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Applied Nursing Research 20 (2007) 63–71

Applied Nursing Research

www.elsevier.com/locate/apnr

An intervention for multiethnic obese parents and overweight children

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Received 20 May 2005; revised 21 October 2005; accepted 10 January 2006

Abstract The purpose of this pilot study was to determine the effects of the addition of coping skills training for obese multiethnic parents whose overweight children were attending a weight management program. At 6 months, parents in the experimental group had significantly lower body mass index (BMI) and body fat percentage (BFP) and higher numbers of pedometer steps compared with those in the control group. Parents in the experimental group also demonstrated significant improvement in interpersonal relationships, behavior control, and stress management compared with those in the control group. Children in the experimental group demonstrated trends toward decreased BMI and BFP and increased pedometer steps.

1. Introduction

Obesity is increasing at an alarming rate in the United States. The percentage of at risk for overweight or overweight children and overweight and obese adults has increased dramatically over the past 40 years, with Black, Hispanic, and Native American families disproportionately affected (Jolliffe, 2004; United States Department of Health and Human Services, 2001). Currently, 64% of adults (Mokdad et al., 1999) are either overweight or obese, and 30% of children (Centers for Disease Control and Prevention [CDC], 1999) are either at risk for overweight or overweight. Obesity is associated with an increased risk for prediabetes (impaired glucose tolerance and impaired fasting glucose), type 2 diabetes, hypertension, dyslipidemia, cardiovascular disease, sleep apnea, and depression in children and adults, leading to long-term morbidity and early mortality (Ruser, Federman, & Kashaf, 2005; Sturm, 2002). For the first time in two centuries, there is a potential decline in life expectancy in the United States secondary to the effect of obesity on longevity (Olshansky et al., 2005). Obese adults spend approximately 36% more on health services and 77% more on medications than do normal-weight individuals (Sturm, 2002). Children account for approximately US $127 million in overweight-associated hospital costs secondary to type 2 diabetes, cardiovascular disease, sleep apnea, and orthopedic problems (Wang & Dietz, 2002).

In adults, overweight is defined as a body mass index (BMI) >25–29.9 kg/m^2 and obesity is defined as a BMI >30.0 kg/m^2 (National Heart, Lung, and Blood Institute, 2000). In children, at risk for overweight is defined as a BMI >85th percentile and overweight is defined as > 95th percentile for gender and age (CDC, 1999; Kuczmarski et al., 2000). Black and Hispanic children are at a higher risk for developing overweight when their parents are overweight or obese, eat a diet high in fat, and do not follow a regular exercise program (Ogden, Flegal, Carroll, & Johnson, 2002; Troiano & Flegal, 1998). Parents who eat a nutritionally balanced diet and exercise regularly are in a unique position to be positive role models for their children.

Nutrition education, exercise, and behavioral interventions are the mainstay of treatment for overweight and obese parents (adults) and at risk for overweight or overweight

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doi:10.1016/j.apnr.2006.01.007

children (Wadden & Stunkard, 2002) and are aimed at improving nutritional choices, increasing physical activity, and decreasing sedentary activity. Adults and children may be targeted separately or together (Berry et al., 2004). Nutrition education is based on decreasing portion sizes, lowering fat intake, decreasing sugared drinks, and increasing intake of lean meats and fish, whole grains, fruits, and vegetables (Engels, Gretebeck, Gretebeck, & Jimenz, 2005). A balanced nutritional approach teaches parents and children to eat foods within their cultural preference by making small changes in portions and in the fat content of their recipes and by substituting healthier ingredients without dramatically changing the basic foods that they have grown up with and that are important for them to include in their daily meals. When caloric intake is decreased and exercise is increased, weight loss outcomes improve (Cole & Rolland-Cachera, 2002; Goldfield, Raynor, & Epstein, 2002). Parents who display high levels of unhealthy eating habits may foster the development of excess body fat in their children (Hood et al., 2000).

It is important for parents and children to incorporate exercise into their life on a daily basis. Currently, 39% of boys and 58% of girls aged 7–18 years do not achieve recommended levels of exercise, which includes at least 1 hour a day at moderate intensity (Horgan, 2005). The goals for overweight and obese parents and their children include increasing physical activity and decreasing sedentary behaviors such as watching television and playing video games. Parental exercise has been found to be associated with children's increased extracurricular sports participation and cardiorespiratory fitness (Cleland, Venn, Fryer, Dwyer, & Blizzard, 2005). The level of adult encouragement and intention has been found to predict vigorous activity and perceived level of competence in their children (Biddle & Goudas, 1996). Increasing lifestyle activity is designed to increase physical activity and decrease sedentary behaviors in day-to-day activities (Parizkova, Maffeis, & Poskitt, 2002).

Behavioral interventions with parents and children use varying levels of parental involvement (Cooper & Fairburn, 2002). When both parents and children are targeted for behavior change, weight loss outcomes usually improve (Epstein, 1996). Direct involvement in the weight loss process of at least one parent as an active partner with their child has been found to improve the child's short- and long-term (1-year) weight loss (Epstein, 1996; Wadden & Stunkard, 2002). Six- to 11-year-old children, in whom parents are frequently the mediators of change (Epstein, 1996), have demonstrated increased weight loss and positive behavior change (Golan, Fainaru, & Weizman, 1998; Golan, Weizman, Apter, & Fainaru, 1998). When parents are taught new parenting skills such as problem solving, role modeling, self-monitoring, and praise, their children's weight loss outcomes have improved (Epstein, McKenzie, Valoski, Klein, & Wing, 1994). To date, most family-based interventions for children have been conducted on middle-class White children and adults, whereas the prevalence of obesity is higher in Hispanic, Black, and Native American adults and children (Berry et al., 2004; Heisler, Rust, Pattillo, & Dubois, 2005).

