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Coaching to Improve Mealtime Parenting in Treating Pediatric Obesity

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Childhood obesity is a significant public health concern, with about 17% of children in the United States reported as obese (Centers for Disease Control and Prevention [CDC], 2012a). Family Mealtime Coaching (FMC) is a live coaching intervention using positive psychology interventions and modeling to improve mealtime parenting, child behavior and weight status, and parent–child communication. The purpose of this study was to examine how parent coaching affects feeding practices and pediatric obesity in 2 to 10 year olds. We used a pre-/postexperimental design comparing treatment assessments of children and their caregivers participating in FMC. Caregivers ($N = 51$) consented to participate in the study. Only those participants with at least 2 measurements of height and weight from which BMI could be calculated ($N = 43$) were included. The children averaged 6.96 years of age ($SD = 2.7$), ranging between 2 and 11 years of age, and 58% were female. The large majority were Latino (84%). Children's baseline body mass index (BMI) averaged at the 97.3 percentile ($SD = 3.4$), and waist circumference averaged 78.02 cm. Results of analyses showed that children entering treatment within the upper limits of BMI percentile (i.e., 97th percentile or higher) were more likely to complete treatment and showed a significant reduction in BMI z score. The intervention also yielded significant increases in family style serving, intuitive eating, and mealtime communication; reduced maladaptive feeding comments among parents; and decreased problematic mealtime behaviors in the children. These findings suggest a promising empirical basis for using coaching to reshape feeding-related parent–child interactions.

Keywords: coaching, parenting, pediatric obesity, family mealtime coaching, active play

Approximately 17% of children ages 2 through 19 are obese in the United States, and the rates are higher among Latinos (22%) and African Americans (20%; Centers for Disease Control and Prevention [CDC], 2012a). Obesity has devastating health, academic, and social–emotional consequences (Theodore, Bray, & Kehle, 2009) and contributes to the onset of Type II diabetes, heart disease, high blood pressure, stroke, sleep apnea, and certain cancers (Anderson & Phelps, 2009; Hopkins, DeCristofaro, & Elliott, 2011). Overweight children experience higher rates of depression, anxiety, low self-worth, disruptive behavior, substance use, unhealthy weight management strategies, peer teasing, school absenteeism, and academic underachievement (Rojas & Storch, 2010; Theodore et al., 2009; White, Nicholls, Christie, Cole, & Viner, 2012).

Although parent food selection might have the greatest effect on what children eat, care-

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givers are often unaware that exposure to unhealthy foods, the social and family environment (Epstein, Paluch, Roemmich, & Beecher, 2007), and their feeding approach influences their child's weight (Slusser et al., 2012; Moore et al., 2010). This influence is most pronounced with younger children (Epstein et al., 2007; Moore et al., 2010). Investigations promoting caregiver treatment participation and change in communication related to food and eating have resulted in the best outcomes for children, including decreased body mass index (BMI) and enhanced self-esteem (Jansen Mulkens & Jansen, 2011).

Parent coaching has been identified as an optimal approach for modifying child behavior (Graf, Grumm, Hein, & Fingerle, 2014) by changing the parent's perception, behavior, and communication with their child through the relational acquisition of effective child rearing skills (Graf et al., 2014). Given the importance of parenting skill on pediatric obesity intervention, this study aimed to build parent-feeding competencies through in-the-moment mealtime coaching to improve feeding dynamics in the family.

Strategies for the Treatment of Childhood Obesity

Traditionally, childhood obesity treatment programs focused on BMI stabilization through self-monitoring, diet, lifestyle modification, and positive reinforcement (Anderson & Phelps, 2009; Hopkins et al., 2011). More recently, effective interventions include family-based treatments involving parent training and application of principles from behavioral and social learning models (Boutelle, Cafri, & Crow, 2012; Slusser et al., 2012). These family-based approaches promote healthy feeding by teaching parents to use a more positive authoritative parenting style and make healthier lifestyle choices (Boutelle et al., 2012; Faith et al., 2012). To accomplish this, parents learn how to structure aspects of the child's environment in ways that influence a balanced diet and physical activity (Faith et al., 2012). Parent coaching aims to enhance the parent–child relationship through live instruction in effective communication and coaching of positive parenting strategies that are geared to reduce resistance to healthy eating, which could otherwise decrease the caregiver's commitment to adopting a healthy lifestyle (Faith et al., 2012). In their meta-analytic review of family-based pediatric obesity treatments investigated over the last 25 years, Epstein et al. (2007) found that parent education on nutrition and physical activity were common components of child obesity treatments. However, neither in Epstein and colleagues' (2007) nor in our review of the literature did we find practitioners incorporating live mealtime coaching to assist parents in rehearsing new habits and building adaptive feeding skills. This study is the first to report the investigation of a parent coaching intervention for improving mealtime parenting in the treatment of pediatric obesity.

Treatment Intervention

The investigational treatment, Family Mealtime Coaching (FMC), incorporates family-based and psychologically healthy principles in its intervention approach. Central to the FMC model is implementation of an authoritative division of responsibility, where the parent decides what foods are available and when and where they are served (Satter, 2007). The child decides whether he or she feels hungry and how much to eat. When families implement this division of responsibility, parents learn to create a healthy family lifestyle in which children can learn to trust their body's hunger/satisfaction cues (Tschann et al., 2013), whereas parents practice limiting access to unhealthy food and introduce their child to new healthy foods.

FMC shares some similarities with the live parent-coaching model, Parent–Child Interaction Therapy (Eyberg, 2005). The most salient is the use of a one-way mirror and earpiece to facilitate live coaching. Therapeutically, the interventions also have an overlapping emphasis in coaching parents to increase positive attention to their children's appropriate behaviors, although FMC focuses particularly on appropriate and adaptive feeding and eating behaviors.

