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B.A., Cornell University, 2012
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Abstract

Parent Variables Associated with Attrition and Weight Outcomes in a Family-Based Pediatric Weight Loss Clinic

By Elise Ozbardakci

Childhood obesity is associated with a multitude of negative mental and physical health outcomes. The preferred treatments are family-based pediatric weight loss programs that include a high degree of parental involvement. However, these programs have variable outcomes and suffer from high rates of attrition. The aims of this study were to 1) describe weight outcomes for a sample of families completing a family-based weight loss program in Atlanta, GA, and 2) to examine parental factors (i.e., parental eating styles and feeding practices) associated with patterns of attendance and weight outcomes in a primarily African American sample of treatment-seeking, obese children and adolescents. Parent/child dyads (N=98) were recruited from a six-month, family-based, weight loss program in an Atlanta pediatric hospital. Child weight outcomes and attendance were tracked via electronic medical records. Parent eating styles were assessed with the Dutch Eating Behavior Questionnaire (i.e., restraint, emotional eating, external eating) and feeding practices with the Child Feeding Questionnaire (i.e., monitoring, restriction). Program attrition was moderate, at 32.7%. Intent-to-treat analyses revealed that children had modest (but insignificant) decreases in BMIz ($p>.05$), yet significant increases in BMI ($p<.01$). Families who extended treatment beyond the suggested visit number had poorer weight outcomes than those who dropped out of treatment early or remained in treatment for the recommended duration ($p<.001$). Parental eating attitudes, child feeding practices, and demographic factors were not associated with attendance patterns (*p*s >.05). Multiple linear regression analyses indicated that parental external eating was significantly associated with BMI and BMIz increases ($\beta=0.23$, $p=.02$; $\beta=0.24$, $p=.034$) throughout treatment and parental restrained eating was associated with decreases in BMI ($\beta=-0.23$, $p=0.02$). Implications for family-based pediatric weight loss treatment and the differential findings based on weight outcome measures (BMI and BMIz) are discussed.

Keywords: Childhood Obesity, Eating Attitudes, Child Feeding Practices, Weight Management

Associations of Parental Eating Attitudes and Feeding Practices with Attendance and Weight Outcomes in a Family-Based Pediatric Weight Loss Clinic

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Introduction

Overweight and obese children are at an increased risk of developing chronic, adverse health outcomes, including Type II diabetes and cardiovascular disease (Pulgarón, 2013; Sanders, Han, Baker, & Cobley, 2015). Compared to their normal-weight counterparts, obese adolescents are also more likely to have negative psychosocial and mental health outcomes, including low self-esteem, depression, and anxiety (Rankin et al., 2016; Strauss, 2000). These negative outcomes are highly concerning, considering that nearly 35% of children and adolescents in the United States ages 2-19 years are classified as being overweight (i.e., body mass index [BMI] $\geq$ 85th percentile and < 95th percentile for age and sex) or obese (i.e., BMI $\geq$ 95th percentile for age and sex) (Hales, Carroll, Fryar, & Ogden, 2017; Skinner, Ravanbakht, Skelton, Perrin, & Armstrong, 2018).

The prevalence of overweight and obesity is even higher among African American children and adolescents, with 38% being considered overweight or obese compared to 29.9% of their White counterparts (Skinner, Ravanbakht, Skelton, Perrin, & Armstrong, 2018). Despite evidence that obesity rates were stabilizing between the years 2003-2004 and 2009-2010 (Ogden, Carroll, Kit, & Flegal, 2014), recent findings suggest that prevalence of overweight and obesity continues to rise (Skinner et al., 2018), particularly among non-Hispanic African Americans and adolescents (Skinner, Perrin, & Skelton, 2016; Skinner, Ravanbakht, Skelton, Perrin, & Armstrong, 2018). Considering the rising prevalence of overweight and obesity among African American youth, and the numerous, chronic, negative health outcomes associated, it appears critical to identify effective treatment options for this population that lead to weight loss as early in development as possible.

Recommended Treatment Interventions:

Currently, the preferred intervention for overweight and obese youth is family-based, behavioral weight loss treatment (FBT), which targets both parents and children (Altman & EWilfley, 2015; Styne et al., 2017). In FBT, families are provided multidisciplinary treatment that includes psychoeducation, nutrition counseling, behavioral therapy, and problem-solving skills. In addition, monitoring of energy intake and physical activity is incorporated into treatment. Importantly, parents are also encouraged to make healthy changes in their nutrition and physical activity habits so that they can better model positive eating and fitness behaviors for their children (Epstein, Myers, Raynor, & Saelens, 1998; Epstein, Paluch, Roemmich, & Beecher, 2007).

While FBT has shown efficacy and has led to maintained weight loss (up to ten years post-intervention) with some children, it does not work with all families (Epstein, Valoski, Wing, & McCurley, 1990; Epstein et al., 2007; Gunnarsdottir, Njardvik, Olafsdottir, Craighead, & Bjarnason, 2012; Jelalian et al., 2008). The majority of children re-gain weight or even exceed baseline weight status at a ten-year follow-up (Leonard H. Epstein, Valoski, Wing, & McCurley, 1994). Further, most interventions have only targeted children between the ages of 8 and 12 years, and those targeting adolescent populations have had less consistent results (Jelalian & Saelens, 1999; Jelalian et al., 2008).

Alarmingly, FBT programs also experience high levels of attrition (between 27% and 73%), described as early discontinuation of treatment. Attrition is also particularly high among racial and ethnic minorities (Skelton & Beech, 2011; Joseph A. Skelton, Goff, Ip, & Beech, 2011). A meta-analysis comparing effectiveness of FBT interventions found that reduction of child BMI is positively associated with duration and frequency of treatment (Whitlock, O'Connor, Williams, Beil, & Lutz, 2010). Thus, premature discontinuation in these programs makes stabilizing or decreasing child weight status less likely. Families' decisions to attend or discontinue in FBT may be modifiable. Understanding variables that are associated with successful weight outcome (i.e., weight loss or prevention of further weight gain) and program attendance could lead to better targets for intervention, and result in designing more effective, family-centered obesity treatment interventions.

Variables Associated with FBT Attrition and Outcome

Child variables. There have been a variety of studies that have identified both child and parent variables associated with treatment response and attrition. Child/adolescent factors associated with attrition and treatment outcome include: baseline BMI, race/ethnicity, socio-economic status (SES), living in a single-parent household, self-reported depressive symptoms, self-concept (i.e., the child's perceptions about his/her abilities in various areas of his/her life including academic performance), age, and gender (Baxter, Ware, Batch, & Truby, 2013; Goldschmidt et al., 2014; Jelalian et al., 2008; Kelleher et al., 2017; Pratt, Collier, Walton, Lazorick, & Lamson, 2015; Williams et al., 2010; Zeller et al., 2004). Early treatment response, or weight loss within the first half of program intervention, has been associated with positive weight outcomes through the remainder of treatment. However, the association between early treatment weight loss and attrition has not been as well studied (Goldschmidt et al., 2011; Gow et al., 2016; Jelalian et al., 2008). Children who have higher weight loss expectations have been shown to be more likely to drop out of treatment prematurely (Rhodes et al., 2017). This may indicate that those who do not experience early intervention weight loss might become discouraged and prematurely drop-out.

Despite the numerous child variables researched, only two have shown relatively consistent results across studies: 1) being an ethnic/racial minority and 2) early treatment response. Racial/ethnic minority status is associated with higher levels of attrition and lower levels of weight loss (Jelalian et al., 2008; Williams et al., 2010; Zeller et al., 2004). Early treatment response is more consistently associated with greater weight loss at the end of treatment (Goldschmidt et al., 2011; Jelalian et al., 2008). Other variables have shown more mixed results, demonstrating contradicting associations with both attrition and overall treatment response. With such discrepant results across studies, it is difficult to draw conclusions regarding what child factors could be potentially targeted in future interventions. Thus, parent factors may also be important to consider. Parents can be powerful agents of change for pediatric weight loss given that they are required to attend every appointment, engage in positive health behavior changes, and restructure the home environment to support child behavioral changes.

