Examination of Group-Based Behavioral Family Treatment for Overweight Children Enrolled in Florida Medicaid

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**EXECUTIVE SUMMARY**

This pilot study is one of the first to examine the efficacy of a group-based Behavioral Family Intervention addressing pediatric obesity delivered solely to children from economically disadvantaged backgrounds. Forty overweight and obese children, ages 6 to 12 years, and their parents/legal guardians were assigned to either a group-based Behavioral Family Intervention (BFI) or an Individual Standard Care control condition (ISC). The BFI included 12 weekly group treatment meetings with multiple families and two interventionists. The ISC included three treatment contacts between the child, parent, and an interventionist over the course of 12 weeks.

- Preliminary analysis found that there was no difference in child weight change between the BFI and the ISC from pre-treatment to post-treatment.

- There was a significant difference in child weight change based on race. African American children who were assigned to the BFI exhibited significantly greater increases in weight compared to non-African American children (i.e., Caucasian, Hispanic) who as a group exhibited a decrease in weight.

- Improvement in child weight was associated with parent weight loss, such that children who exhibited greater improvements in weight had parents who demonstrated less weight gain following the 12 week treatment program.

- Families reported high satisfaction with the BFI program.

- This study provides promising preliminary data that the use of BFIs may be an effective intervention strategy to help overweight and obese non-African American children from economically disadvantaged backgrounds establish healthier long-term weight.

- Continued enhancement and evaluation of this program are necessary to improve the effectiveness of the intervention for children from diverse racial and ethnic backgrounds.

Preliminary analysis found that there was no difference in child weight change between the BFI and the ISC from pre-treatment to post-treatment. However, there were differential outcomes by race. When examining only children who were assigned to the BFI, African American children exhibited an increase in weight from pre-treatment to post-treatment, while children from other racial and ethnic groups combined exhibited a decrease in weight. When reanalyzing the weight outcomes between groups while controlling for race, children in the BFI exhibited significantly greater improvements in weight compared to children assigned to the ISC.

Given the disparity in outcomes between African American and non-African American children, it is likely that this BFI needs to be modified to be more culturally relevant and appropriately address the needs of African American children and families. However, it will be important to make these improvements while not losing the effectiveness that was noted in non-African American children. There are a variety of potential strategies that could be
employed to this end, including the use of in-home and phone counseling contacts, allowing extended family members and close friends to attend treatment groups to provide culturally salient social support, and expanding program content to include recipes and cooking strategies that incorporate African American style and culture. Given higher rates of obesity, as well as the lack of resources and effective treatment options available for children and families from economically disadvantaged backgrounds, effective group-based BFI programs could substantially increase the services available to these families. Future refinement and evaluation of these programs, including long-term follow-up and assessment of the clinical significance of weight change, are needed before more definitive conclusions can be drawn.

INTRODUCTION AND BACKGROUND

The alarming increase of childhood obesity in the U.S. is a vital public health concern. Current estimates indicate that almost 19% of children ages 6 to 19 years in the U.S. meet criteria for obesity (>95th percentile for BMI), while an additional 16% are overweight (>85th and <95th percentile for BMI). These children are at elevated risk for abnormal glucose tolerance and insulin resistance, type 2 diabetes, hypertension and high cholesterol levels, and metabolic syndrome. Childhood and adolescent obesity are significant predictors of obese status in adulthood, which is associated with increased risk for type 2 diabetes, coronary heart disease, hypertension, dyslipidemia, respiratory disease, and premature death. Not only does obesity exact a toll in terms of morbidity and mortality, but it also has substantial economic and psychosocial effects. The total economic costs related to obesity exceed $117 billion. The direct costs represent about 5.7% of the total health-care expenditures in the U.S. Children who are obese incur greater medical expenditures relative to their non-overweight peers. Moreover, obesity-associated annual hospital costs specific to children ages 6 to 17 have increased threefold over the last 20 years. The social and psychological effects of obesity on children and adults are profound and include social discrimination, personal distress, and decreased emotional well-being.

Obesity is a major risk factor in the development of type 2 diabetes. One of the most important treatments to prevent diabetes and other obesity-related conditions in children and adolescents is improved weight management. Reduction in percentage overweight has been related to a variety of positive health outcomes in obese children including improvements in insulin and fasting glucose, lipid levels and cardiovascular risk factors, and decreases in blood pressure. The most effective interventions for childhood obesity address dietary intake and physical activity through the use of behavioral modification strategies. Behavioral strategies typically include self-monitoring, goal setting, performance feedback, reinforcement, stimulus control, and instruction in behavioral parenting strategies. Participants in behavioral or lifestyle interventions are taught to modify their eating and physical activity patterns so as to produce a negative energy balance (or a more appropriate energy balance ratio of caloric intake to caloric expenditure) and thereby lose or maintain weight. Consistent with the behavioral or lifestyle approach, the Expert Committee for Obesity Evaluation
and Treatment recommends that treatment of childhood obesity begin early and focus on gradual, targeted changes in dietary habits and physical activity. Modest decreases in caloric intake are recommended through the reduction or elimination of specific high calorie and high fat foods from the diet. Increases in physical activity of at least 30 minutes per day are recommended via incorporation of physical activity into the typical daily routine and participation in active play and sports activities.

Behavioral-based dietary interventions appear to be the most effective strategy to gradually decrease caloric intake, maintain adequate nutrient intake, and encourage long-term maintenance of weight reduction in children. Although a variety of dietary strategies may be implemented to encourage reductions in caloric intake, many treatments have addressed dietary intervention via the Stoplight Program. Interventions using this program as part of a multicomponent treatment have reported improvements in nutritional intake and long-term maintenance of improved weight status in children. In addition, interventions that encourage some form of increased energy expenditure with dietary modification improve the short-term effectiveness of pediatric obesity treatments over dietary modification alone. Most commonly, increases in energy expenditure are encouraged through gradual increases in physical activity. An increase in moderate intensity physical activity of 180 minutes per week is a reasonable goal that most children can achieve. Lifestyle programs that encourage increased activity through a variety of daily activities (walking to school, washing the car, taking the stairs, walking the dog, helping clean the yard), as opposed to structured physical activity, appear to be more successful. Moreover, the use of behavioral strategies to target a decrease in sedentary activity (i.e., watching television, playing video games) is associated with increased physical activity and can be a successful adjunct to treatments for pediatric obesity.

