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# The Preliminary Effects of a Primary Care-based Randomized Treatment Trial with Overweight and Obese Young Children and Their Parents

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## Abstract

**Introduction—**Twenty-three percent of preschoolers are overweight/obese and this puts these children at risk for development of chronic health comorbidities. The purpose of this randomized control pilot study was to determine the feasibility and preliminary effects of a theoretically based, primary care intervention on the physical outcomes of 60 overweight/obese preschool/early school-aged children, 4–8 years.



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**Methods—**Following recruitment and baseline assessment, parent-child dyads were randomly assigned to either the treatment or control condition. Four intervention sessions were conducted with the parents in their child's primary healthcare office. The impact of the intervention was evaluated by assessing child anthropometric measures (e.g., waist, waist-by-height ratio, BMI) immediately, 3, and 6 months following the intervention period.

**Results—**ANOVA models suggested that children in the experimental group were found to have reduced waist circumference and waist-by-height ratio immediately following the intervention that persisted for 3 and 6 months ($f$ = .33, .35 respectively). BMI and BMI percentile was not differentially effected.

**Discussion—**These promising findings suggest that a primary care–based, parent-focused overweight/obesity treatment program is feasible and demonstrated positive preliminary effects, improving the children's overall health trajectory.

## Keywords

Preschool child; obesity treatment; randomized controlled trial; motivational interviewing

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The prevalence of overweight (BMI percentile>85$^{th}$) and obesity (BMI percentile 95$^{th}$) in children 2 to 19 years of age has increased rapidly in the last 20 years (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010; Ogden, Carroll, Kit, & Flegal, 2012). The most recent epidemiological data suggest that this trend appears to have decreased for all child age groups except preschool-aged children (2–5 years). One recent publication suggests that the trends in obesity have demonstrated a modest decline in this child population as well; however, upon closer review the rates continue to climb in 4-year-olds (Pan, Blanck, Sherry, Dalenius, & Grummer-Strawn, 2012). In this age group, rates of overweight and obesity (BMI percentile >85$^{th}$) continue to rise from 19.6% in 2008 to 23.4% in 2010 (Ogden et al., 2010; Ogden et al., 2012). In addition, the increase in prevalence of overweight and obesity between age groups continues to be greatest between the preschool (2–5 years) and the school-aged (6–11 years) groups (Ogden et al., 2010; Ogden et al., 2012). This epidemiologic data suggest that research in the child years that cross these age categories are needed.

To date, intervention studies conducted with overweight and obese children have demonstrated limited anthropometric changes (i.e., reduction in weight, BMI, BMI percentile, waist circumference, waist-by-height ratio) following the intervention. Small and colleagues' (2007) review of rigorously conducted treatment and prevention intervention studies identified a limited number of treatment studies ($n$ = 6) that included young children, 4–8 years old, in their samples. Since that time, 3 other systematic reviews of studies that target preschool children, less than 5 years of age, have identified 15 recent treatment studies (Bluford, Sherry, & Scanlon, 2007; Bond, Wyatt, Lloyd, Welch, & Taylor, 2009; Campbell & Hesketh, 2007), 9 of which included children 4–8 years. The interventions in these reviews were characterized by the authors as "individual", "group", "primary care-based" or "treatment". All of the studies ($n$ = 15) reviewed in those systematic reviews were found to have limited effects on weight, BMI percentile, or other anthropometric measures (i.e., skin fold thickness, waist circumference). While these reviews and the studies included

were very heterogeneous, thereby complicating overall synthesis statements, the anthropometric outcome effects ranged from “not reported” to “non-significant” changes to “no group difference” in 9 of 15 studies. Six studies reported a positive change in anthropometric measures that was statistically significant; however, the measures were incomparable (i.e., percent of obesity distribution of study participants, percent of lean muscle mass, degree of overweight, sub-sample weight-to-height by ethnic group comparisons).

A recent comprehensive Cochrane systematic review by Luttikhuis and colleagues (2009) that appraised and synthesized the evidence regarding treatment intervention studies with overweight or obese children (3–21 years) included 54 lifestyle intervention studies. They reviewed 12 treatment studies, characterized as “diet” focused, “physical activity” focused or “behavioral” intervention studies, which were conducted in children less than 12 years. These authors reported “…the effect size was small but statistically significant and clinically relevant” (Luttikhuis, 2009) and was no longer significant 12 months following the interventions. Taken together, this suggests that more intervention studies are needed to learn how to impact the recalcitrant problem of overweight and obesity early in childhood and reduce the lifetime risk of comorbid health problems.