Coping skills training (CST) is a form of a cognitive behavioral intervention and is based on social learning theory (Bandura, 1977), which is designed to improve self-efficacy outcomes. CST includes communication skills training, which includes social skills training and assertiveness training, social problem solving, conflict resolution, and cognitive behavior modification (Forman, 1993). Grey, Boland, Davidson, Li, and Tamborlane (2000) found that in female patients with type 1 diabetes, CST prevented weight gain and improved long-term metabolic and psychosocial outcomes. In a pilot study of a school-based intervention program to prevent type 2 diabetes among high-risk youth, CST was successful in improving not only nutrition and exercise for both Black and Hispanic children and parents but also metabolic outcomes in children (Grey et al., 2004). However, these studies did not specifically target obese parents of overweight children.

Most studies using nutrition education, exercise, and behavioral interventions for obesity target middle-class White adults and children separately or together and have had mixed results (Berry et al., 2004). There are no data about interventions using CST to target multiethnic obese parents and their overweight children attending a weight management program.

This article presents results from a pilot study that was conducted to determine the effects of the addition of CST for obese multiethnic parents whose overweight children were attending the Bright Bodies weight management program. The primary research question was, "What are the effects of the addition of CST for obese multiethnic parents whose overweight children were attending a weight management program on clinical outcomes of parents and their children and health behavior outcomes of parents?"

2. Methods

Following approval for protection of human subjects from the Yale School of Nursing and Yale New Haven Hospital Institutional Review Boards, parents whose children were enrolled in the Bright Bodies weight management program were given a brochure that described the study. If they were interested in joining the study, they were invited to call the research office and leave a message. The principal investigator (PI) called them back to answer any questions, and they were screened for eligibility by asking their height and weight and calculating their BMI (in kilograms per meters squared). If they were interested, the PI scheduled an appointment to meet with the parent and child to discuss the study and review the consent and child assent forms. Inclusion criteria included any ethnic group (Black, Hispanic, or White), either gender, English- or Spanish-speaking parents and their children between the ages of 7 and 17 years who

assented and whose parent or guardian consented to their participation, BMI >25 for parents and >85th percentile for children, and no major diagnosis that would affect their participation in the study.

After the participants consented and children assented to join the study, they were randomized by class, using the "sealed envelope technique" in blocks of 8–10 parent–child dyads to either the experimental group or the control group. Between November 1, 2003, and September 30, 2004, 80 parent–child dyads met the inclusion criteria and agreed to participate. All parents and children who consented to be a part of the study received an Accusplit Eagle 170 Deluxe Activity Pedometer and a Pedometer Walking Book (Sweetgall, 2001) with a 1-year pedometer logbook.

2.1. Setting and sample

The study was conducted at a middle school in an early evening program. A total of 88 parents contacted the PI to participate in the study. However, because eight parents did not meet the inclusion criteria of having a BMI >25, they were not included in the study. A total sample of 80 parent–child dyads were inducted into the study. The baseline demographic characteristics of the parents and children can be seen in Tables 1 and 2. There were no significant ($p < .05$) baseline differences between the parents and children. All of the parents and children were able to read, write, and speak English. Therefore, the intervention was delivered in English.

2.2. Intervention

The intervention protocol is shown in Table 3. All children and parents received the nutrition and exercise education program (NEEP). All children received formal exercise and behavior modification, and all parents were encouraged to exercise as detailed below. Only the parents in the experimental group received CST.

Table 1
Demographic baseline comparison of parents in the experimental group (n = 40) and the control group (n = 40)

Demographics	Experimental group ($M \pm SD$)	Control group ($M \pm SD$)	t	df	p
Age	41.1 ± 7.6	43.6 ± 8.6	−1.4	78	.2
BMI	37.7 ± 7.0	37.9 ± 10.8	−1.3	78	.2
BFP	43.3 ± 6.8	43.4 ± 8.4	−0.8	78	.4
Pedometer steps	2356 ± 953	2334 ± 728	−0.5	75	.6
	Experimental group (n)	Control group (n)	χ^2	df	p
Gender					
Female	34	36	0.5	1	.5
Male	6	4			
Ethnicity					
Black	17	11	3.0	2	.2
Hispanic	12	11			
White	11	18			
Income (US$)[a]					
<19,900	10	9	7.1	6	.3
20,000–59,999	24	19			
>60,000>100,000	5	8			

[a] Five participants did not answer.

Table 2
Demographic baseline comparison of children in the experimental group (n = 40) and the control group (n = 40)

Demographics	Experimental group ($M \pm SD$)	Control group ($M \pm SD$)	t	df	p
Age	11.9 ± 2.3	11.9 ± 2.5	−0.0	78	1.0
BMI	35.8 ± 5.1	36.7 ± 5.6	−0.7	78	.5
BFP	45.5 ± 7.1	44.9 ± 8.2	−0.4	78	.7
Pedometer steps	1921 ± 876	1955 ± 721	−0.2	75	.9
	Experimental group (n)	Control group (n)	χ^2	df	p
Gender					
Female	24	23	0.05	1	.8
Male	16	17			
Ethnicity					
Black	17	11	2.8	2	.3
Hispanic	12	11			
White	11	18			
Birth order					
First born	25	22	1.9	4	.8
Second born	10	12			
Third born	3	5			
Fourth born	2	1			

The Bright Bodies' registered dietitians taught the NEEP classes once a week. Nutrition education focused on making better food choices, ethnic menu plans, lowering fat and calories, and portion control. Exercise education focused on increasing physical activity and decreasing sedentary behaviors. Parents and children in both the experimental and control groups attended six weekly 45-minute classes together, and then children in both the experimental and control groups attended additional six weekly 45-minute NEEP classes with behavior modification without their parents.