Behavioral family interventions (BFI) have been the most studied intervention for pediatric obesity, producing the best short-term and long-term outcomes for pediatric weight loss. These interventions are most-commonly delivered in a group format of between six and ten families. In a series of studies, Epstein and colleagues have demonstrated the short-term and long-term effectiveness of a BFI delivered in a group-format with an average reduction of 20% in percentage overweight at 10-year follow-up. While the main focus of BFIs are to impact the child’s weight, these interventions commonly target both the child and parent for lifestyle change and weight loss. It is expected that by targeting the parent and the child, parents will be motivated to make bigger changes in the home environment. Children may also be more motivated to make changes if they see their parents making similar changes. Research suggests that parent participation in physical activity has been linked to increased physical activity by their children, and parent modeling of appropriate eating behavior positively influences children’s eating behavior. Both children and parents commonly lose weight in these interventions, although parents demonstrate greater difficulty maintaining weight loss than their children. Moreover, children whose parents are also targeted for weight loss demonstrate greater long-term maintenance of weight loss in behavioral family interventions.
While BFIs show documented long-term decreases in children’s percentage overweight, the generalizability of these interventions is less clear. Many of these programs have been developed and tested in well-controlled, clinic settings with middle class families, and have not been tested in community-based settings or with families from economically disadvantaged backgrounds. Moreover, in clinic-based settings these interventions are often delivered by a multidisciplinary team of experts, as opposed to community-based settings that may use bachelor’s level interventionists.

Children from low-income backgrounds are at greater risk for obesity compared with children in higher socio-economic status (SES) groups, independent of race and ethnicity. Even more specifically, a number of studies have documented higher rates of childhood obesity in the Medicaid population relative to national norms. Low-income children also appear more likely to experience obesity-related health problems such as type 2 diabetes. The higher rates of obesity among ethnic minority and low-income children, when combined with the adverse health effects of childhood obesity, are likely to produce continued racial and economic differences in health outcomes.

There are a wide variety of factors that have been implicated as potential factors contributing to this disparity. Most directly, economic difficulties can lead to the purchase of cheaper, energy-dense foods. More indirectly, relative to their peers from higher SES backgrounds, low-income communities have fewer supermarkets and convenience stores that stock fresh, good quality, affordable foods such as whole grains or low-fat dairy products and meats. With fewer supermarkets available, low-income families often shop in corner stores with markedly less healthful foods. Youth from low-income backgrounds are also disproportionately exposed to marketing activities that can impact food consumption. Low-income children watch more television, and have higher levels of media exposure, than higher-income children. Other factors that have also been mentioned as contributing to this disparity include the built environment, less safe neighborhoods for physical activity, and parenting attitudes about obesity and child health. Not surprisingly, children and families from economically disadvantaged backgrounds, and those enrolled in Medicaid in particular, have higher dropout rates in professionally administered weight management programs relative to their higher income peers.

While some of the factors impacting pediatric obesity in economically disadvantaged populations will require community and public policy interventions, there are also several aspects of the home environment (e.g., availability of healthy foods, television viewing, parenting behaviors) that may be amenable to change in low-income populations through targeted interventions. With the focus on building a supportive home environment to support healthy eating and physical activity patterns for family members, behavioral family interventions may be well suited to helping address less than optimal healthy habits within these families. While BFIs have been rigorously evaluated, the generalizability of these interventions is less clear. Few studies have examined these interventions with economically disadvantaged families. Unfortunately, as noted by Kerner and colleagues, “too little is known about how to improve the health of those who are at greater health risks or bear the greatest burden of disease.”
Reducing the disparities in disease occurrence and in the availability of preventive health services represents a high national priority as outlined by Healthy People 2010 and the U.S. Surgeon General. Given the scope of obesity in America, the lack of published intervention studies examining BFIs to address obesity in economically disadvantaged families highlights a pressing need for treatment outcome research in this area.

**Study Purpose**

Given the growing prevalence of pediatric obesity and the lack of intervention programs available for children from economically disadvantaged backgrounds, the purpose of this pilot study is to evaluate the efficacy of a Behavioral Family Intervention delivered via group contacts on child BMI z-score relative to an Individual Standard Care treatment in an important and underserved population, overweight and obese school age children and their parents enrolled in Florida Medicaid.

**DESIGN AND METHODS**

**Participants**

Participants were 40 children enrolled in the Florida Medicaid program, ages 6 to 12 years, and their parent/legal guardians. All children had a body mass index (BMI) (calculated as weight in kilograms divided by height in meters squared) above the 85th percentile based on age and gender norms published by the CDC. There was no requirement for parental weight, but the participating parent/legal guardian was required to live in the same house with the child and be age 75 years or younger. Families were excluded if the child or parent had a medical condition that contraindicated mild energy restriction or moderate physical activity, were using prescription weight loss drugs, or were enrolled in another weight loss program. Families were also excluded if the child had a significant developmental delay.

**Procedures**

**Participant Recruitment.** Families were recruited from Gainesville, Lake City, Ocala, and surrounding areas through direct solicitation during children’s primary care clinic visits, distribution of brochures through local schools, and community presentations. The intervention was promoted as a healthy lifestyle program to help establish effective weight management strategies for children and families. Interested parents were invited to call our office toll-free to learn about the study, complete a telephone screening, and schedule an in-person screening visit. At the in-person screening, children and their parent(s) completed consent forms and measures of their height and weight. Child-parent dyads who met eligibility criteria were scheduled for baseline assessment.

**Assessments.** All assessment and intervention sessions took place at the Children’s Medical Services building in Gainesville and Ocala, and the Columbia County School
Board office building in Lake City. Baseline assessments were held two weeks before the start of the intervention. At the baseline assessment visit children completed measures of height, weight, blood pressure, and blood lipids. Parents also were measured for height and weight. In addition, children were asked to wear an armband accelerometer for the next seven days to assess physical activity and energy expenditure. Children and parents were asked to complete a variety of paper and pencils questionnaires (see below for more details). Finally, at the end of the baseline visit each family was notified of their assignment to treatment condition.

All families completed post-treatment assessment (end of month 3) within two weeks after the last treatment session of their particular intervention program, and then a follow-up assessment visit six months later. The same assessment measures completed at baseline were completed at post-treatment and six month follow-up assessments, with the exception that blood lipids and blood pressure were only assessed at the baseline and six month follow-up visits. Families received $50 as compensation for completing the post-treatment and 6-month follow-up assessment.

**Participant Assignment to Treatment Condition.** Families in three of the four treatment cohorts were randomized to one of the two treatment conditions: Behavioral Family Intervention (BFI) delivered via group meetings with other families or Individual Standard Care (ISC) condition when a treatment team member met with each child-parent dyad individually. Randomization of families to the two treatment conditions was unbalanced to ensure that at least six child-parent dyads in each treatment cohort were assigned to the BFI, as six or more child-parent dyads is optimal to ensure proper group processes and functioning. Unfortunately, recruitment efforts in cohort two resulted in only six eligible child-parent dyads enrolling in the study. As we required six families for the group intervention, we were not able to randomize families to the ISC control condition in cohort two. When two siblings from a family participated, they were both assigned to the same condition based on the assignment of the younger sibling. Families were notified of their group assignment at the end of the baseline (pretreatment) assessment.