Excess body weight has been associated with poor health and the development of several chronic illness processes. More specifically, central or visceral fat distribution, independent of total adiposity, has been found to be a risk factor for the development of several chronic health problems such as type 2 diabetes, cardiovascular disease, hyperlipidemia, increased asthma symptoms, and atherosclerosis in adults (Despres et al., 2008; Kramer et al., 2011; Okosun, Liao, Rotimi, Prewitt, & Cooper, 2000) and children (Freedman, Dietz, Srinivasan, & Berenson, 2009; Hacihamdioglu et al., 2011; Johnson et al., 2009; Kahn, Imperatore, & Cheng, 2005; Lurbe, Alvarez, & Redon, 2001; Maffeis, Banzato, Talamini, & Obesity Study Group of the Italian Society of Pediatric Endocrinology and Diabetology, 2008; Manco et al., 2008; Musaad et al., 2009; Nambiar, Truby, Abbott, & Davies, 2009; Steinberger et al., 2009). Abdominal obesity in young children has been found to be associated with initial endothelial dysfunction and vascular damage (Hacihamdioglu et al., 2011), a first stage in the development of atherosclerosis, higher blood pressure, insulin, lipid levels (LDL cholesterol, triglycerides) and circulating proinflammatory peptides compared with children without abdominal obesity (Steinberger et al., 2009). Trends in waist circumference and waist-by-height ratio have greatly increased in the United States (U.S.) during the last 10 years (Li, Ford, Mokhad, & Cook, 2006) making this an important anthropometric variable. Therefore, this study included waist and waist-by-height anthropometric measures.

The U.S. Preventive Task Force and the American Academy of Pediatrics currently recommend that young children be seen by a primary care provider yearly for recommended screenings and immunizations, an interval health history update, and physical examination (Hagan, Shaw, & Duncan, 2008; Schor, 1999; U.S. Preventative Task Force, 2010). This visit provides an excellent opportunity for primary healthcare providers to frequently see and assess their young patients and intervene in the intractable problem of excess body weight early on, prior to the development of comorbid health sequelae.

To effectively address the issue of excess weight with their patients and parents, providers may turn to the research evidence to establish practice and care for their patients. In our review of the research literature we have identified 27 treatment studies that have been conducted with young overweight or obese children and their parents in the last 30 years. Of these only nine were identified as occurring in a "clinic-based setting" (Bluford et al., 2007; Bond et al., 2009; Campbell & Hesketh, 2007; Luttikhuis, 2009; Small et al., 2007) and of those only three were conducted in the United States (Quattrin et al., 2012; Schwartz et al., 2007; Stark et al., 2011). These three studies conducted within the American medical system and in primary care settings included aspects in their design or conduct which make it difficult to replicate (e.g., group sessions, 18 sessions, home visits) or weaken the internal or external validity of their findings (small sample sizes [$n$ = 17] without effect size calculations, non-randomized design, wait list control group; (Quattrin et al., 2012; Schwartz et al., 2007; Stark et al., 2011). Given the limited available research evidence, this pilot intervention study was undertaken with overweight or obese children, 4–8 years of age, and their parents in primary care settings to address the extant gap in readily translatable research evidence. The purpose of the study was to appreciate the effect of a parent-focused, multifaceted intervention conducted in a traditional office setting on their children's anthropometric measures (BMI percentile, waist circumference, and waist-by-height ratio [WHtR]). This pilot study was conducted with a small sample to appreciate the preliminary efficacy of the intervention as a first step to conducting a large scale study.

## Methods

### Setting and Sample

Following Institutional Review Board approval, 14 local primary care offices that serve a diversity of patients were identified through which recruitment efforts occurred. To facilitate the appropriate assessment of child BMI status and referrals to the study, the researchers reviewed the method of determining and charting BMI percentile, and reviewed the study inclusion and exclusion criteria with the providers and staff of each office. Posters and flyers placed in the primary care offices facilitated recruitment to the study. Parents of overweight or obese children, 4–8 years, who would qualify for study participation on the basis of child BMI percentile, were provided with a flyer that had study office contact information; the provider and office staff encouraged parents to call and discuss the potential of study participation. Study assistants verbally screened interested parents to exclude those children who had uncontrolled medical problems (e.g., asthma) that might preclude them from fully participating in the intervention. Using this recruitment strategy, 67 parent-child dyads completed the formal consenting process in their homes and enrolled to participate in the study. Baseline sample characteristics are presented in Table 1.

### Intervention

Parents who called the research office with interest in study participation and who met the study inclusion criteria were explained the purpose of the study and the randomization process. If the parent and the child continued to be interested in study involvement research assistants met the parent and child in the home to complete a formal consenting process.