The Bright Bodies' exercise physiologists taught the exercise classes twice a week. The exercise classes for the children were held in an exercise room at the hospital or at a local middle-school gymnasium. Activities included basketball, dancing, tag, walking, and stair climbing. Children in both the experimental and control groups attended 12 twice-a-week, 45-minute classes. Parents in the experimental and control groups were encouraged by the research assistants to walk between 30 and 60 minutes a day and keep track of their progress in their pedometer logbooks. If they felt that they could not do 30 minutes at one time, they were encouraged to take at least three 10-minute walks each day. Parents were asked to get medical clearance from their health care provider before self-starting an exercise program.

The Bright Bodies' registered dietitians taught the behavior modification classes with NEEP to the children in both the experimental and control groups without their parents once a week for 45 minutes during the last 6 weeks of classes. Behavior modification focused on improving

Table 3
Intervention

Parents in the experimental group	Parents in the control group	Children in the experimental and control groups
6 weeks of NEEP 6 weeks of CST 12 weeks of exercise	6 weeks of NEEP 12 weeks of exercise	6 weeks of NEEP 6 weeks of BM with NEEP 12 weeks of exercise

Note. BM = behavior modification.
CST = coping skills training

self-image and learning new skills such as self-awareness, stress control, and stress management.

The CST classes were taught to the parents in the experimental group by an advanced practice nurse in six weekly 60-minute classes. The CST classes included an introduction, cognitive behavior modification and exercise, social problem solving and barriers to weight loss, assertiveness training and how to motivate oneself, conflict resolution and rebounding from relapse, and social problem solving and weight maintenance.

Communication skills training included social skills training and assertiveness training, which assisted individuals to express themselves in a clear and constructive manner. Social skills training taught parents ways to communicate, which resulted in positive outcomes and included instructions on how to handle social situations by witnessing role modeling, practicing role play, and receiving feedback on role play. Assertiveness training encouraged communication that was direct and honest between parents and their family members in regard to motivating themselves to eat healthier foods and to exercise daily.

Social problem solving provided skills necessary to deal with societal pressures by thinking through a problem and the process that was required to solve it, which allowed insight into possible outcomes and consequences of decisions made. Forman (1993) identified six problem-solving steps, which included identifying the problem, determining goals, generating alternative solutions, examining consequences, choosing a solution, and evaluating the outcome. Social problem solving was used to address barriers to weight loss and weight loss maintenance.

Conflict resolution provided skills necessary to resolve conflict in a positive manner and resulted in positive outcomes (Deutsch & Brickman, 1994). The conflicts in relation to rebounding from relapse were identified, and all possible outcomes were explored. Role playing allowed new skills to be practiced, and feedback was obtained in relation to communication skills and conflict resolution.

Cognitive behavioral modification (Cooper & Fairburn, 2002) included recognition of thoughts and feelings, problem solving, and guided self-dialogue in relation to exercise. First, group members were given time to reflect on how they thought and responded in certain situations. Second, thoughts were examined to see if they were based on assumption or fact. Third, they were taught to use their thoughts to help them follow through on a decision made in the previous step. Group members were encouraged to list their negative thoughts, and then they formulated alternative positive thoughts to counter the negative thoughts in relation to exercise.

2.3. Outcome measures

Data were collected at baseline and at 3 months (completion of the 12-week intervention) and 6 months on all clinical and health behavior outcomes. Trained research assistants blinded to the study group collected clinical and psychosocial data.

Two research assistants collected parent and child clinical outcomes and included height, weight, calculated BMI, body fat percentage (BFP), and downloaded pedometer steps at baseline and at 3 and 6 months on both the parents and their children. Height was measured using a wall-mounted stadiometer, which was calibrated in 1/8-cm intervals. Weight was measured using a Tanita Body Fat Monitor and Scale and measured in kilograms. The Tanita Body Fat Analyzer Scale (TBF300) was zeroed and calibrated before each measurement. BMI was calculated using the formula BMI = weight (in kilograms)/height (in meters squared) for the parents and the BMI gender- and age-specific growth charts for the children (Kuczmarski et al., 2000).

BFP was obtained using the TBF300, which was programmed for each participant entering age, gender, height, and activity level. The TBF300 uses leg-to-leg bioimpedance analysis (BIA), which is a low-level electrical signal that is passed through the body using foot electrodes. BFP is calculated based on the amount of impedance as the current flows from one point to another (Davies & Cole, 1995). The signal passes faster through lean muscle than fat because muscle contains approximately 70–75% of the body's water and fat contains almost no water (Davies & Cole, 1995). BIA is most consistent and reliable if the participants are properly hydrated and have waited 3 hours after eating or exercising before measuring BFP. All adult participants were asked if they had pacemakers or internal cardiac defibrillators before BFP measurement because BIA is contraindicated in those participants. BIA has been found to correlate well with hydrodensitometry and dual-energy X-ray absorptiometry (Nunez, Rubiano, Horlick, Thornton, & Heymsfield, 1999). BFP was calculated on all participants consistently between 5:00 and 7:00 p.m. at baseline and at 3 and 6 months.