**Outcome Measures**

*Measures Completed by Research Team Members or Electronic Device:*

- **Height and Weight** were assessed for the child and parent by a trained research team member. Height without shoes was measured to the nearest 0.1 cm using a Harpendon stadiometer (Holtain Ltd, Crosswell, United Kingdom). Weight was measured to the nearest 0.1 kg with 1 layer of clothing on and without shoes using a calibrated balance beam scale. Height and weight were measured 3 times, and the average of each was used for analysis. Body mass index (BMI) z-scores were calculated for each child based on normative data from the Center for Disease Control. 53

- **Blood Lipids** was assessed via use of the Cholestech lipid analyzer. Specifically, a few drops of blood were collected via finger prick at baseline and 6-month follow-up to assess cholesterol via a point-of-care assessment device produced by Cholestech. Blood pricks were conducted by a nurse or physician. To limit child burden, blood was
not collected at post-treatment due to the short time interval between baseline and post-treatment assessment.

● **Blood Pressure** was assessed by a nurse or physician at baseline and 6-month follow-up assessment.

**Questionnaire Measures Completed by Parent:**
- **Demographic Questionnaire:** Parents were asked to complete a demographic questionnaire at the initial screening visit. This questionnaire requested family background information including: age and gender of child and parent participants, parent marital status, years of school for parent, family size, and estimated family income.

- **Quality of Life Questionnaire:** Sizing Them Up is a 22-item obesity-specific parent proxy measure of children’s quality of life. This measure is comprised of 7 subscales: Emotional Functioning, Physical Functioning, Teasing/Marginalization, Positive Social Attributes, Mealtime Challenges, School Functioning and Overall QOL. Sizing Them Up has demonstrated good psychometric properties. This measure was completed at baseline, post-treatment, and 6-month follow-up assessment.

- **Program Satisfaction Questionnaire:** This is a 4-item measure that was used to assess the parent’s satisfaction with their assigned intervention. This was administered to parents at the post-treatment assessment.

**Questionnaire Measures Completed by Child:**
- **Quality of Life Questionnaire:** Sizing Me Up is a 22-item obesity-specific quality of life measure completed by children. The measure is comprised of 6 subscales: Emotional Functioning, Physical Functioning, Teasing/Marginalization, Positive Social Attributes, Avoidance, and Overall QOL. The measure has demonstrated good psychometric properties. This measure was completed at baseline, post-treatment, and 6-month follow-up assessment.

- **Program Satisfaction Questionnaire:** This is an 11-item measure that was used to assess program and group leader satisfaction of children who participated in the Group Based Family Intervention. This was administered to children in the BFI at the post-treatment assessment.

**Questionnaire Measures Completed Together by Child and Parent:**
- **Block Kids Physical Activity Screener:** This 9-item measure was designed for school-aged children and gathers information about physical activity and sedentary activity over the past 7 days, including school, leisure time, and job-related activities. The measure asks about the frequency and duration of activities. This measure was completed at baseline, post-treatment, and 6-month follow-up assessment.

- **Dietary Intake:** The Block Kids 2004 is a 77-item questionnaire that was used to assess the child’s dietary intake over the preceding month. The food list for this
questionnaire was developed from the NHANES 1999-2002 dietary recall data. The nutrient database was developed from the USDA Nutrient Database for Dietary Studies, version 1.0. This measure was completed at baseline, post-treatment, and 6-month follow-up assessment.

Interventions

*Behavioral Group Intervention.* Child-parent dyads assigned to the group-based BFI participated in 12 weekly, 90-minute sessions over the course of 3 months. Each week a new knowledge and skills topic related to lifestyle change was addressed. The topics for the twelve sessions are listed in Table 1. For all child and parent participants, the primary treatment objectives were to decrease caloric intake in a nutritionally sound manner and to increase moderate intensity exercise. Children and adults were encouraged to eat a well-balanced diet based on the USDA’s MyPyramid food guidance system. Changes in dietary habits were addressed via a modified version of the Stoplight Program. The program is a simplified approach to classifying foods and setting goals to modify dietary intake. Families are taught to classify foods into three categories, “green,” “yellow,” and “red.” “Green” foods have less than 2 grams of fat per serving, “yellow” foods have been 2.0 and 6.9 grams of fat per serving, and “red” foods have 7.0 or more grams of fat per serving. The focus of the intervention is on calorie reduction via reducing high fat “red” foods. Interventions using this program as a component of a multicomponent treatment have reported improvements in nutritional intake and long-term maintenance of weight loss in children. In the current group intervention, child and parent participants were asked to monitor everything they ate and drank using a daily food log. Abbreviated monitoring forms were available for families who struggled with completing the daily monitoring forms. Children and parents were asked to gradually reduce the amount of high-fat/high-sugar “red” foods to an ideal level of no more than 14 servings per week (average of 2 per day). However, goals were tailored to the needs of each child and parent based on baseline dietary intake and weekly progress in reaching goals. Increased physical activity was promoted through a pedometer-based step program. Children and parents were each provided with pedometers. Children and parents were encouraged to monitor their physical activity and gradually increase their daily steps. Program goals were based on baseline level of steps and targeted an increase of at least 3,000 steps/day by the end of the program for both children and parents.

<table>
<thead>
<tr>
<th>Table 1. List of Session Topics for BFI</th>
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<tbody>
<tr>
<td>Session 1: Getting Set for Success</td>
</tr>
<tr>
<td>Session 2: Colors of the Stoplight</td>
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<tr>
<td>Session 3: Get Moving: Building Physical Activity</td>
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<tr>
<td>Session 4: Healthy Eating Patterns</td>
</tr>
<tr>
<td>Session 5: Fruits &amp; Vegetables</td>
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<tr>
<td>Session 6: Self-Esteem &amp; Body Image</td>
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<tr>
<td>Session 7: Family Meals and Portion Control</td>
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<tr>
<td>Session 8: Healthy Beverages and Dealing with Hunger</td>
</tr>
<tr>
<td>Session 9: Eating Away from Home</td>
</tr>
<tr>
<td>Session 10: Get Moving – Part II: Cutting Back on TV</td>
</tr>
<tr>
<td>Session 11: Healthy Cooking Strategies</td>
</tr>
<tr>
<td>Session 12: Long-Term Maintenance</td>
</tr>
</tbody>
</table>
consistent with literature suggesting overweight children take approximately 3,000 steps per day fewer than their non-overweight peers\textsuperscript{58} and is equivalent to an increase of approximately 30 minutes per week of physical activity. Children were also asked to gradually decrease sedentary activities so that children spent no more than two hours per day watching television, playing computer games, or playing video games. Each family was reimbursed $5 for each treatment session attended as compensation for travel expenses.

