What matters most - what parents model or what parents eat?

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A R T I C L E I N F O

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A B S T R A C T

Purpose: Parents have a strong influence on their children's eating habits; however, researchers struggle to identify which food parenting practices to recommend. This study examined the influence of parents modeling of healthy eating ("parent role modeling") and parents' actual food intake ("parent dietary intake") on child diet quality, and explored whether these practices work together to influence children's diets.

Methods: Baseline data from a larger intervention trial were used for this analysis. The sample included parents of preschool-age children from households with at least one overweight parent. The Comprehensive Feeding Practices Questionnaire was used to assess parent modeling of healthy eating ("healthy modeling"). Three days of dietary recalls were used to collect parents' report of their own intake and their children's intake (excluding food at child care). Associations between parent healthy modeling and parent intake of healthy and unhealthy foods were explored using Pearson correlations. Associations between parent healthy modeling and parent Healthy Eating Index (HEI) score on child HEI score were examined with linear regression. Additionally, the interaction between parent healthy modeling and HEI score on child HEI score was tested.

Results: Parent healthy modeling was significantly correlated with parent intake of healthy foodsLinear regression showed a significant association between parent modeling and child HEI score, even after controlling for parent diet ($\beta = 3.08$, SE = 0.87, $p < 0.001$). Children whose parents had high parent healthy modeling scores had higher HEI scores (mean = 61.5 ± 10.4) regardless of parent HEI score. We did not find evidence that parent healthy modeling and diet quality interact to influence child diet quality.

Conclusions: Parents' healthy modeling is an important practice in influencing children's diet quality, possibly more so than the quality of parents' diets.

1. Introduction

A healthy and balanced diet is critically important for the growth and development of young children. Dietary intake during the early years of life can have lasting impact on food preferences and eating habits (Gugusheff, Ong, & Muhlhausler, 2015). Unfortunately, data from many developed parts of the world, including Australia (Golley, Hendrie, & McNaughton, 2011), Europe (Diethelm et al., 2012), and North America (Kirkpatrick et al., 2012; Reedy & Krebs-Smith, 2010), consistently demonstrate that children's dietary intakes fail to meet guidelines. In the U.S., many young children (2–3 years old) fail to consume recommended intakes of fruit (32%), vegetables (80%), whole grains (99%), and milk (41%), and most exceed recommended limits for solid fats (99%) and added sugars (98%) (Krebs-Smith et al., 2010).

Children's dietary intakes and eating behaviors are influenced by a multitude of interacting factors. Davison and colleagues (Davison & Birch, 2001), and more recently Harrison and colleagues (Harrison et al., 2011), used Ecological Systems Theory to identify the variety of determinants of children's weight-related behaviors, including diet. Their models recognize multiple levels of influence, including community and society, family and home, and child-specific characteristics. These models underscore the particularly important role that the home environment plays in shaping children's habits, including eating behaviors.

Parents, as key gatekeepers of the home environment, strongly influence the home's physical and social characteristics. Several food parenting practices have been shown to impact children's dietary intake (Blissett, 2011; Vaughn et al., 2016). Findings around the specific

Abbreviations: BMI, Body Mass Index; HEI, Healthy Eating Index; NDSR, Nutrition Data System for Research

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practices of parent role modeling and parent dietary intake have shown some inconsistencies. A 2009 systematic review of family correlates of children's fruit and vegetable intake concluded that parent role modeling and parent dietary intake were positively associated with children's dietary intake (Pearson et al., 2009). A 2011 meta-analysis examining similarities between parent and child dietary intakes concluded that associations were weak; however, authors of that review observed stronger associations in studies using recalls and food records (versus other diet assessment methods) and in studies involving younger children (versus older children) (Wang et al., 2011). Conceptually these practices are somewhat related, but there are differences. Parent dietary intake refers to the parent's actual consumption of food and beverages and may be assessed via food recall, food frequency questionnaire, or dietary screener (Vaughn et al., 2016). Parent role modeling is often conceptualized as a parent's purposeful or intentional effort to demonstrate healthy food choices and eating behaviors to encourage similar behaviors in the child; however, a parent may be less deliberate and unintentional in these behaviors and their demonstration of healthy or unhealthy eating in front of the child (Vaughn et al., 2016).

