2:30 PM			Kidventure PA			Kidventure PA	Kidventure PA	
3:00 - 3:15 PM	Snack Time	Snack Time: Fruit Smoothie	Snack Time: Fruit 'n Nut Roll ups	Snack Time: Sunshine Salad	Snack Time: Veggie Wrapper	Snack Time: Celebration Sundae		
3:30 PM	Post Camp	Win & learn to use Pedometers.	PS #4: Review GIRL TALK Cheer and steps. Each group makes up own skits & performs in front of counselors.	Asking Skills #1: skit and activity from comic.	Asking #2: Review Askin w/ Attitude Cheer.	Problem Solve & Asking Scavenger Hunt:		
4:00 PM		PS #3: GIRL TALK pedometer skit and activity. Review Girl Talk cheer		Learn how to use HR monitor and rules on how to win it each day.	Learn Askin with Attitude cheer	Do role Play (judges).	Girls Process Evaluation	
4:15 PM			Circle-Up-Buddy Groups: Set goal to do PA with parent and make recipe. Turn in HR monitor.		Parent/daughter PA Checklist LP. Turn in HR monitor.	Camp ends at 4:30 on Fridays		
4:30 PM			Circle Up-Buddy Groups. STEPS CHEER. Set FJV goal				Circle Up-Buddy Groups. STEPS CHEER. Set goal to do PA and fill out checklist.	
4:45 to 5 PM		Evening Challenges	FJV challenge	PA challenge	Do FJV challenge	Do PA goal. Mom/ Daughter handout	Recipe prep & PA goal for weekend.	

Fig 1. Day-to-day schedule for Week 2 of the Kid Venture (control) and GEMS-FFFP summer day camps

sota. Nutrient values were the mean of 2-day intakes. The derived variables (numbers of servings of specified foods or food groups) reflected specific eating behaviors targeted by the GEMS interventions, and described food choices and strategies used by participants to modify their diets in response to the in-

terventions. The sum of the intake over 2 days was given for these derived dietary variables. Physical activity (PA) was assessed by both the Computer Sciences and Applications (CSA) accelerometer and the GEMS Activity Questionnaire (GAQ), a modification of the Self-Administered Physical Activity Checklist

(SAPAC) that has been validated and assessed for test-retest reliability on the same day.³⁵ A computerized GAQ was completed by each girl with the assistance of a field center staff. All measures were taken by centrally trained and certified staff. Participants completing baseline and 12-week follow-up assess-



Fig 2. Entry page for Treatment Girls' Website

ments received an incentive (children \$10; adults \$25). More details on these measures can be found in this volume.³⁶

Attendance at camp was calculated as number of days attended divided by number of days camp was open, with the result averaged across girls. Children who came late or left early on any day were counted as having attended that day. Every treatment group participant was expected to log-on once per week, and every control participant once per month. Weekly and monthly log-on rates were calculated as the percent of participants logging on at least once during those time intervals. Overall log-on rates were the mean of the weekly log-on rates.

Analyses

Data were analyzed according to "Intention-to-Treat" (ITT) principles.³⁷ Two-sided tests of significance were

performed with type-I error set at $\alpha = .05$.

Statistical comparisons were performed to compare treatment and control groups with respect to demographic characteristics and important prognostic factors at baseline. The baseline value of outcome measures was compared, to determine possible systematic differences among the treatment and control groups after randomization.

Differences between treatment and control groups in outcome measures at 12 weeks were tested using ANCOVA. The post-intervention value was used as the dependent variable and the baseline value as a covariate. This analysis was performed at 4 weeks (after camp), and at 12 weeks (after randomization). As a secondary analysis of whether the program was more successful among the heavier girls, the sample was split at the median baseline BMI, and tests were

performed to determine whether the interventions were effective in either BMI strata. Poisson regression was employed for variables not normally distributed; specifically, servings of FJV, sweetened beverages, and water. Estimated ratios between treatment and control groups were derived from Poisson regression.

As this pilot project did not have sufficient power to detect statistically significant differences between treatment and control groups, data were examined for trends of differences in the hypothesized directions. Because of the very small sample, P values $\leq .10$ were accepted as suggestive of between-group differences.