During each group meeting children and parents attended simultaneous, but separate, parent and child groups. As both children and parents were targeted as “active agents of change,” the emphasis was on modeling and providing support to work together to establish healthier eating and exercise patterns. The parent group meetings were divided into three segments. The first segment was used to review parent and child progress in implementing the strategies discussed for changing their eating or exercise in the previous session. Parents described the progress they and their children achieved since the previous meeting and any problems they encountered. Good progress was highlighted by strong positive feedback. Difficulties reported by parents were dealt with through group support, discussion, advice, and problem solving. The second segment focused on knowledge and skill training related to benefits of weight loss, basics of energy balance and nutrition, appropriate methods for increasing physical activity, behavior management, and positive parenting skills (e.g., goal setting, self-monitoring, stimulus control). At the end of each session, children and parents were brought together to set specific goals for the week; children and parents received feedback and encouragement from the group leader and other group members. The goal setting at the end of each session focused on developing specific plans for making healthy substitutions and environmental changes. New goals were systematically introduced throughout the program with goals individualized to each participant’s progress and preferences.

The child group meetings were divided in four segments. During the first segment children briefly described the progress they achieved in reaching their dietary and physical activity goals. Good progress was highlighted by strong positive feedback. The second segment included a fun exercise or game component to demonstrate strategies/activities to help children keep physically active. Third, children and group leaders prepared and sampled a healthy snack. During the food sampling portion of each session, fun and educational activities were used to teach children about nutrition (e.g., recognizing calorie and fat content of foods via “signals” of the Stolight program), strategies to increase physical activity, behavioral management skills, and strategies to cope with psychosocial concerns (i.e., building self-esteem). Finally, at the end of each session, children and parents worked together to set goals for the next week.

\textit{Individual Standard Care}. Families randomized to the Individual Standard Care (ISC) condition participated in three 60-minute intervention sessions. Families met individually with a treatment team member for these sessions. The first visit occurred directly after the baseline assessment, the second session occurred six weeks later, and the third session occurred six weeks after the second treatment session and within
a week of the post-treatment assessment. During the first session the parent received feedback on their child’s blood pressure, lipid levels, and weight status. The child and parent were then introduced to the Stoplight system and handouts were provided that included numerous examples of “red”, “yellow”, and “green” foods. The interventionist engaged the family in a discussion of environmental modification. The family was then asked to identify the biggest barriers to eating healthy foods. Finally, the interventionist worked with the child and parent to set two specific goals and plans to overcome their barriers and increase fruit and vegetable intake and decrease “red” food intake. During the second session the interventionist first reviewed the family’s progress in making lifestyle changes and reaching their dietary goals since the first meeting. The interventionist then helped the family problem solve any difficulties and establish updated dietary change goals. The interventionist then discussed the importance of physical activity, positive parent support, and modeling. The child and parent were then given pedometers, and the interventionist helped them establish specific goals and plans to increase physical activity. During the final session the interventionist reviewed progress since the last intervention contact, refined dietary intake and physical activity goals and plans to reach these goals, and discussed strategies to maintain healthy lifestyle changes. Each family was reimbursed $5 for each treatment session attended as compensation for travel expenses. The ISC intervention is in line with the recommendations recently put forth by an expert committee on pediatric overweight and obesity for a brief, clinic-based intervention.\textsuperscript{30}

**Interventionists**

The interventions were delivered by graduates students and a postdoctoral fellow in clinical psychology. All interventionists received eight hours of training before the intervention. Interventionists participated in weekly supervision meetings with the principal investigator.

**RESULTS**

**Summary of Participant Characteristics at Baseline**

Baseline demographic and weight status data are displayed in Table 2. The mean age of child participants at the start of treatment was 9.12 years. Mean child BMI was 28.0, while mean child BMI z-score was 2.21, which is in the obese range (BMI z-score above 2.0). Just less than half (47.5%) of the child participants were female. The majority of the sample consisted of children who were African American (40.0%), with similar percentages of children identified as Caucasian and Hispanic. Of the 40 parent/legal guardians participating in the study, just over 70% were mothers of the participating child. The mean age of parent/legal guardians were 40.1 years. Mean parent BMI was 40.6. Only 22.5% of participating adults reported graduating from college. Seventy-five percent of the sample reported a family income below $30,000 per year. There were no statistically significant differences between treatment conditions on the above variables.
Table 2. Baseline Demographic and Anthropometric Variables

<table>
<thead>
<tr>
<th></th>
<th>All Participants (n = 40)</th>
<th>BFI Only (n = 27)</th>
<th>ISC Only (n = 13)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Child Age</strong></td>
<td>9.12 (1.90)</td>
<td>9.30 (1.98)</td>
<td>8.77 (1.74)</td>
</tr>
<tr>
<td><strong>Child Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>52.5%</td>
<td>55.6%</td>
<td>46.2%</td>
</tr>
<tr>
<td>Female</td>
<td>47.5%</td>
<td>44.4%</td>
<td>53.8%</td>
</tr>
<tr>
<td><strong>Child Race</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>27.5%</td>
<td>18.5%</td>
<td>46.2%</td>
</tr>
<tr>
<td>African-American</td>
<td>40.0%</td>
<td>51.9%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>20.0%</td>
<td>22.2%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Other</td>
<td>12.5%</td>
<td>7.4%</td>
<td>23.0%</td>
</tr>
<tr>
<td><strong>Caregiver Relationship</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>72.5%</td>
<td>70.4%</td>
<td>76.9%</td>
</tr>
<tr>
<td>Father</td>
<td>12.5%</td>
<td>14.8%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Grandparent</td>
<td>10.0%</td>
<td>7.4%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Other</td>
<td>5.0%</td>
<td>7.4%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Caregiver Age</strong></td>
<td>40.10 (9.94)</td>
<td>40.08 (10.71)</td>
<td>40.15 (8.59)</td>
</tr>
<tr>
<td><strong>Caregiver Education</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Did Not Finish H.S.</td>
<td>7.5%</td>
<td>11.1%</td>
<td>0.0%</td>
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<tr>
<td>High School Degree</td>
<td>25.0%</td>
<td>37.0%</td>
<td>0.0%</td>
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<tr>
<td>Some College</td>
<td>45.0%</td>
<td>33.3%</td>
<td>69.2%</td>
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<tr>
<td>College Degree</td>
<td>17.5%</td>
<td>11.1%</td>
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<td>Post-Graduate School</td>
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<tr>
<td><strong>Annual Family Income</strong></td>
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<td></td>
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<tr>
<td>Below $9,999</td>
<td>12.5%</td>
<td>18.5%</td>
<td>0.0%</td>
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<td>$10,000-$19,999</td>
<td>40.0%</td>
<td>44.5%</td>
<td>30.8%</td>
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<td>$20,000-$29,999</td>
<td>22.5%</td>
<td>22.2%</td>
<td>23.1%</td>
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<td>$30,000-$39,999</td>
<td>7.5%</td>
<td>3.7%</td>
<td>15.5%</td>
</tr>
<tr>
<td>$40,000 &amp; Above</td>
<td>15.0%</td>
<td>11.1%</td>
<td>23.1%</td>
</tr>
<tr>
<td>Not Reported</td>
<td>2.5%</td>
<td>0.0%</td>
<td>7.5%</td>
</tr>
<tr>
<td><strong>Child Blood Pressure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic (n = 36)</td>
<td>104.97 (11.17)</td>
<td>105.87 (10.65)</td>
<td>103.17 (12.42)</td>
</tr>
<tr>
<td>Diastolic (n = 36)</td>
<td>65.44 (11.50)</td>
<td>66.58 (11.67)</td>
<td>63.17 (11.27)</td>
</tr>
<tr>
<td><strong>Child Cholesterol</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (n = 32)</td>
<td>149.49 (27.53)</td>
<td>150.08 (28.41)</td>
<td>148.36 (27.09)</td>
</tr>
<tr>
<td>HDL (n = 33)</td>
<td>35.67 (10.97)</td>
<td>37.23 (11.75)</td>
<td>32.54 (8.90)</td>
</tr>
<tr>
<td>LDL (n = 31)</td>
<td>80.23 (24.09)</td>
<td>85.19 (23.23)</td>
<td>69.80 (23.61)</td>
</tr>
<tr>
<td>Triglycerides (n = 33)</td>
<td>174.03 (93.91)</td>
<td>140.00 (65.97)</td>
<td>242.09 (106.96)</td>
</tr>
<tr>
<td><strong>Child BMI Z-score</strong></td>
<td>2.21 (0.43)</td>
<td>2.17 (0.47)</td>
<td>2.33 (0.26)</td>
</tr>
<tr>
<td>Parent BMI</td>
<td>40.58 (9.71)</td>
<td>41.02 (10.04)</td>
<td>39.69 (9.44)</td>
</tr>
</tbody>
</table>
with the exception of racial status and triglycerides. Specifically, there were significantly more children identified by their parent as African American in the BFI (52%) relative to the ISC (15%) ($\chi^2 = 5.286; p < .022$). The mean triglycerides value at baseline for children assigned to the ISC condition also was significantly higher than that of children assigned to the BFI [$t = -3.393; p = .002$].