Because the practices of parent role modeling and parent dietary intake are somewhat related, these concepts have often been used interchangeably in studies. Rarely, however, have these practices been examined together to confirm how they may work in combination to influence children's dietary intake. Additionally, relationships between parent role modeling and parent dietary intake with child dietary intake are often specific to fruit and vegetable consumption (e.g., how parents' intake and modeling around fruits and vegetables influences child intake of fruits and vegetables). However, these practices may also impact children's intake of unhealthy foods and their overall diet quality.

The purpose of this study was to examine the relationships between parent role modeling, parent dietary intake, and child dietary intake more closely. Specifically, this study will use cross-sectional data to examine whether there is evidence that parent role modeling and parent dietary intake are associated with child dietary intake. First, relationships between these parent practices will be examined to assess the possible overlap of constructs. Then, independent and additive relationships will be examined between these parent practices and child dietary intake to assess their relative level of association with parent role modeling and parent dietary intake.

2. Materials and methods

This study used baseline data from a larger randomized control intervention trial evaluating a child obesity prevention intervention (My Parenting SOS) (Ward et al., 2011). Participants in this larger trial included a convenience sample of 320 parent-child dyads recruited from central North Carolina. To be eligible for the larger trial, parents had to have one child 2–5 years old and at least one parent in the household had to be overweight (an effort to recruit children at higher risk for becoming overweight). Protocols have been described in detail elsewhere (Ward et al., 2011), but are reviewed in brief below. All study procedures were approved by the Institutional Review Board at the University of North Carolina at Chapel Hill (#08-0354).

2.1. Data collection and measures

Data were collected primarily during in-person measurement events. During these events, trained research staff collected signed consent, monitored completion of parent surveys, and measured parent and child anthropometrics. Dietary recalls were completed by telephone in the 3–4 weeks following these events.

2.1.1. Parent surveys

The parent surveys included a demographic questionnaire capturing parent and child date of birth, parent race/ethnicity and education, and household income, as well as a food parenting practices questionnaire that incorporated several scales from existing instruments (Hughes et al., 2005; Musher-Eizenman & Holub, 2007; Wardle et al., 2002). Nine scales from Musher-Eizenman's Comprehensive Feeding Practices Questionnaire were used in this food parenting practices questionnaire, including the scale for "modeling" (Musher-Eizenman & Holub, 2007). This questionnaire was developed and validated with parents of children 1.6–8 years old (Musher-Eizenman & Holub, 2007) (similar in age to our sample). In our sample, the modeling scale demonstrated good internal reliability ($\alpha = 0.83$). Items in the modeling scale ask parents to rate their agreement or disagreement (using a 5-point scale: disagree, slightly disagree, neutral, slightly agree, agree) with four statements: I model healthy eating for my child by eating healthy foods myself; I try to eat healthy foods in front of my child, even if they are not my favorite; I try to show enthusiasm about eating healthy foods; and I show my child how much I enjoy eating healthy foods. Items are averaged to calculate a mean score. Hereafter, we refer to this scale as "healthy modeling."

2.1.2. Anthropometrics

Anthropometrics of parents and children were measured by trained data collectors. Height was measured to the nearest 1/8 inch with a Shorr or Seca stadiometer (Shorr Productions, Olney, MD; Seca Corporation, Columbia, MD); and weight was measured to the nearest 0.1 lb with a Seca model 770 portable electronic scale (Seca Corporation, Columbia, MD). Data collectors also recorded child sex. These data were used to calculate BMI; and then used in combination with CDC sex-specific growth charts to calculate children's BMI percentile (Centers for Disease Control and Prevention, 2016). BMI percentile was then used to identify children as normal weight (< 85), overweight (≥ 85 and < 95), or obese (≥ 95).

2.1.3. Dietary intake

Dietary intake of parent-child dyads was assessed using three days (2 weekdays and 1 weekend day) of unannounced dietary recalls. All recalls were conducted using the Nutrition Data System for Research (NDSR, versions 2009-2010, University of Minnesota, Minneapolis) and traditional multi-pass procedures, which provide cues for portion size, use of condiments, etc. During the telephone calls, parents were asked to report what they ate the previous day and what their children ate outside of foods consumed at child care (while not under parent supervision). NDSR uses recall data and its food database to estimate intakes of energy (i.e., kilocalories), servings of various food groups (e.g., fruit, vegetables, snacks, and sugar-sweetened beverages), macronutrients (e.g., carbohydrate, fat, and protein), micronutrients (e.g., vitamins, minerals).