Parent variables. According to social learning theory, parents act as role models for their children, influencing child habits, including those associated with weight status (Sato et al., 2011). Considering the high degree of parental involvement in FBT, (Epstein et al., 2007), parental factors may greatly impact pediatric weight loss treatment attendance and response. Greater parental involvement in treatment has been associated with child weight loss early in the intervention (Heinberg et al., 2010). Further, programs targeting only parents have shown equal effectiveness as those programs that target both parents and children (Boutelle, Cafri, & Crow, 2011; Janicke et al., 2008). Thus, both parent characteristics and parent-child interactions likely influence program attendance and weight outcomes.

Parent modeling of desired health behaviors plays an important role in modifying child eating patterns and physical activity throughout treatment (Lindsay, Sussner, Kim, & Gortmaker, 2006; Wilfley, Kass, & Kolko, 2011; Wrotniak, Epstein, Paluch, & Roemmich, 2005). Studies have consistently shown that parental adoption of positive nutritional and fitness behaviors is associated with better child weight outcomes (Sato et al., 2011; Wrotniak et al., 2005). Parental weight loss during treatment has been strongly associated with treatment completion and greater child short-term and long-term weight loss (Sato et al., 2011; Wrotniak et al., 2005). Two factors that may influence how parents model healthy nutrition practices and structure the home's food environment are parent eating behaviors and child feeding practices.

Parent Eating Behaviors. Parent eating behaviors may influence parents' ability to model desired eating patterns, and perhaps their motivation to attend program appointments. This is supported by a study wherein parent modeling of healthy eating and exercise behaviors strongly predicted reduction in child BMI (Wrotniak et al., 2005). Greater parental self-monitoring of food intake has also been associated with greater child weight loss during treatment (Sato et al., 2011). Conversely, challenges in modeling and implementing positive behavioral changes may lead to treatment dissatisfaction and poor motivation to attend appointments, resulting in early drop-out. This could be the case if parents struggle with their own eating behaviors. For instance, one study found that parent binge-eating symptomatology was related to higher program attrition in a pediatric weight loss intervention (Braden et al., 2015). Another study found that parents who reported higher levels of an eating style, called restrained eating (i.e., conscious attempts to restrict types and amount of food consumed), at baseline assessment were less likely to even attend an initial session of a pediatric weight control program (Mikhail et al., 2009).

Few other studies have attempted to assess associations between parent eating styles and pediatric weight loss program attrition and outcome. However, maladaptive parental eating behaviors have been linked to similar eating behaviors in children (Scaglioni, Salvioni, & Galimberti, 2008). Parents' emotional eating (i.e., eating in response to negative emotional states rather than to internal hunger cues)(van Strien, Frijters, Bergers, & Defares, 1986) has been associated with higher levels of child emotional eating (Tan & Holub, 2015), which is linked to higher child weight status (Braet et al., 2008; Geliebter & Aversa, 2003). Higher levels of parental restrained eating have also been associated with higher levels of child restrained eating, which has been linked to higher lifetime BMI trajectories (Snoek, Harriette, Van Strien, Janssens, & Engels, 2007). Parental external eating (i.e., eating in response to external food cues rather than internal hunger cues) (van Strien et al., 1986) may similarly influence children to adopt this eating pattern, which has been associated with higher weight status (Halberstadt et al., 2016). Given the importance that parent modeling likely has on child eating behavior and weight change, understanding the impact that parental eating style has on pediatric weight loss treatment attendance and response appears to be crucial.

Child feeding practices. There is some evidence that parental eating styles may affect how they approach feeding their children. Birch & Fisher (2000) demonstrated that mothers with restrained eating styles (van Strien et al., 1986) exerted more control over their daughters' eating, which was in-turn associated with daughter's poorer self-regulation of eating behavior (Birch & Fisher, 2000). Further, parents who engage in emotional eating have also been shown to engage in emotional regulation feeding practices with their children (i.e., providing food to their child as emotional comfort) (Wardle, Sanderson, Guthrie, Rapoport, & Plomin, 2002). Thus, parents' eating behaviors may influence both how parents are able to model positive nutritional changes and how they structure feeding practices in the home.

Parents’ child feeding practices constitute another important parental area to consider in program attendance and child weight outcome because they directly impact child eating patterns and weight status (Johannsen, Johannsen, & Specker, 2006). Research indicates that excessive restriction and monitoring of the types and amount of food a child may eat is associated with increased consumption of unhealthy foods (Fisher & Birch, 1999), higher levels of loss of control of eating during eating episodes (Matheson et al., 2015), as well as childhood overweight and obesity (Berge, Meyer, Loth, MacLehose, & Neumark-Sztainer, 2015). This type of controlling feeding pattern may prevent children from being able to self-regulate food intake, which could be associated with overeating when not in the presence of parental monitoring (Rhee, 2008).

Parents’ child feeding practices, therefore, seem to be another critical area to examine in relation to FBT attendance and weight outcomes, since they can influence how children are able to self-regulate their own eating patterns and have been linked to child weight status. Understanding how both parent eating behavior and parents’ child feeding practices are associated with FBT attrition and weight outcome could provide guidance for developing more targeted interventions aimed at parents.

Present Study

Given the high parental involvement needed in pediatric weight loss (Kalarchian et al, 2009; Wilfley et al, 2011), and the degree to which parental modeling and structuring of the home environment may influence child eating behavior, studying how parental factors could affect clinical obesity program outcomes may provide insight into modifiable factors to target during treatment. To date, many previous studies that have investigated factors associated with pediatric obesity treatment attrition and weight outcomes were completed within clinical research interventions and thus may not be generalizable to more heterogeneous samples seen in outpatient obesity programs treating families. Consideration of the influence of parental psychological factors in clinical populations represents a vital, yet understudied area, especially since the most efficacious programs include parental participation.

This study fills a gap in the literature by exploring variables that are likely associated with parents' ability to model desired behavioral changes (parent eating styles) and to foster home environmental changes (child feeding practices) that would support child adoption of positive nutrition-related behaviors. The current study was conducted with treatment-seeking families participating in an outpatient, family-based, pediatric obesity program located at Children's Healthcare of Atlanta's Pediatric Hospital. This clinic treats a primarily African American patient population, a particularly at-risk, yet understudied group in pediatric weight loss literature.

The purpose of this study was to describe the weight outcomes for a sample of families completing an FBT intervention at the Atlanta-based pediatric hospital and to examine parental factors associated with patterns of attendance and weight outcomes in this primarily African American sample of treatment-seeking, obese children and adolescents. It was hypothesized that: 1) participation in the FBT program would be associated with a decrease or stabilization in weight status between the first and last attended visit, 2) children whose families prematurely discontinued their participation in the program would show less weight loss at the point of termination than those who remained in treatment for the recommended duration, 3) higher levels of parental emotional eating, external eating, restraint, and restrictive child feeding practices would be associated with attrition, and 4) lower levels of parental external eating, emotional eating, restraint, and restrictive child feeding practices during intervention would be associated with greater overall child weight loss assessed at the end of the treatment.

Methods

Participants

Children between the ages of 8 and 17 years and a primary guardian who were participating in the pediatric hospital's FBT program were recruited. Children participating in the clinic are either overweight or obese (BMI≥85%) and constitute a high-risk population.

Eligible families were those participating in the FBT program who were willing to complete questionnaires when they were attending a regularly scheduled appointment. Families were excluded from participation if the child had any psychotic disorders or limited intellectual functioning that would prevent him/her from completing questionnaires independently.

Out of 218 parent-child dyads that were approached, 117 agreed to take part in the study. Of those 117 dyads, 98 were included in the current sample. Nineteen parent-child dyads were excluded due to having greater than 50% missing data on the primary study measures.

FBT Program Structure in Current Study

Participants were recruited from an FBT program that is an outpatient pediatric weight loss intervention that utilizes a family-based approach and aims to involve all members of the family to participate in evidence-based treatments for obesity-related conditions. There are three programs that the clinic offers to overweight and obese youth:

1) a five-day summer camp that teaches children and families about nutritious practices

2) *a six-month outpatient weight loss program involving monthly in-person visits* and

3) *a bariatric program that involves support groups, nutrition and fitness coaching, and gastric bypass surgery*.

