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Maternal encouragement and discouragement: Differences by food type and child weight status

Megan H. Pesch, MD, MS [Post-Doctoral Fellow and Clinical Fellow],

Division of Developmental and Behavioral Pediatrics, Department of Pediatrics and Communicable Diseases, University of Michigan, 1540 E. Hospital Drive SPC 5718, Ann Arbor, MI, 48109-5718. Phone: (734) 936-9777, fax: (734) 936-6897

Danielle P. Appugliese, MPH [Appugliese Professional Advisors],

5 Piece Way, North Easton, MA 02334. Phone: (508) 243-7995, Fax: (508) 238-1510

Niko Kaciroti, PhD [Research Scientist, Department of Biostatistics, Research Scientist, Center for Human Growth and Development],

School of Public Health, 300 North Ingalls Street, 10th Floor, University of Michigan, Ann Arbor, Michigan, 48109-5406. Phone: (734) 763-9714, fax (734) 936-9288

Katherine L. Rosenblum, PhD [Associate Professor, Associate Research Scientist],

Psychiatry, Medical School, University of Michigan. Center for Human Growth and Development. University of Michigan. 300 North Ingalls Street 1031 NW. Ann Arbor, Michigan, 48109-0406. Phone: (734) 764-2442, fax: (734) 936-9288

Alison Miller, PhD [Adjunct Research Scientist, Associate Research Scientist, Associate Research Professor], and

University of Michigan. Department of Psychology, University of Michigan. Center for Human Growth and Development, University of Michigan. Department of Health Behavior and Health Education, School of Public Health, 3718 School of Public Health I, Ann Arbor MI, 48109-2029. Phone: (734)-615-7459, fax: (734) 936-9288

Julie C. Lumeng, MD [Associate Professor of Pediatrics and Communicable Diseases, Associate Professor of Nutrition, Associate Research Professor]

Medical School, University of Michigan. School of Public Health, University of Michigan. Center for Human Growth and Development, University of Michigan, 300 N. Ingalls Street 1031NW, Ann Arbor MI, 48109-5406. Phone: (734) 647-1102, fax: (734) 936-9288

Megan H. Pesch: pesch@umich.edu; Danielle P. Appugliese: dpappugliese@gmail.com; Niko Kaciroti: nicola@umich.edu; Katherine L. Rosenblum: katie@umich.edu; Alison Miller: alimill@umich.edu; Julie C. Lumeng: jlumeng@umich.edu

Abstract

Corresponding author: Megan H. Pesch, MD, MS. University of Michigan, 1540 E. Hospital Drive SPC 5718, Ann Arbor, MI, 48109-5718. Phone: (734) 936-9777, fax: (734) 936-6897, pesch@umich.edu.

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Childhood obesity prevention practice guidelines recommend that parents encourage the intake of certain types of foods and discourage the intake of others. It is unknown if parents of children of different weight statuses encourage or discourage their child's intake differently based on food type. The objective of this study was to determine the association of child weight status with maternal for four different types of food. A total of 222 mother-child dyads were video-taped during the standardized, sequential presentation of four foods to both participants: cupcakes (familiar dessert), green beans (familiar vegetable), halva (unfamiliar dessert) and artichoke (unfamiliar vegetable). Mother's encouragements and discouragements of child intake were reliably coded for each food type. Poisson regression models were used to test the independent association of child weight status (normal weight, overweight and obese) with encouragement and discouragement for each food type. Mothers of an obese, vs. normal or overweight child, had lower rates of encouragement for a familiar dessert ($p = 0.02$), and a higher rates of discouragements for a familiar dessert ($p=0.001$), a familiar vegetable ($p=0.01$), and an unfamiliar vegetable ($p = 0.001$). There were no differences in encouragements or discouragements between mothers of an overweight, vs. obese child, for any of the 4 food types. Mothers of obese children may alter their feeding behavior differentially based on food type. Future work should examine how interventions promoting maternal encouragement or discouragement of different food types impact child weight status.