**Participant Screening and Randomization**

Participant flow through the project is presented in Figure 1. Overall, 76 child-parent dyads called our research office to inquire about participating in the FLIP for Kids project. Of these 76 dyads, 27 never completed an initial in-person screening visit. Of the 27 dyads, three dyads never completed the phone screening process. In addition, two dyads indicated that they were not willing to accept random assignment to treatment condition and thus were not eligible to participate in the study. Twenty-one dyads completed the initial phone screen, but "no-showed" for their scheduled initial in-person screening visit. Finally, one dyad cancelled their in-person screening visit and gave no reason.

Of the 76 child-parent dyads that initially inquired about the study, 49 dyads completed phone screening and initial in-person screening visits. Nine of the 49 dyads that completed the phone screening and in-person screening visit ultimately did not complete the baseline assessment visit and were not randomly assigned to treatment. Five of out these nine dyads no-showed for their baseline assessment visit and did not return our phone calls, while four dyads officially withdrew from the study before completing the baseline assessment. Therefore, 40 child-parent dyads were assigned to treatment across all sites (27 to the group treatment and 13 to the individual treatment). Unbalanced assignment was necessary to ensure an adequate number of participants in the BFI groups to allow for effective group treatment.

**Weight Change from Pre-Treatment to Post-Treatment**

Weight at pre-treatment and post-treatment assessment time-points is displayed in Table 3. There was no difference in weight change for children in the BFI across treatment sites [$F (3,19) = 0.791, p = .41$]. An ANCOVA comparing child BMI z-score by treatment condition at post-treatment, while controlling for baseline child BMI z-score, was not significant [$F (2,32) = 1.334, p = .25$]. The effect size based on Cohen’s d was .26.

For children in the BFI only, correlation analyses were conducted to assess the relationships between child weight change and key variables. A large and statistically significant relationship was found between change in child weight and change in parent weight from baseline to post-treatment ($r = .65; p = .002$) such that parents who gained less weight had children who exhibited better improvements in weight. The relationships between child weight change and other key variables exhibited small to medium effect sizes, but none reached statistical significance. These included child age ($r = -.26; p = .23$), session attendance ($r = -.25; p = .24$), child
Figure 1. Participant Flow

Completed Initial Phone Screening and Scheduled for In-person Screening Assessment (n = 73)

Excluded (n = 9):
• No-Show at Baseline Assessment (5)
• Cancelled Assessment; no longer interested (4)

Completed In-Person Eligibility Screening and scheduled for Baseline Assessment (n = 49)

Excluded (n = 24):
• No-Show at In-Person Screening Visit (21)
• Not willing to accept randomized assignment (2)
• Cancelled Screening Visit – no reason given (1)

Assigned to Treatment (n = 40)

Completed In-Person Eligibility Screening and scheduled for Baseline Assessment (n = 49)

Excluded (n = 9):
• No-Show at Baseline Assessment (5)
• Cancelled Assessment; no longer interested (4)

Completed Initial Phone Screening and Scheduled for In-person Screening Assessment (n = 73)

Excluded (n = 9):
• No-Show at Baseline Assessment (5)
• Cancelled Assessment; no longer interested (4)

Completed Initial Phone Screening and Scheduled for In-person Screening Assessment (n = 73)

Excluded (n = 9):
• No-Show at Baseline Assessment (5)
• Cancelled Assessment; no longer interested (4)

Completed In-Person Eligibility Screening and scheduled for Baseline Assessment (n = 49)

Excluded (n = 24):
• No-Show at In-Person Screening Visit (21)
• Not willing to accept randomized assignment (2)
• Cancelled Screening Visit – no reason given (1)

Assigned to Treatment (n = 40)

Group Behavioral Family Intervention (n = 27)

Lost to Follow-up (n = 4):
• Drop out before treatment started; parent employment situation changed (1)
• Drop out before treatment started; too busy due to schedule change (1)
• Failed to respond to attempts to schedule assessment (2)

Completed Post-Treatment Assessment (n = 23)

Individual Standard Care Intervention (n = 13)

Lost to Follow-up (n = 2):
• Drop out before treatment started because not happy with assignment to individual treatment condition (2)

Completed Post-Treatment Assessment (n = 11)
weight at baseline \((r = -.24; p = .28)\), and parent weight at baseline \((r = -.20; p = .42)\). An independent sample t-test also found that there was no difference in weight change by child gender \((t = -0.254, p = .80)\).

**Weight Change by Race**

As there were significantly more African American children in the BFI compared to the ISC condition, differences in weight change by race were examined. Weight change by child race for each treatment condition is presented in Table 4. Visual inspection of the data suggests that African American children benefited less from the treatments (greater mean increase in BMI z-score) than children from other racial and ethnic groups.