Children typically participate in only one of the programs. The current study collected data from patients participating in the six-month, outpatient, weight loss intervention. This program consists of an interdisciplinary team including psychologists, nurses, nutritionists, and physicians who work with families to create nutrition and fitness goals and monitor progress throughout the process. The clinic helps families create fitness and nutrition goals around four main healthy habit tenets: *1) make half the plate veggies and fruits 2) drink more water 3) decrease screen time (i.e., tv, phone, video game, and movies)* and *4) increase physical activity.*

Referrals. Families typically receive referrals to the weight loss clinic from primary care physicians because a child or adolescent is overweight or obese. However, parents concerned about child weight status may also independently seek treatment at the program without referral.

Visits. The program aims for families to participate in at least six, monthly visits (one visit per month over a six-month period). However, given the real-world clinic population, many families do not attend the monthly visits as recommended. Rather, visits are often scheduled more variably, whenever the family can realistically attend. Thus, families may remain in treatment for longer than six months, despite only attending six appointments. This flexibility is intended to help families to overcome scheduling and transportation barriers that are often associated with attending such clinical obesity interventions. For this reason, the program will be described according to visit number rather than treatment duration.

During their first visit, families have an initial assessment to determine whether they are willing to participate in the intensive program. The clinic also assesses current problematic eating behaviors, household family structure, child emotional functioning (including teasing at school and school performance), parent and child motivation, and past weight loss attempts. The clinic also takes baseline anthropometric variables (i.e., weight, height, BMI, waist to hip ratio), and metabolic profiles (i.e., glucose, cholesterol, lipid levels, blood pressure). This information, along with clinician progress notes are all tracked in an electronic medical chart. Each visit, families' progress in treatment is evaluated, and their nutrition and fitness goals are modified as needed. Anthropometric variables are tracked each visit. Additional contacts may be initiated by the families or by clinicians, which may include phone calls or additional in-person visits. Phone calls typically involve coaching and problem-solving surrounding goals made during the most recent visit. Families may remain in the program for longer than the recommended six visits if desired.

Study Procedure

The Emory University Institutional Review Board approved the study protocol. Parents or guardians provided digital informed consent on an iPad to allow the data from themselves and their child to be used for research, and children provided assent. Families were approached in the waiting room during their monthly visits (typically their second visit) and were asked to fill out questionnaires on an iPad. Study participation required questionnaire completion by both the one parent and the child attending the program. Participation was compensated with two $15-dollar gift certificates to Target ($30 in total provided to the dyad). Total time to complete questionnaires was estimated to be between 30-45 minutes. Participants first provided demographic information, including race/ethnicity and age. Anthropometrics, including child's BMI, and BMI Z-score (BMIz), as well as program attendance, were retrieved from their electronic medical charts.

Measures

Demographics. Participants provided information on their name, birthday, age, and race/ethnicity. Parents were also asked to provide relative information regarding their socioeconomic status by reporting income according to federal income guidelines.

Parental Eating Style. Parental eating style was assessed using the Dutch Eating Behavior Questionnaire (DEBQ). The DEBQ is a 33-item self-report measure that contains three subscales of different eating styles: dietary restraint, emotional eating, and external eating behaviors. The restraint subscale measures the tendency to create inflexible mental rules about what and how much to eat to lose or control weight. The emotional eating subscale measures the tendency to overeat in response to negative mood states. The external eating subscale measures the tendency to overeat in the presence of food stimuli, such as availability of highly palatable foods (Sung et al., 2010). Participants rated how often they engage in behaviors related to each of these subscales on a 5-point Likert scale from 1 (“Never”) to 5 (“Very Often”). Higher scores indicate a higher degree of said eating style. Each of the scales have demonstrated good internal consistency, (Cronbach α=.80-.95 for all subscales) and factorial validity (van Strien et al., 1986; Wardle, 1987). For this population, the test also demonstrated good internal consistency (Cronbach α=0.93).

Parenting Child Feeding Practices. Parental child feeding practices were assessed using the Child Feeding Questionnaire (CFQ). The CFQ is a 31-item self-report questionnaire that assesses parental perception about child weight status, and level of parental control in child feeding practices. Participants answered questions utilizing a 5-point Likert scale, ranging from 1 (“Never”) to 5 (“Always”) and 1 (“Disagree”) to 5 (“Agree). Subscales utilized to assess for restrictive and controlling feeding practices included the “restriction,” and “monitoring.” Higher scores on the scales indicate a higher presence of the behavior. The measure has been shown to be reliable, with Cronbach α estimates between .71 and .72 (Anderson, Hughes, Fisher, & Nicklas, 2005). The measure has also been amended and analyzed in African American populations, and has shown reliability (Anderson et al., 2005; Boles et al., 2010). Within this sample, the measure has shown adequate reliability (Cronbach α=0.82).

Child Anthropometrics and Process Variables. Child anthropometrics were assessed in two ways: 1) with child BMI, and 2) with child BMIz. Early child weight loss in treatment assessed early response to treatment.

Body Mass Index (BMI). BMI measures weight that is adjusted for height (Must & Anderson, 2006). BMI was calculated by staff at the obesity clinic (kg/m^2) after measuring children’s height and weight. This data was obtained from medical records for each visit.

However, there are no defined BMI cut-points for children to classify their weight status as normal, overweight or obese, as there are for adults. This can make it difficult to determine weight status in children and adolescents. In children, body mass varies with age and sex. For example, a seven-year-old boy with a BMI of 20kg/m^2 would be considered to be overweight, but a fourteen year-old-boy with a similar BMI would be considered normal weight (Freedman, Mei, Srinivasan, Berenson, & Dietz, 2007; Must & Anderson, 2006). Thus, to be able to compare and interpret weight status in children and adolescents, it must be compared to a standard reference point that accounts for age and sex, such as BMI z-score.

BMIz-score (BMIz). BMIz measures the relative weight of a child/adolescent adjusted for his/her age and sex. It expresses the anthropometric value as a number of standard deviations or z-scores below or above the reference mean or median value. The reference standard is an external, rather than an internal standard, which allows for comparisons across study samples. BMIz scores are equivalent to BMI growth chart percentiles (Must & Anderson, 2006). A BMI z-score of one is equated to a BMI percentile of 85 and is considered overweight. A BMI z-score of two is equated to a BMI percentile of 97 and is considered obese. Finally, a BMI z-score of three is equated to a BMI percentile of 99, and is also considered obese (Khadilkar & Khadilkar, 2011). An advantage of using Z-scores is being able to compare results across age groups since z-scores have the same statistical relation to the distribution of the reference around the mean at all ages (Must & Anderson, 2006). For this study, CDC national reference standards for BMIz were used to determine child BMIz and can be found at (www.cdc.gov/growthcharts).

Early Weight Loss. The FBT program intended for duration of treatment between visits one and three to be three months; however, it was quite variable among families in this program. Many studies define early weight loss as any weight loss occurring within the first half of treatment (Goldschmidt et al., 2014; Gow et al., 2016; Jelalian et al., 2008). Thus, early weight loss for this study was defined as any reduction in BMIz between visit one and visit three, as measured by the standardized residual change score for BMIz; this would be considered weight loss within the first half of the six-month program. This definition also allowed for early weight loss to be determined for drop-outs, as well as those defined as “engaged in treatment.” The standardized residual change score also allows for consideration of initial BMIz in the program. While raw BMI can be more sensitive to change, BMIz provides a more conservative estimate of early weight change and may indicate more prominent shifts in child weight status early in treatment (Cole, Faith, Pietrobelli, & Heo, 2005).

For those whose families dropped out of treatment after visit two, early-treatment child weight loss was defined as weight loss between visits one and two. Those who attended only one visit were not considered to have a change score and were classified as not experiencing early weight loss. A BMIz regression change score between visits one and three (or one and two for those who did not attend a third session) was dichotomized into "early weight loss" and "no early weight loss." Change scores less than zero were considered to be "early weight loss" and those greater than or equal to zero (which would include those who gained weight) were classified as "no early weight loss."

Outcome. Outcome was assessed in two ways: with change in BMIz and BMI at the end of treatment.