Keywords

Mothers; Child; Feeding Behavior; Mother-Child Relations; Pediatric Obesity

Introduction

The childhood obesity epidemic continues to be a major public health focus in the United States ("Let's Move!," 2015). Practice guidelines (Barlow & The Expert Committee, 2007; Daniels et al., 2005; McGuire, 2011; Nicklas & Hayes, 2008; Ogata & Hayes, 2014; Shelov, 2009) addressing the prevention and treatment of childhood obesity include themes related to encouraging the intake of certain types of foods and discouraging the intake of other types of foods. For example, it is recommend that parents encourage the consumption of fruits and vegetables (Barlow & The Expert Committee, 2007; Daniels et al., 2005), fiber containing foods (Barlow & The Expert Committee, 2007; Daniels et al., 2005; McGuire, 2011) and macro-nutrient containing foods (Barlow & The Expert Committee, 2007; Ogata & Hayes, 2014). Parents are also advised to encourage dietary variety (Nicklas & Hayes, 2008; Ogata & Hayes, 2014; Shelov, 2009), by providing "opportunities for children to enjoy a variety of nutritious foods by regularly exposing them to, and encouraging them to taste these foods" (Nicklas & Hayes, 2008). At the same time it is recommended that parents discourage their child's intake of salt and sugar (Daniels et al., 2005; McGuire, 2011; Ogata & Hayes, 2014), sugar sweetened beverages (Barlow & The Expert Committee, 2007), and energy dense foods (Barlow & The Expert Committee, 2007; Ogata & Hayes, 2014). The American Academy of Pediatrics (AAP) (Barlow & The Expert Committee, 2007) also recommends limiting portion size, but cautions against overly restrictive or controlling feeding behaviors. Additionally the AAP (Shelov, 2009) recommends that parents "limit or eliminate the junk food in [their] child's diet," stating that "desserts like ice cream and cake are fine once in a

while, but certainly shouldn't be an everyday indulgence." Despite these many recommendations about food type and parent feeding behaviors, the position statement of the Academy of Nutrition and Dietetics (Ogata & Hayes, 2014) acknowledges that there is minimal research on the role of childhood nutrition in the prevention of childhood obesity.

Thus, overall, parents hear messaging from professionals that they should encourage quantity and variety of vegetables in addition to restricting junk food and dessert, while also avoiding being overly controlling in their feeding. In addition, parents are told not to worry about picky eating in toddlers (Hassink, 2006), but that by age four, their children should be eating the same foods as the rest of the family (Shelov, 2009) (implying an expectation that picky eating is extinguished). All of this feeding advice is given in the context of acknowledgement by professional societies that the evidence linking dietary composition to obesity prevention is limited (Barlow & The Expert Committee, 2007; Ogata & Hayes, 2014).

Implied in the provision of these feeding recommendations is the idea that when children are obese, that it is at least in part due to the fact that their parents do not adhere to appropriate feeding recommendations. Specifically, the implication is often that when children are obese, it is because their parents do not or have not appropriately encouraged intake of a wide variety of vegetables, do not or have not appropriately discouraged intake of junk food, and do not or have not appropriately discouraged excessive intake of large portion sizes. Furthermore, there is also an implied belief that parents of obese children are inappropriately controlling --- both pressuring and restricting excessively (Barlow & The Expert Committee, 2007).

Despite the practice guidelines recommending that to prevent and treat obesity, parents of obese and at risk children be advised to encourage intake of a wide variety of vegetables and discourage intake of junk food, there are very limited data regarding whether parents of obese children are actually less likely to practice these parenting behaviors than are parents of normal weight children. Interpretation of the limited available literature is complicated by the fact that the majority of potentially relevant work has conflated a number of issues. First, the concept of encouraging children to eat a wide variety of vegetables has been enveloped within measures of "pressuring" children to eat (Birch et al., 2001). This is problematic because the concept of "pressure" often implies an overly controlling, coercive (Vaughn et al., 2015) or demanding type of behavior (Gregory, Paxton, & Brozovic, 2010) that may not characterize the manner in which most parents are prompting children to eat a wide variety of vegetables. Encouragement, on the other hand, can be defined as the positive, gentle and non-coercive ways in which a parent may attempt to guide their child to eat more healthy foods (Vaughn et al., 2015). Secondly, the concept of discouraging intake of junk foods, desserts, or excessively large portion sizes has been subsumed under measures of "restriction". The concept of "restriction" in the literature has often been characterized as inappropriately harsh and controlling (Rollins, Savage, Fisher, & Birch, 2015; Vaughn et al., 2015) and therefore framed as a potential cause of childhood obesity, though the evidence for causation is remarkably limited (Birch, Fisher, & Davison, 2003; Gregory, Paxton, & Brozovic, 2011; Rollins, Loken, Savage, & Birch, 2014; Webber, Hill, Cooke, Carnell, & Wardle, 2010).