FMC identifies specific and empirically derived behaviors to promote and avoid in successful treatment. The appropriate behaviors are represented by the acronym "FIT" and the unwanted ones by "ABCDE" (Daniels et al., 2009). In FIT, *F* stands for preparation of food from the various food groups and family style serving (e.g., self-serving buffet style). *I* stands

for intuitive eating (e.g., awareness of satiation vs. hunger), and *T* stands for table talk (e.g., dialogue during meals). In ABCDE, *A* stands for artificial comments, such as attempting to label one food item as being more appetizing than another to get the child to attempt it (e.g., "Yummy" or "These are tasty"). *B* stands for bribing, as in using food as a tool of negotiation (e.g., "If you eat your dinner, I'll let you watch your favorite DVD"). *C* stands for coaxing or trying to persuade the child to eat parent-provided foods (e.g., "Come on, give it a try—eat it"). *D* stands for defining preferences, such as labeling for the child what foods they like or dislike (e.g., "You do not like mushrooms"), thus suggesting that food preferences are fixed, hindering their development of a balanced, variable diet. Last, *E* stands for emotional eating, such as using food to comfort or regulate behavior or emotions (e.g., "Do not cry; here eat this cookie" or "Mommy will be proud of you if you eat"), which can create negative or addictive associations with food.

The FMC intervention is brief (eight 1-hr sessions) and lends itself as a standard of practice billable intervention for insurance-covered mental health conditions. For example, the current study was conducted at a Medicaid clinic and clinicians billed the current procedural terminology (CPT) codes for family therapy without patient (90846) for the didactic session in which the parent was taught the feeding principles without the child present. The CPT for family therapy with patient (90847) was billed for pre-/post assessments and live coaching sessions. Diagnoses billed using the International Classification of Diseases (10th ed.; World Health Organization, 1992) include eating disorders (e.g., F50.81 binge eating disorder, F50.89 other specified eating disorder, and F50.90 eating disorder unspecified) and other behavioral disorders that might produce impairments around feeding/eating and mealtimes (e.g., F43.20 adjustment disorder unspecified, F91.8 other conduct disorder, F91.3 oppositional defiant disorder). Other feasible funding sources include grants, community donations, and private pay.

The pillars of healthy weight are good nutrition and physical activity (Epstein, 1984; Saavedra, García-Hermoso, Escalante, & Domínguez, 2014). With this in mind, physical activity was incorporated into FMC coaching sessions. Play is a developmentally appropriate forum for encouraging movement and energy expenditure in young children, making it a natural environment for child physical activity. After FMC was developed and tested, the researchers collaborated with an early childhood physical activity specialist (Turner, 2013). Our goal was to promote vigorous child play through caregiver modeling of fundamental movements and engagement in active play. A total of four modules were designed to accompany FMC, teaching fundamental movement skills (e.g., locomotor skills, balance, catching, throwing, rolling, striking, tossing, trapping, hand-eye coordination, squatting), using simple household items (e.g., socks, laundry basket), and basic toys (e.g., balloons, bubbles, balls; Turner, 2013). The active play component was incorporated approximately half way through data collection following initial data analysis and literature review pointing to the importance of physical activity. Therefore, only a segment of the participants received the active play portion of the intervention.

Considerations for Treatment in the Latino Population

Before embarking on the current study, we recognized that because our clinic is located in a Latino community, our clientele would reflect that, and it did, with 84% of our sample self-identifying as Latino. We therefore approached FMC program development and evaluation with a lens to providing culturally and linguistically matched services to the Spanish-speaking Latinos that we serve. Four main factors have been found to contribute to culturally competent interventions (Vesely, Ewaida, & Anderson, 2014): (a) the use of the Latino values of *familismo* (engaging immediate and extended family members) and *respeto* (affirming children's respect of elders); (b) the engagement of community members or stakeholders; (c) the provision of culturally and linguistically matched clinicians; and (d) the availability of forms in the participants' native language (i.e., Spanish; Domenech Rodríguez, Baumann, & Schwartz, 2011; Suarez-Balcazar, Friesema, & Lukyanova, 2013; Vesely et al., 2014). In our study, we ensured that each of these four factors was in place.

FMC is a parenting-oriented intervention that welcomes all caregivers involved in children's mealtimes. The coaching also affirms parents' authoritative role in the family, reinforcing their sense of themselves as their children's protectors and role models. All coaching of parents who felt most comfortable speaking in Spanish was conducted in Spanish. Furthermore, therapists adjusted the words they used when coaching to match the vocabulary used by the parents. This strategy was thought to insure that parents understood therapists' coaching and to build rapport. All forms, assessments, and handouts were available in Spanish.

The Role of Parent Feeding Style

In the treatment of pediatric obesity, parents' feeding practices are the most modifiable factors and therefore might have the greatest potential for improving children's weight status (Morrison, Power, Nicklas, & Hughes, 2013). Baumrind (1971) and subsequently Maccoby and Martin (1983, as cited in Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006, p. 2048) described parent behaviors that formed the four classic parenting styles: authoritative, authoritarian, permissive, and neglectful/uninvolved. They conceptualized that an optimal parenting approach is characterized by a balance of demandingness on the basis of the child's maturity and responsiveness to his or her emotions (sometimes referred to as *nurture*). This framework continues to be used to understand the effect of parenting practices on child outcomes. Chaidez and Kaiser (2011) explained that parent feeding style relates to the responsiveness and the structure that the parent provides around mealtimes. Rhee et al. (2006) conducted a study looking at the effect of parenting style on overweight status of first graders ($n = 872$) and found that authoritarian parent feeding resulted in a statistically significant higher risk of obesity compared with authoritative parent feeding. Similarly, they found that permissive and neglectful parent feeding was also associated with more overweight children. The authors concluded that highly regimented or controlling feeding practices and low levels of sensitivity to children's developmental needs place children at higher risk for overweight.

Among Latinos, which comprise the majority of the participants in this study, the research has identified culturally specific beliefs and practices that influence their feeding style. Falbe, Cadiz, Tantoco, Thompson, and Madsen (2015) found that Latino parents might have a cultural perception that heavier is healthier, so they might overfeed and not limit the food environment as a result (Martinez, Rhee, Blanco, & Boutelle, 2015). Houston, Waldrop, and Mccarthy (2011) reasoned that Latino mothers' preference for chubby babies might be explained by their belief that the baby is happier and that the extra weight helps him or her fight infection and protect against illness. In other words, it might be that, as a group, Latinos are more likely to correlate leanness with illness and heaviness with healthiness. Morrison et al. (2013) noted that parents might be more prone to believe this if they have a personal history of food scarcity and poverty. This might explain why some parents view having plump children as an indicator to the community that they have the financial means to feed them (Martinez et al., 2015).