Change in BMI (ΔBMI) and Change in BMIz (ΔBMIz). ΔBMIz from visit one to last attended visit was the main outcome measure. The standardized residual of BMIz was obtained by regressing the last recorded BMIz in the participant's electronic medical record onto the participant's first visit BMIz. This standardized residual was used as the ΔBMIz because it takes into account initial weight status when beginning the program. However, BMIz has low variability, leading to restriction of range. Thus, change in raw BMI from visit one to the last attended visit was also assessed to evaluate program effectiveness. The standardized residual of BMI between first and final visits was similarly used as the change score.

Program Attrition. Visual inspection of a frequency histogram (Figure 1) showed the total number of visits attended by families. Based on these data, three patterns of attendance were identified. Attrition was defined as attending less than four visits. These individuals were labeled "drop-outs." Individuals who attended between four and seven visits were labeled as "engagers" since they attended at least more than half the recommended number (six) of sessions of the program. Since individuals could choose to attend more than the standard six sessions, those who attended eight or more sessions were considered program "extenders." As explained later, the length between visits which characterized participation in this clinic was highly variable. The total time (weeks in treatment) was reported by staff as more typically due to logistics than to poor engagement in treatment. Thus, duration of time (weeks in treatment) was not determined to be a useful way to reflect level of engagement.

Statistical Analyses

All statistical analyses were performed using SPSS software (version 25; SPSS Inc., Chicago, IL). Missing data on parental questionnaires were inspected with Little MCAR's test to assess whether those cases with missing values were missing completely at random; 33.3% of cases had missing data on parental predictor variables of interest. All child data utilized in this study were obtained from chart review, and thus had no missing data. According to the Little MCAR test, parental questionnaire data was found to be completely missing at random ($ps > 0.05$). Missing data was handled with both listwise deletion and multiple imputation. Listwise deletion was used with cases that had greater than 50% missing data on primary parental predictors, which constituted a proportion of missing data too large to include in a multiple imputation (Garson, 2015; Jakobsen, Gluud, Wetterslev, & Winkel, 2017). Since data were found to be completely missing at random, listwise deletion of these cases does not pose any potential for bias in analyses (Garson, 2015).

For those cases that remained, 26.8% had missing data on parental predictors. A multiple imputation on the item level for parental questionnaires was used on remaining cases to avoid losing additional power (Eekhout et al., 2014). Multiple imputation has been shown to be a valid method for handling missing data in clinical samples (David Garson, 2015; Eekhout et al., 2014; Jakobsen et al., 2017; Schlomer, Bauman, & Card, 2005). Five imputations were done using the Markov Chain Monte Carlo (MCMC) simulation method (Jakobsen et al., 2017). Sensitivity analyses were run by repeating all analyses with the complete un-imputed data set as well as the imputed data set. Results were then compared to check whether imputation influenced findings.

Frequency analyses were used to determine demographic and baseline weight characteristics of the sample, as well as patterns of attendance. Data were checked for normality of distribution, and acceptable levels of skewness and kurtosis. BMIz for all visits were found to be non-normally distributed, and logarithmic transformation did not adjust the distribution. Thus, a Wilcoxon signed-rank test was used to test the effect of the intervention. Chi-square analyses were conducted to test for differences in program engagement as a function of categorical demographic variables. Kruskal-Wallis independent sample tests and associated pairwise comparisons with adjusted p-values were used to analyze differences between attendance groups as a function of non-normally distributed continuous variables.

Bivariate correlations were then used to identify any parent or child demographic and early-treatment anthropometric variables associated with child ΔBMIz. Additionally, early treatment weight loss, an established robust predictor of successful child weight outcomes, was also analyzed for associations with overall outcome. Significant correlates were then entered as controls in the first step of a hierarchical multivariate linear regression. Parental feeding practices and eating styles were then added simultaneously into the second step of the regression to determine whether they were uniquely associated with child weight loss/stabilization. While the outcome variables ΔBMIz and ΔBMI were not normally distributed, violations of normality in linear regressions do not necessarily bias estimates, particularly within clinical samples when

N≥40 (Field, 2013; Schmidt & Finan, 2017). The same steps were taken to run a hierarchical linear regression with ΔBMI as the outcome (rather than ΔBMIz) which may more sensitively detect changes in weight status between first and final visits.

Results

Demographics and Baseline Weight Characteristics

Demographics and baseline weight characteristics for parents and children are presented in Table 1. Ninety-eight parent/child dyads were recruited. Children had a mean age of 12.2 (SD 2.4) years. Children were predominately in the obese category with a mean baseline BMIz of 2.45 (SD .04) and a mean baseline BMI percentile of 98.9 (SD 1.37). 53.1% of children were female, 62.2% were African American, 29.6% were White, 4.0% were Hispanic/Latino, and 1.0% Asian. The parent participants were predominately mothers (85.7%). Parental mean age was 42.0 (SD 7.9) years, and the participating parents were predominately in the obese category themselves (self-reported mean BMI=36.2, SD 9.6). About half of the parents (56.1%) reported having an annual family income of greater than $50,000.

Parental Profiles of Eating Styles and Feeding Practices

Table 2 outlines descriptive information of parental responses to the CFQ and DEBQ. Parents reported having higher levels of restraint (M=3.0, SD=.07) than emotional eating (M=2.5, SD=1.0) and external eating (M=2.7, SD=0.7). This profile is similar to previous findings in samples of female individuals who were obese (van Strien et al., 1986). Parents tended to have higher levels of restrictive child feeding practices. On the CFQ, mean restriction was 3.0 (SD 0.7) and mean monitoring was 3.8 (SD 0.9). These responses are similar to those shown in parents who have overweight or obese children (Matheson et al., 2015; Shloim, Edelson, Martin, & Hetherington, 2015).

Weight Outcome and Patterns of Attendance

Baseline and final-visit BMIz (T=1,585, *p*=.063, r=-.19) showed no significant reduction on average (average decrease was .05 units). However, raw BMI scores increased an average of 1.5 kg/m^2 between first and final visits (T=3,531, *p*<.001, r=.33) (Table 4). Overall, of those who completed at least four visits, fifty-five children (56.1%) decreased or maintained their BMIz as assessed at their last visit (mean raw ΔBMIz=-0.15), while forty-three children (43.9%) had small increases in their BMIz (mean raw ΔBMI change = 0.08 units).

Descriptive information regarding family attendance patterns at the pediatric hospital's FBT program are presented in Table 2 and Figure 1. Families attended an average of five total visits (M=5.3, SD 2.4). Average total length of time in treatment was 15.3 months (SD 14.5), indicating that most families did not reliably attend visits on a monthly basis though they remained engaged with the program. Thirty-two families (32.7% of the total sample) dropped out of treatment before the fourth session. Forty-nine families (50.0% of total sample) engaged in treatment, and seventeen families (17.3%) were considered extenders, as they chose to remain in treatment for more than seven sessions. Modal number of visits attended for each group were: two visits for dropouts, four visits for engagers, and nine visits for extenders.

Attendance Group Differences. There were no differences among the three attendance groups in child gender, race/ethnicity, age, initial weight status, family income, parental age, gender, and race/ethnicity (*p*s>.05). While not significant, extenders had slightly higher starting BMIzs (2.6) than engagers (2.4) and drop-outs (2.4). Attendance groups also did not differ in

ΔBMIz between first and last visit. However, raw ΔBMI between first and final visits was significantly affected by duration of program attendance H(2) =13.94, *p*=.001 (Table 5; Figure 2). Pairwise comparisons with adjusted *p*-values (using a Bonferroni correction) showed that there were no significant differences in ΔBMI between drop-outs and engagers (*p*=.215, r=0.20) (Table 6). However, there were significant differences in ΔBMI between drop-outs and extenders as well as engagers and extenders. Dropouts lost significantly more weight (decrease in BMI) than extenders (*p*=.001, r=0.53), and engagers lost significantly more weight (decrease in BMI) than extenders (*p*=.035, r=.31). These discrepant results are likely due to greater sensitivity of raw BMI to detect change, and a restriction of range in ΔBMIz. Early weight loss was not significantly different between attendance groups. Figures 3 and 4 show mean ΔBMI and mean ΔBMIz between first and final visits across groups, and Figures 5 and 6 show changes in mean BMI and BMIz between the first and third visits.

Contrary to prediction, parental factors were not associated with attrition. Parental eating styles, including emotional eating, external eating, and restrained eating did not significantly differ between program attendance groups (*p*'s >.05). Parental restrictive child feeding practices were also not significantly associated with attendance (*p*'s>.05).