This study therefore sought to address several gaps in the literature. Our first set of hypotheses related to how parents of an obese or overweight child, compared to a normal weight child, may exhibit differences in encouraging their child to eat. First, we hypothesized that parents of an obese or overweight child, compared to parents of a normal weight child, would provide fewer encouragements to eat unfamiliar foods. This hypothesis is based on the implication in practice guidelines that parents of obese children do not adequately encourage dietary variety (Nicklas & Hayes, 2008; Ogata & Hayes, 2014; Shelov, 2009) or support their children to overcome picky eating (Hassink, 2006). Second, we hypothesized that parents of an obese or overweight child, compared to parents of a normal weight child, would provide fewer encouragements to eat vegetables. This hypothesis is based on the implication in practice guidelines that parents of obese children do not adequately encourage the intake of vegetables (Barlow & The Expert Committee, 2007; Daniels et al., 2005). Third, we hypothesized that parents of an obese or overweight child, compared to a normal weight child, would provide more encouragements to eat desserts. This hypothesis is based on the theoretical model in the existing literature (Hughes, Shewchuk, Baskin, Nicklas, & Qu, 2008) that parents of obese children often encourage children to eat beyond satiety, are indulgent, and generally take pleasure in witnessing their child enjoying palatable foods.

Our second set of hypotheses related to how parents of an obese or overweight child, compared to a normal weight child, may exhibit differences in discouraging their child to eat. First, we hypothesized that parents of an obese or overweight child, compared to parents of a normal weight child, would provide more discouragements to eat unfamiliar foods. This hypothesis is based on the implication in practice guidelines (Hughes et al., 2008; Ogata & Hayes, 2014) that parents of obese children model distaste for unfamiliar foods, discouraging the sampling of new foods and thereby reducing healthy dietary variety. Second, we tested two competing hypotheses for how parents of an obese or overweight child, compared to a normal weight child, discourage desserts. First, based on the literature positing that parents of obese children are excessively controlling (and thereby causing obesity) (Birch et al., 2003; Faith, Scanlon, Birch, Francis, & Sherry, 2004), we hypothesized that parents of an obese or overweight child would provide more discouragements to eat dessert as compared to parents of a normal weight child. Our competing hypothesis, based on the literature positing that parents of obese children are excessively indulgent and permissive (Hughes et al., 2008) (and thereby causing obesity), was that parents of an obese or overweight child would provide fewer discouragements to eat dessert as compared to parents of a normal weight child.

In order to test these hypotheses, we recruited mother-child dyads to participate in a laboratory-based eating situation in which they were offered four different foods: cupcakes (familiar dessert), green beans (familiar vegetable), halva (unfamiliar dessert) and artichoke (unfamiliar vegetable). Providing these four foods allowed us to systematically test all of our hypotheses related to encouraging (or discouraging) the sampling of new foods, encouraging (or discouraging) vegetables, and encouraging (or discouraging) desserts. We chose to test our hypotheses using a laboratory-based observational approach given concerns that available self-report questionnaires do not examine these behaviors by food type (Birch et al., 2001; Hughes, Power, Fisher, Mueller, & Nicklas, 2005; Ogden, Reynolds, & Smith,

2006). We selected portion sizes that were intentionally large with the goal of eliciting both more encouragement to eat vegetables and more discouragement to eat excessively large portions. We conducted this work within a low-income population because obesity and overweight are more common within this group (Singh, Mulder, Twisk, van Mechelen, & Chinapaw, 2008), which raises the question as to whether suboptimal feeding behaviors (Baughcum et al., 2001) (i.e., allowing a child to indulge in desserts and large portion sizes, not encouraging intake of vegetables or sampling of new foods to promote dietary diversity) are more common within this demographic group.

We use the terminology “encouragement”, as opposed to pressure, and “discouragement”, as opposed to restriction, for two reasons. Practice guidelines (Barlow & The Expert Committee, 2007; Daniels et al., 2005; Ogata & Hayes, 2014) typically use the words “encourage” and “discourage” which imply adaptive, positive, responsive approaches to managing vegetable intake, portion size, and limiting junk foods. Since our study sought to determine whether parents of children of different weight status were implementing these types of adaptive behaviors, we chose to use language reflecting this type of positive, appropriate parenting around feeding. Secondly, preliminary work with the study population has demonstrated that behaviors characterized as controlling commands or directives are exceedingly uncommon. Since definitions of pressure and restriction in the existing literature often imply this type of excessive control, we felt using the vocabulary “encouragement” and “discouragement” more accurately captured the actual behaviors.