The NDSR output was used to calculate parents' servings of foods that were healthy (i.e., fruits, vegetables, whole-grains, low-fat dairy) or less healthy (i.e., snacks, sugar-sweetened beverages) as well as parents' and children's 2010 Healthy Eating Index (HEI) scores (Guenther et al., 2013). The 2010 HEI provides an overall assessment of diet quality based on consumption of fruit, vegetables, particularly dark green vegetables and legumes, protein, seafood protein, fatty acids, refined grains, sodium, and empty calories. The resulting scores range from 0 to 100, with higher scores indicating better diet quality. Parent and chlidren's HEI scores were used in regression analyses.

2.2. Analysis

2.2.1. Descriptive statistics

Distribution of select demographic and anthropometric characteristics, parent healthy modeling scores, and parent and child dietary intakes (HEI scores and intake of key food groups) were first examined.

2.2.2. Association of parent healthy modeling and parent dietary intake

Pearson's correlations were calculated between parent's healthy modeling, HEI scores, and intake of healthy and less healthy foods (e.g., fruits, vegetables, whole grains, low-fat diary, cakes, and sweetened beverages). We hypothesized that correlations between parent modeling and parent intake of healthy foods would be significant, but that correlations would not indicate a complete overlap of constructs ($r < 0.85$). The rationale for this hypothesis was that items within the healthy modeling scale focused on intentional modeling of healthy foods, but did not capture unintentional modeling of unhealthy foods. Since the modeling of healthy and unhealthy foods are not mutually exclusive behaviors, and the healthy modeling scale only captures the former, we did not anticipate significant associations between parents intake of unhealthy foods and their use of healthy modeling.

2.2.3. Association of parent healthy modeling and parent diet quality on child diet quality

First, Pearson correlations were calculated between parents' healthy modeling and HEI scores and children's HEI scores. Second, separate multiple linear regression models were used to examine the associations between the independent variables of parents' healthy modeling and HEI score with the dependent variable of children's HEI score. We examined the associations adjusting for: (1) child age and sex; (2) child age, sex, child BMI percentile, parent age, race, education, and household income; and (3) child age, sex, child BMI percentile, parent age, race, education, and household income, and including both healthy modeling and parent HEI score in one model. We used multiple imputation methods to estimate values of missing diet and covariate information [diet ($n = 42$), parent modeling ($n=3$), household income ($n = 4$), race ($n = 4$), and education level ($n = 1$) (Rubin, 1996). We used 10 iterations to produce 10 imputed datasets for regression analyses and pooled estimates from the 10 datasets were reported (Rubin, 1996). We hypothesize that healthy modeling and parent HEI score would each have a positive associated with child HEI score.

2.2.4. Interaction between parent healthy modeling and parent dietary intake on child's dietary intake

First, to descriptively explore the combined effects of parents' healthy modeling and diet quality on child diet quality, we dichotomized parents' healthy modeling and HEI scores at the sample medians. Four joint categories were created based on parents' healthy modeling and HEI scores being < median (low) and ≥median (high): (1) low modeling/low diet quality; (2) high modeling/low diet quality; (3) low modeling/high diet quality; and (4) high modeling/high diet quality. We calculated the mean child HEI score for each joint category. Second, to formally test the interaction between parent healthy modeling and parent HEI scores, we included interaction term for parents' healthy modeling x parent HEI scores in an unadjusted model ($\alpha = 0.05$). All analyses were conducted using SAS version 9.4 (SAS Institute Inc, Cary, NC).

3. Results

3.1. Descriptive statistics

The parent sample was almost all mothers (92.4%), and they were on average 35.6 years old (SD = 6.1). The final sample was primarily white (54.5%) or African American (37.2%), but included few Latino/Hispanic families (5.6%). The majority were also overweight (29.3%) or obese (43.2%), which was expected given the larger trial's eligibility criteria (of at least one parent in the household being overweight, but not necessarily the participating parent). They also tended to be well educated (79.3% having a college education or higher) and middle to high income (66.9% having a household income $50,000 or higher). The child sample included roughly equal numbers of boys and girls (male = 51.5%, female = 48.5%), and on average they were 41.2 months old (SD = 9.7). The majority of children were normal weight (74.8%); however, 17.7% were overweight and 7.5% were obese.