Following study enrollment and the completion of baseline measures, each parent-child dyad was randomly assigned to the treatment or control condition. At the outset of the study each child was given a group-specific (e.g., treatment group and control group) bag of toys to facilitate activities that parents would be encouraged to complete with their child. In both conditions parents were asked to attend a total of four sessions at their child's primary care office (see Table 2). Prior to each of the four intervention sessions, parents were provided with age-appropriate, audiotaped, educational information on a range of topics. Parents in the treatment group ($n$ = 34) were offered educational information about the establishment of healthy habits in young children, nutritional information, information regarding increasing physical activity and decreasing sedentary time, and age-specific information regarding the child's behavior in response to change; whereas parents assigned to the control condition ($n$ = 33) were provided with educational age-appropriate, evidence-based health and safety information (e.g., care for thermal injuries, first aid care, care for insect bites and stings) that is specific to parenting in the Southwest United States. Parents were asked if they had the opportunity to review the information provided, asked to relay some information that they had learned (an intervention fidelity check), and indicate if they had any questions about the materials by the assigned interventionist.

The face-to-face intervention sessions conducted with parents assigned to both treatment and control conditions occurred in the pediatric primary care offices and ranged in length from 30 to 60 minutes, during which trained research assistants used principles of Brief Motivational Interviewing (Elicit information from the patient, Provide non-judgment information, Elicit the patient's understanding; (Dunn & Rollnick, 2003) to collaborate with parents on identifying specific realistic healthy lifestyle goals, developing clear steps to reach those goals, routinely having the parents re-evaluate progress, and identifying new goals as needed. Parents assigned to the treatment condition were provided with specific feedback about their child (i.e., physical activity and dietary intake) prior to establishing goals for their child and family. All face-to-face parent intervention sessions were separated by 4–6 weeks to provide each family with time to enact planned changes, encounter child responses to those changes, and review new educational information prior to the next face-to-face session. Phone calls were made to each parent, regardless of group assignment, 2 weeks between sessions to (a) review the established goals and planned steps, (b) check with the parent regarding progress toward planned changes, (c) answer questions, (d) encourage review of newly-provided educational materials, and (e) establish a date and time for the next face-to-face appointment. Intervention fidelity was assured through the use of checklists research assistants completed following each face-to-face visit or phone interaction with each parent.

Using the brief motivational interviewing (MI) approach (i.e., elicit, provide, elicit) parents in the treatment group were encouraged to establish healthy lifestyle goals for their child and family that were associated with nutrition, physical activity, and/or parenting (e.g., make healthier food choices with my child when eating out of the home). Interventionists would guide parents through a step-wise, problem-solving approach to identify actions to take toward their stated goals. At subsequent face-to-face sessions parents were encouraged to evaluate successes and barriers encountered when working with their child toward the goals.

Needed skills (e.g., age appropriate portion provision) identified by a parent were discussed and opportunities to practice the skill with the interventionist were provided. In this manner parents in the treatment group were offered education, motivational support, and skill-building information/practice.

Parents randomly assigned to the control group met with a control interventionist and in a similar way were encouraged to make health and safety goals for their family (i.e., development of first aid materials, identification of a fire escape plan). During subsequent meetings the parents and interventionist reviewed progress toward established goals, discussed any barriers encountered, reviewed educational materials, and when necessary set new goals.

## Measures

A variety of child anthropometric measures and questionnaires used with the children and the parents to assess the impact of the intervention. Once enrolled in the study, a research assistant met with the parent and child in their home to gather the necessary data at each data collection time point. The parents and children were asked to complete data collection prior to randomization, immediately following the last intervention session, and then 3, and 6 months later. At each of the four measurement time points parents were offered 35 dollars as remuneration for their time completing the various measurements (i.e., questionnaires, diet diaries).

Prior to completing a data collection session with the parent and child participants, the research assistants completed five study training sessions. These sessions were provided to discuss provide information regarding the study, research ethics, and assure measurement fidelity. Following this training, research assistants were observed by the principal investigator once each month as they collected data as yet another method to assure measurement fidelity.