In terms of feeding practices, Martinez et al. (2015) noted that Latino mothers tend to use reinforcement strategies involving unhealthy food (e.g., ice cream, pizza) as a motivator to eat healthy food; practice taking away privileges for failure to eat healthy food or finish their plate, and use fear tactics (e.g., "You'll get diabetes") or persuasion (e.g., "You'll be strong like [cartoon character]") to coax their children to eat healthily. Tschann et al. (2013) found that Latino mothers and fathers equally engage in pressure tactics and use food to control behavior—both of which are associated with higher BMI. Using the lens of the four feeding styles, Chaidez and Kaiser (2011) found that Latinos tend to be more indulgent (i.e., permissive), resulting in higher food consumption and, thus, more overweight children. Conversely, when Latino parents used a more authoritative approach to feeding—that is, child-centered feeding whereby the parent both structures the feeding environment and is sensitive to the child's needs—the result was lower BMI (Tschann et al., 2013).

Aims and Hypotheses

The present study aimed to examine treatment effectiveness for a coaching intervention designed to improve mealtime parenting for treating pediatric obesity in 2 to 10 year olds.

The intervention offered parents an opportunity to learn and practice helpful approaches to promote their child's willingness to eat nutritious foods, abstain from those with low nutritional value, and increase physical activity through active play using a combination of didactic instruction and live parent coaching that is inclusive of Latino values and delivered in both English and Spanish.

Thus, we predict the following differences between pre- and postintervention (FMC):

> *Hypothesis 1 (H1):* There will be an increase in parental use of adaptive feeding practices (FIT skills).
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> *Hypothesis 2 (H2):* There will be a decrease in maladaptive feeding approaches (ABCDE).
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> *Hypothesis (H3):* There will be improvement in parental assessment of the frequency and perceived difficulty in managing child mealtime behaviors (as measured by the Behavioral Pediatric Feeding Assessment Scale [BPFAS]; Crist et al., 1994).
>
> *Hypothesis 4 (H4):* There will be a decrease in children's waist circumference (WC) and BMI.

Method

Participants

Participant recruitment process. Recruitment consisted of phone calls and electronic mailing of research study flyers to child/adolescent providers from June 2012 to October 2016. Referrals were received from clinical practices (e.g., mental health providers, pediatricians) and nonclinical settings (e.g., family resource centers). Children were also screened at youth recreational facilities (e.g., YMCA) and community health events (e.g., Family Fun Days). The investigators additionally held monthly recruitment screenings at the clinic in which children were assessed for eligibility by obtaining their BMI. Eligible children had BMI scores in the overweight (85th percentile; CDC, 2012b) or obese range (95th percentile or greater; CDC, 2012b). To simplify the research design, participants reported to be taking appetite-influencing medications (e.g., stimulants commonly prescribed for ADHD) were excluded from the study.

Fifty-one caregivers and an identified child consented to participate in the study. Only those participants with at least two measurements of height and weight from which BMI could be calculated ($N = 43$) were included in the current study. Those not returning for treatment after the intake assessment ($N = 8$) were not included. Those excluded from the study did not differ in sex, age, or BMI percentile from those included in the study.

Study participants entered treatment between June 2012 and October 2016. The children averaged 6.96 years of age ($SD = 2.7$), ranging between 2 and 11 years of age, and 58% were female. All children were classified as overweight or obese. Their average pretreatment BMI percentile scores were 97.3 ($SD = 3.4$) and mean z scores equaled 2.3 ($SD = .77$), signifying that study participants had BMI scores on average 2.3 standard deviations above the mean for their age and sex. Children's WC averaged 78.4 cm ($SD = 15.8$).

The large majority of children entered treatment accompanied by their biological mothers ($N = 33$, 77%), 7% ($N = 3$) came with fathers, 7% ($N = 3$) were stepparents, and 9% ($N = 4$) with relative kin foster caregivers. Caregivers ranged in age from 24 to 63 years, averaging 38.8 years ($SD = 10.0$). Approximately 84% of caregivers were Latino, and 16% were White (non-Hispanic). Approximately two thirds of caregivers were married or living with a partner (64%), and the remaining one third had been divorced, separated, or had never married. Approximately one half of families (52%) reported yearly income of $20,000 or less per year, and one third (33%) of the caregivers reported that in the last 6 months they often worried where the next meal would come from. Caregivers had an average of 10.4 years of education ($SD = 4.2$).

Meal preparation and incentives. Following didactic instruction on preparing foods from the five basic food groups, parents were instructed to prepare a meal for the live coaching session that included a minimum of three food groups. For example, a typical meal following the recommendations might have included roasted potatoes, baked chicken, vegetable medley, fresh strawberries, and water. Participants were incentivized and supported in buying whole

foods, by being awarded a $10 grocery card per visit. Additional parent incentives included bus passes for the public transportation system, or a $15 gasoline card for their vehicle. Child participants received token reinforcers such as stickers and party favor-sized toys (e.g., puzzle, ball, miniature color book) at each visit.

Therapists

All FMC coaches minimally held a master's degree or higher in a mental health field (e.g., psychology, social work, marriage and family counseling) and attended a 5-hr training session that consisted of an introduction to the theory, orientation to the treatment outline, an overview of the manualized protocol, and coding exercises. Criterion-referenced mastery assessments determined 94% competency in the FMC treatment procedures. Average coaching skill scores by individual category were as follows: baseline session (99.3%), didactic session (95.6%), coding behaviors (88%), coaching sessions (89.8%), and calculation of BMI and WC (97.7%). Following the training, all sessions were coded live (not via video review) and coded by one rater.

Measures

The BPFAS. The BPFAS (Crist et al., 1994) is a 35-item parent-completed questionnaire that assesses child mealtime behavior problems and parent feelings and strategies related to feeding and management of child mealtime behaviors. Parents rate the frequency of child and parent behaviors using a five-point Likert scale and endorse "yes" or "no" to indicate if they consider the behavior to be a problem. The BPFAS results in the following four scores: frequency and problem of child behavior (CF and CP, respectively) and frequency and problems of parent feelings and strategies relevant to mealtimes with their child (PF and PP, respectively).