RESULTS

Baseline characteristics of randomized girls appear in Table 1. Girls were 8

**Fun, Food and Fitness
Summary of Treatment Group-Weekly Web Site Activities**

GIRLS-TREATMENT GROUP

Section	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
FFF Comic Book focus	Do fun PA at home	Choose a FJV for snack	Avail/Access of FJV	Do PA with parent in evening	Drink water vs. soda	Do PA after school	Eat FJV at school	Maintain 5 A Day
Comic Cliffhanger/ Problem solving	Help comic character solve her problem on how to choose a FJV snack at home	Help comic character solve her problem on how to ask for Avail/Access-FJV at home	Help comic character solve her problem on how to do PA with parent in evening	Help comic character solve her problem on how to drink water vs. soda	Help comic character solve her problem on how to do after school PA	Help comic character solve her problem on how to eat FJV at school	Help comic character solve her problem on how to reach 5 A Day	Help comic character solve her problem on how to maintain 5 A Day
Review of Last Week's Challenge	Reviews what their parent said they accomplished during the past week with their FJV, water and PA / pedometer goals							
Weekly Challenges (goals)	FJV, PA & Water Challenges - Set a goal to eat 5 FJV servings each day, drink 5 glasses of water each day, and get 12,000 pedometer counts for PA each day						Maintain FJV, PA & Water	
Fantastic Food -	Weekly food, recipe and nutrition web links for girls							
Keep Movin' -	Weekly fitness web links for girls							
Just for Girls -	Weekly links for girls' health web sites							
Weekly links for girls' general web sites	Weekly links for girls' general web sites							
Games to Play -	Weekly game site links for girls							
Music Links	Girl music web site links							
Homework Help -	Weekly homework help links							
Photo Album	Photo album of camp buddies with email and phone numbers							
Questions?	Link to email for questions, comments and other contact with their camp counselors							

Fig 3. Week-to-week schedules of Girls' Treatment Group Website activities

years of age. Despite random assignment, girls in the control group had a greater BMI and percent body fat (as determined by DEXA) compared to girls in the intervention group, with the differences being of statistical significance. Associated with their larger size, girls in the control group were likely to be at a more advanced pubertal stage compared to intervention group girls. Groups were comparable on socioeconomic characteristics.

Very high levels of participation were maintained in summer day camp (Table 2). The low rate in the control camp during week one was due to Tropical Storm Alison (the worst storm in the history of Houston), which flooded the control camp (but not the treatment camp) forcing its closure for one day. The severe flooding also inhibited the

participation of some control families whose homes were flooded and destroyed.

Weekly log-on rates for the treatment group started below 50% for both girls and parents (Table 3). To increase log-on rates, a \$100 lottery was offered to parents in week 3; this doubled log-on rates. The weekly \$100 lottery was maintained through the remaining 5 weeks. Despite the lottery, log-on rates trailed off throughout the remaining weeks resulting in overall log-on rates of 48% for girls and 47% for parents (Table 3). Control group girls and parents had even lower log-on rates, although they were only expected to visit the Website once a month (Table 3), and control parents also had a monthly \$100 lottery as an incentive.

After adjusting for baseline BMI as a

covariate, BMI at the end of summer camp did not vary between groups. In a secondary analysis, when the sample was restricted to girls with baseline BMI above the median split (BMI>22.1), there was a trend ($P<.08$) for lower BMI for the treatment girls ($x=28.6$ kg/m²), compared to the control girls ($x=29.3$ kg/m²).