As part of the study, each parent and each child participant were given an Accusplit Eagle 170 Deluxe Activity Pedometer and a Pedometer Walking Book (Sweetgall, 2001) with a 1-year pedometer logbook. The pedometers counted steps, computed walking distance in miles, and computed the number of calories burned. The research assistants taught both parents and children how to program their pedometers and use their pedometers, and both parents and children gave the research assistants a return demon-

stration. They were also given written instructions on how to program their pedometers to take home with them. The parents and children were asked to return to the research assistant and have their pedometer reprogrammed if they lost 5 lb or if they were unsure how to reprogram it themselves. The pedometers were programmed by measuring stride length using a standard measuring tape and measuring the participant's stride three times (heel of one foot to heel of the next foot) after walking down a 30-ft hallway. The mean of the three measurements was then programmed into the pedometer with the participant's weight. Pedometer readings were collected by the research assistants by looking at the pedometer logbook of both the parents and children at baseline and at 3 and 6 months.

Parent health behavior outcomes were assessed using the Family Assessment Device (FAD), the Eating Self-Efficacy Scale (ESES), and the Health-Promoting Lifestyle Profile II (HPLP II). The subscales of the FAD were used to measure general family functioning, problem solving, communication, roles, affective involvement, affective responsiveness, and behavior control. The self-report questionnaire consisted of 60 items and measures six family functioning dimensions (Epstein, Levin, & Bishop, 1976). A 4-point Likert scale was used to determine a member's perception of the family. The test included both positive and negative statements that require reverse scoring. Item responses were totaled to obtain a total subscale score. A higher score indicated unhealthy family functioning. Reliability and internal consistency with coefficient α values were as follows: general functioning, .83–.86; roles, .57–.69; problem solving, .74–.80; communication, .70–.76; affective responsiveness, .70–.78; affective involvement, .70–.78; and behavior control, .71–.73 (Arslanian, 2002). The test–retest reliability was based on data from a nonclinical sample tested at a 1-week interval and included the following: problem solving, .66; communication, .72; roles, .75; affective responsiveness, .76; affective involvement, .67; behavior control, .73; and general functioning, .71 (Miller, Epstein, Bishop, & Keitner, 1985). Construct validity for each scale ranged from .83 to .90 (Miller et al., 1985). The FAD has been widely used with diverse populations and has been translated into seven languages (Kabacoff, Miller, Bishop, Epstein, & Keitner, 1991).

Both scales of the ESES (Glynn & Ruderman, 1986) were used to measure self-efficacy related to dietary changes. The instrument is a 25-item scale that asks participants to rate their difficulty controlling eating from 1 (*no difficulty controlling eating*) to 7 (*difficulty controlling eating*) on two subscales, which include negative effect (NA) and socially acceptable circumstances (SAC). Total scores range from 25 to 175, with a higher score indicating more difficulty controlling eating. Internal consistency reliability α coefficients for the entire scale was .92 and .94 for the NA subscale and .85 for the SAC subscale (Glynn & Ruderman, 1986). The test–retest reliability was .70 in a sample (n = 600) of women and men.

The HPLP II was used to measure health-promoting lifestyle behaviors (Walker, Sechrist, & Pender, 1987). The instrument is a 48-item, 4-point Likert scale that measures the frequency of health-promoting behaviors in six subscales, which include health responsibility, exercise, nutrition, interpersonal relationships, stress management, and spiritual growth. The instrument has been used in minority and Caucasian populations (Jefferson, Melkus, & Spollett, 2000) and is available in English and Spanish. For the entire scale, α = .92, and for the subscales, α = .70–.90. Test–retest reliability in Black women ranged from .70 to .74.

A demographic data sheet was used at baseline for parents to provide data on sociodemographic status such as ethnicity, race, socioeconomic status, and religion. In addition, age, birth order, gender of their children, and any health problems that their children had were obtained.

2.4. Participation in the intervention

Attendance sheets were documented weekly for both the children and their parents. Seven (8%) of the parent–child dyads dropped out after baseline data. When asked why they decided not to continue, most of the parents and children responded that they were not "overweight enough" or that they had "moved and it was too far to travel" to attend the program. At 3 months, 13 more parent–child dyads (total = 20 dyads) or 25% dropped out of the study, and they gave the same answers when asked why they decided not to continue. However, of the 20 dyads, 7 had moved and left no forwarding address or telephone number at which to contact them. According to several parents, it was common to move "two to three times a year to a new apartment." Not all participants attended all of the classes offered. Seventy-five percent of the participants took advantage of the makeup classes offered.

2.5. Analyses

Data were entered into a Statistical Package for the Social Sciences (SPSS) database and checked for accuracy. Analyses were performed using version 13.0 of the SPSS (2005). Chi-square and t tests were used to compare baseline group differences. Repeated measures analysis of variance (ANOVA) was used to test the hypotheses that the participants in the experimental group would have improved parent and children clinical outcomes and improved parent health behavior outcomes at 3 and 6 months when compared with those in the control group. For this pilot study, trends are reported at or below p = .3.