Family demographic characteristics. At pretreatment, parents completed the Family Life Questionnaire (Timmer, Zebell, Boys, Forte, & Urquiza, 2014). Therapists ask parents to provide information about children's family demographic characteristics, such as ethnicity, household income, and food insecurity.

Weekly check-in. At pretreatment and before each session, the parents completed a Weekly Check-In form on which they rated on a five-point scale the frequency of the child's mealtime problem behavior, exercise level, variety of new healthy foods tried, how pleasant mealtimes are, the number of family meals they had that week, FMC skills used, and identification of food groups in the FMC meal brought to session.

Observational measure. The Family Mealtime Coaching Coding System (FMCCS) is a microanalytic coding system (Shinn, 2010) to categorize food exposure, verbalizations in the parent–child interaction relevant to feeding, and mealtime communication. The coding categories have particular relevance to the assessment of the progress in FMC. FMCCS has a total of eight different codes that are reflected in the acronyms FIT and ABCDE (see the Appendix).

Coders were doctoral-level researchers, undergraduate, and graduate students in psychology or human development, who received didactic training in FMC coding and procedures. Coders achieved mastery when 85% of their codes matched each of the eight criterion tapes coded by the first author.

Physiological measures. WC was measured using a standard anthropometric tape. The measurement was taken from the narrowest part of the torso, above the umbilicus and below the sternum (Watts, Bell, Byrne, Jones, & Davis, 2008). BMI was calculated from weight and height as measures of adiposity in children. Although BMI percentiles, which adjust for age and sex, are commonly used to measure change in BMI, z scores are more precise measures of change in obese populations: z scores of children scoring in the extreme region beyond two standard deviations (97.5 percentile) better reflect the real distance of the child's weight from the population mean. For example, a child might have a clinically significant reduction in BMI that could be captured in a z score change 4.0 to 3.5, which would be missed if judging change by percentile scores (99.9%ile to 99.9%ile). For this reason, we used BMI z scores in analyses of change in adiposity.

When the activity module was incorporated into the FMC coaching session (starting in 2014), we added an activity measurement to the pre- and posttreatment assessments, using a pedometer to count the number of steps taken during a structured activity. Numbers of steps

during the activity module were also recorded at each treatment session on a pedometer. We used the Ariel Fitness First Pedometer—a digital, battery operated pedometer that uses a small pendulum to count up to 99,999 steps.

Design and Procedures

Study design. This study was reviewed and approved by the local institutional review board. It uses a prepost experimental design comparing pre- and posttreatment assessments of children and their caregivers participating in FMC. The intervention, provided at Child Guidance Center in Santa Ana, California, consisted of a coded mealtime baseline, a didactic session, four coaching sessions, a post treatment coded observation, and booster sessions when clinically indicated. Clients' clinical need for boosters was decided in collaboration with the primary treating clinician who monitored overall patient progress. Data pertaining to boosters were not included in this study.

Physiological and observational data were collected at baseline, each intervention session, and 8 weeks postbaseline. For participants in the active play protocol, the number of steps used in an active play task was recorded on the basis of pedometer readings. Parent–child interactions were videotaped and coded during an observational assessment designed to mimic a mealtime for 15 min at pre- and posttreatment. Parent verbalizations were coded according to the FMCCS, noting the frequency of "FIT" skills and "ABCDE" behaviors (see the Appendix for full description). Paper-and-pencil measures of parent and child psychological functioning were obtained pre- and posttreatment. The participants completed all consent forms and outcome measures in their dominant language. Bilingual (Spanish) parents received the didactic and coaching sessions in their preferred language.

FMC. FMC uses a live coaching intervention to guide caregivers through a meal that is conducted at a community mental health agency. Each session began with a check-in and a 5-min behavioral observation, during which a meal was presented by the caregiver and parent–child interactions were coded for FIT skills and ABCDE behaviors. Following the brief observation, the FMC clinician coached the parent from behind a one-way mirror during the meal as they ate and conversed. FMC focused on decreasing maladaptive feeding strategies related to food consumption while delivering empirically based positive psychology responses and modeling techniques to improve mealtime interactions, behaviors, and communication. During coaching sessions, parents were guided through live application of the division of responsibility, "FIT" skills, and coached to extinguish "ABCDE" behaviors.

Active play component. The four active play modules include the following activities: (a) moving in place according to the directions of the activity song lyrics (Taylor Lucas, Shinn, & Turner, 2015), (b) playing ball with various tossing implements, (c) balancing and twisting on spots, and (d) tossing balloons and popping bubbles. The FMC coach guided the caregiver in vigorous play for 15 min. Families were also assigned 15 min of active play daily and provided with a handout and materials for the activity they learned that day. The space used to conduct active play is small (approximately 5-ft. × 10-ft. play room), making it more easily generalizable to a modest home environment. To track movement, children wore waist pedometers to count the number of steps they took during active play.

Weekly assessment. At the end of each coaching session, the child's height, weight, and WC were measured, and BMI was calculated. For children participating in active play during FMC sessions, the number of steps the child took was recorded. The researchers opted to collect these measurements at the end of session for logistical reasons because families completed check in forms and coding of meals for inclusion of food groups at the beginning of the session. Children in FMC were required to attend four coaching sessions to be considered as having completed treatment. FMC participants returned eight weeks after the pretreatment assessment for the posttreatment assessment.

Dosage. When possible, analyses including treatment completers and noncompleters were conducted in order to improve the power of analyses and as a rough estimate of the importance of completing treatment. Because height, weight, parents' mealtime skills and perceptions of their children's eating behavior and activity were measured at each visit, we were able to assess change for all participants with at least two assessments. For 84% of participants, two

assessments of BMI were available for use in dosage analyses.