Table 1
Participant characteristics (n = 266).

	mean ± SD	n (%)
Parent characteristics		
Mother		244 (92.4)
Age in years	35.6 ± 6.1	
Race		
White		145 (54.5)
Black		99 (37.2)
Other		22 (8.3)
Latino/Hispanic Ethnicity		15 (5.6)
BMI	29.8 ± 6.8	
Weight status		
Normal weight		73 (27.4)
Overweight		78 (29.3)
Obese		115 (43.2)
Education level		
Less than some college		55 (20.7)
College graduate		116 (43.6)
Masters/Doctorate		95 (35.7)
Household income		
Less than $25,000		28 (10.5)
$25,000-$49,999		60 (22.6)
$50,000 or higher		178 (66.9)
Married		216 (81.2)
Number of children in home	1.9 ± 0.9	
Parent healthy modeling score	4.2 ± 0.8	
Healthy Eating Index Score	58.2 ± 10.6	
Child characteristics		
Gender		
Boys		137 (51.5)
Girls		129 (48.5)
Age in months	41.2 ± 9.7	
BMI percentile	59.2 ± 28.5	
Weight status		
Normal weight (< 85^{th} percentile)		199 (74.8)
Overweight (85^{th}—94^{th} percentile)		47 (17.7)
Obese (≥95^{th} percentile)		20 (7.5)
Healthy Eating Index Score	57.9 ± 11.9	

The mean healthy modeling score was 4.2 ± 0.8; and scores ranged between 1 and 5. Scores appear slightly lower than those observed during the scale's original development (mean of 4.4) (Musher-Eizenman & Holub, 2007), but slightly higher than scores observed in other studies with preschool-age children (means ranging from 3.1 to 3.8) (Foster et al., 2015; Musher-Eizenman et al., 2009). The mean HEI scores for parents and children were 58.2 ± 10.6 (range: 27.8–89.5) and 57.9 ± 11.9 (range: 30.0–91.6), respectively. These scores are comparable to those observed in national samples of adults (Wilson, Reedy, & Krebs-Smith, 2016) and preschool age children in the US (Gu & Tucker, 2017). Please refer to Table 1 for complete sample descriptives.

3.2. Association of parent healthy modeling and parent dietary intake

Pearson correlations showed significant associations between parents' healthy modeling and parents intake of healthy foods but not with less healthy foods. Significant, but small (Cohen, 1988), associations were observed between healthy modeling and parent intake of healthy foods, including total fruit ($r = 0.20$, $p = 0.001$), whole fruit excluding juices ($r = 0.18$, $p = 0.003$), vegetables excluding potatoes ($r = 0.23$, $p < 0.001$), and whole grains ($r = 0.13$, $p = 0.04$). Associations with less healthy foods were not significant, with the exception of sugar-sweetened beverages ($r = -0.16$, $p = 0.009$).

3.3. Association of parent healthy modeling and parent diet quality on child diet quality

Pearson correlations showed significant correlations between parent healthy modeling and child HEI score ($r = 0.25$, $p < 0.001$), as well as

Table 2
Pearson correlations for parent healthy modeling, parent HEI score, child HEI score, and parent intake of key food groups.

	Parent Healthy Modeling	Parent HEI	Child HEI
Parent HEI Score	0.11		
Child HEI Score	0.25***	0.15*	
Total Fruit	0.20***	0.16**	0.06
Whole Fruit[a]	0.18**	0.16**	0.10
Vegetables[b]	0.23***	0.19**	0.16**
Whole Grains	0.13*	0.21***	0.29***
Cakes	−0.05	−0.01	−0.09
Salty Snacks	−0.03	0.03	0.00
Sugar-sweetened Bevs	−0.16**	−0.23***	−0.20***

*p = 0.05, **p = 0.01, ***p = 0.001.
[a] Whole fruit excludes juice.
[b] Vegetables excluding potatoes.

between parent HEI score and child HEI score (r = 0.15, p = 0.02; Table 2). Linear regression analysis showed significant association between parent healthy modeling and child HEI score after adjustment for child age and sex (Regression Coefficient = 3.32 (SE = 0.85), p= < 0.001; Table 3) that was only slightly attenuated after inclusion of parent factors (i.e., age, education, income, and BMI). A positive significant association between parent HEI score and child HEI score was observed after adjustment for child age and sex (Regression Coefficient = 0.19 (SE = 0.07), p < 0.01); however, after additional adjustment for parent factors the association was no longer observed (Regression Coefficient = 0.13 (SE = 0.07), p = 0.05). When parent healthy modeling and parent HEI score were included in the same model only parent healthy modeling was significantly associated with child HEI score (Regression Coefficient = 2.82 (SE = 0.83), p < 0.001).