**Child measures—**The children had their height assessed to the nearest eighth inch using a Seca® portable stadiometer. Their weight was assessed in pounds (scale displayed to the nearest one hundredth decimal place) using a portable Tannita® scale. Waist circumference was assessed to the nearest eighth inch using a plastic measuring tape placed at the navel. Each anthropometric measure was completed 2 times and the mean was calculated. BMI *z* score was calculated from height, weight, gender, and child age in months using parameters and formulas provided by the Centers for Disease Control and Prevention (2005). The BMI percentile was derived from the BMI *z* score using the normal distribution function in Microsoft Excel 2003. Waist-by-Height Ratio (WHtR) was determined by dividing the waist circumference by the child's height. WHtR has not been found to be related to cardiovascular risk (e.g., blood pressure) in children 3 years and younger (Whitrow, Moore, & Davies, 2011) but has been more strongly associated with cardiometabolic risk factors in children (5–17 years) than has BMI for age or BMI percentile which does not adequately reflect body fat distribution (Freedman et al., 2009; Johnson et al., 2009; Kahn et al., 2005; Lurbe et al., 2001; Nambiar et al., 2009; Roswall et al., 2009; Savva et al., 2000).

### Statistical Analyses

Data were analyzed using SPSS (Version 20). Significance was set at $p = .05$. Descriptive characteristics of the parents and children are presented as means and standard deviations. A series of ANOVA models were conducted to compare the change in means from T1 (baseline) to times 2–4 across the intervention and control groups. Each model tested the treatment group × time interaction, time main effect, and treatment group main effect.

## Results

### Attrition Analyses

Attrition rates for the full sample were 25% immediately following the intervention (T2), 50% three months later (T3), and 38% six months following the completion of the intervention (T4). Chi-square analyses indicated that attrition rates were not significantly different across the treatment and control groups. Independent *t*-test results indicated that the mean values on child BMI percentile, waist circumference, or WHtR at Time 1 (T1) were not significantly different between children who participated in the study at times 2–4 and those who did not participate in the study at times 2–4.

Seven parent-child dyads returned incomplete T1 data, thus we removed data from those dyads from all other analyses. This resulted in experimental and control group sample sizes of 33 and 27 respectively. We used multiple imputation techniques in SPSS 20 to account for the missing data in subsequent analyses for the remaining 60 parent-child dyads. This process produces more robust parameter estimates than traditional approaches to missing data estimation, such as listwise deletion or mean imputation (Enders, 2010).

### Preliminary Analyses

Independent samples *t*-tests revealed that the only significant difference between treatment and control means at baseline was number of hours a parent worked (demographic variable), with control mothers working significantly more hours outside the home than treatment mothers (see Table 1). The number of hours a parent worked was not correlated with any of the anthropometric measures. Bivariate correlations among the study variables ranged from .22 to .68 for the intervention group, and .25 to .72 for the control group.

### ANOVA Model Results

**Child BMI percentile—**ANOVA results indicated that there were no significant treatment group × time interactions predicting change in child BMI percentile means from T1 to T2–T4, suggesting that there was no difference between treatment and control change in means (see Figure 1). The main effects of time were significant, suggesting that there was an overall decrease in child BMI percentile for both the treatment and control groups from T1 ($M = 96.06$) to T2 ($M = 94.22$; $F = 6.37$, $p = .01$), T1 ($M = 96.06$) to T3 ($M = 91.32$; $F = 20.49$, $p = .00$), and T1 ($M = 96.06$) to T4 ($M = 94.87$; $F = 6.23$, $p = .02$). The significant time main effects of child BMI percentile had medium to large effect sizes ranging from .31 (95% CI = $.07 \leq f \leq .70$) to .64 (95% CI = $.27 \leq f \leq 1.32$). The main effects of the treatment group were not significant. The meaningfulness of these changes is unclear due to the

various times in which children go through adiposity rebound (Daniels et al., 2005; Dietz & Robinson, 2005; Reilly, Wilson, Summerbell, & Wilson, 2002)

**Child waist circumference—**ANOVA results indicated that there was a significant treatment group × time interaction effect ($F = 4.75$, $p = .03$), suggesting that waist circumference significantly increased in the control group from T1 to T2 (see Table 3), whereas waist circumference did not significantly increase in the treatment group from T1 to T2 (see Figure 2). The effect size for the treatment group × time effect was .33 (95% CI = .08 ≤ $f$ ≤ .74), indicating a medium effect. There was no significant main effect of time on treatment group comparing baseline to T3. There was a main effect of time that was significant ($F = 6.44$, $p = .01$) comparing T1 to T4, suggesting that the child waist circumference for all children irrespective of group increased from baseline (T1 $M = 27.93$) to 6 months following the intervention (T4 $M = 29.31$) and the main effect of treatment group was not significant.