Material and Methods

Participants—Participants were a sample of 222 female primary caregiver-child dyads (mean child age 70.9 months) from South-central Michigan who enrolled in a longitudinal study examining psychosocial and behavioral contributors to low-income children's obesity risk in 2009-2011. Participants in the original study ($n = 380$) were invited through their child's Head Start program (free, federally subsidized preschool programs for low-income children) to participate in a study about children's eating behaviors. As all child participants were originally recruited from Head Start, they were aged three to four-years and living in low-income families at the time of recruitment into the original study. Participants were followed longitudinally, and about two years later invited to participate in a follow-up study, which was explained as seeking to “understand how mothers and caregivers feed their children.” A total of 301 parent-child dyads participated, in which 5 of the parents were fathers and excluded from this analysis. Of the remaining 296, 95% were biological mothers. The remaining 5% were adoptive mothers and grandmothers; henceforth we refer to the entire group as “mothers”.

For the original study, eligible mothers were fluent in English, and had less than a four-year college degree. Exclusion criteria for the original study included that the child had a gestational age less than 35 weeks, significant perinatal or neonatal complications, serious medical problems that may affect appetite, eating or growth (e.g. hormonal disorders, genetic syndromes), food allergies, or foster care. Additional exclusion criteria for this study included food allergy or intolerance in the mother or a new food allergy that had developed in the child since recruitment.

A total of 244 mother-child dyads completed the Structured Eating Protocol (SEP) (described in detail below), which is a videotaped laboratory eating task which elicits mothers' and children's behavior in response to different types of foods. Of the 244 completed SEPs, 19 dyads were excluded from this analysis: two for missing maternal body mass index (BMI) information, one for missing child BMI z-score information, one for child being sick, one for mother speaking language other than English during the SEP, eight for the video being uncodeable (e.g., noise or video recording malfunction) and six for study protocol violation (e.g., the research assistant deviating from the protocol script). An additional three dyads were excluded for the child being underweight (BMI < 5th percentile for age and sex as defined United States Center for Disease Control and Prevention growth charts). This resulted in a sample of 222 for this analysis.

Study design—This was an observational cross-sectional study. Mothers completed demographic questionnaires and mother-child dyads participated in the SEP, described below, in which mothers and their child were presented with foods that varied by sweetness and familiarity. Child and mother anthropometrics were measured at the end of the visit. The University of Michigan Institutional Review Board approved the study protocol. Mothers provided written informed consent and were each compensated \$60 for their participation in this portion of the study.

Structured Eating Protocol—Maternal encouragement and discouragement of child food intake were measured in a videotaped structured eating protocol. This standardized protocol, which has been described elsewhere (Goulding et al., 2014; Lumeng & Burke, 2006; Mosli et al., 2015; Radesky et al., 2014) both examines the mother's and child's responses to different types of foods and serves to reduce the broad variability that occurs during home mealtimes (e.g., distractions of other family members or television, or mother attending to food preparation, other children, etc.). The mother and child were asked to fast for two hours prior to the protocol. The mother and child were seated at a table alone in a quiet room, and were videotaped throughout the entire procedure. The mother and child were presented with individual portions of four different types of foods, sequentially in a randomized order by a research assistant. The research assistant used a standardized script to introduce each food to the dyads upon presentation (e.g., “These are [name of food]”). The research assistant then asked about food familiarity, saying “Have you, [mom's name] ever had [name of food] before?” and “Has [child's name] ever had [name of food] before?” Responses were recorded. The familiarity of the food is presented in Table 1. At the start of the protocol, the mother-child dyad was told, “Once you and [your child] are comfortable, I will bring two servings of a food into the room. You can either choose to try (the food) or not. Your child can either choose to try it or not. We are interested in how your child reacts to the food. No one has to eat anything if they do not want to. After a couple of minutes, we will then bring in two servings of another food.” Prior to the presentation of each of the four foods, the research assistant said, “Give it a try if you'd like and tell me what you think of it when I come back in a couple of minutes.” They were then left alone for four minutes. The four foods were chosen such that they differed in familiarity (familiar or unfamiliar) and sweetness (dessert vs. vegetable). The decision was made to focus on the food qualities of sweetness and familiarity as these characteristics have been shown to be predictors of

children's food preferences (Birch, 1979), which are important in making long-term improvements in children's dietary quality (Cooke, 2007). The food items served to each participant included one cup of green beans (Del Monte, Cut Green Beans, No Salt Added, 123.7 ± 0.5 grams, 45 kilocalories), one cup of artichoke hearts (Reese Quartered, Artichoke Hearts, 123.7 ± 0.5 grams, 50 kilocalories), two cupcakes (Hostess Chocolate Cupcakes, 104.96 ± 0.5 grams, 320 kilocalories), and one-quarter container of halva (Ziyad, Halva with Vanilla, 76 ± 0.5 grams, 384 kilocalories). The portion sizes were identical for both child and mother, and were specifically selected to be large in order to elicit encouragement or discouragement from the mothers. Serving size of vegetables was selected to be 1 cup in volume, which is double the recommended serving size of vegetables for school aged children (American Academy of Pediatrics, 2015). The portion size for the cupcakes was selected as two cupcakes, as this is how cupcakes are typically packaged. The portion size of halva was selected to approximate the caloric content of the cupcakes. Foods were prepared and portioned outside the room and served in plastic containers free of brand packaging.