3.4. *Interaction between parent healthy modeling and parent dietary intake on child's dietary intake*

When looking at average HEI scores of children based on low vs. high healthy modeling and parent HEI scores, we found that children of parents who had higher healthy modeling scores had higher HEI scores irrespective of their parents HEI scores. Specifically, child HEI scores when parents had low healthy modeling and either low or high HEI was 55.1 (12.3) or 55.6 (13.5), respectively. While child HEI scores when parents had high healthy modeling and either low or high HEI was 57.5 (11.2) or 61.5 (10.4), respectively. However, a formal test of interaction between continuous parent healthy modeling and parent HEI score on child HEI score was not significant (Wald test $p = 0.34$).

4. Discussion

Results from this study suggest that parent modeling of healthy eating and parent dietary intake may be distinct practices; however, only parent healthy modeling is associated with the quality of children's diets when accounting for both parent modeling and parent diet (i.e., HEI). Specifically, children of parents with higher healthy modeling scores had higher HEI scores. In addition, children whose parents had high healthy modeling scores had higher diet quality, irrespective of their parent's diet quality, which suggests that parent modeling is of more importance to child diet quality than parent's own diet quality. However, data were cross-sectional; hence, caution must be taken when interpreting meaning behind these associations.

This study provides a unique contribution to the literature in that it measured parent modeling and diet intake separately and assessed their independent and joint associations with child diet quality. We are aware of only one other study to date that has looked at these practices together. In the Harris and Ramsey study of fathers, children's intakes of fruits and vegetables were associated with fathers' intakes of these foods but not fathers' use of modeling (Harris & Ramsey, 2015). The inconsistent findings between that study and ours reiterate the need to repeat similar analyses in additional samples. One notable difference between the studies that may help explain the inconsistant findings is the use of a parent sample of fathers vs. predominantly mothers. The influence of specific food parenting practices may depend upon the parent's role in the home; however, differential impacts between mothers' and fathers' behaviors have not been well explored in the food parenting practices literature. Our sample included a small number of fathers (n = 17) and in sensitivity analyses excluding fathers, we did not find that inclusion of them impacted our results.

Results of the study also reiterate the importance of clear conceptualization of food parenting practice constructs. Recently, a content map with clear terminology and definitions of food parents practices has been published (Vaughn et al., 2016), which should facilitate improved conceptualization of these practices. Within the description of "modeling", authors recognize the recent distinction between these two constructs of parent modeling and parent diet (Larsen et al., 2015). Given the small correlations (< 0.30) observed between parent modeling of healthy eating and parent intake of healthy foods, findings would suggest that these are related but distinct constructs. Future research should evaluate the convergent and divergent validity of these constructs before deciding if terms can be used interchangeably. Authors of the content map also recognize limitations in current modeling scales, which focuses predominately on intentional modeling of healthy practices (Vaughn et al., 2016). The modeling scale used in this study also had this narrow focus (Musher-Eizenman & Holub, 2007). This limitation provided the rationale for our hypothesis that parent

Table 3
Models of parent modeling and parent HEI score with child HEI score.

	Model 1[a]				Model 2[b]				Model 3[c]	
	Regression Coefficient (SE)	*P*	Regression Coefficient (SE)	*P*	Regression Coefficient (SE)	*P*	Regression Coefficient (SE)	*P*	Regression Coefficient (SE)	*P*
Intercept	43.92 (5.07)	< 0.001	47.24 (5.04)	< 0.001	43.94 (6.94)	< 0.001	50.73 (6.58)	< 0.001	39.87 (7.16)	< 0.001
Child age	−0.07 (0.07)	0.34	−0.08 (0.07)	0.27	−0.05 (0.07)	0.44	−0.07 (0.07)	0.33	−0.05 (0.07)	0.43
Child sex	1.88 (1.35)	0.16	1.94 (1.37)	0.15	1.84 (1.28)	0.15	1.76 (1.30)	0.18	1.72 (1.27)	0.18
Parent Healthy Modeling	3.32 (0.85)	< 0.001	–	–	3.01 (0.81)	< 0.001	–	–	2.82 (0.83)	< 0.001
Parent HEI score	–	–	0.19 (0.07)	< 0.01	–	–	0.13 (0.07)	0.05	0.09 (0.07)	0.16
Cohen's f^2	0.08		0.04		0.20		0.15		0.21	