Analysis strategy. We conducted repeated-measures analyses of covariance ANCOVA to determine whether FMC has a positive effect on feeding-related attitudes and behaviors, and physiological outcomes, comparing pre- and post- intervention (8 weeks postbaseline), and covarying protocol type. When outcome measures were collected weekly, we paired scores across two measurement points (e.g., pre- and final comparisons) and conducted repeated-measures analyses of covariance ANCOVA to estimate treatment effectiveness, covarying early treatment termination and the type of protocol received (nonactive vs. active). These statistical procedures produced partial η^2, from which the power of the findings can be determined. Most researchers use a criterion level of observed power (OP) = .80 as a standard of acceptability of findings, signifying that 80% of studies replicating the statistical test under similar conditions would achieve the same results.

Results

Descriptive Statistics: Treatment Engagement and Protocol Type

Out of 43 caregiver-child dyads that had at least two visits, 30 (69.8%) completed the intervention. Children completing treatment did not differ in age, sex, ethnicity, or type of protocol received. However, children that terminated early had significantly lower pretreatment BMI z scores (completers: $M = 2.45$, $SD = .82$); early terminators: $M = 1.91$, $SD = .77$; $F(1, 42) = 4.97$, $p = .03$, $\eta^2 = .06$, Power = .59). This difference in BMI z score suggests that in analyses of treatment effectiveness involving children that terminated early, we should control for baseline BMI z scores as this appears to be connected with treatment engagement and also might be connected with other aspects of motivation to change.

Approximately 44% ($N = 19$) of the sample received the protocol with activity modules. A comparison of pre- and posttreatment pedometer readings using the Wilcoxon signed-ranks test showed a significant increase in the number of steps taken in the same play activity during the pre- and posttreatment assessment ($N = 13$; pretreatment steps: $M = 240.2$, $SD = 257.8$; posttreatment steps: $M = 841.2$, $SD = 465.2$; $z = -2.70$, $p = .007$, $r = .75$; OP = .99). Dyads receiving the active version of the protocol did not differ significantly from those in the nonactive version in child's age, sex, ethnicity, BMI z score, or WC.

Effects of FMC on Measures of Weight Change

We used two measures of obesity: BMI z scores, and WC. We conducted repeated-measures analyses of variance of these measures with assessment point as the repeated measure, covarying early treatment termination, a dummy indicator of high baseline z scores (<1.9 [i.e., <97th percentile] = 0 vs. $\leq 1.9 = 1$), and protocol type. Findings revealed only a significant assessment point by baseline BMI score interaction, $F(1, 39) = 5.0$, $p = .03$, $\eta^2 = .11$, OP = .59, such that the significance of the change in BMI z score from pre- to posttreatment (or final assessment if the child terminated early and there was no 8-week postbaseline assessment) varied by whether children entered FMC with a low versus high BMI z score. An examination of cell means suggested that when children entered FMC with higher BMI z scores, their z scores decreased from pretreatment to their final assessment, whereas the BMI of those entering with lower scores increased (see Figure 1). With regard to WC, we found no significant pre- to final assessment change (baseline WC: $M = 78.5$, $SD = 16.0$; final assessment WC: $M = 78.8$, $SD = 16.9$), $F(1, 39) = .34$, $p = .57$, $\eta^2 = .009$, OP = .09.

Effects of FMC on Parent Behaviors

Both FMC skills (FIT) and discouraged behaviors (ABCDE) of parents were measured weekly by coding during 5-min behavioral observation. To determine the change in FMC skills from the baseline assessment at pretreatment to the final assessment, we conducted repeated-measures multivariate ANCOVAs, with assessment point as the repeated measure and covarying protocol type, treatment completion, and low versus high baseline BMI z scores. As is shown in Table 1, results of analyses showed significant increases in the frequency of FIT behaviors from baseline to the final assessment. Results showed no further variation in scores by protocol type, treatment termination, or baseline BMI z score. Because the dis-

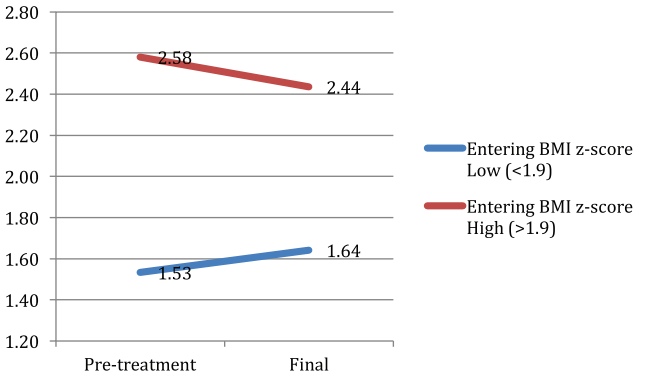

Figure 1. Body mass index (BMI) z-scores at the pretreatment and final assessment for children entering with BMI z-scores classified as lower (<1.9, i.e., <85th-97th percentiles) and higher (1.9 or greater, i.e., 97th percentile and above). See the online article for the color version of this figure.

tribution of discouraged behaviors was nonnormal we conducted nonparametric statistical tests, which are suitable for data that show high levels of skewness and kurtosis. As shown in Table 2, results of Wilcoxon signed-ranks test of the significance of change from pretreatment to their final assessment showed significant reductions in artificial talk, coaxing, defining food preferences, and the total frequency of all ABCDE comments. Bribing and emotional eating showed no significant change over the course of the intervention. However, this lack of significance might have been due to a low base rate causing a "floor effect."

FMC and Parents' Activity Ratings

Baseline and final assessments of parents' ratings of the child's overall mealtime problem behaviors, activity level, willingness to try new and healthy foods, parents' enjoyment of mealtime conversations, and number of family meals in the last week were compared using repeated-measures ANCOVAs, with assessment as the repeated measure and covarying protocol type, treatment completion, and high versus low baseline BMI *z* score. Because of the demand characteristics of these items, we also included baseline indicators of optimal levels of each item in analyses. Results of these analyses (see Table 3) suggest that problem behavior decreased, whereas activity level, children's willingness to try new foods, pleasant mealtime talk, and the number of family meals taken together all increased when parents reported imperfect ratings at the baseline assessment.