3. Results

Parents' age ranged from 27 to 77 years (M = 42.3, SD = 8.2); 87.5% were female, 35.0% were Black, 36.2% were White, and 28.8% were Hispanic. Children's age ranged from 7 to 17 years (M = 11.9, SD = 2.4); 58.8% were male, 33.8% were Black, 36.2% were White, and 30.0% were Hispanic. The randomization procedure

Table 4
Clinical outcomes of parents and children at baseline and at 3 and 6 months

Clinical outcomes	Experimental group, *M* (*SD*)			Control group, *M* (*SD*)			Group × Time	
	Baseline	3 months	6 months	Baseline	3 months	6 months	*F*	*p*
Parents								
BMI	37.7 (7.0)	37.1 (6.8)	36.9 (6.9)	37.9 (10.8)	38.0 (10.9)	38.2 (11.2)	6.4	.003
BFP	43.3 (6.8)	42.4 (7.2)	42.0 (7.6)	43.4 (8.4)	43.7 (8.1)	43.9 (8.6)	4.1	.02
Pedometer steps	2356 (953)	4471 (1,215)	5843 (1,407)	2334 (728)	3953 (1,747)	4803 (1,565)	3.9	.03
Children								
BMI	35.5 (7.0)	35.0 (5.4)	34.3 (5.5)	35.9 (5.6)	35.7 (5.8)	35.6 (6.1)	2.6	.08
BFP	45.2 (7.9)	43.4 (7.5)	42.8 (7.6)	44.8 (8.1)	43.4 (7.0)	43.5 (7.2)	2.1	.1
Pedometer steps	1942 (931)	3743 (1,015)	5098 (1,377)	2019 (743)	3754 (1,794)	4724 (1,734)	1.4	.3

produced two parent and children groups comparable on demographic and clinical variables at baseline (Tables 1 and 2). Both the experimental and control groups received equal NEEP classes; hence, differences between the randomized groups at 3 and 6 months may be due to the CST intervention.

Tables 4 and 5. contain the results of the repeated measures ANOVA. By 6 months, parents in the experimental group had significantly lower BMI ($p = .003$) and BFP ($p = .02$) and increased their pedometer steps ($p = .03$) compared with those in the control group. Parents in the experimental group demonstrated significant improvement in interpersonal relationships ($p = .04$), behavior control ($p = .04$), and stress management ($p = .05$) and showed trends toward improved nutrition ($p = .06$), physical activity ($p = .1$), health responsibility ($p = .3$), negative affect eating ($p = .06$), socially acceptable eating ($p = .08$), problem solving ($p = .06$), general family functioning ($p = .2$), and family roles ($p = .3$) compared with those in the control group. At 6 months, children in the experimental group demonstrated trends toward decreased BMI ($p = .08$) and BFP ($p = .1$) and increased pedometer steps ($p = .2$). No significant differences or trends were noted in spirituality, communication, affective responsiveness, or affective involvement.

4. Discussion

Results from this pilot study demonstrate that the addition of CST for parents enhanced outcomes in an established weight management program for overweight youth. Both parents and children in the experimental group had better outcomes compared with those in the control group. Parents and children from both the experimental and control groups received NEEP and some form of exercise training, and thus, outcomes improved in both groups.

The National Weight Control Registry has followed up more than 4,500 individuals over the age of 18 years who have successfully maintained a 30-lb weight loss for a minimum of 1 year (Wing & Hill, 2001). Findings suggest that successful weight losers reported making substantial changes in their eating and exercise habits to lose weight and maintain their weight loss and that walking was the most frequent form of physical exercise. In addition, shared behavioral strategies among those who were successful at

Table 5
Behavioral outcomes of parents at baseline and at 3 and 6 months

Behavioral outcomes	Experimental group, *M* (*SD*)			Control group, *M* (*SD*)			Group × Time	
	Baseline	3 months	6 months	Baseline	3 months	6 months	*F*	*p*
HPL PII								
Health responsibility	2.26 (0.54)	2.58 (0.64)	2.64 (0.64)	2.42 (0.57)	2.65 (0.61)	2.64 (0.57)	1.2	.3
Nutrition	2.34 (0.64)	2.67 (0.67)	2.79 (0.59)	2.34 (0.46)	2.53 (0.48)	2.45 (0.47)	3.0	.06
Physical activity	1.74 (0.63)	2.25 (0.70)	2.42 (0.59)	1.69 (0.49)	1.94 (0.62)	2.01 (0.63)	2.2	.1
Stress management	2.12 (0.48)	2.45 (0.61)	2.68 (0.55)	1.97 (0.45)	2.18 (0.54)	2.24 (0.56)	3.2	.05
Interpersonal relationships	2.74 (0.51)	2.91 (0.60)	2.95 (0.52)	2.84 (0.53)	2.94 (0.51)	2.81 (0.52)	3.4	.04
Spirituality	2.75 (0.45)	2.85 (0.54)	2.78 (0.56)	2.73 (0.58)	2.88 (0.54)	2.75 (0.49)	0.3	.7
FAD								
Problem solving	2.02 (0.45)	1.96 (0.37)	1.84 (0.46)	2.03 (0.39)	2.14 (0.46)	2.06 (0.45)	3.0	.06
Behavior control	1.68 (0.38)	1.68 (0.40)	1.66 (0.38)	1.64 (0.37)	1.65 (0.34)	1.82 (0.33)	3.3	.04
General functioning	1.79 (0.47)	1.86 (0.37)	1.76 (0.41)	2.01 (0.48)	2.02 (0.35)	2.01 (0.37)	1.5	.2
Roles	2.31 (0.47)	2.26 (0.41)	2.24 (0.39)	2.56 (0.41)	2.42 (0.36)	2.40 (0.33)	1.1	.3
Communication	1.95 (0.50)	1.91 (0.44)	1.97 (0.41)	2.10 (0.43)	2.05 (0.42)	2.09 (0.37)	0.3	.8
Affective responsiveness	1.85 (0.53)	1.87 (0.47)	1.93 (0.47)	2.10 (0.49)	2.01 (0.41)	2.08 (0.38)	0.6	.5
Affective involvement	2.00 (0.48)	2.15 (0.31)	1.96 (0.41)	2.14 (0.50)	2.26 (0.35)	2.12 (0.41)	0.2	.8
ESES								
Socially acceptable eating	38.8 (14.4)	35.9 (12.9)	32.2 (12.3)	36.5 (15.8)	37.9 (14.8)	37.3 (15.2)	2.6	.08
Negative affect eating	48.4 (26.1)	41.1 (20.1)	40.5 (18.6)	51.7 (28.7)	4.2 (28.7)	51.3 (22.9)	2.9	.06