Measures

Maternal encouragement or discouragement of child food intake—Counts of maternal encouragement and discouragement were quantified in the SEP using the Bob and Tom's Method of Assessing Nutrition (BATMAN) (Klesges et al., 1983) coding scheme. The BATMAN is a coding scheme that quantifies child and parent mealtime behaviors from videotaped feeding interactions. For this analysis we focused on two of the parent behavior categories: verbal encouragement (e.g., the parent suggests, commands, directs or makes positive statements about the food being eaten), which we call encouragement given that the preponderance of these behaviors in this cohort were suggesting or making positive statements rather than commands or directives, and verbal discouragement (e.g., the parent forbids, scolds, refuses or makes negative statements about the food being eaten), which we call discouragement, given that the preponderance of these behaviors in this cohort were making negative statements about the food.

Two raters coded 20% of the video segments, with intra-class correlation coefficients exceeding 0.78. Once reliability was established, the remainder of the videos were coded. For each dyad, the four separate segments during which the different foods were presented were coded for counts of encouragement and counts of discouragement.

Anthropometrics—Heights and weights of mothers and children were measured according to standardized procedures (Shorr, 1986). BMI was calculated as weight in kilograms divided by height in meters squared. For 12 mothers who were pregnant or had given birth within the last three months, self-reported pre-pregnancy weight was used instead of measured weight. Children were categorized as being normal weight (defined as a BMI $>5^{\text{th}}$ to $<85^{\text{th}}$ percentile for age and sex), overweight (defined as a BMI 85^{th} to $<95^{\text{th}}$ percentile for age and sex) or obese (BMI $\geq 95^{\text{th}}$ percentile for age and sex) based on the United States Center for Disease Control and Prevention growth charts.

Demographics—Mothers reported their own age, education level and race/ethnicity via questionnaire. Child age and sex were collected via questionnaire completed by the mother.

Household food security was categorized as food secure versus food insecure as reported by the mother on the United States Department of Agriculture Household Food Security Scale (18 items) (Bickel, Nord, Price, Hamilton, & Cook, 2000).

Statistical Analysis—To analyze the association of child weight status with counts of maternal encouragement or discouragement, we ran Poisson regression models adjusting for overdispersion with 3-category child weight status as the predictor and encouragement or discouragement as the outcome separately for each of the 4 foods, controlling for maternal race/ethnicity (white non-Hispanic vs. other), education level (high school diploma or less vs. more than a high school diploma) and BMI; child age and sex; as well as household food security status (secure vs. insecure). A p-value of less than .05 was considered statistically significant.

Results

Characteristics of the sample are shown in Table 2. Adjusted associations between child weight status and maternal encouragement and discouragement by food type are shown in Table 3 and Figure 1. Mothers of an overweight, vs. normal weight, child did not exhibit any differences in rate of encouragement or discouragement for any of the four foods. Mothers of an obese, vs. normal weight or overweight, child exhibited many differences in rate of encouragement and discouragement for the four different food types.

When compared to mothers of a normal weight child, mothers of an obese child exhibited several differences in their feeding behaviors. Specifically, for a familiar dessert (cupcakes, Figure 1a), mothers of an obese child had lower rates of encouragement ($RR = 0.60$, $p = 0.02$), and higher rates of discouragement ($RR = 2.04$, $p = 0.001$), almost double those of mothers of a normal weight child. For a familiar vegetable (green beans, Figure 1b), mothers of an obese child showed no differences in rates of encouragement, but had rates of discouragement three times higher than those of mothers of a normal weight child ($RR = 3.43$, $p = 0.01$). For an unfamiliar dessert (halva, Figure 1c), there were no differences in rates of encouragement or discouragement between mothers of an obese child and mothers of a normal weight child. For an unfamiliar vegetable (artichokes, Figure 1d), mothers of an obese child showed no differences in rates of encouragement, but had over three-fold higher rates of discouragement ($RR = 3.66$, $p = 0.001$) than mothers of a normal weight child.