Note: Test for interaction between parent healthy modeling and parent HEI score p = 0.34.
[a] Model 1 includes child age and sex.
[b] Model 2 includes child age, sex, race, child BMI percentile, parent age, parent education, household income, parent BMI.
[c] Model 3 includes child age, sex, race, child BMI percentile, parent age, parent education, household income, parent BMI, and both parent healthy modeling and parent HEI score.

modeling would be associated with parent intake of healthy foods, but not less healthy foods. Results from this study seemed to confirm this hypothesis and suggest that just because parents model healthy eating does not mean that they are also avoid modeling less healthy eating (as parents may do both). However, the reliance on parent-report about what they may perceive as socially desirable behaviors (e.g., modeling, eating a healthy diet) may have also produced response bias (Kroller & Warschburger, 2008). The associations observed may have also resulted from parents over-reporting of what they perceived as positive practices. Moving forward, studies of parent modeling may benefit from instruments that assess modeling of both healthy and less healthy food habits. For example, Palfreyman and colleagues have suggested that there are three distinct types of modeling: verbal modeling, unintentional modeling, and behavioral consequences (Palfreyman, Haycraft, & Meyer, 2014). The unintentional modeling scale appears to capture parents' modeling of unhealthy foods, as significant associations were observed between unintentional modeling and parent intake of savory snacks. The differential impact of modeling healthy vs. less healthy eating behaviors should be examined in future research.

This study had several strengths associated with its use of measures and its analytic approach. Not only were parent modeling and parent dietary intake measured separately, but both employed well-established methods. Parent and child dietary intakes were assessed using three randomly collected days of diet recalls using NDSR and multi-pass procedures. This recall protocol provides a rigorous method for diet assessment that is able to quantify intake while minimizing the potential for reactivity. Similarly, the modeling scale used in the current study was selected based on its rigorous development and demonstration of good psychometric properties (Musher-Eizenman & Holub, 2007). The analytic approach incorporated several steps to systematically explore the relationships between parent modeling, parent dietary intake, and child dietary intake. Hypotheses for each stage were developed a priori, which in turn assisted with the interpretation of the findings.

There are some study limitations that are important to note, including the cross-sectional nature of the data, the reliance on parent report, and characteristics of the study sample. While we were able to observe significant associations between parent modeling, parent dietary intake, and child dietary intake, cause and effect cannot be determined from cross-sectional data. In addition, all data were derived from parent report, and thus represent a single data source. Parents reported on their child's dietary intake, which can be difficult given that parents may not be present for all meals and snacks that their child consumes (e.g., meals and snacks eaten at child care). This study, therefore, asked parents to report only those foods consumed while under their supervision, which resulted in a truncated day of intake given that many of the children in this sample where in child care. However, limiting children's dietary intake data to foods eaten with the parent allowed us to better focus on the impact that parents have on their child's dietary intake without the variance that may be caused by foods consumed elsewhere. Caution must also be taken when trying to generalize these findings as the sample included a large percentage of overweight and obese parents (higher than the general population in the US) and they were well educated and higher income.

5. Conclusions

Food-related parenting practices are thought to be important influences on the quality of their young child's diet quality. In this study, parent modeling, a parent's purposeful effort to demonstrate healthy food choices and eating behaviors, was positively associated with children's diet quality as measured by the Healthy Eating Index. Although what a parent eats was also associated, parent modeling had a stronger association. Importantly, children of parents with higher healthy modeling scores had higher HEI scores, on average, than children of parents with lower healthy modeling scores. Future studies are needed to confirm these findings and to explore potential differences between mothers and fathers. If confirmed, parent modeling of healthy eating would be an important target to include in interventions promoting healthy eating habits in children.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.appet.2018.03.025.

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