weight loss and maintenance included eating a diet low in fat, frequent self-monitoring of weight and food intake, and high levels of physical activity (Wing & Hill, 2001).

To date, no studies have been reported to have used an experimental design to test the impact of the addition of CST delivered to obese multiethnic parents whose overweight children were attending an established weight management program on clinical outcomes of both parents and children and on behavioral outcomes of the parents. The ability of parents and children in the experimental group to decrease BMI and BFP and increase pedometer steps, as well as the parent's ability to improve behavioral outcomes after 6 months, provides support for interventions that include both parents and children using NEEP, exercise, and CST over interventions that use nutrition education and exercise alone.

These data demonstrate that parent participants who received CST showed improvement in nutrition and physical activity knowledge, stress management, interpersonal relationships, negative affect eating, socially acceptable eating, problem solving, and behavior control compared with those parents who did not receive CST. BMI and BFP values from parents in the experimental group steadily decreased over the 6-month period, whereas those from parents in the control group increased slightly. Pedometer steps increased for parents in both the experimental and control groups, but parents in the experimental group increased number of steps per day more than those in the control group.

Previous studies using nutrition education, exercise, and behavior modification, behavioral therapy, or problem solving in family-based interventions with parents and children have demonstrated mixed results and predominately targeted middle-class White families (Berry et al., 2004). Similar to this study, previous studies that used some form of behavior modification (Golan et al., 1998; Israel, Guile, Baker, & Silverman, 1994; Wadden et al., 1990) or behavioral therapy (Epstein et al., 1994; Flodmark, Ohlsson, Ryden, & Sveger, 1993) and targeted parents or children separately were found to improve weight loss outcomes. As in this study, other studies that used problem-solving (Epstein, Paluch, Gordy, Saelens, & Ernest, 2000; Graves, Meyers, & Clark, 1988) interventions and targeted parents of children showed improved weight loss outcomes for their children.

A major difference in this pilot study, as compared with most behavioral intervention studies with parents and children, is that our data suggest that CST taught to multiethnic parents improves health-promoting behaviors such as nutrition knowledge, exercise, stress management, and interpersonal relationships. Furthermore, socially acceptable eating and negative affect eating improved, suggesting improved eating self-efficacy. Finally, family problem solving, family roles, general family functioning, and behavior control improved after receiving CST. The addition of a parental behavioral component appeared to enhance weight management behaviors in parents and showed similar beneficial trends in their children.

4.1. Limitations

As a pilot study, these data do not provide definitive evidence that an NEEP, an exercise program, and a CST program targeting obese multiethnic parents of overweight children will have long-lasting results. Dropout rates and loss to follow-up were moderate. When working with low-income multiethnic families who move from two to three times a year, we have learned that, at induction, it is important to record additional family members' telephone numbers and permission to call them if the study staff has difficulty contacting them.

The data suggest CST delivered to parents adds an important component to a traditional weight management program for children. The partnership between parent and child with the parent role modeling healthy behavior change may be effective in changing family health behavior. Further testing of the CST intervention and extending it to children may provide increased knowledge of weight management in parents and children.

4.2. Implications for nursing practice and research

The study demonstrates positive effects of CST for multiethnic obese parents and their overweight children. Nurses can use CST in research and clinical practice to teach management and prevention of overweight and obesity in parents and their children. Nurses who teach parents and children the importance of good nutrition and daily exercise can use cognitive behavioral modification, social problem solving, communication skills training, and conflict resolution.

Nurses can use cognitive behavioral modification (Cooper & Fairburn, 2002) to teach parents and children about the importance of daily exercise. Parents and children can better understand the barriers they may be having to losing weight when the nurse is able to help them identify the problem, determine goals, generate alternative solutions, examine the consequences, choose a solution, and evaluate the outcome using social problem solving (Forman, 1993). Nurses can teach parents and children the importance of direct and honest communication with each other, which results in positive outcomes and conflict resolution (Deutsch & Brickman, 1994) and encourages parents and children to improve their health. In addition, nurses can be instrumental in helping parents and children understand that weight management entails difficult work and that relapse is not uncommon and should not be viewed as a failure. Instead, relapse should be viewed as an opportunity to get back on track as soon as possible.