At the end of the 12-week intervention (summer day camp and Internet programs), diet differences were in the hypothesized directions: lower total calories (-231 kcal) and percent calories from fat, greater consumption of water and FJV, and lesser consumption of sweetened beverages (Table 4). There were no differences in BMI, most physical activity measures (but Met adjusted usual GAQ was 0.8 greater in the hypothesized direction), or in preferences

Fun, Food and Fitness
Summary of Treatment Group-Weekly Web Site Activities

PARENTS-TREATMENT GROUP

Section	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Weekly Comic Book Focus	How to encourage daughter to do fun PA at home	How to encourage daughter to choose a FJV for snack	How to make FJV more Avail/Access for daughter	How to encourage daughter to do PA with them in PM	How to encourage daughter to drink water vs. soda	How to encourage daughter to do PA after school	How to encourage daughter to eat FJV at school	How to encourage daughter to Maintain 5 A Day
Weekly Parent Poll question	Having FJV at home for snack	Avail/Access of FJV at home	Doing PA with daughter in evening	Help daughter drink water vs. soda	Have after school PA avail.	Promoting daughter to eat FJV at school	Promoting daughter to reach 5 A Day	Maintaining 5 A Day
Weekly Parent Poll results	None, tips given for parent challenge	Having FJV for daughter's snack at home	Avail/Access of FJV at home	Doing PA with daughter in evening	Having daughter drink water vs. soda	Having after school PA for daughter	Encouraging daughter to eat FJV at school	Encouraging Daughter to Maintain 5 A Day
Review-Parent's Previous Week's Challenge	None, first week	What PA did they do with daughter?	How they encouraged daughter to choose a FJV for snack	How made FJV more Avail/Access for daughter	How encouraged daughter to do PA with them in evening	How encouraged daughter to drink water vs. soda	How encouraged daughter to do PA after school	How encouraged daughter to eat FJV at school
Parent Weekly Challenge	Encouraging daughter to do fun PA at home	Encouraging daughter to choose a FJV for snack	Having FJV more Avail/Access for daughter	Encouraging daughter to do PA with them in PM	Encouraging daughter to drink water vs. soda	Encouraging daughter to do PA after school	Encouraging daughter to eat FJV at school	Encouraging daughter to Maintain 5 A Day
Daughter's Challenge	Chart how daughter has done on completing her weekly FJV, Water and PA challenges							
Weekly Recipes	Fruit Pizza	Fuzzy Peach Smoothie	Black Bean Salsa	Savory Potato Salad	Pasta Primavera	Breakfast Sundaes	Veggie Quesadillas	Stone Soup
	Fantastic Fruit Freezes	Colossal Pina Colada	Mango-Kiwi Salsa	Calico Bean Salad	Veggie Lasagna	Apple-Raisin Muffins	Blazin' Raisin Tortillas	Ultimate Spaghetti Sauce
	Microwave Fruit Crisp	Lucky Lime Moat Float		Fruity Coleslaw		Easy Banana Bread		
Fitness Links -	Weekly fitness links to help them do more physical activity with Daughter							
What's Cookin' -	Weekly Food, recipe and nutrition web links focusing on increasing consumption of FJV							
Doctor's In -	Weekly health information links, focusing on increasing FJV and water intake and PA with daughter							
Homework Help	Weekly homework help links to help Daughter							
Daughter's Web	Link takes them to Daughter's web pages							
Questions?	Link to email for questions, comments and other contact with GEMS/FFFP staff							

Fig 4. Week-to-week schedules of Parents' Treatment Group Website activities

for physical activity or sweetened beverages.

Table 1. Baseline characteristics of pilot study sample (mean, SD or %)

	Intervention	Control
N	19	16
Age, yrs	8.3 (0.3)	8.4 (0.3)
Body mass index, kg/m ²	21.1 (4.4)	26.3 (7.9)*
% Pubertal (Tanner=2 for breast or pubic hair)	36.8%	66.7%†
Household income, N (%)		
<\$20,000	3 (15.8%)	1 (6.3%)
\$20,000-\$39,999	6 (31.6%)	6 (37.5%)
≥\$40,000	10 (53.6%)	9 (56.2%)
Maximum household education, N (%)		
High school graduate or less	1 (5.3%)	0 (0.0%)
Technical school or some college	5 (26.4%)	7 (43.8%)
College graduate or post graduate	13 (68.4%)	9 (56.3%)
Female-headed household, N (%)	8 (42.1%)	5 (31.3%)
Age of caregiver, yr	35.7 (5.4)	37.8 (7.0)
Body mass index of caregiver, kg/m ²	32.5 (8.4)	34.8 (7.8)
% Body fat from DEXA	30.8 (7.3)	35.7 (10.4)

* P<.01.