Parental Factors Associated with Weight Outcome. Bivariate analyses revealed that most parent and child demographic variables including gender, family income, and race/ethnicity were not significantly associated with ΔBMIz. While child age was not significantly correlated with weight outcome (*p*>.05), parental age was (r= -.22, *p*=.034). Early treatment child weight loss was also significantly correlated for engagers and extenders (n=66; r=0.54, *p*<.001). Since early child weight loss was defined as any weight loss within the first three visits of treatment, it would be expected that drop-outs' early weight loss would be highly correlated with overall weight loss (n=32; r=0.56, *p*=.001). Yet, given that all groups had high correlations between early weight loss and overall program weight loss, and that there were no significant group differences in early weight loss, all groups were combined to run a multiple linear regression with early treatment weight loss and parental age entered into step 1 of the model. Parental restrained eating, external eating, emotional eating, and child feeding practices were entered simultaneously into the second step to determine if any variables are uniquely associated with child ΔBMIz above and beyond early treatment child weight loss and parental age (Table 7).

Early treatment child weight loss and parental age accounted for 34% of child ΔBMIz (Step 1). Greater parental age was associated with greater child weight loss (β=-0.20; *p*=.02), and greater early treatment weight loss was also associated with child weight loss (ΔBMIz) (β=0.55; *p*<.001). Parental eating and feeding variables only explained an additional 4.3% of child ΔBMIz (*p*>.05). Parental external eating was the only significant predictor in the model (β=0.23; *p*=.02), with higher levels being associated with child weight gain during treatment. The complete model accounted for 38% of the variance in child ΔBMIz from first to final visit (R^2=0.36, F(5, 90) =8.1, *p*<.001).

A regression model was also run for the outcome, ΔBMI (Table 8). Bivariate analyses did not find any significant difference on parental or child demographic factors, including parental age, with ΔBMI. The only factor associated with overall treatment outcome was early treatment weight change (r=0.34, *p*=.001). The same steps were followed as those for the regression with ΔBMIz. The only difference was that parental age was not included in the model since bivariate analyses did not reveal significant associations with ΔBMI .

Early treatment child weight loss accounted for 12% of child ΔBMI (Step 1). Greater early treatment weight loss was associated with greater ΔBMI (β=0.34; *p*=.001). Parental eating and feeding variables explained an additional 12% of child BMI change, which was significant (*p* =0.02). In this model, both parental external eating and parental restrained eating were significantly associated with the outcome (β=0.24, *p*=.034; β=-0.23, *p*=0.02, respectively). Higher levels of parental restrained eating were associated with greater child weight loss (ΔBMI), whereas higher levels of parental external eating were associated with child weight gain.

Sensitivity Analyses

There were no significant differences found between the imputed data set and that of the original data set for any of the results described, indicating that imputation did not skew the results of the current study.

Discussion

Despite the numerous, chronic health risks that childhood obesity poses, interventions have shown variable weight outcomes, and programs suffer from high levels of attrition, particularly among adolescents and African American populations (Jelalian et al., 2008; Skelton & Beech, 2011). Currently, the recommended treatments are those that are family-based and require a high degree of parental involvement during intervention (Epstein et al., 2007). Thus, identifying parental factors that are associated with positive weight outcomes and program attrition could help to design more effective family-based interventions. This study aimed to examine the attendance patterns and weight outcomes of an FBT program and to explore parental eating styles and feeding practices associated with intervention attendance and weight outcomes.

Weight Outcomes and Attendance

Weight Outcome. This study found that, on average, participants maintained or slightly decreased their weight status over time, when weight was measured as compared to peers of the same age and sex (BMIz decrease of .05) even though their raw BMI increased throughout treatment (1.5kg/m^2). Given anticipated increases in height associated with development in this age range, this raw BMI increase would be expected. The difference observed in treatment outcome for BMI and BMI-z indicates that gauging progress in pediatric weight loss programs is dependent upon which outcome measure is tracked. BMI-zs may provide more meaningful information regarding weight status throughout treatment since BMI varies by age and sex.

In the current study, more than half of the participants (56.1%) maintained or demonstrated a decrease in their BMIz of about .15. Conversely, those who demonstrated a BMIz increase had a very small average increase of .08. These findings support the hypothesis that families participating in the Atlanta-based pediatric hospital's obesity program would typically demonstrate at least a stabilization of their weight, which was the identified goal of the program. Even though reductions in BMIz-scores were moderate, such changes are generally associated with other positive clinical outcomes. In prior research, similar moderate decreases in BMIz (between .10 and .15) have been associated with reductions in serum cholesterol, blood glucose levels, and other cardiovascular risk factors (Kirk et al., 2005; Kolsgaard et al., 2011). Further investigation would be needed to determine if the BMIz reduction in this sample was associated with improvements in other clinical health indicators.

Attendance. Findings indicate that while a majority of this pediatric hospital's FBT participants were engaged, with 67.3% of families remaining in treatment beyond three visits, attrition remains a concern since nearly one-third (32.7%) of families dropped out before their fourth visit. This attrition rate is generally consistent with findings from other studies, which have varied between 27% and 73% in multidisciplinary pediatric weight loss programs (Skelton & Beech, 2011). However, attrition rates across studies are difficult to compare given that programs differ in intensity, duration, and setting. Moreover, they vary in how they define attrition.

The hypothesis that those remaining in treatment for the recommended duration would experience greater weight loss than those who prematurely dropped out was not supported. ΔBMIz between the first and final visits did not differ significantly between groups. However, change in raw BMI did differ significantly between groups, with extenders experiencing increases in BMI throughout treatment. Compared to engagers, early drop-outs experienced similar changes in BMI, indicating that attrition may not necessarily mean that children were responding poorly to the program. Attrition may be due to logistical barriers rather than program-related factors. However, extenders' poorer weight outcomes may indicate the need for programs to refer families who request treatment beyond the recommended durations to alternative, more intensive treatments rather than simply continuing in the program.

These findings differ from previous studies which have shown that reduction in child BMI was associated with longer treatment duration (Jelalian et al., 2008; Whitlock et al., 2010). One study conducted in a multidisciplinary pediatric weight loss program reported that parents cited lack of improvement in their child's weight as an important contributing reason for discontinuation (Skelton et al., 2011). This would indicate that failure to lose weight during treatment would be associated with early drop-out. In this sample, however, extenders tended to gain weight throughout treatment. These families might have struggled with treatment recommendations, leading them to remain in the program for longer durations in hopes of seeing some weight change.

Parental Factors and Attendance. Contrary to what was hypothesized, parental eating styles and restrictive practices were not associated with attendance patterns. Despite numerous studies showing that restrictive child feeding practices are associated with maladaptive child eating patterns and higher child weight status (Berge et al., 2015; Birch, Fisher, & Davison, 2003; Fisher & Birch, 1999; Matheson et al., 2015; Shloim et al., 2015), this study indicates that they may not influence program attendance. Rather, the feeding practices that parents utilize in the home might be more associated with development of child overweight and obesity than with family motivation to engage in treatment. Few previous studies have assessed parental feeding practices and program attendance and many report on younger children. This study's findings may be partly explained by the fact that many of the youth in this program were adolescents, who are likely more independent with their eating behaviors and less responsive to parental feeding practices. Thus, parental feeding practices may not greatly influence how families engage in and respond to pediatric treatment programs that target adolescent populations.

Demographic and baseline weight characteristics were also not significantly different among attendance groups in this study. These findings are somewhat different from other studies that have found that racial and ethnic minorities, and those with lower annual income, higher child age, higher parental BMI, and higher starting child BMI were more likely to drop out of treatment prematurely (Demeule-Hayes et al., 2016; Williams et al., 2010; Zeller et al., 2004). However, other studies have found no association with attrition and these demographic and baseline anthropometric characteristics (Braden et al., 2015; Braet et al., 2008).