**Child waist-by-height ratio (WHtR)—**ANOVA results indicated that there was a significant treatment group × time interaction effect ($F = 5.71$, $p = .02$), such that WHtR significantly decreased in the treatment group from T1 to T2 (see Table 3), whereas WHtR in the control group remained fairly constant from T1 to T2 (see Figure 3). In a separate model, there were no significant effects of treatment group on height; therefore, this change was not accounted for by height changes. The effect size for the treatment group × time effect was $f = .35$ (95% CI = .09 ≤ $f$ ≤ .78), indicating a medium effect. There was no significant main effect of time or treatment group from T1 to T4. There were also no significant treatment group × time interaction effects, time main effects, or treatment group main effects when comparing T1 to T3, and T1 to T4.

## Discussion

This randomized controlled study resulted a medium effect size on the mean waist circumference of the children whose parents participated in the treatment intervention. This is an important finding given the small sample size included in this pilot study because a small sample size increases the potential for making a Type II error, or not finding a difference between the experimental and control groups when in fact there was.

The WHtR showed the largest change by group over time. The mean WHtRs taken at each of the 4 time points all were greater than the 95$^{th}$ percentile (.554 and .556 for males and females respectively; (Cook, Weitzman, Auinger, & Barlow, 2005) suggesting that all of these youths were at high risk of developing health comorbidities. Furthermore the mean WHtR was .60 with a standard deviation of .06; therefore, a decline of .032 in the treatment children compared with an increase of .005 in the control group children is clinically important (Nambiar et al., 2009). We believe that these anthropometric changes following a low intensity, primary care intervention are important especially in light of recent findings of a thorough systematic review (Browning, Hsieh, & Ashwell, 2010) that identified a WHtR greater than 0.5 is a significant predictor of diabetes and cardiovascular disease, stronger than, and independent of, BMI percentile.

The finding of a positive medium effect size on waist circumference and WHtR is additionally noteworthy given the small sample size of this study and the findings of Luttikhuis and colleagues (2009) and those of Bond and colleagues (2009), Bluford and colleagues (2007), and Campbell and Hesketh (2007) following their rigorous systematic reviews of childhood obesity treatment interventions that identified a limited amount of treatment research conducted with this child sub-population and a number of non-significant and/or small effect sizes of prior interventions on anthropometric outcomes (Bluford et al., 2007; Bond et al., 2009; Campbell & Hesketh, 2007; Luttikhuis, 2009).

## Limitations

The purpose of this pilot study was to determine if this primary care–based, parent-focused approach to treatment of child overweight and obesity would result in preliminary effects in child anthropometric measures; as such, the sample size was limited ($n$ = 67). This sample size was deemed large enough at the outset of the study to assess mediators and determine the preliminary effects of the intervention (effect sizes), a step necessary to accurately power future full-scale testing for statistical significance in a randomized clinical trial. A small sample increases the risk of a Type II error, or failure to find a change when in fact a change occurred. Therefore, while the sample size was small significant effects of the intervention were still identified, which underscores the importance of the anthropometric changes that occurred.

While WHtR was reduced in the children whose parents were assigned to the treatment condition, we did not reduce the waist circumference to less than half of the children's height, which McCarthy and Ashwell (2006) and other researchers (Roswall et al., 2009) have noted is desirable. Additionally, there were no intervention effects recognized on child BMI percentile; however, a reduced waist circumference and WHtR may be considered by some researchers and clinicians to be an important outcome. It may be that more rigorous intervention is needed with such an obese ($M$ BMI = 96.1 percentile) and rotund ($M$ waist circumference = 27.98 inch, > 90$^{th}$ percentile) child sample. This calls into question the inclusion of both overweight and obese children because the different sub-groups may require different levels of intervention as recommended by the American Academy of Pediatrics (Barlow & Expert Committee, 2007).

**Potential recruitment bias from providers or from parents seeking study involvement—**The average BMI percentile of the children and their parents referred to the study was at the 96$^{th}$ percentile; although the study was designed for both overweight and obese children and their parents. We anticipated a child sample with a lower BMI percentile because the U.S. population has many more children who are overweight than obese. It is unclear if this is a result of selective referral by the participating healthcare providers, who may have referred potential study participants due to visual recognition of the weight excess rather than determining study eligibility based on BMI percentile, or if parents of larger children sought out study involvement more so than parents of overweight children. This study sample that was much more obese and rotund than anticipated occurred similarly in a primary care-based treatment study conducted by Jacobson and Melnyk (2012) with overweight or obese school-aged children, 9–13 years of age, in which the mean BMI

percentile was 96. In future studies it may be important to devote greater emphasis on staff and provider training with regards to consistent and clear identification of both overweight and obese children for study recruitment prior to provider interaction with the children and parents. Additionally, it may be important to employ an office staff member at each site to identify and recruit all eligible participants, rather than rely on staff and providers in busy practices to consistently encourage study participation with their patients.