When compared to mothers of an overweight child, mothers of an obese child exhibited several differences in their feeding behaviors. For a familiar dessert (cupcakes, Figure 1a), mothers of an obese, vs. overweight child, showed no differences in encouragement but had higher rates of discouragement ($RR = 2.04$, $p = 0.01$). For a familiar vegetable (green beans, Figure 1b), mothers of an obese child showed no differences in rates of encouragement, but had rates of discouragement three times higher than those of mothers of an overweight child ($RR = 3.44$, $p = 0.047$). For an unfamiliar dessert (halva, Figure 1c), there were no differences in rates of encouragement or discouragement between mothers of obese and overweight children. For an unfamiliar vegetable (artichokes, Figure 1d), mothers of an obese child showed higher rates of encouragement ($RR = 1.64$, $p = 0.01$), and had nearly

three-fold higher rates of discouragement ($RR = 2.90$, $p = 0.01$) than mothers of an overweight child.

Discussion

This study contributes several new findings to the literature with regard to differences in mothers' encouragements of their child to eat by child weight status across food types. These findings provide partial support for some of our hypotheses. First, we found no evidence to support our hypotheses that mothers of an obese or overweight child, compared to a normal weight child, would provide fewer encouragements to eat unfamiliar foods (artichokes or halva) or fewer encouragements to eat vegetables (green beans or artichokes). Contrary to our hypothesis that mothers of an obese or overweight child, compared to a normal weight child, would provide more encouragements to eat desserts, mothers of an obese child provided fewer encouragements to eat cupcakes as compared to mothers of an overweight or normal weight child.

This study also contributes several new findings to the literature with regard to differences in mothers' discouragement of their child's intake by child weight status across food types. These findings also provided only partial support for some of our hypotheses. First, we found that mothers of an obese, compared to an overweight or normal weight child, provided more discouragements to eat three of the four food types. Specifically, they provided more discouragements to eat a familiar dessert (cupcake), a familiar vegetable (green beans), and an unfamiliar vegetable (artichoke); they did not provide more discouragements to eat an unfamiliar dessert (halva).

The observation that mothers of an obese child provided more (and not fewer) discouragements to eat across three of four food types was contrary to our hypothesis that mothers of an obese child would do less to discourage intake. To the contrary, these mothers were discouraging intake of three of the four foods. The observation that mothers of an obese child discourage the intake of a familiar dessert (a cupcake) more than do mothers of an overweight or normal weight child can be interpreted, in the context of prior literature, in several ways. Specifically, this discouragement may be viewed as adaptive and appropriate if understood in the context of recommendations to limit portion size (Barlow & The Expert Committee, 2007) and intake of desserts and junk food (Shelov, 2009). Alternatively, this discouragement may be viewed as maladaptive and inappropriate if understood in the context of recommendations to allow occasional desserts (Shelov, 2009) and avoid overly controlling feeding behaviors (Barlow & The Expert Committee, 2007). Longitudinal work and randomized controlled trials are needed to better understand the implications of these differences in feeding behaviors for children's weight status.

The observation that mothers of an obese, versus an overweight and normal weight child, provided more discouragements to eat vegetables (both green beans and artichoke) can also be framed in two different ways. First, this behavior could be perceived as an adaptive and appropriate response to a laboratory situation in which an obese child is being offered nearly 800 kilocalories of different foods in a setting outside of mealtime; if the child is consuming large amounts of all types of foods, generally discouraging intake may be appropriate.

However, an alternative interpretation is that parents are inappropriately discouraging intake of vegetables (green beans and artichokes), when obese children in particular should be permitted to eat these foods in whatever quantity they wish. Given the lack of evidence that promoting vegetable intake prevents obesity (Field, Gillman, Rosner, Rockett, & Colditz, 2003), it is not clear how to advise parents of an obese child around their child's vegetable intake, especially if portions are excessively large. Future, longitudinal work is needed to better understand how a parent's encouragement or discouragement of their child's vegetable intake may contribute to children's weight status.

Finally, the observation that mothers of an obese, compared to an overweight or normal weight child, provided more discouragements to eat artichokes may also be interpreted in several different ways. If this behavior reflects an attempt to limit portion size, this may be appropriate. However, if this behavior reflects a discouragement of sampling new foods (perhaps related to parental modeling of distaste for the food), and therefore potentially limiting the expansion of healthy dietary variety, this behavior may be less optimal. Regardless, the evidence linking dietary variety to obesity prevention is minimal (O'Dea & Wilson, 2006; Raynor & Epstein, 2001), and therefore advising parents of obese children to focus increasing dietary variety as a target behavior is questionable.