As the number of children from each of the other racial and ethnic groups was small, we combined all non-African American children into one group for analysis to examine the impact of racial status (particularly African American status) on weight change outcomes. Across both treatment conditions combined (BFI + ISC), children identified as African American exhibited an average increase in their BMI z-score of 0.070 (SD = 0.15) units, while children from all other racial groups combined exhibited an average decrease in BMI z-score 0.014 (SD = 0.06) units.

When examining only the children assigned to the BFI condition, a similar pattern was noted. Table 4 shows that children identified as African American exhibited an average increase in weight of 0.049 BMI z-score units (SD = .13), while children from each of the other racial groups exhibited decreases in weight status. When combining non-African American children into one group for statistical analysis, non-African American children exhibited an average decrease in their BMI z-score of -0.030 (SD = 0.07). An ANCOVA examining post-treatment BMI z-score by race (African American vs non-African American) while controlling for baseline z-score was statistically significant \([F (2,20) = 4.18, p = .05]\), showing that non-African American children benefited more from the BFI intervention compared to African American children.

Given the differences in weight change between African American and non-African American children, and the significantly greater percentage of African American children assigned to the BFI relative to the ISC, a second ANCOVA was conducted. Specifically, ANCOVA analyses controlling for baseline weight and race (African American vs non-African American) was used to examine the impact of the BFI on post-treatment weight. The result of this second ANCOVA was statistically significant, with children assigned to the BFI exhibiting significantly better weight at post-treatment compared to children in the ISC \([F (2,31) = 4.500, p = .04]\).

**Parent Body Mass Index**

There were no significant differences in parent weight change from baseline to post-treatment assessment between treatment conditions. See Table 3 for mean parent
weight at pre-treatment and post-treatment by treatment condition. There was no difference in parent weight change by parent or child race.

**Dietary Intake and Energy Expenditure**

Children's daily caloric intake (based on a questionnaire completed jointly by the child and parent) at baseline and post-treatment assessment are displayed in Table 5. There was no significant difference in baseline child caloric intake between treatment conditions ($t = -.815, p = .42$). While children in both treatment conditions exhibited a mean decrease in caloric intake from baseline to post-treatment, there was no significant difference in change in caloric intake from baseline to post-treatment between treatment conditions [$F (2,31) = 0.068, p = .79$].

Children's daily energy expenditure (based on a questionnaire completed jointly by the child and parent) at baseline and post-treatment assessment are also displayed in Table 5. There was no significant difference in baseline energy expenditure between treatment conditions ($t = .491, p = .62$). While children in both treatment conditions exhibited a mean increase in daily energy expenditure from baseline to post-treatment, there was no significant difference between treatment conditions [$F (2,27) = 0.689, p = .41$].

**Quality of Life**

Self-report and parent proxy report data on child quality of life are displayed in Table 6. Children tended to exhibit increases in both self-reported and parent-proxy reported quality of life from baseline to post-treatment assessment across both treatment conditions. However, there were no significant differences between treatment conditions on any quality of life domain. Moreover, there were no significant differences on any quality of life domain by child race.

**Participant Satisfaction**

An ANOVA found no significant differences in parent reported “overall program satisfaction” between parents in the BFI ($M = 3.84; SD = 0.37$) and ISC ($M = 3.50; SD = 0.93$) conditions. Overall program satisfaction for children in the BFI was high, 90 on a scale of 0 to 100. There were no statistically significant differences in program satisfaction by race. Unfortunately program satisfaction data was not collected from children assigned to the ISC condition.
Table 3. Child and Parent Weight Change

<table>
<thead>
<tr>
<th></th>
<th>Group Intervention ($n = 23$)</th>
<th>Individual Intervention ($n = 11$)</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child BMI z-score (M±SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (Month 0)</td>
<td>2.137 ± .48</td>
<td>2.392 ± .30</td>
<td></td>
</tr>
<tr>
<td>Post-Treatment (Month 3)</td>
<td>2.145 ± .46</td>
<td>2.429 ± .26</td>
<td></td>
</tr>
<tr>
<td>∆ Month 0 - 3</td>
<td>.008 ± .11</td>
<td>.037 ± .12</td>
<td>$p = .04$</td>
</tr>
<tr>
<td>Parent Weight (kg) (M±SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (Month 0)</td>
<td>103.1 ± 25</td>
<td>102.2 ± 21</td>
<td></td>
</tr>
<tr>
<td>Post-Treatment (Month 3)</td>
<td>104.4 ± 26</td>
<td>102.5 ± 23</td>
<td></td>
</tr>
<tr>
<td>∆ Month 0 - 3</td>
<td>1.31 ± 3.3</td>
<td>.036 ± 3.3</td>
<td>$p = .48$</td>
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</table>
Table 4. Child Weight Change by Race

<table>
<thead>
<tr>
<th>Treatment (M±SD)</th>
<th>Baseline</th>
<th>Post-Treatment</th>
<th>Change from Baseline to Post-Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BFI Treatment (M±SD)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American (n = 11)</td>
<td>2.193 ± .54</td>
<td>2.242 ± .47</td>
<td>0.049 ± .13</td>
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<tr>
<td>Non-African American (n = 12)</td>
<td>2.087 ± .43</td>
<td>2.057 ± .46</td>
<td>-0.030 ± .07</td>
</tr>
<tr>
<td>Caucasian (n = 5)</td>
<td>1.969 ± .43</td>
<td>1.967 ± .49</td>
<td>-0.002 ± .07</td>
</tr>
<tr>
<td>Hispanic (n = 5)</td>
<td>2.211 ± .19</td>
<td>2.161 ± .26</td>
<td>-0.050 ± .07</td>
</tr>
<tr>
<td>Other (n = 2)</td>
<td>2.071 ± .99</td>
<td>2.025 ± 1.05</td>
<td>-0.047 ± .02</td>
</tr>
<tr>
<td><strong>ISC Treatment (M±SD)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American (n = 2)</td>
<td>2.376 ± .40</td>
<td>2.553 ± .30</td>
<td>0.178 ± .28</td>
</tr>
<tr>
<td>Non-African American (n = 9)</td>
<td>2.396 ± .30</td>
<td>2.401 ± .49</td>
<td>0.005 ± .05</td>
</tr>
<tr>
<td>Caucasian (n = 4)</td>
<td>2.521 ± .22</td>
<td>2.523 ± .30</td>
<td>0.002 ± .04</td>
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<tr>
<td>Hispanic (n = 2)</td>
<td>2.210 ± .36</td>
<td>2.236 ± .30</td>
<td>0.026 ± .06</td>
</tr>
<tr>
<td>Other (n = 3)</td>
<td>2.354 ± .40</td>
<td>2.350 ± .30</td>
<td>-0.004 ± .06</td>
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</table>
### Table 5. Baseline and Post-Treatment Calorie Intake and Physical Activity Data