Table 1
Means, Standard Deviations, and Results of Repeated-Measures Analysis of Variance of Family Mealtime Coaching Positive Parenting Skills (FIT)

	Treatment differences in FIT skills and ABCDE behaviors		
	Pretreatment	Final assessment	
FIT skill	*M* (*SD*)	*M* (*SD*)	Effects test statistic, significance level, effect size (*r*), observed power (OP)
Family serving	4.12 (2.3)	6.44 (2.2)	$F(1, 39) = 4.26$, $p = .046$, $\eta^2 = .10$, OP = .52
Intuitive eating	.63 (1.2)	2.86 (1.6)	$F(1, 39) = 7.76$, $p = .008$, $\eta^2 = .17$, OP = .78
Table talk	.60 (.96)	2.49 (1.4)	$F(1, 39) = 13.7$, $p = .001$, $\eta^2 = .26$, OP = .95
Total FIT ($N = 43$)	5.35 (2.6)	11.8 (4.1)	$F(1, 39) = 19.2$, $p < .001$, $\eta^2 = .33$, OP = .99

Note. Assessment point is the repeated measure, covarying early treatment termination and active versus nonactive protocol type. $N = 43$. In FIT, *F* stands for preparation of food from the various food groups and family style serving, *I* stands for intuitive eating, and *T* stands for table talk (e.g., dialogue during meals).

Table 2
Means, Standard Deviations, and Results of Wilcoxon Signed Ranks Test of Differences Between Pre- to Posttreatment Frequencies of Discouraged Behaviors (ABCDE) in Family Mealtime Coaching (N = 41)

ABCDE statement	Pretreatment *M* (*SD*)	Final assessment *M* (*SD*)	Effects test statistic, significance level, effect size (*r*), observed power (OP)
Artificial talk	1.29 (1.6)	.49 (1.1)	$z = -3.07$, $p = .002$, $r = .48$, OP = .91
Bribing	.41 (1.4)	.07 (.34)	$z = -1.57$, $p = .12$, $r = .25$, OP = .48
Coaxing	4.66 (7.5)	.80 (2.2)	$z = -4.63$, $p < .001$, $r = .72$, OP = .99
Define preference	.80 (1.1)	.24 (.62)	$z = -3.38$, $p = .001$, $r = .53$, OP = .96
Emotional eating	.15 (.65)	.07 (.26)	$z = -.37$, $p = .71$, $r = .06$, OP = .15
Total ABCDE	7.2 (9.5)	1.67 (3.5)	$z = -4.87$, $p < .001$, $r = .76$, OP = .99

Note. $N = 41$. Effect size is $r = z/\sqrt{(N)}$. In ABCDE, *A* stands for artificial comments, *B* stands for bribing, *C* stands for coaxing or trying to persuade the child to eat parent-provided foods, *D* stands for defining preferences, and *E* stands for emotional eating.

Mealtime Child Behavior Problems and Parenting Problems

To examine the degree to which the participation in FMC related to decreases in parent-reported child behavior problems and parenting stress related to feeding and nutrition, we compared pre- and posttreatment scores on four scales: the frequency and number of child behavior problems (CF and CP, respectively), the frequency and number (PF and PP, respectively) of parent feelings and strategies used to manage children's difficult feeding-related behavior. We used repeated measures ANCOVAs, with assessment point as the repeated measure, covarying low versus high baseline BMI *z* score (protocol type did not significantly predict either outcomes or change, so it was eliminated from the final analysis in an effort to maximize power). As shown in Table 4, results of analyses showed a significant decrease in the frequency of child behavior problems and in the number of strategies parents needed to use to manage the behavior problems pre- to posttreatment.

Discussion

This study extends previous research by looking at the effect of live mealtime parent coaching on pediatric obesity, investigating an important gap in the pediatric clinical research literature. The research hypotheses centered on the idea that across all the measured outcomes, parents and children participating in live mealtime coaching would show significant change from pre- to post- treatment. Results of analysis confirmed the majority of the four hypotheses

Table 3
Means, Standard Deviations, and Results of Repeated-Measures Analysis of Covariance of Parents' Report of Children's Activity Levels and Feeding-Related Behavior

Child anxiety levels & feeding-related behavior	Pretreatment *M* (*SD*)	Final assessment *M* (*SD*)	Test statistic, significance level, effect size (*r*), observed power (OP)
Problem behavior ($N = 41$)	3.39 (1.0)	2.73 (1.2)	A × B: $F(1, 37) = 4.54$, $p = .04$, $\eta^2 = .11$, OP = .55
Activity level ($N = 42$)	3.17 (.96)	3.36 (1.2)	A × B: $F(1, 36) = 16.7$, $p < .001$, $\eta^2 = .31$, OP = .98
Tries new food ($N = 43$)	3.07 (1.2)	3.23 (1.3)	A × B: $F(1, 37) = 16.4$, $p < .001$, $\eta^2 = .30$, OP = .98
Mealtime talk ($N = 43$)	3.63 (.95)	3.70 (1.0)	A × B: $F(1, 38) = 4.83$, $p = .03$, $\eta^2 = .11$, OP = .57
Number of family meals per week ($N = 35$)	3.97 (1.2)	4.03 (1.2)	A × B: $F(1, 30) = 15.6$, $p < .001$, $\eta^2 = .34$, OP = .97

Note. Assessment point is the repeated measure, covarying treatment termination and active versus nonactive protocol type. A = assessment point; A × B = Assessment Point × Baseline Score.

Table 4
Means, Standard Deviations, and Results of Repeated-Measures Analysis of Covariance of Parents' Report of the Frequency and Number of Children's Problem Behaviors and the Frequency of Stressful Feedings and Number of Strategies Needed to Manage the Child

Feeding-related child behavior problems	Pretreatment *M* (*SD*)	Posttreatment *M* (*SD*)	Assessment point effects: Test statistic, significance level, effect size (*r*), observed power (OP)
Child problem frequency (0–125)	49.9 (11.8)	44.4 (12.1)	$F(1, 20) = 4.83$, $p = .04$, $\eta^2 = .19$, OP = .55
Number of child problems (0–50)	7.5 (6.1)	3.9 (5.9)	$F(1, 20) = 1.61$, $p = .22$, $\eta^2 = .08$, OP = .23
Parent stress frequency (0–50)	21.6 (6.7)	19.3 (7.3)	$F(1, 20) = 3.90$, $p = .06$, $\eta^2 = .16$, OP = .47
Number of strategies parent used (0–10)	3.4 (2.6)	1.7 (2.5)	$F(1, 20) = 10.9$, $p = .004$, $\eta^2 = .35$, OP = .88

Note. Assessment point is the repeated measure, covarying baseline low versus high body mass index (BMI) *z* score. ($N = 22$).

tested to assess this unique intervention. We evaluated these hypotheses using a primarily low-income, Latino sample, therefore allowing for discussion regarding implications for the treatment of pediatric obesity with low-income Latino caregivers and their children.