While starting weight status was not significantly different between attendance groups, extenders had a slightly higher BMIz than the other two groups. This finding also differs from some previous studies, which have found attrition to be associated with higher baseline weight status (Denzer, Reithofer, Wabitsch, & Widhalm, 2004; Jelalian et al., 2008; Zeller et al., 2004). However, Skelton et al. (2011) similarly found that those with higher starting weight statuses were more likely to remain in treatment for longer durations than those with lower weight statuses. They proposed that heavier participants may be more motivated to lose weight, or that those with lower weight statuses may have experienced earlier success and thus felt that further support was not needed. It may be useful to follow-up with participants of varying attendance patterns to ascertain their motivations for dropping out, engaging, or extending in treatment.

Parental Factors and Weight Outcomes

It was hypothesized that higher levels of restrictive child feeding practices (restriction and monitoring) and maladaptive parental eating styles (parental restraint, emotional eating, external eating) would be associated with poorer weight outcomes. This hypothesis was only partially supported. After accounting for relevant demographic factors, and early treatment weight loss, only parental external eating was associated with ΔBMIz. In this model, unique parental variables associated with BMIz change were parent age and external eating. Older parental age was associated with decreases in child BMIz. Conversely, greater parental external eating was associated with increases in child BMIz throughout treatment.

For child ΔBMI between their first and last visit, parental external eating was still significantly associated with ΔBMI after considering early child weight loss. In this model, restrained eating was also significantly associated with ΔBMI. This association was contrary to prediction, with results showing that higher parental restraint was significantly associated with reductions in child BMI. Parental eating attitudes and feeding practices significantly explained variance in BMI change, beyond early treatment weight loss (p=.02).

Taken together, these models indicate that certain parental eating styles may significantly impact child weight outcomes in pediatric weight loss programs. This study did not find any significant association between child feeding practices and weight outcome, which may mean that parental modeling of eating behaviors has a greater impact on children's weight loss outcomes. However, not all eating attitudes were associated with weight outcomes. The hypothesis that parental emotional eating would be associated with poorer weight outcomes was not supported. While studies have linked parental emotional eating with child emotional eating and higher child weight status (Tan & Holub, 2015), this association may not necessarily be linked to pediatric weight outcomes in primarily African American, treatment-seeking populations.

Given that parental external eating was associated with higher BMI and BMIz, pediatric weight loss programs may want to assess for and target parents with higher levels of this eating style. Parents with external eating patterns may be modeling maladaptive eating habits and may make food choices that also impact the child's food environment. For instance, parents with higher levels of external eating may be more likely to respond to external food stimuli such as signs for fast food restaurants while driving home or purchasing sweets they see near the checkout aisle. These choices may create greater difficulty in children's ability to make positive food choices for themselves merely because their home food environment has less nutritious, likely higher energy-dense foods more readily available.

Parental restraint has been previously associated with higher child restraint and BMI (Snoek, Harriette et al., 2007). However, parents in this study were primarily obese, and their own dietary restraint may have been a conscious attempt to restrict their own food intake in order to lose weight. This approach may have led to parents modeling a reduction in food portions or less intake of non-nutritious foods. In fact, one previous study demonstrated that greater parental self-regulation of their own food intake was associated with greater child weight loss throughout treatment (Sato et al., 2011). Studies have also shown that parental reduction in BMI is strongly associated with positive child weight outcomes (Sato et al., 2011; Wrotniak et al., 2005). This may indicate that within pediatric weight loss programs, parental restrained eating is associated with their own successful weight loss attempts, which may also lead to more positive child weight outcomes.

The difference in association of parental restrained eating between ΔBMI and ΔBMIz, may be attributed to greater variability in ΔBMI. Additionally, raw BMI may be more sensitive to change than is BMIz (Cole et al., 2005). Since this sample saw an average increase in raw BMI from first to final visit, the association between parental restraint and decrease in BMI indicates a potentially important factor associated with child weight outcomes. This study also found a difference in the association of parental age in ΔBMI and ΔBMIz, with higher parental age being significantly associated with decreases in child BMIz while having no association with ΔBMI. While the explanation for this difference is unknown, it points to the impact that weight outcome measures have on interpreting results. Studies often use a variety of weight outcome measures to track pediatric weight loss, including BMI, BMIz, BMI percentile, and BMI percent over the 95^{th} percentile, each with their own strengths and limitations. It might be useful to use multiple indices of pediatric weight outcome in order to get a more nuanced understanding of what may be occurring in treatment and to view results in the context of the strengths and weaknesses of each measure.

Strengths and Limitations

The current findings should be considered in light of the study's limitations. Firstly, there was variability in the study visit from which parents' data were collected. This may have introduced some variance in the parent data which could make it difficult to interpret parental factors as being predictive of weight outcomes. Further, this sample of children represented a high-risk clinical population with weight statuses in the upper range of obese (98^{th} to 100^{th} percentiles). Children in this BMI range pose particular difficulties in assessing ∆BMIz. When children are severely obese, those with varying levels of adiposity may map onto similar BMI z-scores, since there is a theoretical maximum for this metric (Freedman et al., 2017). Since scores might not as accurately reflect this populations' adiposity at baseline nor at final visit, findings may be obscured.

Additionally, since most children in this sample were severely obese, all outcome measures had low variability. This was particularly evident for BMIz. Low variability in outcome measures creates restriction of range problems, which may reduce generalizability of study findings to those programs serving children who are primarily overweight or less severely obese.

Defining drop-out or attrition within this type of clinical setting is difficult since the duration of the program is very flexible. While the program aims for the intervention to be approximately six, monthly visits, families are permitted to alter the attendance schedule to accommodate their needs. Further, families may extend in treatment for as long as they may see fit. Even if families discontinue treatment, they could decide to re-engage at a later point in time. While this flexibility is useful in clinical settings, and may reduce logistical barriers for accessing treatment, it also obscures definitions of engagement and attrition. The difficulty in clearly defining treatment attrition may partly explain why this study did not find any significant parental or demographic differences between varying attendance patterns.

The current study also has many strengths. One advantage was the access to a sample of high-risk, treatment-seeking families. Additionally, the sample was primarily African American, which allows for findings to be generalized to a population that often experiences the highest degree of attrition and the worst outcomes in pediatric weight loss clinics. While the clinic setting of this program led to challenges in defining levels of attrition, it provided a more realistic view of how programs may typically operate outside of clinical research trials. Findings may, thus, be more generalizable to other programs treating clinical populations of obese children and adolescents.

This study uniquely contributed to the literature by investigating associations of potentially modifiable parental factors with both attrition and weight outcomes in a family-based pediatric obesity clinic. While prior studies have reported relationships among child feeding variables, parental eating styles, and child weight status, few have linked these variables with attrition and outcome in pediatric weight loss programs. Additionally, this study analyzed weight outcomes with two different measures of weight change (ΔBMI and ΔBMIz), which provided a more nuanced understanding of how assessment measures may affect interpretation of results.

Implications for Treatment and Future Research

As noted, these results suggest that families who feel the need for additional treatment after the recommended six, monthly visits potentially should be referred to more intensive interventions. Identifying treatment durations that are associated with lack of response may enhance cost-effectiveness and save families time and frustration in treatment modalities that are ineffective. In addition, it may be useful for treatment programs to assess for and address parental external eating patterns early in treatment. Parents with higher levels of external eating may lack interoceptive awareness of their own hunger and satiety cues. Appetite Awareness Training and Mindful Eating interventions may be useful with these parents by to help them increase awareness of their hunger cues, and to notice when they are responding to non-hunger, environmental cues. Parental restraint may be associated with parents' successful weight loss attempts. Thus, it might be useful for child programs to invest even more time and resources into helping parents make behavioral changes. It might be that successful parental implementation of weight change strategies is necessary or sufficient to facilitate successful child weight change.

Future studies may want to investigate parental factors associated with early treatment child weight loss, since that was supported here, and may be a fairly robust predictor of longer-term child weight loss success. Studies should also aim to track parental factors longitudinally so that modifiable variables associated with treatment response can be more easily identified and considered when developing future interventions.

Conclusions

In conclusion, this study demonstrated that the Atlanta pediatric hospital’s FBT program showed modest positive weight outcomes when utilizing ΔBMIz. Those families remaining in treatment beyond the recommended duration showed poorer treatment response than those who attended fewer sessions, suggesting that those parents may have needed additional help. Parental eating attitudes, child feeding practices, and demographic factors were not associated with attendance patterns. However, parental external eating and restrained eating styles showed some differential associations with child weight outcomes, with external eating associated with child weight gain and restrained eating with child weight loss/stabilization. Further research is needed to more clearly identify factors associated with attrition, as well as those associated with early treatment response.