<table>
<thead>
<tr>
<th></th>
<th>Group Intervention ( n = 23 )</th>
<th>Individual Intervention ( n = 11 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Post-Tx</td>
</tr>
<tr>
<td>Caloric Intake (M+SD)</td>
<td>1656 (766)</td>
<td>1371 (709)</td>
</tr>
<tr>
<td>Energy Expenditure (kcals) (M+SD)</td>
<td>439 (515)</td>
<td>462 (410)</td>
</tr>
</tbody>
</table>
Table 6. Baseline and Post-Treatment Quality of Life Data

<table>
<thead>
<tr>
<th>Group Intervention (n = 22)</th>
<th>Individual Intervention (n = 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td><strong>Child Report</strong></td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td>72.7 ± 30</td>
</tr>
<tr>
<td>Physical</td>
<td>70.0 ± 25</td>
</tr>
<tr>
<td>Teasing</td>
<td>72.7 ± 29</td>
</tr>
<tr>
<td>Positive Attributes</td>
<td>47.1 ± 20</td>
</tr>
<tr>
<td>Avoidance</td>
<td>88.8 ± 17</td>
</tr>
<tr>
<td>Overall QOL</td>
<td>68.9 ± 17</td>
</tr>
</tbody>
</table>

| **Parent Proxy Report**   |          |         |          |         |
| Emotion                   | 80.5 ± 19| 83.5 ± 22| 63.6 ± 17| 69.5 ± 13|
| Physical                  | 81.5 ± 16| 85.1 ± 15| 71.5 ± 20| 78.0 ± 21|
| Teasing                   | 75.7 ± 24| 79.8 ± 21| 64.6 ± 25| 68.9 ± 19|
| Positive Attributes       | 60.2 ± 25| 63.6 ± 24| 62.9 ± 11| 59.2 ± 13|
| Mealtime Challenges       | 71.2 ± 29| 68.9 ± 28| 68.2 ± 24| 71.7 ± 22|
| School                    | 100.0 ± 00| 93.9 ± 21| 93.9 ± 13| 96.7 ± 11|
| Overall QOL               | 76.4 ± 14| 78.9 ± 15| 67.3 ± 15| 70.9 ± 10|
DISCUSSION

While the growing rate of pediatric obesity in the United States has received significant attention, there is less awareness of how obesity disproportionately impacts children from economically disadvantaged backgrounds. Children from low-income backgrounds are at greater risk for obesity compared with children in higher socio-economic status (SES) groups, independent of race and ethnicity. Moreover, these children appear more likely to experience obesity-related health problems such as type 2 diabetes. These factors are likely to produce continued racial and economic differences in health outcomes for the foreseeable future. Unfortunately there are few treatment options available for obese children and their parents from economically disadvantaged backgrounds except for overcrowded primary care or obesity clinics that often are only able to provide brief, infrequent appointments to help address a complex, multidimensional problem. This is a substantial concern as frequent, consistent, and extended intervention contacts are often necessary to help children and families make changes to healthy lifestyle habits that last over time and lead to improvements in long-term weight status.

The current pilot study is one of the first to examine the efficacy of a group-based BFI addressing pediatric obesity delivered solely to children from economically disadvantaged backgrounds. Our initial analysis showed there was no difference in weight outcomes from pre-treatment to post-treatment for children assigned to the BFI relative to those assigned to the ISC control condition. The overall effect size was small, with a Cohen’s d of .26. The small effect size is not entirely surprising given that treatment, and the time between assessments, was relatively short at only 12 weeks. We implemented a brief intervention due to concerns that barriers to attending clinic meetings for low-income families would make it difficult to attend a longer intervention program. Given that our BFI intervention encourages gradual changes in eating and physical activity behaviors, weight change is expected to be slow. In fact, it is expected that many child participants of BFIs will experience improvement in overall weight (BMI z-score) by maintaining weight while increasing in height. Three months may be too short a time period to allow for increases in height to impact calculations of weight change. In fact, almost all studies examining BFIs include treatments that last between four and six months, thus allowing for more intervention contacts and more time between assessment to allow for weight and height changes. We are currently collecting six-month follow-up data which will allow for a longer term assessment of weight change. Information on 6-month follow-up outcomes will be presented in a supplemental report.

As behavioral health interventions are often delivered to children and families from diverse backgrounds, it is vital to not only learn more about what interventions work best, but also for what children and families, and under what conditions these interventions work best. In essence, it is important to determine if there are differential impacts on treatment outcomes by age, gender, race, family income, and baseline weight. There is limited evidence to suggest differential outcomes by age or gender for pediatric weight management programs. As expected, data from the current study also
showed no difference in outcome based on these variables, nor were there differential outcomes by baseline weight. However, we felt it was particularly important to examine the moderating effect of race on child weight outcomes because a number of studies examining the effectiveness of behavior weight management interventions with adults suggest that African Americans experience less benefit from these interventions relative to Caucasians.61-63

Our analysis found that there were differential outcomes by child race. Children identified as African American benefited less from the treatment program compared to non-African American children, regardless of treatment condition. Moreover, when examining only children who were assigned to the BFI, African American children \((n = 13)\) exhibited an increase from pre-treatment to post-treatment of 0.049 \((\pm 0.13)\) BMI z-score units, while children from other racial and ethnic groups combined \((n = 12)\) exhibited a decrease of 0.03 \((\pm 0.07)\) BMI z-score units. This difference was statistically significant despite the small sample size. Moreover, when controlling for baseline weight and child race, children assigned to the BFI exhibited statistically significant better weight, as measured by BMI z-score, following treatment compared to children who received an ISC intervention.

As noted above, these results are consistent with weight management studies with adults that have indicated smaller or slower rates of weight loss in African American participants relative to their Caucasian counterparts.61-63 Despite our best efforts, we were not able to find any data documenting poorer weight outcomes for African American children compared to Caucasian or non-African American school age children within the same intervention study. There is some evidence to suggest that African American children may not benefit as much from BFI as Caucasian children, as previous studies have shown that African American families have higher rates of attrition from pediatric weight management programs compared to Caucasian families.48 It is important to note that in many studies differences in treatment outcome by race are often confounded by income. However, as this study included only children enrolled in the Florida Medicaid, these differences in treatment outcome by race were found despite controlling for family income.

While we can only speculate on the causes of these differential outcomes by race, it is possible that the intervention was not adequately tailored to address the cultural norms and values of African American group members, which may have contributed to poorer treatment outcomes.64 As noted by Kumanyika and Morssink, there is often a “cultural mismatch” between the standard behavioral weight management program and the needs and cultural perspectives of African American families.65 The fact that all group leaders in this intervention were Caucasian females could have contributed to this “cultural mismatch,” although it is likely that multiple factors played a role in this. It is important to note, however, that there was no difference in participant attendance or reported participant satisfaction across racial groups to help support these possible mechanisms.
Our assessment of caloric intake and energy expenditure showed that children in both treatment conditions reported improvements in these variables from pre-treatment to post-treatment. This was unexpected given that, on average, there was a slight increase in weight for child participants. However, self-report measures are often vulnerable to bias and it is likely that participants underestimated their dietary intake and overestimated their energy expenditure at post-treatment, partially because they may have wanted it to appear that they had made more positive changes to their eating and exercise habits.