The majority of differences in encouragement or discouragement that we found occurred between mothers of an obese, compared to an overweight or normal weight child, and not among mothers of an overweight, compared to a normal weight child. Our study cannot provide insight related to causality or the temporal relationship between maternal feeding practices and childhood obesity, given its cross-sectional design. However, the observation that the feeding behaviors differed only among mothers of an obese child is notable. Specifically, the pattern of results is most consistent with the literature (Eckstein et al., 2006) that parents recognize and become concerned about obesity in their child more so than overweight, and therefore may be reacting to the child's obese (but not overweight) weight status with different feeding behaviors. It is more difficult to explain this finding in the context of literature for which the theoretical model is that these feeding behaviors cause child overweight and obesity (Birch & Fisher, 1998), given the lack of evidence for a dose-response relationship (i.e., counts of encouragements or discouragements did not change in a linear fashion with increases in weight status). Future research including longitudinal studies and randomized controlled trials is needed to increase the understanding of the temporal and causal relationships between maternal feeding and child weight status.

The results of this study point to the need for future work in a number of areas. First, the lack of evidence that parents of an obese child provide fewer encouragements to eat unfamiliar foods or vegetables calls into question whether components of obesity prevention and intervention programs that focus on teaching parents how to increase their child's dietary variety and intake of vegetables would be effective in preventing obesity. Specifically, though dietary variety and vegetable intake are valuable goals for many reasons, we could not find evidence that mothers of an obese child are encouraging this type of diet less. Thus, focusing on fixing this “deficit” in the feeding behavior of parents of obese children may not be effective for weight management.

Secondly, while a number of obesity intervention (Oude Luttikhuis et al., 2009) programs target overly indulgent feeding behaviors on the premise that parents of obese children are too permissive with desserts and even encouraging intake beyond satiety, we did not find evidence that parents of obese children are encouraging the intake of dessert in their children. To the contrary, parents of normal weight children encouraged the intake of dessert more than did parents of obese children. Thus, the notion that parents of an obese child are encouraging their child to eat beyond satiety and eat more dessert and that these behaviors are in turn leading to the child's becoming obese may simply not be warranted.

The observation that parents of obese children discouraged intake more than did parents of overweight or normal weight children raises a number of critical questions for future work. First, temporality and causality are key questions that can only be answered with longitudinal studies and experimental designs. There are a number of unanswered questions regarding whether and how parents should discourage intake of palatable foods – i.e., what approach is most adaptive and what level of intensity may be most effective in order to prevent obesity. Practice guidelines give little information in this regard. In addition, the literature and current practice guidelines are also remarkably silent on whether and how parents of obese children should discourage excessive intake of foods that are not “junk food” or desserts. A large number of foods fall into a range that could elicit uncertainty regarding whether or not to discourage intake. For example, it is not clear how a parent should respond to an obese child who reports that he or she is still hungry and asks for second helpings of the main course at dinner. Discouraging a second helping of junk food like pizza or hamburgers seems appropriate, but it becomes less clear how to respond when the food in question is a vegetable stir fry with rice, or a nutritionally well-balanced casserole. The results of the current study suggest that parents of obese children are discouraging intake of a range of foods, both vegetables and junk food. Recommendations for parents should provide greater precision regarding which types of foods to discourage and when, in order to prevent child obesity. Simply put, it may be best to advise that portion sizes should be limited for some foods but not others. For example, perhaps dishes that include vegetables should never be discouraged, no matter how large the portion. Studies that use longitudinal and/or experimental designs to unpack the role of portion size and food type in relation to their effects on childhood obesity are needed to inform professional recommendations for parents.

Strengths of this study include a relatively large, racially/ethnically diverse US sample, in addition to the observational methodology. While a strength of this study is that the SEP was conducted in a laboratory setting free from distractions, allowing us to examine the dyadic interaction in isolation, this is also a limitation as these observational results may not reflect the typical feeding dynamic (Faith et al., 2004) of the home mealtime, which may also differ from how parents may interact with their children around a snack. In addition, although foods were presented during the laboratory protocol with clear directions to both mother and child that they could each choose to try them or not, participants may have felt that they were expected to eat the foods presented in the protocol, which may have influenced mothers' feeding behaviors. Furthermore, the selection of a familiar vs unfamiliar food was pre-determined and did not account for each participant's individual experience with each food type (Table 1), which may have affected some mothers' feeding behaviors. Mothers

may have also influenced their children's eating through modeling eating behaviors, which were not accounted for in this study. This study is based on a single laboratory study, and cannot examine how mothers' feeding practices may change over time. Mothers may have also modified their feeding behaviors based on social desirability bias. Findings may not be generalizable to non-native English speakers, fathers or other family members who play a role in child feeding, as well as populations outside of South-central Michigan.