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Tables and Figures

Table 1

Sample Characteristics (n=98 dyads)

	n (%)	*M±SD*	*Range*
Child age (years)		12.21(2.40)	8-17
Child gender			
Male	46 (46.9)		
Female	52(53.1)		
Child baseline BMI (kg/m^2)		35.4(9.4)	20.5-62.8
Child baseline BMI z-score		2.5 (0.4)	1.4-3.2
Child baseline BMI Percentile		98.3 (1.4)	92.0-100.0
Child baseline Weight Status			
Overweight	2 (2.0)		
Obese	96 (98.0)		
Child Race			
African American	61 (62.2)		
White	29 (29.6)		
Hispanic/Latino	4 (4.1)		
Asian	1 (1.0)		
More than 1 race	3 (3.1)		
Total Family Income			
Less than 50,000	43 (43.9)		
Greater than 50,000	55 (56.1)		
Parent Age		42(7.9)	25-65
Parent Gender			
Male	14(14.3)		
Female	84(85.7)		
Parent Race			
African American	57 (58.2)		
White	30 (30.6)		
Hispanic/Latino	5(5.1)		
Asian	1(1.0)		

Native American/Alaska Native	1(1.0)		
More than 1 race	5(5.1)		
Parent Self-Reported BMI (kg/m^2)		36.2(9.6)	19.4-70.5
Parental Weight Status			
Normal	12(12.2)		
Overweight	15(15.3)		
Obese	71(72.4)		
Parent Self-Reported Highest BMI		40.1(10.7)	22.0-71.0

Table 2

Descriptive Data for Parent Eating Style (Dutch Eating Behavior Questionnaire) and Restrictive Feeding Practices (Child Feeding Questionnaire) (n=98)

	M±(SD)	*Range*
Dutch Eating Behavior Questionnaire		
Restraint	3.0(0.7)	1.0-4.7
Emotional Eating	2.5(1.0)	1.0-4.9
External Eating	2.7(.7)	1.3-4.5
Child Feeding Questionnaire		
Restriction	3.7(0.7)	1.0-5.0
Monitoring	3.8(0.9)	1.0-5.0

Table 3

Attendance Patterns (n=98)

	n (%)	*M±(SD)*	*Range*
Total Visits Attended		5.3(3.4)	1-21
Total Length of Tx (Months)		15.3(14.5)	0-60
Attendance Group			
Drop-out (attended less than 4 visits)	32(32.7)		
Engagers (attended 4-7 visits)	49(50.0)		
Extenders (attended 8+ visits)	17(17.3)		

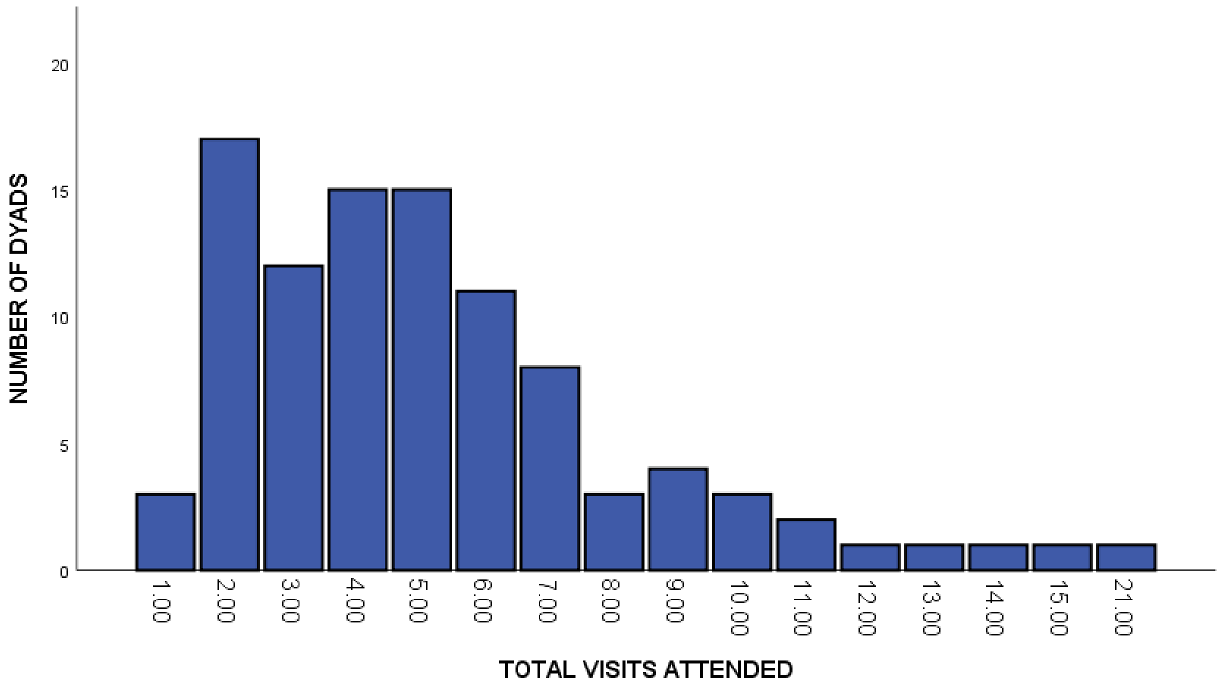

Figure 1. Frequency Distribution of Total Visits Attended by Parent-Child Dyads.

Table 4

Wilcoxon Signed-Rank Test Assessing Treatment Outcome (n-98)

	First Visit	Final Visit			
	M (SD)	M (SD)	Δ	Z	Effect Size (r)
BMI (kg/m^2)	35.4(9.4)	36.8(9.8)	1.4	4.6**	0.3
BMIz	2.5(0.4)	2.4(0.4)	-0.1	1.9	0.1

*p<.05. **p<.001

Table 5

Kruskal Wallis and Chi Square Tests for Attendance Group Differences in Demographic, Baseline Anthropometric Parental Eating Style and Parental Feeding Practices (n=98)

Variables	*Drop-Outs (n=32)*	*Engagers (n=49)*	*Extenders (n=17)*	*Test Statistics*			
	M (SD)	*M (SD)*	*M (SD)*	*H*	*df*	*p*	*Effect Size (r)*
Child Baseline BMI (kg/m^2)	35.8 (9.3)	35.1 (9.6)	35.5 (9.3)	0.1	2	0.93	
Child Baseline BMIz	2.4 (0.3)	2.4 (0.3)	2.6 (0.4)	2.8	2	0.25	
Child Age	12.1(2.3)	12.6(2.5)	11.5(2.2)	2.9	2	0.23	
ΔBMIz	0.08(0.9)	-0.07(1.1)	0.01(1.0)				
ΔBMI (kg/m^2)	-0.43(0.6)	-0.09(0.8)	0.91(1.4)	13.9	2	.001**	
Child Age	12.1(2.3)	12.6(2.5)	11.5(2.2)	2.9	2	0.23	
Parent BMI	35.4(9.4)	35.1(9.4)	40.6(9.8)	5.7	2	0.06	
Parent Age	40.4(7.6)	43.2(8.1)	41.8(7.4)	2.2	2	0.34	
Parent DEBQ							
Restrained Eating	3.1(0.7)	2.9(0.6)	3.0(0.7)	0.7	2	0.72	
Emotional Eating	2.7(0.9)	2.4(1.0)	2.4(1.1)	0.2	2	0.24	
External Eating	2.9(0.5)	2.7(0.7)	2.7(0.8)	2.2	2	0.34	
Parent CFQ							
Restriction	4.0(0.9)	3.7(0.6)	3.5(0.8)	1.6	2	0.44	
Monitoring	3.8(0.7	3.7(0.9)	3.8(0.8)	3.0	2	0.22	
	n (%)	*n (%)*	*n (%)*	X^2	*df*	*p*	*Effect Size (ϕ)*
Child Sex				0.3	2	0.86	0.31
Male	15 (46.9)	24 (49.0)	7 (41.2)				
Female	17 (53.1)	25 (51.0)	10 (58.8)				
Child Race/Ethnicity				6.4	8	0.60	0.26
African American	17 (53.1)	30 (61.2)	14 (82.4)				
White	11 (34.4)	15 (30.6)	3 (17.6)				
Hispanic/Latino	2 (6.3)	2 (4.1)	0				
Asian	0	1 (2.0)	0				
More than 1 race	2 (6.3)	1 (2.0)	0				
Family Income							
Less than 50k	17(53.1)	23(46.9)	12(70.6)				
Greater than 50k	15(46.9)	26(53.1)	5(29.4)				
Parent Sex				1.0	2	0.62	0.10
Male	3(9.4)	8(16.3)	3(17.6)				
Female	29(90.6)	41(83.7)	14(82.4)				
Parent Race/Ethnicity				7.9	10	0.64	0.28