Weight management programs including nutrition education, exercise, and some form of behavioral modification for parents and children are congruent with *Healthy People 2010*'s goals of reducing overweight and obesity to decrease morbidity and mortality. Parents and children need to be empowered to improve their health, manage their weight, and ultimately prevent the development of type 2 diabetes

and cardiovascular disease later in life. CST may add another component that can improve clinical and psychosocial outcomes. However, further research is needed.

Acknowledgment

This study was supported, in part, by Grants R21DK59248, R01NR004009, R01NR008244, and T32NR008346 to Margaret Grey; by Grant MO1RR06022 to the General Clinical Research Center; and by Grant RO1HD40787 to Sonia Caprio.

References

Arslanian, S. (2002). Type 2 diabetes in children: Clinical aspects and risk factors. *Hormone Research 57*, 19–28.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Berry, D., Sheehan, R., Heschel, R., Knafl, K., Melkus, G., & Grey, M. (2004). Family-based interventions for childhood obesity: A review. *Journal of Family Nursing 10*, 429–49.

Biddle, S., & Goudas, M. (1996). Analysis of children's physical activity and its association with adult encouragement and social cognitive variables. *Journal of School Health, 66*(2), 75–8.

Centers for Disease Control and Prevention. (1999). National Center for Health Statistics: Overweight among U.S. children and adolescents, National Health and Nutrition Examination Survey. http://www.CDC.gov/NCHS/NHANES.htm.

Cleland, V., Venn, A., Fryer, J., Dwyer, T., & Blizzard, L. (2005). Parental exercise is associated with Australian children's extracurricular sports participation and cardiorespiratory fitness: A cross sectional study. *International Journal of Behavioral Nutrition and Physical Activity, 2*(1), 1–15.

Cole, T. J., & Rolland-Cachera, M. F. (2002). Measurement and definition. In W. Burniat, T. J. Cole, I. Lissau, & E. M. E. Poskitt (Eds.), *Child and adolescent obesity: Causes, consequences, prevention, and management* (1st ed). Cambridge, England: Cambridge University Press.

Cooper, Z., & Fairburn, C. (2002). Cognitive–behavioral treatment of obesity. In T. A. Wadden, & A. J. Stunkard (Eds.), *Handbook of obesity treatment* (pp. 465–479). New York: The Guilford Press.

Davies, P. S. W., & Cole, T. J. (1995). *Body composition techniques in health and disease*. New York, NY: Cambridge University Press.

Deutsch, M., & Brickman, E. (1994). Conflict resolution. *Pediatrics in Review, 15*(1), 16–22.

Engels, H. J., Gretebeck, R. J., Gretebeck, K. A., & Jimenz, L. (2005). Promoting healthful diets and exercise: Efficacy of a 12-week after-school program in urban African Americans. *Journal of the American Dietetic Association, 105*(3), 455–9.

Epstein, L. H. (1996). Family-based behavioural intervention for obese children. *International Journal of Obesity and Related Metabolic Disorders 20*, S14–21.

Epstein, L. H., McKenzie, S. J., Valoski, A., Klein, K. R., & Wing, R. R. (1994). Effects of mastery criteria and contingent reinforcement for family-based child weight control. *Addictive Behaviors 19*, 135–45.

Epstein, L. H., Paluch, R. A., Gordy, C. C., Saelens, B. E., & Ernest, M. M. (2000). Problem solving in the treatment of childhood obesity. *Journal of Consulting and Clinical Psychology 68*, 717–21.

Epstein, N. B., Levin, S., & Bishop, D. S. (1976). The family as a social unit. *Canadian Family Physician 22*, 1411–3.

Flodmark, C. E., Ohlsson, T., Ryden, O., & Sveger, T. (1993). Prevention of progression to severe obesity in a group of obese school children treated with family therapy. *Pediatrics 91*, 880–4.

Forman, S. G. (1993). *Coping skills training for children and adolescents*. San Francisco: Jossey-Bass.

Glynn, S. M., & Ruderman, J. (1986). The development and validation of an eating self-efficacy scale. *Cognitive Therapy and Research 10*, 403–20.

Golan, M., Fainaru, M., & Weizman, A. (1998). Role of behaviour modification in the treatment of childhood obesity with the parents as the exclusive agents of change. *International Journal of Obesity and Related Metabolic Disorders, 22*(12), 1217–24.

Golan, M., Weizman, A., Apter, A., & Fainaru, M. (1998). Parents as exclusive agents of change in the treatment of childhood obesity. *American Journal of Clinical Nutrition 67*, 1130–5.

Goldfield, G. S., Raynor, H. A., & Epstein, L. H. (2002). Treatment of pediatric obesity. In T. A. Wadden, & A. J. Stunkard (Eds.), *Handbook of obesity treatment*, vol. 1 (pp. 532–555). New York: Guilford Press.

Graves, T., Meyers, A.W., & Clark, L. (1988). An evaluation of parental problem-solving training in the behavioral treatment of childhood obesity. *Journal of Consulting and Clinical Psychology 56*, 246–50.

Grey, M., Berry, D., Davidson, M., Galasso, P., Gustafson, E., & Melkus, G. (2004). Preliminary testing of a program to prevent type 2 diabetes among high-risk youth. *Journal of School Health 74*, 10–5.

Grey, M., Boland, E. A., Davidson, M., Li, J., & Tamborlane, W. V. (2000). Coping skills training for youth with diabetes mellitus has long-lasting effects on metabolic control and quality of life. *Journal of Pediatrics, 137*(1), 107–13.