**Assessments of intervention fidelity—**Intervention fidelity of the face-to-face sessions was assessed through interventionists' reporting of goal establishment and completion of intervention checklists, which were reported following each face-to-face intervention session or phone call. Given the need for flexibility when using MI, we found rigorous intervention fidelity (i.e., goal establishment) was difficult to track in both the treatment and control interventions because goal setting and goal achievement occurred at different rates. This may be overcome by including a more rigorous training at the outset of the study in Motivational Interviewing and the establishment of periodic interrater reliability assessments prior to and throughout the study intervention period. Intervention fidelity also might be enhanced by the inclusion of randomly recorded intervention sessions that could be rated for intervention fidelity. A more formal assessment of parents' understanding of the educational materials might also be implemented prior to each face-to-face session which would assure that the parents had assimilated the information prior to each personal session.

## Recommendations for Future Research and Practice

Using the principles of brief MI, we found that variable amounts of time and/or sessions were needed for parents to identify specific dietary, physical activity, and parenting goals for their child. We anticipated that much more time in the four face-to-face sessions would be spent by interventionists to assist parents to deal with their children's responses to changes made in the home environment (i.e., dietary or activity changes). Because of the limited number of planned intervention sessions, we felt that limited the number of environmental changes were made by parents. This suggests to us that the frequency and number of meetings and/or phone calls needed to encourage parents to identify specific issues, define goals and action plans, and then work through children's responses to changes made by parents in the home should be more than four.

Taken together, our results suggests that a primary care intervention conducted with parents of overweight and obese children, 4–8 years, has the potential to result in important changes and subsequent child anthropometric changes. These intervention effects could change a child's risk profile for the development of many chronic health problems associated with obesity.

Although there are limitations with this research, several practice implications may be underscored. Consistent inclusion of a child's elevated BMI percentile on the problem list and provider awareness of this problem prior to each patient visit is an important recommendation provided by the American Academy of Pediatrics (Krebs, Jacobson, & American Academy of Pediatrics Committee on Nutrition, 2003). This is the first step to identifying children needing intervention. Although calculation of BMI percentile is

recommended for all children, 2 years of age and older, researchers have found that this recommendation may not be consistently followed (Cook et al., 2005; Gance-Cleveland, Gilbert, Kopanos, & Gilbert, 2010; Mabry et al., 2005). Clinicians may want to consider the addition of WHtR of their overweight and obese child patients as it has been found by many researchers to be an important predictor of pathologic sequelae and a measure that may be influenced independent of change in absolute BMI or BMI percentile as we found in this primary care study.

This preliminary study and other research has shown that Brief MI (Dunn & Rollnick, 2003) used with parents of overweight and obese children when combined with education and skill-building can result in child anthropometric changes (i.e., waist circumference, WHtR) after four sessions in primary care; however, a greater number of sessions also may effect a child's BMI percentile. The content of these sessions and amount of time for each session lie within the scope of practice and knowledge base of all pediatric primary healthcare providers. While compensation for practice time spent counseling patients is variable, early intervention with parents of young overweight or obese children may be imperative to affect their later health trajectory.

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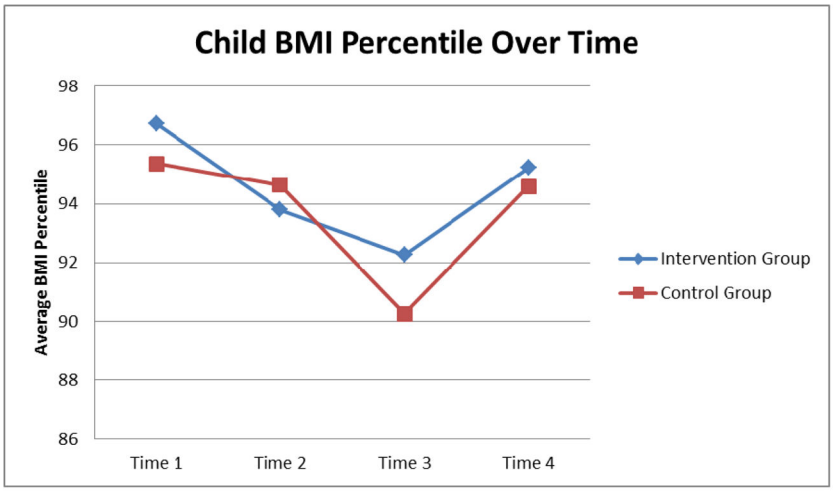