Confirming our first hypothesis that parents who received coaching would develop more helpful feeding practices (H1), we found that by their final assessment parents were observed to have significantly more skill for offering food items from the food groups, serving meals family style, modeling satiation for their children, and implementing positive communication strategies to promote pleasant dialogue during meals. This is an important finding because research has consistently shown that these skills contribute to healthy attitudes and behaviors around eating, and our data suggest that FMC might be a good approach for helping caregivers to apply these skills.

We confirmed our second hypothesis (H2) that parents who received coaching would reduce the frequency with which they used maladaptive mealtime tactics such as coaxing and making artificial statements to get their children to eat. Results of analyses showed that parents indeed benefitted significantly from the didactic instruction and live coaching. We were able to demonstrate that coaching parents to practice replacing pressure tactics (i.e., ABCDE) with new skills (i.e., FIT) greatly changed their mealtime parenting. By treatment completion, caregivers consistently reduced efforts to coax their children into eating, and defining their food preferences for them, and instead were more focused on creating a pleasant experience and improving their mealtime communication. This finding further reinforces existing research which states that family-based interventions and improving parenting skills are key ingredients to healthy eating. We believe these findings related to the first two hypotheses speak to the effectiveness of coaching as a mechanism for changing parents' mealtime parenting practices.

We confirmed our third hypothesis (H3) that families participating in FMC would report improvements in parents' ratings of children's mealtime behavior problems on the BPFAS. We found that the frequency of children's behavior problems during meals was reported to decrease and that parent challenges in managing their children's behaviors at meals became less problematic. In effect, coaching parents to apply the positive mealtime parenting skills also improved child behavior management—even though we did not teach caregivers any specific behavior management techniques (e.g., positive reinforcement). It appears that when caregivers know what parenting behaviors promote healthier eating and what provokes their children, it also has the effect of improving children's behaviors during meals.

Finally, and most ambitiously, we hypothesized that children participating in FMC would show significant decreases in their BMI *z* scores and WC (H4). We understood that changes in BMI typically took significantly longer than our intervention period. However, in our review of the literature, no previous studies have reported on the time required to achieve BMI changes through parent coaching, therefore we believed it important to assess BMI and WC. This hypothesis

was partially supported. We did not find any change in WC. However, we found that children with the highest BMI (i.e., >97th percentile) had significantly lower BMI *z* scores by their final assessment. These findings suggest that children who have the highest need (i.e., >97th percentile BMI) and their caregivers might benefit the most from an intensive live coaching intervention. Conversely, children with BMIs ranging from the 85th through the 97th percentiles tended to complete fewer coaching sessions and did not have the same measure of improvement on BMI. This potentially reveals something about the caregivers' motivation to change when their children are at the lower limits of obesity compared with the motivation of those parents whose children have BMIs in the extreme limits (>97th percentile). It might be that caregivers with "moderately elevated" BMIs (85th to 97th percentile) see their children's weight as more typical and therefore see less of a need to participate in a mealtime coaching program or adopt new feeding principles and strategies. Another explanation might be that children with higher BMI had greater room for improvement, thus making assessment of change more easily detectable.

Finally, for the portion of the sample that received the physical activity modules, our data suggest increased caregiver aptitude for engaging their children in movement-based play and significantly increased number of steps taken by the children. These findings begin to reveal the potential role of active play for supporting children's improved fitness. Moreover, because the pre- and postactive play assessments were conducted by the parent without the support of the coach, we think it might mean that the parents developed increased skill for getting their children to move while they play. We see this as a nice play alternative to support parents in offering their children increased opportunities for physical activity and as an alternative to physically sedentary play (e.g., play involving sitting). Overall, we observed no differences in treatment effectiveness by protocol type. However, the numbers of families that participated in the active protocol were relatively few and could not support the power needed for a test of protocol differences.

On the basis of participant demographics, which is predominantly low-income and Latino, this study's findings suggest that participation in a coaching intervention can predict positive changes in high-risk and diverse families' mealtime parenting skills and active play. We learned that with coaching, parents were more likely to substitute unhealthy feeding behaviors (e.g., parent offering unhealthy foods, coaxing and bribing) with positive feeding practices (e.g., proper food selection, family style serving, modeling of intuitive eating, use of table talk communication skills, and applying division of responsibility). Children were also reported to be significantly more active and receptive to eating new, healthy food.

These findings also suggest that the coaching modality additionally might be useful in other types of parent training and parent education models in which learning and rehearsal for establishing new family routines and child habits are key. For example, live parent coaching can be applied to managing exposure to anxiety-provoking situations such as activities requiring parent–child separation (e.g., school, day care), phobic stimuli (e.g., animals, wind, clouds, injections), feared activities (e.g., travel on planes, elevators), speaking (i.e., selective mutism; Kurtz, 2016), and improving social communication skills (e.g., starting conversations, making new friends). Additionally, because this study was conducted in a community clinical practice setting with managed health care (i.e., Medicaid), the methods and approaches might also generalize to similar clinical environments. However, because of the predominantly Latino sample, it remains to be seen whether other ethnic groups would have the same positive response to caregiver mealtime coaching.