Heisler, M. B., Rust, G., Pattillo, R., & Dubois, A. M. (2005). Improving health, eliminating disparities: Finding solutions for better health care for all populations. *Ethnicity and Disease, 15*(2 (S)), S1–S4.

Hood, M. Y., Moore, L. L., Sundarajan-Ramamurti, A., Singer, M., Cupples, L. A., & Ellison, R.C. (2000). Parental eating attitudes and the development of obesity in children, The Framingham Children's Study. *Journal of Obesity and Related Metabolic Disorders, 24*(10), 1319–25.

Horgan, G. (2005). Healthier lifestyles series: Exercise for children. *Journal of Family Health Care 15*(1), 15–7.

Israel, A. C., Guile, C. A., Baker, J. E., & Silverman, W. K. (1994). An evaluation of enhanced self-regulation training in the treatment of childhood obesity. *Journal of Pediatric Psychology 19*, 737–49.

Jefferson, V., Melkus, G., & Spollett, G. (2000). Health promotion practices of young black women at risk for type 2 diabetes mellitus. *Diabetes Educator 26*, 295–302.

Jolliffe, D. (2004). Continuous and robust measures of the overweight epidemic: 1971–2000. *Demography, 41*(2), 303–14.

Kabacoff, R. I., Miller, I. W., Bishop, D. S., Epstein, N. B., & Keitner, G. I. (1991). A psychometric study of the McMaster Family Device in psychiatric, medical and nonclinical samples. *Journal of Family Psychology 3*, 431–9.

Kuczmarski, R. J., Ogden, C. L., Grummer-Strawn, L. M., Flegal, K. M., Guo, S.S., Wei, R., et al. (2000). Centers for Disease Control growth charts. *United States Advanced Data 314*, 1–27.

Miller, I.W., Epstein, N.B., Bishop, D.S., & Keitner, G.I. (1985). The McMaster Family Assessment Device: Reliability and assessment. *Journal of Marital and Family Therapy 11*, 345–56.

Mokdad, A. H., Serdula, M. K., Dietz, W. H., Bowman, B. A., Marks, J. S., & Koplan, J. P. (1999). The spread of the obesity epidemic in the United States, 1991–1998. *JAMA, 282*(16), 1519–22.

National Heart, Lung, and Blood Institute. (2000). *The practical guide to identification, evaluation, and treatment of overweight and obesity in adults*. Washington, DC: National Institutes of Health.

Nunez, C., Rubiano, M., Horlick, J., Thornton, J., & Heymsfield, S. B. (1999). Leg-to-leg bioimpedance system validity in children. Paper presented at the Experimental Biology, New York.

Ogden, C. L., Flegal, K. M., Carroll, M. D., & Johnson, C. L. (2002). Prevalence and trends in overweight among US children and adolescents, 1999–2000. *Journal of the American Medical Association, 288*(12), 1728–32.

Olshansky, S. J., Passaro, D. J., Hershow, R. C., Layden, J., Carnes, B. A., Brody, J., et al. (2005). A potential decline in life expectancy in the

United States in the 21st century. *New England Journal of Medicine, 352*(11), 1138–45.

Parizkova, J., Maffeis, C., & Poskitt, E. M. E. (2002). Management through activity. In W. Burniat, T. J. Cole, I. Lissau, & E. M. E. Poskitt (Eds.), *Child and adolescent obesity: Causes, consequences, prevention, and management* (pp. 3–27, 1st ed.). Cambridge, England: Cambridge University Press.

Ruser, C. B., Federman, D. G., Kashaf, S. S. (2005). Whittling away at obesity and overweight. Small lifestyle changes can have the biggest impact. *Postgraduate Medicine, 117*(1), 31–34, 37–40.

SPSS. (2005). *Statistical Package for Social Sciences (Version 13.0)*. Upper Saddle, NJ: Prentice Hall.

Sturm, R. (2002). The effects of obesity, smoking, and problem drinking on chronic medical problems and health care costs. *Health Affairs 21*(2), 245–53.

Sweetgall, R. (2001). *Pedometer walking*. Clayton, MO: Creative Walking.

Troiano, R. P., & Flegal, K. M. (1998). Overweight children and adolescents: Description, epidemiology, and demographics. *Pediatrics 101*, 497–504.

United States Department of Health and Human Services. (2001). *The Surgeon General's call to action to prevent and decrease overweight and obesity*. Washington, D.C: U.S. Department of Health and Human Services, Public Health Services, Office of Surgeon General, Government Printing Office.

Wadden, T. A., & Stunkard, A. J. (2002). *Handbook of obesity treatment*. New York: The Guilford Press.

Wadden, T. A., Stunkard, A. J., Rich, L., Rubin, C. J., Sweidel, G., & McKinney, S. (1990). Obesity in black adolescent girls: A controlled clinical trial of treatment by diet, behavior modification, and parental support. *Pediatrics 85*, 345–52.

Walker, S. N., Sechrist, K. R., & Pender, N. J. (1987). The Health-Promoting Lifestyle Profile: Development and psychometric characteristics. *Nursing Research 36*, 76–81.

Wang, G., & Dietz, W. H. (2002). Economic burden of obesity in youths aged 6 to 17 years: 1979–1999. *Pediatrics 109*, E81.

Wing, R. R., & Hill, J. O. (2001). Successful weight loss maintenance. *Annual Review of Nutrition 21*, 323–41.