† P<.10.

DISCUSSION

The GEMS-FFFP did not result in lower BMI in the intervention compared with the control group at the end of the 12-week intervention. While the study was not powered to detect such an effect, no trend for a difference in the hypothesized direction was evident. Part of the reason for this lack of difference in the hypothesized direction may have been the substantial difference (5.2 kg/m²) in BMI between groups at baseline, since statistical adjustments cannot account fully for baseline differences. Alternatively, there was a trend toward lower BMI among the heavier girls in the treatment, as compared to the control, group at the end of summer day camp. This suggests that summer

Table 2. Weekly camp attendance rates

	N	Week				Overall
		One	Two	Three	Four	
Treatment	19	85%	91%	95%	96%	91.5%
Control	16	68%	85%	89%	80%	80.5%

day camp served as a useful tool for intervening on diet and physical activity practices among heavier African-American girls, which is consistent with the findings of other recent studies.¹⁵⁻¹⁷ It is possible that the changes due to GEMS enhanced summer camp activities were lost during the Internet period.

The difference between groups of -231.5 kcal per day was substantial. This level of difference between groups in kcal intake is larger than study findings reported in the literature,³⁸⁻⁴¹ two of which studies^{39,41} resulted in a change in BMI when implemented over multiple years. Thus, if maintained for a longer duration, this level of difference could result in a lesser increase in BMI. The level of kcal consumption by the end of camp was not assessed; therefore, it is impossible to determine whether elements of the intervention affected the trajectory of intake over the 12 weeks.

Treatment girls consumed 1.2 times more servings of FJV, compared to control girls (4.9 vs 4.1 servings over 2 days). This is among the larger differences reported among children.⁴² The conceptual foundation for GEMS-FFFP to change FJV consumption was similar to that of some of our other projects.^{33,43-45} The substantial change in

this project was likely due to its implementation by project-trained staff, not by usual camp counselors.¹⁰

The mean percent kcal from fat at 12 weeks follow up was 33.1% for the treatment group, which was 1.6% lower than that for the control group, but still exceeded the desired 30%. Changing dietary fat intake was not a target of this project, but was expected to decrease as a result of increased FJV consumption.⁴⁶ It appears likely that FJV consumption needs to increase by more than 20% to further decrease dietary fat intake.

To our knowledge, ours is the first intervention to effect a 20% reduction in servings of sweetened beverages, and a 40% increase in servings of water. The conceptual foundation for changing beverages was similar to that for changing FJV intake. The results provide some support for the efficacy of this conceptualization, though this should be repeated in larger trials.

It is not known whether any of the diet and PA differences occurred after summer day camp and were maintained during the Internet program, or perhaps decreased during the Internet program (due to low rates of Internet participation). Research needs to be conducted on summer day camps to assess their

potential to serve as a stand alone intervention modality.

To encourage log-on to the treatment Internet program, the investigators provided two weekly email reminders, one weekly telephone call, and a \$100 lottery incentive from weeks 3 through 8. The very low log-on rates were highly problematic. We know of only one other report that published Internet program log-on data.⁴⁷ They reported 1.1 log-ons per participant per week in the treatment group, and 0.3 log-ons per participant per week in the control group, with a steep decline over their 8-week program. The higher log-on rate for treatment compared to control groups, as well as the steep decline, were consistent with our findings. The average of 1.1 weekly log-on per participant was substantially higher than our approximately 0.5 weekly log-ons per participant in the treatment groups. While the samples in both studies were highly self selected, their participants were adult, diabetic patients (thereby possibly being more motivated for self care than are children with no signs of illness), and were recruited exclusively through Internet channels (therefore perhaps being more comfortable with, and knowledgeable about, the Internet). Other investigators have verbally reported similar problems in log-on rates with healthy adolescents. The decline in log-on rates over the 8 weeks suggests that the initial perceived novelty of the comics declined, while logging on increasingly contributed to participant burden. Thus, while the Internet provided a very attractive medium for delivering a fun, interactive intervention, the low log-on rates minimized its likely impact. Currently, a major challenge with Internet interventions is to identify procedures that maximize Internet log-on rates. Attention should be paid to characteristics of the Web content (eg, attractiveness, developmental and cognitive suitability for population, fun), incentives (eg,