**Figure 1.**

Note. Group specific BMI percentile at baseline (T1), immediately following (T2), 3 months (T3) and 6 months (T4) following the intervention

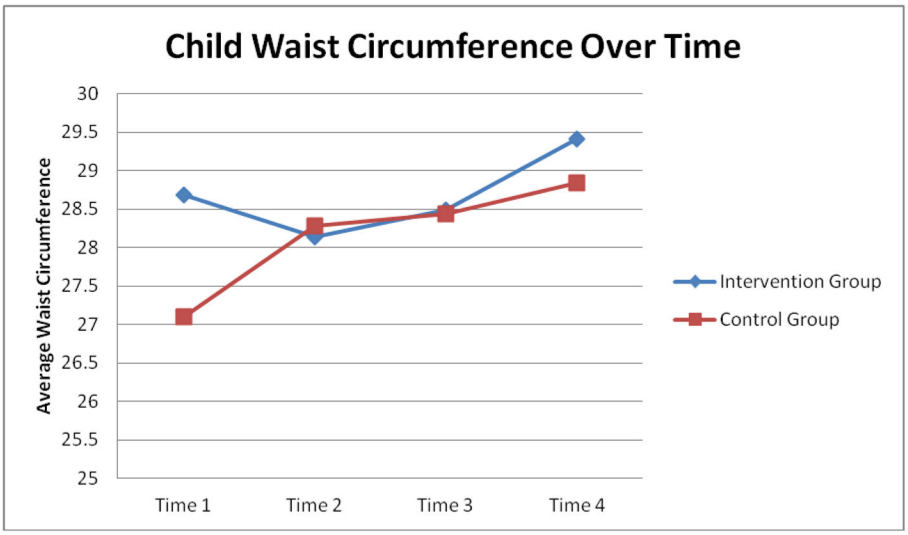


**Figure 2.**

Note. Group specific waist circumference at baseline (T1), immediately following (T2), 3 months (T3) and 6 months (T4) following the intervention. The 90th percentile = 24.9 inches, the 95th percentile = 26.5 inches (Cook et al., 2005)

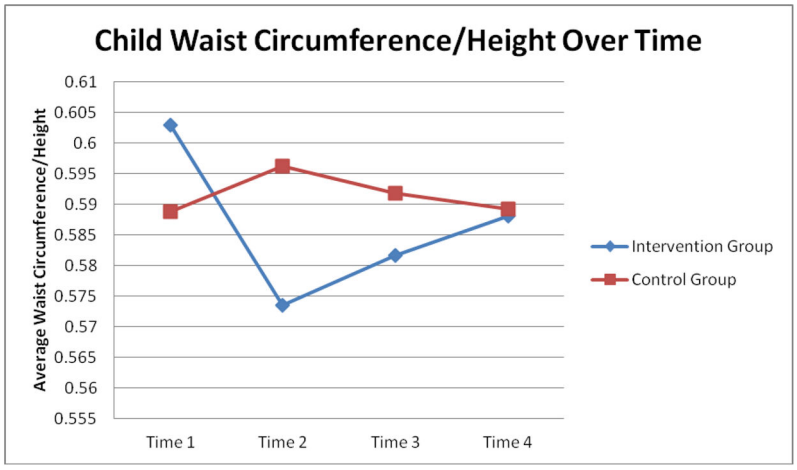


**Figure 3.**

Note. Group specific waist-by-height ratio at baseline (T1), immediately following (T2), 3 months (T3) and 6 months (T4) following the intervention. It is desirable to have a WHtR < 0.5 (Browning, Hsieh, Ashwell, 2010)