African American	16(50.0)	28(57.1)	13(76.5)
White	11(34.4)	16(32.7)	5(29.4)
Hispanic/Latino	3(9.4)	2(4.1)	0
Asian	0	1(2.0)	0
American Indian/Alaska Native	1(3.1)	0	0
More than 1 race	1(3.1)	2(4.1)	1(5.9)

*p<.05. **p<.001

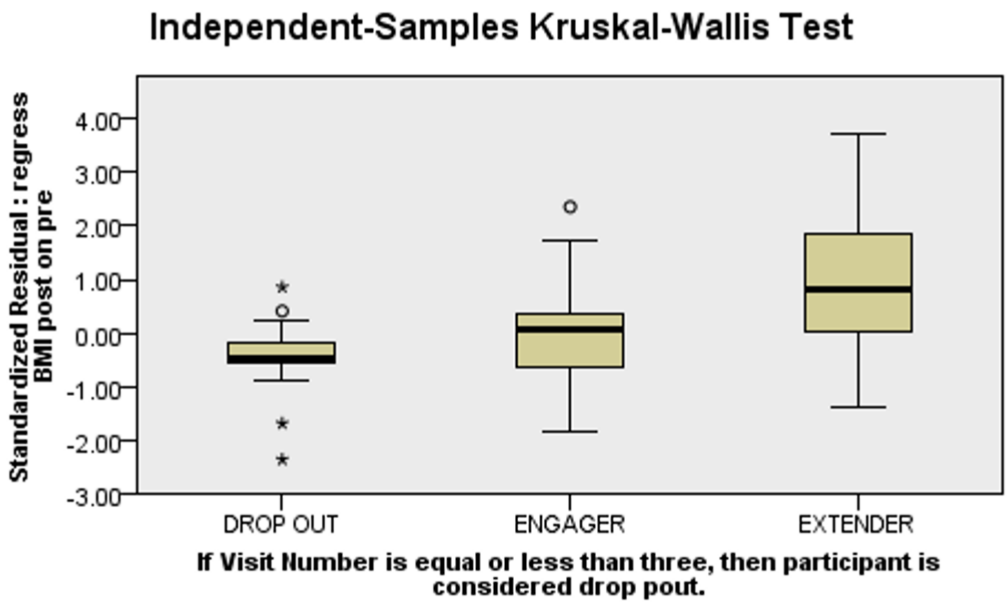

Figure 2. Kruskal Wallis comparing attendance groups on change in BMI between first and last visit. Drop-Out (n=32); Engager (n=49); Extender (n=17).

Table 6

Pairwise Attendance Group Comparisons ΔBMI: Follow-Up Analysis to Significant Kruskal Wallis of ΔBMI from First to Last Visit

Pairwise Group Comparisons	*z*	*SE*	p^a	*Effect Size (r)*
Drop-Out – Engager	-1.8	6.5	0.22	0.13
Drop-Out -Extender	-3.7	8.5	0.00**	0.26
Engager-Extender	-2.5	8.0	0.04*	0.18

*p<.05. **p<.001.

[a] Significance values have been adjusted by the Bonferroni correction for multiple tests.

Note. Effect size references are the following: small effect size r=.10, medium effect size r=.30, large effect size r=.50

Figure 3. Mean BMI at Visit 1 and Final Visit Across Attendance Groups.

Figure 4. Mean BMIz Score on First and Final Visit Across Attendance Groups.

Figure 5. Mean BMI on Visits 1 through 3 Across Attendance Groups.

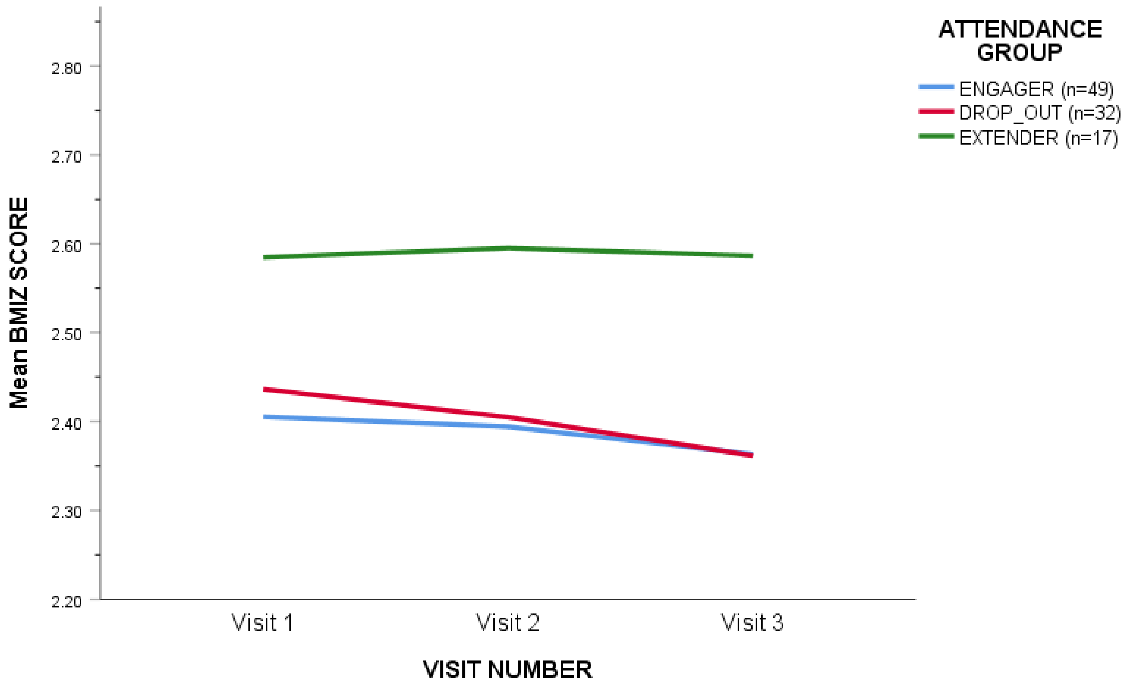

Figure 6. Mean BMIz-score on Visits 1 through 3 Across Attendance Groups.

Table 7

Multivariate Hierarchical Regression Showing Associations Between Parental Eating Styles and Feeding Practices with ΔBMIz

Variable	B	SE	β	p	ΔR^2
Step 1					0.34
Early Treatment Weight Loss	1.1	0.2	0.5	0.00**	
Parent Age	-.03	0.01	-0.2	0.02*	
Step 2					0.04
Parent DEBQ					
Restrained Eating	0.1	0.1	0.05	0.53	
Emotional Eating	-0.1	0.1	-0.1	0.20	
External Eating	0.4	0.2	0.2	0.02*	
Parent CFQ					
Restriction	0.9	0.1	0.6	0.50	
Monitor	-0.02	0.1	-0.02	0.83	

*p<.05. **p<.001

Table 8

Multivariate Hierarchical Regression Showing Associations Between Parental Eating Styles and Feeding Practices with ΔBMI

Variable	B	SE	β	p	ΔR^2
Step 1					0.12
Early Treatment Weight Loss	0.7	0.2	0.3	0.00**	
Step 2					0.12
Parent DEBQ					
Restrained Eating	-0.3	0.1	-0.2	0.02*	
Emotional Eating	-0.2	0.1	-0.2	0.18	
External Eating	0.4	0.2	0.2	0.03*	
Parent CFQ					
Restriction	-0.2	0.1	-0.1	0.23	
Monitor	0.03	0.1	0.3	0.23	

*p<.05. **p<.001