Table 3. Internet log-on rates for treatment and control groups

Treatment Group	N	Week								Mean
		One	Two	Three	Four	Five	Six	Seven	Eight	
Girls	19	47%	37%	68%	53%	63%	37%	37%	42%	48%
Parents	19	32%	47%	68%	58%	58%	37%	26%	47%	47%
Control Group	N	Month One		Month Two		Mean				
Girls	16	31%		19%		25%				
Parents	16	25%		6%		16%				

Table 4. Intervention and control group outcome measures and differences adjusted for baseline values

	12-Week Follow-up* Intervention Mean (SD) (N=17)	Control Mean (SD) (N=14)	Adjusted Difference† or Estimated Ratio‡ (SE)	P Value§
Body mass index, kg/m ²	24.6 (1.0)	24.1 (1.1)	0.6 (1.6)	.72
Waist circumference (cm)	74.1 (0.9)	71.7 (1.0)	2.4 (1.4)	.10
CSA, 24 hours (counts/min)	369.9 (22.0)	364.0 (25.8)	6.0 (34.4)	.86
CSA, mod to vigorous, min	67.5 (7.6)	74.8 (8.9)	-7.3 (11.8)	.54
CSA, noon-6 (counts/min)	606.2 (40.1)	597.9 (46.9)	8.3 (62.1)	.89
MET adjusted GAQ-usually	5.1 (0.4)	4.3 (0.5)	0.8 (0.6)	.19
Total kCal	1678 (137.1)	1909 (155.8)	-231.5 (209.1)	.28
% kCal from fat	33.1 (1.2)	34.7 (1.3)	-1.6 (1.8)	.39
FJV, servings†	4.9 (0.6)	4.1 (0.6)	1.2 (0.2)	.36
Sweetened beverages, servings†	2.9 (0.6)	3.6 (0.7)	0.8 (0.2)	.42
Water, servings†	1.3 (0.3)	0.9 (0.3)	1.4 (0.5)	.41
Physical activity preference	2.5 (0.1)	2.4 (0.1)	0.1 (0.2)	.62
Sweetened beverage preference	1.7 (0.1)	1.8 (0.2)	-0.1 (0.2)	.58

* Adjusted for baseline value.

† Intervention minus control group difference at 12-weeks follow-up, adjusted for baseline value.

‡ Means (summed over 2 days) and standard errors are predicted by the Poisson regression model.

§ For adjusted difference between intervention and control group at 12-weeks follow up. Estimated ratios are ratios of treatment to control groups.

monetary, social, or other), reminders (eg, e-mail, telephone, postcard, by peers), and characteristics of the participants (eg, healthy or ill, self selected or randomly selected, personality characteristics), and whether these vary for differing age and gender groups. In addition, Internet use during the summer day camp may have improved log-on rates after camp by enhancing the girls' familiarity with the software and procedures to log-on. If Internet log-on cannot be substantially increased to above 50% (preferably to 80% or higher), perhaps the Internet can be used for very large-scale public health interventions where weak effects can still have public health significance.

The strengths of this research include a strong theoretical framework, randomization, participatory controls, and substantial process evaluation. Its limitations include the very small sample, the self-report nature of the dietary intake variables, and the large, statistically significant differences in BMI between treatment and control groups at baseline. Despite these limitations, the findings highlight the intervention potential of summer day camps and the need for

research on identifying procedures that maximize Internet log-on rates.

ACKNOWLEDGMENTS

This research was largely funded by a grant from the National Heart Lung and Blood Institute, U01 HL-65160. This work is also a publication of the United States Department of Agriculture (USDA/ARS) Children's Nutrition Research Center, Department of Pediatrics, Baylor College of Medicine, Houston, Texas, and was funded, in part, by 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 US government.

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