## Table 1

Demographic Characteristics of the Sample Population of Parents and Children

| Demographics | Treatment (*n* = 33) | Control (*n* = 27) | Full Sample (*N* = 60) |
|---|---|---|---|
| Child Gender: *n* (%) | | | |
| • Boys | 16 (48.5%) | 8 (29.6%) | 24 (40%) |
| • Girls | 17 (51.5%) | 19 (70.4%) | 36 (60%) |
| Child Age in years: *M* (*SD*) | 5.73 (1.38) | 5.41 (1.50) | 5.58 (1.43) |
| • Range | 4 – 8 | 4 – 8 | 4 – 8 |
| Child Body Mass Index: *M* (*SD*) | 21.93 (3.51) | 20.36 (2.71) | 21.24 (3.25) |
| • BMI Percentile *M* (*SD*) | 96.7 (4.04) | 95.4 (4.62) | 96.1 (4.32) |
| • % Obese | 72.7% | 65.4% | 69.5% |
| Child Height in inches: *M* (*SD*) | 47.55 (4.57) | 45.90 (3.92) | 46.83 (4.34) |
| Child Weight in pounds: *M* (*SD*) | 72.11 (22.36) | 62.27 (17.81) | 67.78 (20.91) |
| Child Waist Circumference in inches: *M* (*SD*) | 28.68 (4.17) | 27.10 (4.15) | 27.98 (4.20) |
| • Waist to Height Ratio *M* (*SD*) | .60 (.06) | .59 (.05) | .60 (.06) |
| Mothers' Age in years: *M* (*SD*) | 36.03 (8.23) | 34.67 (5.12) | 35.40 (6.93) |
| • Range | 23 – 61 | 22 – 44 | 22–61 |
| Mothers' Education *n* (%) | | | |
| • High school degree or less | 8 (24.3%) | 8 (29.7%) | 16 (26.7%) |
| • At least some college | 25 (75.7%) | 19 (70.3%) | 44 (73.3%) |
| Mothers' Marital Status: *n* (%) | | | |
| • Married | 25 (75.7%) | 20 (74.1%) | 45 (75%) |
| • Single/Divorced/Widowed | 8 (24.3%) | 7 (25.9%) | 15 (25%) |
| Family Structure: *n* (%) | | | |
| • Two parent | 32 (97%) | 22 (81.5%) | 54 (90.1%) |
| • One parent | 1 (3%) | 5 (18.5%) | 6 (9.9%) |
| Ethnicity: *n* (%) | | | |
| • White | 21 (63.6%) | 18 (66.7%) | 39 (65%) |
| • Black | 3 (9.1%) | 0 (0%) | 3 (5%) |
| • Hispanic | 8 (24.2%) | 7 (25.9%) | 15 (25%) |
| • Other | 1 (3%) | 2 (7.4%) | 3 (5%) |
| Mothers' Body Mass Index: *M* (*SD*) | 31.56 (8.80) | 31.89 (8.79) | 31.71 (8.72) |
| • Range | 18.5 – 56.6 | 20.6 – 49.1 | 18.5 – 56.6 |

**Table 2**

Study Timeline for Data Collection and Intervention Sessions

| **Study Week** | **Wk1** | **Wk2–3** | **Wk 4** | **Wk 6** | **Wk 8** | **Wk 10** | **Wk 12** | **Wk 14** | **Wk 16** | **Wk 17** | **3 mo** | **6 mo** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Data collection | T1 | | | | | | | | | T2 | T3 | T4 |
| Intervention | | | Session 1 F2F | | Session 2 F2F | | Session 3 F2F | | Session 4 F2F | | | |
| Audio- taped Information packets | | Education Information | | Education Information FU phone call | | Education Information FU phone call | | Education Information FU phone call | | | | |
| Treatment | | Habit development information | Brief MI Goal setting | Nutrition information | Brief MI Portion education and food labels | Physical activity information | Brief MI Physical activity planning problem- solving | Child behavior information | Brief MI difficult child behavior | | | |
| Control | | Planning for safety | Brief MI Goal setting | Care for thermal injuries | Brief MI Sun protection | First aid care Pool safety | Brief MI Care for common injuries | Care of insect bites and stings | Brief MI Review | | | |

Note. Education Information = audiotaped information, FU = follow-up, F2F = Face-to-Face session T1 = Baseline data collection, T2 = Data collection immediately following the intervention, T3 = data collection 3 months following intervention, T4 = data collection 6 months following the intervention

**Table 3**

Means and Standard Deviations for Outcome Variables

| | Treatment Group | | | | Control Group | | | |
|---|---|---|---|---|---|---|---|---|
| | **Time 1 *M* (*SD*)** | **Time 2 *M* (*SD*)** | **Time 3 *M* (*SD*)** | **Time 4 *M* (*SD*)** | **Time 1 *M* (*SD*)** | **Time 2 *M* (*SD*)** | **Time 3 *M* (*SD*)** | **Time 4 *M* (*SD*)** |
| BMI Percentile | 96.72 (4.03) | 93.74 (7.57) | 92.42 (6.81) | 95.13 (4.91) | 95.40 (4.55) | 94.74 (7.02) | 90.19 (11.90) | 94.74 (5.98) |
| Waist Circumference | 28.68 (4.17) | 28.22 (3.80) | 28.50 (3.27) | 29.47 (3.54) | 27.14 (4.11) | 28.35 (3.69) | 28.51 (3.88) | 28.90 (3.73) |
| Waist/Height Ratio | .60 (.06) | .58 (.08) | .59 (.10) | .59 (.09) | .59 (.06) | .60 (.06) | .60 (.09) | .59 (.08) |