Limitations and Future Research

This study is the first phase of research for this parent coaching intervention, showing evidence of the feasibility of this approach for changing eating behavior. Our study intervention and measurement timeframe was brief and would benefit from follow-up assessments and comparison to a control group. Coding of sessions was conducted by clinicians, which might have resulted in rater bias (Hallgren, 2012). Although we opted for this approach as part of our pilot open trial to promote clinician awareness of caregiver behaviors and determining

need to modify their coaching strategy, a future study would benefit from a blind coding design to control for rater bias and calculation of a more valid interrater reliability estimate (Cutts, 2012; Hallgren, 2012; Ladd, Tomlinson, Myers, & Anderson, 2016). The researchers also recognize that BMI and WC are imprecise measures of weight change and recommend that future research incorporate a longer term follow-up period and measures that are more sensitive to short-term change, such as serum glucose, insulin, high-sensitive C-reactive protein and Chitotriosidase, which have been found to differentiate obese from lean children (Kundak et al., 2012).

Conclusion

The present study demonstrated support for coaching as a potential mechanism of change in treating pediatric obesity. Our findings suggest a promising empirical basis for the application of coaching in the reduction of eating disordered behaviors, such as reactions to parents' maladaptive feeding cues, and poor attunement to hunger/satiation cues, that might contribute to overeating and less enjoyable mealtimes. Furthermore, because the use of coaching interventions as a mechanism for change seems to promote positive interactions during mealtimes and improvements in BMI for extremely obese children, practitioners might find coaching to be a more useful method for helping parents address obesity-related issues with their children.

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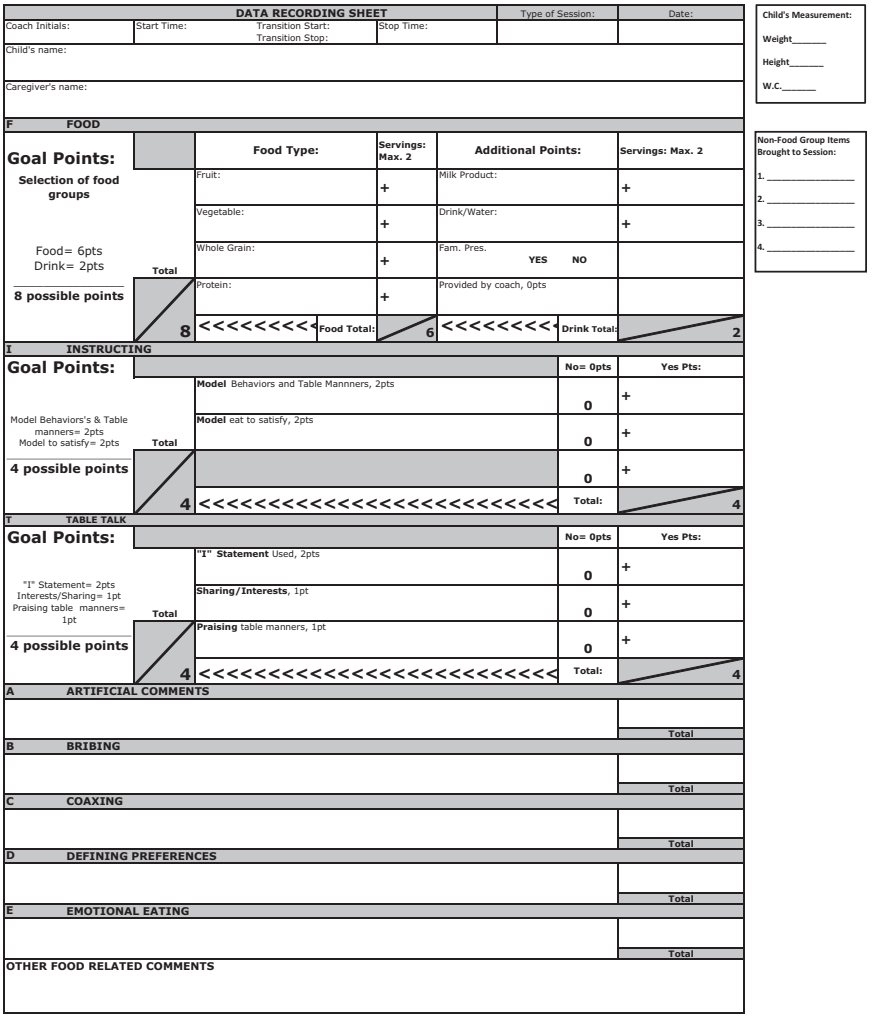
Appendix

Family Mealtime Coaching Coding System Developed at the Child Guidance Center, Inc., Santa Ana, California



DATA RECORDING SHEET

Coach Initials: | Start Time: | Transition Start: / Transition Stop: | Stop Time: | Type of Session: | Date:

Child's name:

Caregiver's name:

Child's Measurement: Weight_____ Height_____ W.C._____

F FOOD

Goal Points: Selection of food groups

Food= 6pts
Drink= 2pts

8 possible points

Total: 8

Food Type:	Servings: Max. 2	Additional Points:	Servings: Max. 2
Fruit:	+	Milk Product:	+
Vegetable:	+	Drink/Water:	+
Whole Grain:	+	Fam. Pres. YES NO	
Protein:	+	Provided by coach, 0pts	
Food Total:	6	Drink Total:	2

Non-Food Group Items Brought to Session:
1. _____
2. _____
3. _____
4. _____

I INSTRUCTING

Goal Points: Model Behaviors's & Table manners= 2pts
Model to satisfy= 2pts

4 possible points

Total: 4

	No= 0pts	Yes Pts:
Model Behaviors and Table Mannners, 2pts	0	+
Model eat to satisfy, 2pts	0	+
	0	+
Total:		4

T TABLE TALK

Goal Points: "I" Statement= 2pts
Interests/Sharing= 1pt
Praising table manners= 1pt

4 possible points

Total: 4

	No= 0pts	Yes Pts:
"I" Statement Used, 2pts	0	+
Sharing/Interests, 1pt	0	+
Praising table manners, 1pt	0	+
Total:		4

A ARTIFICIAL COMMENTS — Total

B BRIBING — Total

C COAXING — Total

D DEFINING PREFERENCES — Total

E EMOTIONAL EATING — Total

OTHER FOOD RELATED COMMENTS

Shinn, M. M. (2010). Family mealtime coaching coding system. Unpublished Manuscript. Santa Ana, California: Child Guidance Center, Inc.

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