Conclusions

In conclusion, in this laboratory protocol, mothers of an obese, vs. normal or overweight child, demonstrated lower rates of encouragement for a familiar dessert and higher rates of discouragement for a familiar dessert, a familiar vegetable and an unfamiliar vegetable. There were no differences in encouragements or discouragements between mothers of an overweight child and those of a normal weight child for any of the four food types. Studies of maternal feeding should consider food type as a contributor to behavior. Guidelines as to how mothers of obese children should feed their children should consider that mothers are already engaging in encouraging and discouraging feeding behaviors, which vary around food type. Future research into adaptive ways in which mothers can feed their children may inform future interventions for mothers to guide their children's intake in healthful ways.

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Abbreviations

AAP	American Academy of Pediatrics
BMI	Body Mass Index
SEP	Structured Eating Protocol

Figure 1.

a-d. Counts of maternal encouragements and discouragements of child food intake by child weight status for four different food types

*Superscripts a, b, and c that differ from one another denote significant differences between normal, overweight and obese weight status for encouragements. Superscripts d,e and f denote significant differences between normal, overweight and obese weight status for discouragements.

Table 1
Familiarity of foods presented in the Structured Eating Protocol

Food type	Children who had eaten it before, n (%)	Mothers who had eaten it before, n (%)
Dessert		
Cupcakes	206 (95.4%)	213 (98.2%)
Halva	1 (0.5%)	13 (5.9%)
Vegetable		
Green beans	213 (98.2%)	215 (99.1%)
Artichokes	28 (13.3%)	86 (40.4%)

Table 2
Participant characteristics, N = 222

	N (%) or mean (SD)
Mother characteristics	
Maternal race/ethnicity:	
White non-Hispanic; n (%)	163 (73.42)
Other; n (%)	59 (26.57)
Maternal level of education:	
High school diploma or less; n (%)	104 (46.85)
Greater than high school diploma; n (%)	118 (53.15)
Mother BMI; mean (SD)	33.02 (9.18)
Encouragements (maternal verbal counts):	
Cupcakes; mean (SD)	1.37 (1.91)
Green beans; mean (SD)	2.73 (3.36)
Halva; mean (SD)	2.85 (3.70)
Artichokes; mean (SD)	3.39 (3.72)
Discouragements (maternal verbal counts):	
Cupcakes; mean (SD)	1.57 (2.41)
Green beans; mean (SD)	0.32 (1.18)
Halva; mean (SD)	0.54 (1.51)
Artichokes; mean (SD)	0.69 (1.64)
Child characteristics	
Child age (months); mean (SD)	70.93 (8.53)
Child is male; n (%)	109 (49.10)
Child weight status:	
Normal weight (BMI 5 th - <85 th % for age and sex); n (%)	128 (57.66)
Overweight (BMI 85 th - <95 th % for age and sex); n (%)	49 (22.07)
Obese (BMI 95 th % for age and sex); n (%)	45 (20.27)
Household characteristics	
Household Food Security Scale:	
Food secure; n (%)	152 (68.47)
Food insecure; n (%)	70 (31.53)

Table 3
Poisson regression associations of child weight status vs referent group with counts of maternal encouragements and discouragements for each food type

Food Type	Predictor vs referent group	Encouragements RR (95% CI)	Discouragements RR (95% CI)
Cupcakes	Obese vs. normal	0.60 (0.38-0.92) *	2.04 (1.34-3.10) **
	Overweight vs. normal	0.88 (0.55-1.39)	1.00 (0.60-1.67)
	Obese vs. overweight	0.68 (0.42-1.10)	2.04 (1.20-3.47) **
Green beans	Obese vs. normal	1.15 (0.78-1.69)	3.44 (1.39-8.48) **
	Overweight vs. normal	0.90 (0.59-1.36)	1.00 (0.31-3.22)
	Obese vs. overweight	1.28 (0.81-2.01)	3.43 (1.02-11.55) *
Halva	Obese vs. normal	0.86 (0.59-1.25)	1.79 (0.78-4.09)
	Overweight vs. normal	0.95 (0.57-1.57)	0.87 (0.36-2.09)
	Obese vs. overweight	0.91 (0.52-1.59)	2.06 (0.87-4.91)
Artichokes	Obese vs. normal	1.33 (0.96-1.85)	3.66 (1.74-7.71) **
	Overweight vs. normal	0.81 (0.57-1.15)	1.26 (0.72-2.22)
	Obese vs. overweight	1.64 (1.12-2.41) **	2.90 (1.28-6.60) **

RR indicates relative rate; CI confidence interval

Adjusted models includes maternal race/ethnicity, maternal education level, maternal body mass index, child age, child sex, and household food security status

*
p<0.05,

**
p 0.01