At this time the clinical significance of these findings is unclear. As we were unlikely to see changes in blood pressure and lipids after only three months, outcome assessment of these variables will only be available for baseline and six-month follow-up assessment, which is on-going. However, Kirk and colleagues have reported that a decrease of .15 BMI z-score units was associated with significant improvements in lipids and insulin levels for obese children. It is unlikely that many children can reach this degree of weight change after only 12 weeks, as was the length of our core intervention component; in fact only one of the 27 children assigned to the BFI in the current study achieved this degree of weight change.

Participant attendance at the BFI group meetings was 55%, which is lower than commonly reported in previous treatment outcome studies examining the efficacy or effectiveness of BFIs in university-based randomized clinical trials. However, this is consistent with the pediatric weight management literature which shows poor attendance and completion of interventions for families of children enrolled in Medicaid. Regardless, this level of attendance was disappointing and likely had a negative impact on the adoption of healthy behaviors and ultimately, weight change. This highlights the necessity of developing intervention strategies to improve the ability, or motivation, of families to overcome barriers to session attendance and participate in regularly scheduled intervention contacts with treatment team personnel. Such strategies will likely overlap with modifying and enhancing the intervention so that it is perceived as more culturally relevant for diverse families.

On-Going Data Collection

Six-month follow-up assessment for our last cohort of participants is currently on-going. Processing and organization of physical activity data from accelerometers is also on-going. Thus, six-month follow-up data, as well as accelerometer physical activity and energy expenditure data from all assessment time points, will be summarized and presented in a supplemental follow-up report.

Study Limitations

There are a number of limitations in the present study that must be acknowledged. Most notably, child-parent dyads were not randomly assigned to treatment condition during Cohort 2 due to the limited number of eligible dyads in that cohort. Thus, this study did not utilize a randomized controlled design. While there were no differences
between treatment sites in baseline demographic variables or weight change, it is possible that participants differed in some other critical, but unmeasured variable. Second, there was an uneven assignment of African American children to the two treatment conditions, with over 50% of the children in the BFI identified as African American, compared to only 15% in the ISC. Although the outcome analysis controlled for race, the small number of African American children in the ISC condition \((n = 2)\) provided a less than optimal estimate of how African American children may respond to the control condition. Third, due to the small sample size and pilot nature of the intervention study, we did not use intent-to-treat analyses. Thus, our analyses did not account for families who did not complete the post-treatment assessment. Fourth, for post-hoc data analysis purposes we combined non-African American children into one group for comparison of weight change across racial groups. Clearly there are important differences between racial and ethnic groups. It will be important in future intervention studies to have larger numbers of children from other racial and ethnic groups and to equally balance these across treatment conditions to allow for a better comparison of the effectiveness of BFIs for children from different racial and ethnic backgrounds. Finally, on average the parents in the current study did not experience significant decreases in weight, which contrasts with previous family-based efficacy trials.\(^{29,33}\) One potential explanation is that not all parents in the current study were overweight. In addition, parents in the current study did not monitor their caloric intake, which is a key strategy associated with successful weight loss in behavioral weight management programs for adults.\(^{33,68}\)

**Implications for Policy, Practice and Research**

Despite the limitations noted above, these findings have potential implications for policy, research, and practice. Although future outcome research is necessary to enhance and evaluate the pilot treatment program described here, this study provides promising preliminary data that the use of BFIs may be an effective intervention strategy that could help children from economically disadvantaged backgrounds establish healthier long-term weight, most notably for Caucasian and Hispanic children. Given higher rates of obesity, as well as the lack of resources and effective treatment options available for children and families from economically disadvantaged backgrounds, such BFI programs could increase the services available to families. Moreover, the group delivery format potentially allows for a more effective child to interventionist ratio than individual treatment sessions with families, potentially placing less of a burden on health care professionals. Furthermore, given the association between childhood obesity and increased health care expenditures,\(^{17,69,70}\) effective pediatric weight management interventions have the potential to reduce long-term health care expenditures. However, given the wide variability in enrollment patterns for children and adolescents enrolled in Medicaid, there is understandable concern that dollars spent to prevent and treat pediatric obesity may not ultimately impact Medicaid expenditures, as many of these children may not remain enrolled in the Medicaid system. However, previous research suggests that Medicaid beneficiaries account for a significantly higher proportion of discharges associated with obesity than they do for discharges without obesity.\(^ {18}\) If future research shows these treatment programs lead to effective weight change and
long-term costs savings for diverse groups of children, it may prove to be an incentive for the reimbursement of pediatric obesity treatment in outpatient settings. Certainly future research should include larger samples sizes to look closely at the long-term cost effectiveness of these interventions.

In addition to the suggestions to help overcome the study limitations that were listed above, there are some important additional areas for future research. The less than optimal attendance in the current study suggests that modifications of the intervention content, design, or delivery are needed to help facilitate more consistent contact with interventionists. Two alternative treatment delivery models to help facilitate more consistent participant contact with treatment professionals are home-based contacts and phone counseling contacts. Each of these models has demonstrated some success in pediatric weight management intervention trials when used to augment behavioral clinic-based interventions, and may eliminate some of the barriers to attending clinic-based treatment sessions. Alternatively, it may be more beneficial to intervene with families when children are younger, such as during the preschool age years, before eating and activity patterns become more firmly established. There has been relatively little research with preschool age children from economically disadvantaged backgrounds, as well as from racial and ethnic minority backgrounds.

Given the disparity in outcomes between African American and non-African American children, it is likely that this intervention, and BFIs in general, need to be modified to be more culturally relevant to appropriately address the needs of African American children and families. However, it will be important to make these improvements while still maintaining cultural relevance and effectiveness with non-African American children. There are a variety of potential strategies that could be employed to this end. First, during our groups we noted a high frequency of African American parents asking to bring extended families members to group sessions and the importance that these extended families members held in raising the children. As such, a strategy that could be conducive to improving long-term treatment participation and facilitate support for making healthy lifestyle changes is to allow children and parents to bring friends or extended family members to the group meetings. Family and friend participation may provide culturally salient social support for adopting healthier lifestyle behaviors for all participants, as well as make group settings more enjoyable and comfortable. Including more ethnic foods choices during weekly snacks, as well as discussing and presenting recipes and cooking strategies that incorporate African American style and culture would also be important. Moreover, increased attention to overcoming broader community issues, such as increasing accessibility and affordability of healthy food choices and opportunities to increase physical activity, may be extremely beneficial. Finally, it may also be helpful to have a more racial and ethnically diverse intervention team to help communication and acceptance of, as well as comfort with, intervention programming.
REFERENCES


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